

Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
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**THE ANTS OF THE IMATONG MOUNTAINS,
ANGLO-EGYPTIAN SUDAN**

BY NEAL A. WEBER

WITH SIXTEEN PLATES

CAMBRIDGE, MASS., U. S. A.
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PART I—BIOLOGY

INTRODUCTION

Rising out of the Central African plain a few degrees on both sides of the Equator and extending to the eastern boundary of West Africa is a series of isolated mountain masses rising 10,000 to 19,317 feet above sea level. These include the snow-capped peaks of Ruwenzori (16,791 feet), Kenya (17,040 feet) and Kilimanjaro (19,317 feet). The life on several of these has been comparatively well studied and there are a number of ant records.

A mountain mass of this region which has but recently been known is that of the Imatong Mountains in the Anglo-Egyptian Sudan. These, highest (10,458 feet) in the Sudan, lie across Latitude 4° North and extend just over the Uganda frontier (Plates 1, 2). The first map to refer to the Imatongs by name was issued as recently as 1929 (Chipp, 1929, p. 177). No white man had visited them until similarly recent years. Only the lower slopes are inhabited and these by natives of the Lango, Latuka and Acholli tribes. On a safari July and August 1939 with the Economic Botanist of the Sudan, Dr. J. G. Myers, I was able to study and collect the ant and other faunas.

Early in the safari it became evident that the ants were confined to well defined zones of altitude and plant life. Altitudes were determined partly by reference to the largest and latest official Sudan contour map and partly by the use of an aneroid barometer which had been officially calibrated in Khartoum. After leaving Africa the collections were studied briefly in the British Museum (Natural History) and more intensively in the Museum of Comparative Zoölogy, American Museum of Natural History and United States National Museum with particular reference to the relationships of the ant species. The studies in the American museums were made through grants from the American Academy of Arts and Sciences and the American Philosophical Society. I am also indebted to the authorities of these museums and the British Museum for facilities for work and courtesies extended. The following study has thus been made from two points of view, distribution of the ants with reference to plant zones and altitude, and the origin of the ant fauna. The latter study unfortunately has been hampered by the scarcity of identified African ants in the United States and the incomplete descriptions in the literature. What was learned of the general biology of the species in the limited time available is included since in practically all cases it

represents everything recorded on the biology of the species and in the few other cases additional information on known species from a country (Anglo-Egyptian Sudan) whose ant fauna has hardly been touched. Also given under each species are its affinities or, if a known species, its range in Africa.

The first compilation of the mountain ants of the world has been included. Though on equatorial mountains the temperate fauna may start at 1500 meters (4920 feet)¹ only the ants listed from 2000 meters (6560 feet) are given. This arbitrarily selected altitude tends to eliminate tropical ants ranging above their usual zone where local or edaphic conditions, such as a warm, dry and sunny south slope, may permit such an extension. Some of the ants on tropical mountains at the 2000 meter elevation, however, are unusually adaptable tropical species. The list shows nevertheless the general nature of the mountain ant faunas and the height to which ants ascend in various parts of the world.

PLANT ZONES AND FLORA OF THE IMATONG MOUNTAINS

Our approach to the Imatongs was from the east (Plate 2) and as we climbed the steep slopes to Mt. Kineti the zonation of plants was particularly striking. The descent was by the same route and we then retraced our way to the native village of Molongori. From here we again climbed the east slopes and traversed the entire massif. On the western descent the zonation was also apparent but included a more luxuriant flora.

The zonation of the slopes may be characterized as follows:

East Lower Montane Slopes

These lower montane slopes are clothed with mesophytic grass-woodland. The slopes are in places so steep, rocky, and exposed to the blistering sun as to present local xerophytic conditions. The soil is bright orange or red clay. Of Trinidad, B.W.I., soils, which are familiar to me and appear superficially similar, Hardy (1940, p. 154)

¹ In Carpenter's study (1935) of the *Rhopalocera* of Abyssinia the 1500 m. contour was chosen as the lower limit of the Abyssinian fauna. Below this level the *Rhopalocera* were largely characteristic of Somaliland. Hutchinson (1930) and Hesse, Allee and Schmidt (1937) use other African altitude zones for insect distribution but these do not apply to ants.

states "uniformly bright red or orange colours generally indicate extensive leaching, low lime status and high acidity, but a fair to high degree of aeration, implying good natural drainage." This zone extends from the surrounding plains (2500–2800 feet) to 6000 feet. The climate is tropical.

West Lower Montane Slopes

Plates 3, 7

The west lower slopes differ from the east in having a more luxuriant mesophytic grass-woodland and, in ravines chiefly, rain forest. The soil of the grass-woodland is often black humus though elsewhere reddish clay. The forest soils are black humus. This zone extends from the surrounding plains (about 3000 feet) to an upper limit which is not as distinct as on the eastern slopes but appears to be about 5600 feet. The climate is tropical.

Acacia abyssinica Zone

Plate 4

This zone is particularly distinct on the eastern slopes and often distinct on the west because of the presence of the striking and abundant tree, *Acacia abyssinica*. Alternating with *Acacia* forests are grassy areas with cycads and aloes. The soil is a rich black humus and there is no heavy moss and lichen growth on the trees. The altitudinal range is from 6000 to 7200 feet on the east slopes and from about 5600 to an upper limit not definitely determined but probably about 7200 feet on the west slopes. The zone is often bathed in clouds and has a temperate climate.

Cloud Forest—Mountain Meadow Zone

Plate 5

Above the *Acacia abyssinica* Zone extends the Cloud Forest—Mountain Meadow Zone. It is characterized by forests of *Podocarpus* and other trees with heavy moss or lichen growth alternating with meadows which grow abruptly to the forest edge. Bordering the forests often is a tall species of mountain bamboo (*Arundinaria*). The soil is a rich black humus in the forests as well as in the meadows. The zone

is in clouds much of the day and the climate is temperate or subalpine and distinctly colder than the next lower zone. The altitudinal range is 5600-6000 feet to about 10,250 feet.

Mt. Kineti Summit

Plate 6

This zone, which may be called alpine, consists of the top two hundred feet or so of Mt. Kineti whose rocky outcrops are covered with heavy lichen growth. Between the rocks grow low grasses and herbs in rich black humus. The top is cold and damp since clouds cover it most of the time. It is probably several thousand feet too low for permanent snow and there was no evidence of snowfalls at the time of our visit.

Flora of the Imatong Mountains

Because of the war the determinations of the plants collected by Dr. Myers are not available nor is it known whether the collection is safe but fortunately the general features of the flora, especially of the west slopes, are on record.

In February 1929 Mr. T. F. Chipp visited this region and collected one hundred specimens of plants which were deposited in the Royal Botanic Gardens, Kew. In his study (Chipp, 1929) he included the determinations made at Kew by Miss M. B. Moss and her conclusions on the phyto-geographical affinities of the flora. The specific determinations and quotations below are from this paper. Mr. Chipp approached the Imatongs from Rejaf on the Bahr-el-Jebel by way of Opari and then east northeast to the Lotti Forest. Our approach differed in that we proceeded from Juba, downstream several miles from the now abandoned Rejaf, to Torit, headquarters of the Sudan Equatorial Corps, which is near the northern base of the mountains. He went from the Lotti Forest to the Laboni Forest and Issore, then climbed Mt. Kineti from the southwest and descended the east slopes to Longoforok. Our journeys followed his path closely, though in reverse, and in addition we crossed the entire range in the northern half, a region not traversed by him. The flora seen and collected by him therefore is similar to the flora associated with the greater part of the ant collections.

Flora of the Surrounding Plains

The flora of the plains surrounding the Imatongs differs from that bordering the Bahr-el-Jebel or Upper White Nile River to which the Imatong rivers flow. For some miles back from the Bahr-el-Jebel the vegetation consists of dwarf trees belonging to the genera "*Acacia*, *Terminalia*, *Euphorbia*, *Tamarindus*, *Kigelia*, *Zizphus* and *Balanites*."

Eastward to the Imatongs the ground rises to 2000 feet or more. "Here the tree constituents of the vegetation changed, and representatives of the next southern great transcontinental belt of vegetation took their place. Noticeable amongst them were species of *Erythrina*, *Dombeya*, *Afzelia*, and *Butyrospermum*. The general physiognomy of the vegetation remained the same." *Erythrina tomentosa* R. Br. and *Dombeya reticulata* Mast. were in flower in February.

Flora of the West Lower Montane Slopes

Plates 3, 7

The Lotti Forest is referred to by Chipp as "closed fringing forest." Dr. Myers considered it in conversations at the time as an edaphic type of gallery forest. Both "gallery" and "fringing" terms refer to the type of forest extending along the banks of rivers or in valleys like the forests along the rivers of the western United States. The "closed" condition refers to the closeness of the canopy caused by the crowns of the large trees touching one another. The Lotti Forest appeared to be in a pocket on the western slopes and had an elevation of 3200-3300 feet which was slightly above that of the surrounding plains, from which it was separated by a ridge. This forest "is the northern limit, in these parts, of the great Cameroons-Congo forest, which crosses the Rift Valley in places, penetrates the ravines, and pushes along the valleys of Uganda towards Abyssinia." Largest trees included "*Alstonia*, *Entandrophragma macrophyllum* A. Chev., *Khaya grandifoliola* C. DC., and *Chlorophora excelsa* Benth. & Hook. Wild coffee, *Coffea robusta* Linden, and Rubiaceous and Acanthaceous shrubs helped to form the lowest stratum of the canopy." A fungus, *Polystictus xanthopus* Fries, grew from a dead log.

Alternating with closed and open types of forest were grassy areas, chiefly of *Hyparrhenia cymbaria* Stapf and *Pennisetum purpureum* Schum. Often these were ten or more feet high and referred to as elephant grass. A striking area of bamboo, *Oxytenanthera abyssinica* Munro, was traversed on the west slopes by Chipp and by ourselves.

Myrmicaria congolensis, *Acantholepis capensis* ssp. and *Polyrhachis* (*Myrma*) *schistacea divina* were among the few ants found in this rather sterile habitat. Herbs found in the grassy areas included *Ruellia sudanica* Lind., *Crotalaria senegalensis* Bacle, *Trichodesma physaloides* A. DC., *Sonchus Elliotianus* Hiern, *Scutellaria pauciflora* Baker, *Peristrophe usta* C. B. Cl., and *Clerodendron cordifolium* A. Rich. Scattered trees included *Combretum laboniense* M. B. Moss.

High forest followed ravines and included a characteristic tree, *Khaya grandifoliola* C. DC. A striking tree was *Dracaena fragrans* Gawl. and occurred in damp ravines with a rich ant fauna (Plate 7).

Flora of the *Acacia abyssinica* Zone

This zone is perhaps not as clearly delimited on the west slopes as on the east and was not characterized by Chipp. Above Issore on the west slopes at an elevation of above 4600 feet he crossed a neck of higher ground from which "it was seen that the Combretaceous trees of the Tall Grass-Woodland were replaced rather higher up the mountain side by a conspicuously flat-topped *Acacia* (*A. abyssinica* Hochst.)." At what was probably the lower limit of this zone he found the bracken fern, *Pteridium aquilinum* Schott., common and the first giant *Lobelia*, *L. Giberroa* Hemsl., 18 feet tall.

Unfortunately his descent of the east slopes was so hurried "that it was not found possible to make any further collection of the zones of mountain vegetation."

Chipp records *Protea abyssinica* Willd from 6000 feet. Wheeler's "Ants of the Belgian Congo" Plate IX, contains an excellent photograph of a tree of this genus with the legend "on the buds of which this ant (*Myrmicaria sakambo*) attends scale insects." At 6200 feet in the Imatongs a tree, doubtless *P. abyssinica*, was found in flower and photographed in color. Search was made unsuccessfully for ants associated with it.

Flora of the Cloud Forest-Mountain Meadow Zone

This zone was not characterized by Chipp. Many collections, however, were made and he mentions the mountain vegetation being reached at about 8000 feet.

The "ravine forests were composed principally of *Podocarpus milanjanus* Rendle, and festooned with mosses, chief amongst which was *Pilotrichella ampullacea* Broth." A bamboo, *Arundinaria* sp.

near *alpina* K. Schum., "appeared as a fringe to the forests." *Protea abyssinica* Willd occurred at 8000 feet and in *Podocarpus* forest were collected the giant *Lobelia*, *Rubus Steudneri* Schw., *Lycopodium clavatum* L. and *Cyperus derreilema* Steud.

Plants of the Mountain Meadows:

Grasses	Herbs
<i>Digitaria uniglumis</i> Stapf.	<i>Delphinium candidum</i> Hemsl.
<i>Exothea abyssinica</i> Anderss.	<i>Hebenstreitia dentata</i> L.
<i>Setaria sphacelata</i> Stapf.	<i>Hypoxis urceolata</i> Nel.
& Hubbard	<i>Justicia Whytei</i> S. Moore
Herbs	<i>Lactuca capensis</i> Thunb.
<i>Athrixia rosmarinifolia</i> Oliv. & Hiem.	<i>Moraea diversifolia</i> Baker.
<i>Coreopsis tripartita</i> M. B. Moss	

Plants bordering the Ravine Forests:

<i>Bothriocline Schimperii</i> Oliv.	<i>Hyparrhenia cymbaria</i> Stapf
<i>Cineraria kilimandscharica</i> Engl.	<i>Kalanchoe Petitiiana</i> A. Rich.
<i>Clematis</i> sp.	<i>Leonotis velutina</i> Fenzl.
<i>Coleus</i> sp.	<i>Tephrosia atrovioleacea</i> E.G.B.
<i>Cyathula Schimperiana</i> Moq.	<i>Vigna Schimperii</i> Baker

Just below the summit of Mr. Kineti a dense growth of prickly scrub was passed which contained brambles, *Dipsacus pinnatifidus* Steud. and species of *Solanum*. Woody species nearest the summit were *Hypericum lanceolatum* Lam., *Anthospermum usambarense* K. Sch., *Lasiosiphon glaucus* Fres., *Brayera anthelmintica* Kth., and *Tephrosia atrovioleacea* E. G. Baker.

Flora of Mt. Kineti Summit

Much of the summit is of rock outcrops on which the lichens, *Usnea florida* Webb and its variety *rubiginea* Ach., were collected by Chipp. Short grass and herbs grown in the black humus between the outcrops.

The herbs collected were:

<i>Asparagus asiaticus</i> v. <i>scaberulus</i> Engl.	<i>Lactuca capensis</i> Thunb.
<i>Carduus Theodori</i> R.E.F.	<i>Lobelia dissecta</i> M. B. Moss
<i>Coreopsis Chippii</i> M. B. Moss	<i>Micromeria biflora</i> Bth.
<i>Helichrysum argyranthum</i> O. Hoffm.	<i>Ramphicarpa recurva</i> Oliv.
" <i>fruticosum</i> Vatke	

Phyto-Geographical Affinities of the Flora

It appears from Miss Moss' analysis of the plants collected by Chipp that there are East, West and South African elements in the flora of the Imatongs, as in the case of the ants.

The grass-woodland lower montane slope contained a few trees with a westerly distribution as far as Nigeria and two common trees which extend from the Sudan to Rhodesia. "The herbaceous vegetation is more widely distributed throughout Tropical Africa, some of it extending into South Africa." Several species, however, are East African.

The closed equatorial forest of the lower montane slopes contained "a number of species of woody plants, some of which are apparently undescribed." This zone also contained many new species of ants. Some of the plants are local, others "with a remarkably disconnected distribution." Such is *Hormogyne altissima* A. Chev., known only from French Guinea and the Gold Coast. In a footnote Miss Moss states that this genus was originally known only from Australia. In this same type of forest a colony of ants close to the subgenus *Odontopelta* of *Leptogenys* was found which has been known only from Australia. A few plants are widely distributed.

"The fringing forest, above the closed equatorial forest, consists mainly of typically East African plants such as *Lobelia Giberroa* . . ." This fringe forest presumably is found in the zone from 5000 feet to 8000 feet.

What corresponds in part to the *Acacia abyssinica* Zone is the zone referred to as "tall grass-fire-swept-woodland, 5000 feet to 8000 feet." This "is composed of the local *Acacia abyssinica* Hochst. and the widespread bulbous *Urginea micrantha* Golms-Laub."

Corresponding to the cloud forest part of the Cloud Forest-Mountain Meadow Zone is the zone of "mountain ravines, 8000 to 10,000 feet." This contains "the only gymnosperm, *Podocarpus milanjanus* Rendle, which extends southwards to Gazaland. Here, however, representatives of both the northern and southern floras meet, and it would appear probable that this flora represents the most ancient type."

Regarding the mountain meadows "the north and south element is also repeated in the herbaceous vegetation of the mountain meadows, *Delphinium candidum* being the only northern representative, whilst *Hebenstreitia dentata*, *Moraea diversifolia*, *Lactuca capensis*, *Hypoxis urceolata* and *Cyrtanthus* sp. have a strong southern flavour. Of the grasses . . . *Digitaria uniglumis* has been recorded from Eritrea,

Abyssinia, Uganda—including Mt. Ruwenzori, Kenya, and southwards to Rhodesia. *Setaria aurea* is common throughout Tropical Africa, and on Mt. Kilimanjaro up to 11,000 feet. *Exothea abyssinica* occurs on the mountains from Eritrea and Abyssinia to north Nyasaland."

"The flora of the mountain tops, 10,000–10,414 feet, shows similar affinities, with the cosmopolitan *Asparagus asiaticus* and *Micromeria biflora*, whilst *Hypericum lanceolatum* and *Carduus Theodori* represent the northern, and *Lasiosiphon glaucus* the southern floras."

Cause of Zonation

The factors including reduced air pressure and decreased heat received from the earth, which accompany increase in altitude, must be among the primary causes of zonation on Central African Mountains. A direct result of lowering temperature is the increase in rainfall in cooler zones because of the precipitation of moisture-laden air rising from hot lowlands and losing its capacity to hold moisture as it becomes chilled. These conditions result in the restriction of most plant species to climatic zones for which they are fitted.

Local conditions in the Imatong Mountains, however, affect the zones here as in other mountains. Winds coming from the dry plains to the east carry little moisture; what is not intercepted by the Abyssinian Highlands beginning 200 miles away may be intercepted by the small Dongotonas ten miles distant. The east lower montane slopes consequently are mesophytic or, where the sun exposure and drainage are considerable, xerophytic. The winds coming from the west have passed over the lush forests of the Congo basin and are moist. The west lower montane slopes are consequently much wetter than the east.

PLANT ZONATION ON OTHER CENTRAL AFRICAN MOUNTAINS

Plant zonation on the Imatong Mountains is probably similar in large part to that on other mountains of this equatorial region. Dr. Bequaert (in Wheeler, 1922, pp. 19–21) summarizes briefly zonation on other and higher mountains as follows: "Tropical plant and animal life stops at 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 . . . 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 . . . On Mt. Kenia and Mt. Ruwenzori, the alpine region above the cloud forest up to the snowline (about 4500 m.) is mainly covered with a peculiar swampy heath-and-bog-formation . . . 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 west slopes; then begins a rather dry, alpine, steppe formation, with short grass growing in tussocks." Bamboo forests are referred to at elevations of 2200–2500 m. (7200–8200 feet) on Mt. Ruwenzori and up to 3000 m. (9840 feet) on Mt. Kenia (*loc. cit.*). Photographs of vegetation on the mountains of Parc National Albert in the Belgian Congo show vegetation similar to that in the Imatongs but extending to higher altitudes. Bamboo is shown at 2800 m. (9200 feet) on Mt. Karisimbi, a giant *Lobelia* growing abundantly on an open slope at 4127 m. (13,537 feet) on Mt. Muhavura and the site of Carl Akeley's tomb at 3300 m. (10,800 ft.) on Mt. Mikenno is in typical cloud forest.

In Moreau's study (Moreau and Sclater, 1937) of the avifauna of mountains three to four degrees south of the equator along the Rift Valley in Tanganyika, the plant zonation may be summarized as follows:

Highland Evergreen Forest—5500–7500 ft.

Mountain Bush—replacing the above forest when the latter is removed.

Acacia Forest—a belt at 5600 ft. and another at 4400 ft.

Savannah—4500–5500 ft.

Mountain Grassland—glades in the Highland Forest.

Moorland or subalpine scrub—above 10,000 ft. and patches from 9500 ft. and upwards.

Some of above zones have been altered markedly by fire and cultivation. The *Acacia* of the Acacia Forest is *A. xanthophloea*. From 7000 to 7700 ft. *Podocarpus* and bamboo are co-dominant. Many of the plant species and genera of these mountains were not found in the Imatongs.

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution

	General	Distribution					
		Imatong Mountains Zones					
		E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit Mt. Kineti
DORYLINAE							
<i>Dorylus (Anomma) nigricans burmeisteri</i> v. <i>molestus</i> Gerst.	E. Afr.	x	x	x	x	x	
<i>Aenictus mentu</i> Weber	Imatong Mts.		x				
<i>Aenictus rotundatus</i> v. <i>merviei</i> Santschi	S. Afr.	x					
CERAPACHYINAE							
<i>Cerapachys (C.) pigra</i> Weber	Imatong Mts.	x					
<i>Cerapachys (C.) sudanensis</i> Weber	Imatong Mts.	x					
PONERINAE							
<i>Platythyrea cribrinodis</i> (Gerst.)	E. Afr.	x					
<i>Pallothyreus tarsatus</i> (Fabr.)	Afr.		x				
<i>Megaponera foetens</i> (Fabr.)	Afr.	x	x				
<i>Opthalmopone berthoudi pubescens</i> Weber	S. Afr.	x					
<i>Phrymoponera gabonensis</i> (E. André)	W. Afr.	x					
<i>Phrymoponera gabonensis</i> v. <i>umbrosa</i> Wheeler	B. Congo		x				

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution—Continued

General	DISTRIBUTION					
	Imatong Mountains Zones					
	E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit, Mt. Kineti
<i>Bothroponera pachyderma</i> (Emery)						
<i>Bothroponera soror</i> (Emery)						
<i>Euponera</i> (<i>Brachyponera</i>) <i>sennaarensis</i> (Mayr)						
<i>Euponera</i> (<i>Mesoponera</i>) <i>ingesta</i> Wheeler						
<i>Euponera</i> (<i>Mesoponera</i>) <i>subiridescens</i> Wheeler						
<i>Euponera</i> (<i>Mesoponera</i>) <i>dentis</i> Weber						
<i>Euponera</i> (<i>Mesoponera</i>) <i>flavopilosa</i> Weber						
<i>Ponera</i> <i>coarctata imatongica</i> Weber						
<i>Ponera</i> <i>mesepinotalis</i> Weber						
<i>Ponera</i> <i>muscicola</i> Weber						
<i>Ponera</i> <i>lotii</i> Weber						
<i>Ponera</i> <i>ambigua</i> Weber						
<i>Leptogenys</i> (L.) <i>maxillosa sericeus</i> Weber						
<i>Leptogenys</i> (L.) <i>stuhmanni</i> Mayr						
<i>Leptogenys</i> (L.) <i>africanus</i> Weber						
<i>Anochetus</i> sp. 1443, 1448						
<i>Anochetus sudanicus</i> Weber						
W. Afr., Tanganyika						
W. Afr., Rhodesia						
Afr.						
B. Congo						
B. Congo						
Imatong Mts.						
Imatong Mts.						
(species) Holarctic, S., E. Afr.						
Imatong Mts.						
Imatong Mts.						
Imatong Mts.						
Imatong Mts.						
(species) Indian Ocean, Rhodesia, Cuba						
S., E. Afr.						
Imatong Mts.						
Imatong Mts.						
Imatong Mts.						

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution—*Continued*

	General	DISTRIBUTION					
		Imatong Mountains Zones					
		E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit, Mt. Kineti
<i>Odontomachus haematoda</i> (L.)	Tropicopol.	x					
<i>Odontomachus assiniensis</i> v. <i>furrier</i> Wheeler	B. Congo	x	x				
MYRMICINAE							
<i>Messor barbarus galla</i> v. <i>rufula</i> Forel	(species) N. Afr., Afr.						
<i>Pheidole megacephala</i> (Fabr.) ssp. A	(species) Tropicopol.			x			
<i>Pheidole megacephala</i> (Fabr.) ssp. B	(species) Tropicopol.			x			
<i>Pheidole megacephala</i> (Fabr.) ssp. nr. <i>punctulata</i> (Mayr)	(subspecies) Afr.			x			
<i>Pheidole</i> sp. nr. <i>liengmei</i> Forel	Imatong Mts.	x				x	
<i>Pheidole</i> sp. 1406	Imatong Mts.		x				
<i>Myrmicaria eumenoides opaciventris</i> v. <i>congolensis</i> Forel	Equat. Afr.	x	x				
<i>Crematogaster</i> (C.) <i>castanea inversa</i> v. <i>flaviventris</i> Santschi	B. Congo, Uganda			x			
<i>Crematogaster</i> (C.) <i>castanea</i> F. Smith, ssp.	Imatong Mts.	x		x			
<i>Crematogaster</i> (C.) <i>chiarinii</i> Emery, ssp.	(species) E. Afr., Congo	x					
<i>Crematogaster</i> (C.) sp. 1369	Imatong Mts.	x					
<i>Crematogaster</i> (C.) <i>latuka</i> spec. nov.	Imatong Mts.	x					
<i>Crematogaster</i> (<i>Decacrema</i>) <i>lango</i> spec. nov.	Imatong Mts.	x					

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution—Continued

	General	DISTRIBUTION					
		Imatong Mountains Zones					
		E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit, Mt. Kineti
<i>Meranoplus nanus scorificulus</i> Wheeler	B. Congo		x				
<i>Calyptomyrmez (C.) brevis</i> spec. nov.	(genus) W. Afr., Rhodesia		x				
<i>Macromischoides viridis</i> spec. nov.	(genus) W. Afr.		x				
<i>Ocymyrmez weilzeckeri celer</i> subsp. nov.	(species) S. Afr., Tanganyika	x					
<i>Tetramorium guineense medje</i> Wheeler	B. Congo	x					
<i>Tetramorium sericeiventris arenarium</i> Santschi	fringes of Sahara, Ethiopia	x					
<i>Tetramorium simillimum</i> (F. Smith)	Tropicopol.						
<i>Tetramorium simillimum isis</i> subsp. nov.	Imatong Mts.		x	x		x	
<i>Tetramorium squaminode nubis</i> subsp. nov.	(species) Kilimanjaro; S. Afr.		x			x	
<i>Tetramorium brevis</i> spec. nov.	Imatong Mts.		x				
<i>Tetramorium jeanae</i> spec. nov.	Imatong Mts.			x			
<i>Tetramorium viticola</i> spec. nov.	Imatong Mts.		x				
<i>Xiphomyrmez weilzeckeri</i> Emery	S. Afr., Congo		x				
<i>Xiphomyrmez weilzeckeri edithae</i> subsp. nov.	Imatong Mts.		x				
<i>Xiphomyrmez minusculus amen</i> subsp. nov.	(species) Cameroon		x	x			
<i>Xiphomyrmez zonacaciae</i> spec. nov.	Imatong Mts.		x				
<i>Triglyphothrix gabonensis</i> E. André	W. Afr.		x	x			

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution—Continued

General	DISTRIBUTION					
	Imatong Mountains Zones					
	E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit Mt. Kineti
FORMICINAE						
<i>Plagiolepis</i> (<i>P.</i>) <i>sudanica</i> spec. nov.						
<i>Acantholepis capensis anceps</i> Forel	x		x			
<i>Acantholepis capensis minuta</i> Forel	x					
<i>Acantholepis capensis simplex</i> Forel			x			
<i>Acantholepis capensis validiuscula</i> Emery		x			x	
<i>Acantholepis capensis thali</i> subsp. nov.						
<i>Acantholepis capensis issore</i> subsp. nov.						
<i>Acantholepis capensis acholla</i> subsp. nov.	x		x			
<i>Oecophylla longinoda</i> (Latr.)	x					
<i>Camponotus</i> (<i>Dinomyrmex</i>) <i>longipes</i> (Gerst)	x					
<i>Camponotus</i> (<i>Dinomyrmex</i>) <i>pompeius cassius</i> Wheeler	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus melanocnemis</i> Santschi	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus brutus</i> Forel	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus aegyptiacus</i> Emery	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus nubis</i> subsp. nov.	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus sudanicus</i> subsp. nov.	x					
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>acvapimensis</i> Mayr	x		x			
<i>Camponotus</i> (<i>Myrmosericus</i>) <i>rufoglaucus cinctellus rufigenis</i> Forel	x					
Imatong Mts.						
B. Congo						
Transvaal						
E., S. Afr.						
Afr.						
Imatong Mts.						
Imatong Mts.						
Imatong Mts.						
Afr., exc. S.						
F. Afr., Rhodesia						
B. Congo						
Equat. Afr., Natal						
W. Afr.						
Egypt, Eritrea						
Imatong Mts.						
Imatong Mts.						
W., E. Afr.						
B. Congo						

Table 1.—Species of Ants found in the Imatong Mountains with their General and Zonal Distribution—Concluded

General	DISTRIBUTION					
	Imatong Mountains Zones					
	E. Lower Slopes	W. Lower Slopes	Acacia abyssinica	Cloud Forest	Mountain Meadows	Summit, Mt. Kineti
<i>Camponotus</i> (<i>Myrmosericus</i>) <i>rufoglaucus flavomarginatus</i> (Mayr)	x	x	x			
<i>Camponotus</i> (<i>Myrmamblys</i>) <i>chapini ganzii</i> subsp. nov.	x					
<i>Camponotus</i> (<i>Myrmamblys</i>) <i>hapi</i> spec. nov.			x			
<i>Camponotus</i> (<i>Orihonotomyrmex</i>) <i>sericeus</i> (Fabr.)	x					
<i>Camponotus</i> (<i>Orihonotomyrmex</i>) <i>viridus calo</i> Forel		x				
<i>Camponotus</i> (<i>Myrmotrema</i>) <i>bayeri</i> Forel	x					
<i>Camponotus</i> (<i>Myrmotrema</i>) sp.	x					
<i>Camponotus</i> (<i>Myrmopiotromis</i>) <i>tricolor</i> spec. nov.						
<i>Camponotus</i> sp. 1447						
<i>Camponotus</i> sp. 1442, 1445						
<i>Polyrhachis</i> (<i>Myrma</i>) <i>schistacea divina</i> Forel		x				
<i>Polyrhachis</i> (<i>Myrma</i>) <i>cubaensis imalongica</i> subsp. nov.	x	x				
<i>Pseudolasius myersi</i> spec. nov.	x					
<i>Prenolepis</i> (<i>Nylanderia</i>) <i>albipes</i> Emery, ssp.		x				
<i>Prenolepis</i> (<i>Nylanderia</i>) sp.		x				
Totals	49	58	31	2	9	1
In one zone only		89	21		3	0

OTHER CENTRAL AFRICAN MOUNTAIN ANTS

There are few records of ants on other Central African mountains; most of these have been collected by expeditions of Alluaud and Jeannel and described by Santschi (1914). Disregarding the winged castes, Dr. Bequaert (in Wheeler, 1922, pp. 20-21) has summarized the Alluaud and Jeannel records, from 1500-2850 m. on Mts. Kenya, Kilimanjaro, Ruwenzori and the Aberdare Range, as follows:

<i>Dorylus</i> (<i>Dorylus</i>)	2 spp.	<i>Xiphomyrmex</i>	1 sp.
<i>Dorylus</i> (<i>Anomma</i>)	1 sp.	<i>Engramma</i>	1 sp.
<i>Bothroponera</i>	1 sp.	<i>Tapinoma</i>	1 sp.
<i>Monomorium</i>	3 spp.	<i>Technomyrmex</i>	1 sp.
<i>Messor</i>	2 spp.	<i>Plagiolepis</i>	1 sp.
<i>Pheidole</i>	5 spp.	<i>Acantholepis</i>	1 sp.
<i>Oligomyrmex</i>	1 spp.	<i>Camponotus</i>	6 sp.
<i>Crematogaster</i>	3 spp.		

Most of these thirty species were taken below 2000 m. and all were taken in what would correspond in the Imatongs to either the lower montane slopes or the *Acacia* zone.

In what would correspond roughly to the mountain meadow part of the Cloud Forest-Mountain Meadow Zone of the Imatongs the following ants were taken above 2600 (east slopes) or 3000 m. (west slopes) (*loc. cit.*):

<i>Melissotarsus emeryi pilipes</i> Santschi (Mt. Kilimandjaro, 2740 m.)
<i>Tetramorium squaminode</i> Santschi (Mt. Kilimandjaro, 2600-3800 m.)
<i>Tetramorium caespitum altivagans</i> Santschi (Mr. Kinangop, 3100 m.)
<i>Engramma ilgi stygium</i> Santschi (Mt. Kilimandjaro, 2740 m.)
<i>Camponotus maculatus kersteni</i> (Gerst.) (Mt. Kilimandjaro, 2500-3000 m.)

On Mt. Ruwenzori *Dorylus brevipennis* and *D. nigricans burmeisteri molestus* were taken at 1600 m. and the latter occurred commonly to 2500 m. *D. molestus* was abundant on Mt. Kenya to 3000 m. and was observed on Mt. Meru up to 3000 m. (*loc. cit.*).

On the Abyssinian highlands, Scott (1933) records the following species, the winged male ants being omitted:

<i>Dorylus</i> (<i>Anomma</i>) <i>nigricans burmeisteri molestus</i> Gerst.	8000-9000 ft.
<i>Bothroponera crassa</i> Emery	7000-8000 ft.
<i>Tetraponera scotti</i> Donisthorpe ¹	8000-9000 ft.

¹ This record must be taken with caution. It consisted of one dealate female without its antennae and clasping in its legs the head of a worker. It could possibly have been carried to this elevation by air currents while still winged.

<i>Messor barbarus galla</i> Emery	8000 ft.
<i>Pheidole megacephala ilgi</i> Forel	8000 ft.
<i>Crematogaster</i> (<i>Acrocoelia</i>) <i>neuvillei</i> Forel	7000-8000 ft.
<i>Monomorium crawleyi</i> Santschi	8000 ft.
<i>Solenopsis punctaticeps erythraea</i> Emery	8000 ft.
<i>Acantholepis capensis</i> Mayr, subspecies	6500-8000 ft.
<i>Camponotus</i> (<i>Paramyrmamblys</i>) <i>moderatus</i> Santschi	8000 ft.
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>ligea</i> Donisthorpe	9000 ft.
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>maculatus pulvinatus</i> Mayr	8000 ft.
<i>Camponotus</i> (<i>Myrmoturba</i>) <i>thraso assabensis</i> Emery	9000 ft.
<i>Camponotus</i> (<i>Myrmotrema</i>) <i>carbo honoris</i> Forel	8000 ft.

Although Dr. Scott's expedition went to 12,000-13,000 ft. in the highlands no ants were found above 9000 ft. except for the one dealate female. It could possibly have been carried to this elevation by air currents while still winged.

Isolated Saharan Mountains

In a collection of ants made by Peyerimhoff and Seurat in the Central Saharan massif of Hoggar (Ahaggar), which straddles the Tropic of Cancer, Santschi (1934) determined 32 forms. Since only three of these were tropical forms Santschi concludes that the massif is at the extreme south of the range of the palaearctic fauna. Thirteen were Saharan, nine were Atlas forms, five were common to the Sahara and the Atlas, one was common to Sahara and Egypt, and one was an Ethiopian form which is becoming cosmopolitan. One species, the tropical *Camponotus* (*Orthonotomyrmex*) *sericeus* (Fabr.), is common to this massif and the Imatong Mts. A new variety, *Camponotus* (*Myrmoturba*) *compressus thoracicus tahatensis* Santschi is of particular interest since it was taken on the summit of Tahat, highest peak of the massif, at an elevation of 3000 m. (9840 ft.). Santschi refers to his new variety *tibestiensis*, of the same subspecies, from the other great massif of the Sahara, the Tibesti, which rises about 500 miles east southeast to a height of 11,201 ft. He considers (p. 172) that the desert separating the two massifs "est suffisant pour intercepter tout passage de cette fourmi monticole et leur permettre une évolution indépendante." The other endemic ants belong to the genera *Messor*, *Leptothorax*, *Tetramorium* and *Cataglyphis*. Of these, *Messor*, *Tetramorium* and *Camponotus* had endemic forms in the Imatong Mts.

IMATONG ANIMALS OTHER THAN ANTS

1. VERTEBRATES. The plains surrounding the Imatongs contain many of the large mammals for which Africa is famous. Among them were elephant, giraffe, many species of antelope, lion, leopard, and hyaenas. I shot tiang (*Damaliscus tiang*) and waterbuck (*Cobus defassa*) on the plains to the north and unearthed a pigmy shrew at the east base. Few mammals, however, ascend into the temperate zones. Freshly made rootings of a giant forest hog (*Hylochoerus*) were seen nearly every day in the Cloud Forest-Mountain Meadow Zone to 8200 feet. A giant bushbuck was supposed to occur also in this zone. A troop of Colobus (*Colobus caudatus*) was found at the top of a fine stand of *Podocarpus* at 8100 feet. This handsome monkey is a mountain species limited to elevations above 6000 feet. The gorilla found on higher mountains south of the Imatongs appears to be a primate confined to higher elevations or cloud forests. In general the temperate zones had comparatively as few species of mammals as ants.

On the plains also were species of birds which did not ascend into the temperate zones. Guinea fowl were abundant at the base of the mountain, affording us most of our meat, but were not seen above 3500 feet. Francolin, bustard and ostrich seemed also not to ascend the mountains. At 9000 feet, however, were shot sun-birds (*Nectarinia*) and other small birds occurred on the meadows and forest margins. A medium-sized eagle soared over us on the summit of Mt. Kineti and hawks were seen at 8000-9000 feet.

Few of the numerous reptiles of the lower slopes ascended into the temperate zones. In the grass beside a ring of barelegged Acholli boys, dancing by their village at 4700 feet on the west slopes, a demon night adder (*Atractaspis conradsi*) was killed. A puff adder was killed at about 6200 feet in the *Acacia abyssinica* zone. Clinging to short grass stems on the summit of Mt. Kineti chameleons (*Chamaeleo bitaeniatus*) of a new race near the race *elliotti* of Kenya were found.

Amphibians also were scarce and the highest record was of tadpoles in a sparkling, cold pool below a waterfall at an elevation of 8700 feet.

2. ARTHROPODS. Time did not permit extensive collecting of arthropods other than ants and many of the former were collected because of their association with ants. Enough Isoptera and Arachnida, however, were collected and identified to give clues to their distribution.

In Carpenter's study (1935) of the Rhopalocera (Lepidoptera) of Abyssinia several records are included from the Imatong Mountains.

The study is particularly relevant, however, because of the conclusions on the affinities of the fauna of the Abyssinian highlands. Carpenter found that the Rhopalocera "fauna on the whole is of East African type" but with "a large number forms or species with West African affinities." "Some of the most characteristic elements of the typical West African forests are missing or extremely poorly represented in Abyssinia. But examples occur on the chain of mountains along or near the Sudan-Uganda border." These mountains include the Imatongs. It is significant that in insects as comparatively well known as the Rhopalocera the range of West African species eastward should end at the Imatongs. Many of the species of West African ants now have a similar range but the distribution of some of them is incompletely known.

A table is included of the species which are "well defined entities confined to the high levels above 5000 ft." Most of these are palaearctic and the rest East or West African with two exceptions.

Rhopalocera from above 1500 meters were considered "Abyssinian," those below 1500 meters were considered characteristic of Somaliland.

DISTRIBUTION OF THE ISOPTERA

Termites were collected where associated with ants or found at the higher altitudes. They were identified by Professor A. E. Emerson of the University of Chicago. The large, black ant, *Megaponera foetens*, preys regularly on termites. The distribution of this ant and two termites which the ants were actually found to carry here, *Macrotermes jeanneli* and *Odontotermes* (O.) *schmitzi*, correspond closely in the Imatongs. All are confined to the zone of lower montane slopes. *M. jeanneli* and *M. natalensis* appear to be the two commonest termites of this zone and the fact that they do not ascend into the *Acacia abyssinica* zone next above doubtless is an important factor restricting the ascent of the *Megaponera*.

As with the ants, the termites are most numerous in the lower zone and scarce in the two higher zones. They were not found on the top of Mt. Kineti, which probably has an environment distinctly unfavorable for them.

The termites are listed below by zones.

Lower Montane Slopes

Acanthotermes (*Pseudacanthotermes*) *spiniger* (Sjöstedt) 2900 ft., in toad stomach.

Amitermes (A.) *evuncifer* Silvestri 4200 ft., mound nest containing colonies of
Aenictus mentu and *Camponotus melanocnemis*.
Anoplotermes (A.) n. sp. 4500 ft., in cells within nest of *Polyrhachis divina*.

Cloud Forest-Mountain Meadow Zone

Basidentitermes aurivillii (Sjöstedt) 3200 ft.
Cubitermes (?) sp. 6000 ft., carried alive by *Tetramorium medje*
Glyptotermes n. sp. 3200 ft.
Macrotermes jeanneli (Grassé) to 4100 ft.; in toad stomach; carried by *Megaponera*; chimney type nest
Macrotermes natalensis (Haviland), fungus-grower found to 4640 ft.
Odontotermes (O.) *nilensis* Emerson (MS) 2900 ft., in toad stomach
Odontotermes (O.) *schmitzi* Emerson 3200 ft., carried by *Megaponera*
Odontotermes (*Cyclotermes*) n. sp. 2900 ft.

Acacia abyssinica Zone

Anoplotermes sp. 6800 ft., carried by *Myrmicaria congolensis*; 7000 ft.
Ceratotermes rhinoceros (Sjöstedt) 6200 ft., carried by *Pheidole megacephala* ssp.

Cloud Forest-Mountain Meadow Zone

Anoplotermes sp. 7570 ft., attacked by *Pheidole megacephala* when chambers of both were exposed
Anoplotermes sp. 8700 ft., chambers anastomosed with those of *Tetramorium simillimum* ssp., no hostility
Anoplotermes n. sp. (same as that at 4500 ft.), 9200 ft.

The occurrence of *Ceratotermes rhinoceros* in the *Acacia* zone is of particular interest, according to Dr. Emerson, since this species and two others are the only members of the genus and all had seemed to be confined to the mouth of the Congo River and French Guinea. They are rare, being known only from one or two collections.

B. DISTRIBUTION OF THE ARACHNIDA

In the limited time available no attempt could be made to collect many representative Arachnida since it would have been at the sacrifice of collecting ants. Thanks are due Dr. W. J. Gertsch of the American Museum of Natural History for his identification of the genera and families of Arachnida. The Imatong spider collection can apparently be identified to species only in Europe, an impossibility because of the war. Since the species unfortunately are not known, no conclusions

can be drawn on the affinities of the spider fauna. The genera are for the most part widely distributed in Africa or throughout the world. Spiders are known from considerable elevations on Central African mountains, such as *Diaea albicincta* Pav. and *Xysticus fagei* de Less. from 3000 m. (9840 ft.) in the Mt. Kilimanjaro-Meru region (de Lessert, 1919). Spiders, however, were collected chiefly in the Cloud Forest-Mountain Meadow zone, on the summit of Mt. Kineti, or where associated with ants. Particularly interesting was the ecological niche of spiders in the cloud forest. They were more abundant than ants, largely because they could live in the only dry place in this zone—the dry cavities of the bamboo internodes. Ants were not found in this niche here and I have rarely found ants in bamboo internodes, upright or fallen, in the Neotropical Region. The spiders in bamboo belonged to the genera *Agelena* and *Clubiona*. Another specimen of the *Agelena* was found on Mt. Kineti summit and a different species of *Clubiona* was taken at 8300 feet, also in cloud forest but on a lichen- and moss-covered tree. These genera were not collected elsewhere. In general many of these spiders tolerated situations which were too cold, damp and dark for ants. The Arachnida are listed by zones below.

Lower Montane Slopes—Eastern

Gnaphosidae—*Herpyllus* (= *Scotophaeus*) sp. A dismembered specimen was in the nest of the ant, *Leptogenys* (L.) *maxillosa sericeus*, at 4100 ft. Another specimen was under a stone nearby.

Thomisidae—*Thanatus* sp. 3300 ft.

Acacia abyssinica Zone

Gnaphosidae—*Zelotes* sp. Prey of ant, *Dorylus* (*Anomma*) *nigricans burmeisteri molestus*, 6200 ft.

Ctenidae—*Ctenus* sp., Prey of the above ant, 6200 ft.

Theridiidae—*Theridion* sp., 6800 ft.

Theridiidae—*Theridion* another sp., 7100 ft.

Linyphiidae—*Microneta* sp., 6800 ft.

Phalangidae—juvenile specimen, 6800 ft.

Acarina—small mite, 6800 ft.

Cloud Forest—Mountain Meadow Zone

Agelenidae—*Agelena* sp. in bamboo, 8780 ft.

Clubionidae—*Clubiona* sp. in bamboo, 8780 ft.

Clubionidae—*Clubiona* sp. from mossy tree, 8300 ft.

Gnaphosidae—*Drassyllus* sp. in grass, 9200 ft.

Thomisidae—*Thomisus* sp. in grass, 7940 ft.

Salticidae—females in grass, 9200 ft.

Argiopidae—*Leucauge* sp. from mossy tree, 8300 ft.; from ground in forest, 8780 ft.

Linyphiidae—*Linyphia* sp. from mossy tree, 8300 ft.

Mt. Kineti Summit, 10458 ft.

Barychelidae—*Leptopelma* sp. in grassy hummock

Agelenidae—*Agelena* sp. in grassy hummock

Gnaphosidae—*Herpyllus* sp. near *Monomorium* nest

DISTRIBUTION OF MISCELLANEOUS ARTHROPODS

Mr. J. A. G. Rehn has recently (1942, Proc. Acad. Nat. Sc. Phila., 94: 287-306, Pl. 26-27) described a new Orthopteran, *Paras hena imatongensis* Rehn, which I collected on the Summit of Mt. Kineti. He states (p. 288) that the "distribution of *Paras hena* is particularly interesting In East Africa it is generally found frequenting mountain or plateau grassland areas, usually at considerable elevations The Ranges of at least certain of the species appear to be completely and widely separated No lowland humid tropical types of the genus are known."

The tick, *Rhipicephalus bursa* Canestrini and Fanzago (det. Dr. J. Bequaert), was found in the Cloud Forest-Mountain Meadow zone on hummocky grass at an elevation of about 8700 feet. It may feed on the bushbuck or giant forest hog. On the plains at the east base of the Imatongs was found on two occasions the tick, *Rhipicephalus simus* Koch (det. Bequaert). One tick was on my arm when I returned to camp from hunting big game, another was hanging to a grass stem about one foot from the ground.

BIOLOGY OF THE ANTS OF THE IMATONG MOUNTAINS

DORYLINAE

DORYLUS

DORYLUS (ANOMMA) NIGRICANS BURMEISTERI v. MOLESTUS (Gerst.)

Plate 8

Driver or legionary ants are distributed throughout Africa. This variety, which is terrestrial like the other Anommas, is confined to

East Africa, from Abyssinia to Mozambique and Rhodesia. The Imatong and other records obtained on the way to this region add the southern part of the Anglo-Egyptian Sudan to its range.

Dorylus molestus was found abundantly in places from 6200 to 9000 feet and also occurred on the surrounding eastern plains and lower slopes. It was particularly abundant in the *Acacia abyssinica* zone but was widespread in the cloud forest-mountain meadow zone to 9000 feet. If we had camped on top of Mt. Kineti (10,458 ft.) we should probably have found it eventually. The ants would have encountered enough insects on the very top to make an occasional marauding expedition feasible from the forests a few hundred feet below. Sjöstedt found this variety on Mt. Meru at 3000 m., Alluaud and Jeannel took it on Mts. Kenya, Kilimanjaro, Ruwenzori and Aberdare to 3000 m. and Dr. Bequaert collected what was probably this variety on Mt. Ruwenzori between 2200 and 2500 m. (Bequaert, in Wheeler, 1922, pp. 20-21).

Not only is this purely carnivorous insect the dominant ant of the Imatong Mountains but it is unquestionably one of the clearly dominant animals. While the largest mammals have been known to succumb to their legions, they play a far more important role in the lives of terrestrial invertebrates, especially other insects. None of these can escape when surrounded by the hordes of *Dorylus* unless they are able to fly outside the range of the marauders. Commonly, winged insects, when started up by these ants, take but a short flight and often alight on a twig or leaf soon to be explored by part of the same horde. They are thus literally driven from pillar to post.

Other species of ants fall prey to the *Dorylus*. The booty carried by them or their congeners, the army ants of the New World tropics, is as likely to be the brood of some other ant as any other kind of animal. It appears very probable that the scarcity of terrestrial ants in the *Acacia abyssinica* and cloud forest zones is due in part to the activities of this *Dorylus*. It is worth noting that the most abundant ants in these zones are the small or very small *Tetramorium*, *Solenopsis*, and *Monomorium* whose minute brood is of a size commonly ignored by terrestrial army and legionary ants of both hemispheres. Their brood is usually safe under rocks, or in soil chambers. The larger ants of the genus *Camponotus*, one of the most abundant ants in species and individuals the world over, are remarkably scarce here and only scattered colonies are found. These nested out in the grass of open meadows where their chances of being encountered by the *Dorylus* would be less than on the more open forest floor. The legionary ants of the size of

this species find difficulty in scattering through dense, fine grass and in the mountain meadows they often followed trails made by the large mammals.

The ant of comparable size which ranked with the *Dorylus* in abundance was *Myrmicaria eumenoides congolensis*. It was remarkable how they tolerated one another. Similar tolerance is exhibited between the army ant, *Eciton burchelli*, and the fungus-growers, *Atta* and *Acromyrmex*, in South and Central America. Both the *Dorylus* and the *Myrmicaria* have the habit of building narrow trenches across game trails and erecting crater entrances to subterranean diggings. The permanent craters of *Myrmicaria* and temporary craters of the *Dorylus* were occasionally close together, even contiguous, with no sign of hostility between the ants. Or the crater of one and a trench built across a trail by the other may be contiguous with no apparent hostility. The following observations taken from my field notes illustrate their relationships: "A *Dorylus* file had erected a temporary crater, 15 cm. in diameter and 5 cm. high, 20 cm. from a trench across the trail dug by a *Myrmicaria* colony. These workers were occasionally wandering through the trench while the *Dorylus* were bringing up soil from below to the crater rim. Every now and then a *Myrmicaria* wandered to the rim of the *Dorylus* crater and slowly walked down with antennae outspread. It would soon encounter a *Dorylus*. There was no hurry on either side. Both were slow and deliberate in their movements. They would touch antennae, the *Dorylus* with mandibles outspread, then the *Myrmicaria* would slowly retreat, the *Dorylus* staying in the crater. A *Myrmicaria* tumbled down the slope of loose soil of the crater. It was not molested and slowly made its way through a seething mass of *Dorylus* untouched!" Contradicting these observations, however, was one made later in the day and some miles away. *Dorylus* and *Myrmicaria* files were found close by at the margin of a glade in *Acacia* forest. Several of the *Myrmicaria* were carrying attached to them, in a literal death grip, heads of the *Dorylus*. There were no immediate signs of hostility and the nearby nest of the *Myrmicaria* was intact under a stone.

Acacia, *Podocarpus-Lobelia*, bamboo and all other types of forest except pure *Podocarpus* were inhabited by these ants. In a magnificent stand of pure *Podocarpus* at 8100 feet no ants could be found and the scarcity of life on the gloomy forest floor made it probable that *Dorylus* would not venture here. Open rocky slopes and the margins of meadows were also explored but the ants were seldom seen far from the margins of meadows.

On August 1 at an average elevation of about 6200 feet a remarkable series of *Dorylus* trails was encountered during the day's trek through the mountains. During the morning three *Dorylus* trails were passed, which was nothing unusual. At 12:40 p.m. another but much denser file was encountered. These, mostly minima and media workers, were carrying prey into a hole beside a stone. Larger workers and soldiers formed a dense ring about the hole and formed a cordon on each side of the file. Within less than a mile three more files were encountered (to 1 p.m.). During fairly steady walking (except for a 20 minute stop at 3 p.m.) from 1 to 4:21 p.m. 14 additional files were passed, crossing my path at all angles. At 4:21 three abandoned trenches of *Dorylus* were also found. These had been in process of building less than 24 hours previously as evidenced by the condition in which they were left. During the day 21 files of *Dorylus* were thus encountered along a trek of probably 12 miles length. The way led mostly along ridges but also up and down many small valleys. Seventeen of the files were encountered at an average of 12 minutes apart and over a total distance of about nine miles. Eight files were found in 35 minutes and in all probability belonged to one army whose diameter must have been over one mile. The numbers in such an army must be almost incredibly large, certainly at least in the hundreds of thousands.

It so happened that this day, August 1, followed a night of full moon. It may be more than coincidence that the only other comparable army ant activity I have seen also followed a full moon. In the bright full moonlight of July 3, 1935, I encountered numerous files of the army ant, *Eciton (E.) vagans* Olivier, in the foothills of the Northern Range of Trinidad, B.W.I. While following these files in an endeavor to find the queen an old Trinidad negro passing by remarked in his patois that these ants "come out in de full moon." Certainly there was more army ant activity than I had yet seen in this locality where I often collected. In a temporary bivouac among tree roots much brood, mostly larvae, was found but the queen escaped. The following day I returned to the same small valley. The ants had disappeared but about 100 meters away across a low ridge in the adjoining valley numerous files of a colony of another army ant, *Eciton (E.) burchelli urichi* Forel, were encountered. They had established a bivouac among dense bushes. The queen was found in this colony.

Dr. Schneirla's excellent studies on Panama army ants (1938, p. 87) led him to conclude that "in the rainy season (at least) the queen's ovulation cycle serves as a pacemaker for the alternation of the major conditions of colony activity (i.e., the nomadic and the statary condi-

tions)." He concluded that the queen produces a clutch of eggs at intervals of approximately 36 days. The movements of the resulting larvae rouse the ants to their nomadic condition.

Like the rhythmic cycle of many marine animals perhaps the ovulation cycle of the army ant queen itself coincides with the phases of the moon. Perhaps we have here another example of the fundamental effect light has upon animals. Since in the tropics the amount of daylight each day varies but little according to the season, it is the added moonlight which determines the ovulation cycle. As the moon waxes the total daylight and moonlight builds up to a maximum at full moon which initiates the cycle. Whether this is exactly a 28 day cycle or not may depend upon specific conditions in the individual, such as the length of time necessary to ripen the ova.

AENICTUS

AENICTUS MENTU Weber

This tiny yellow doryline ant belongs to the west lower montane slopes and a colony was found at an elevation of 4200 feet. It is dedicated to the Egyptian war god Mentu.

From a hemispherical hard black carton nest built and occupied by the termite, *Amitermes* (A.) *evuncifer* Silvestri, two species of ants were taken. The termite mound was 75 cm. in diameter and 35 cm. high. When sectioned it illustrated the theory of physiological gradients strikingly in that termite brood, including eggs and nymphs, were concentrated in greatest numbers in the smallest and most compact cells which were at the center. A colony of *Camponotus maculatus melanocnemis* Santschi occupied cells below the center as well as in all directions towards the periphery to within four centimeters of the top. The *Aenictus* evidently were also nesting in the termite mound since they had quantities of brood in cells from two to five centimeters from the top.

In the melee resulting from cutting open the nest termites, *Camponotus* and *Aenictus* were mixed up, brood and all. The *Aenictus* were by far the smallest of the insects but despite their tiny size they attacked the others. The termite workers were comparatively defenseless because of their soft integument and many were killed by both ant species. The soldier termites, however, had efficient mandibles and attacked the ants. One soldier pierced the prosternum of a far larger *Camponotus* worker and held fast while another grasped a leg with a bulldog grip. The ant was helpless.

AENICTUS ROTUNDATUS Mayr var. *MERWEI* Santschi

This small, red variety was originally described from the Cape Province. The species was described from South Africa and has since been recorded from Rhodesia. The Imatong specimens may possibly be a new form but in view of the lack of information on normal variability in the species it seems best to give them this name since they compare well in general habitus with specimens of *A. merwei* in the British Museum.

A dense column of workers was taken on the east slopes at an elevation of about 3000 feet. They were carrying pupae and larvae of a small myrmicine ant whose nest they had evidently raided and were marching above ground over the rocky soil, only to disappear in holes in the soil. It is probable that they are hypogaeic and appeared above ground only where imbedded rocks forced them out.

CERAPACHYINAE

CERAPACHYS

CERAPACHYS (C.) *PIGRA* Weber

This curious ant, member of a comparatively rare subfamily which links the Dorylinae with the Ponerinae, belongs to the lower montane slopes. It seems unlikely that members of not only the genus but the entire subfamily (Ceropachyinae) will be found to belong to any of the temperate mountain zones.

Workers were found on the east slopes at about 3800 feet travelling slowly in an irregular column, two or three abreast, over wet, stony ground in the shade. When the column was disrupted by my picking up workers they were not aggressive nor did they run at all fast. Rather they moved somewhat sluggishly like *Dacetonine* ants. They did not or were unable to sting the fingers.

CERAPACHYS SUDANENSIS Weber

This species differs from *C. pigra* in its smaller size, antennal proportions and sculpturing.

A file of workers was taken on the east lower slopes at an elevation of about 6000 ft. At this place the soil was red and the vegetation was grass-woodland; the *Acacia abyssinica* zone extended immediately above.

PONERINAE

PLATYTHYREA

PLATYTHYREA CRIBRINODIS (Gerstaecker)

This species, originally described from Mozambique, is distributed generally in East Africa. A worker from Katanga, Belgian Congo (J. Bequaert) in my collection and the present Imatong records add the southern Sudan and southern Congo to its range.

The large, dull black, foraging workers were encountered from the plains up to an elevation of about 4600 feet on the east slopes. When picked up they stridulate audibly. Entrance to their nests may be in the form of a bare hole under a rock or otherwise secluded. One irregular entrance, 20 mm. in greatest diameter, was found roofed over with pebbles of which some were up to seven millimeters in diameter and were distinctly heavier than the ants themselves. The tunnel led in an irregular manner into earth between rocks. One worker was observed carrying an angular pebble similar to those about the entrance. Another was carrying a dead *Camponotus* worker towards the hole. They are probably general insectivores. One was observed carrying a decapitated worker of its own species minus also its legs. Another carried an empty black pupal case, apparently of the same species, two feet downhill from its nest. These two latter were probably merely "cleaning house."

PALTOTHYREUS

PALTOTHYREUS TARSATUS (Fabr.)

This monotypic genus is distributed generally over Africa and is confined to this continent. The type locality is Senegambia. Because of its large size and habit of stalking over the open floor of the forest it is conspicuous and collected by the most casual collector. The present record, however, adds the Sudan to the definite range.

Since the species can hardly be overlooked it is noteworthy that the workers were not encountered on our route along the east front of the Imatongs, on the trek up Mt. Kineti nor on the traverse of the mountains. It was found only in the Lotti Forest on the lower montane slopes of the west side. It seems therefore to be confined to closed rain forest in the Sudan.

Only stray workers were encountered in the Lotti Forest and these could sometimes be smelled before they were seen. They give off an

exceedingly pungent odor, much stronger than that of dorylines, which has been likened by Arnold to the odor of an overripe pipe. In the late afternoon they were taken under pieces of rotted wood or other cover on the forest floor.

MEGAPONERA

MEGAPONERA FOETENS (Fabr.)

The genus *Megaponera* is monotypic and *M. foetens* is one of the commonest ants of the Ethiopian Region. *M. foetens* was originally described from Guinea and ranges across the continent from the southern border of the Sahara to Southern Rhodesia. Santschi has described a variety, *rapax*, from Mt. Kilimanjaro (800m.) and Moschi and Kilema, Tanganyika (1400-1500 m.). The Imatong specimens appear transitional between the typical form and this variety.

This ant was found on both eastern and western slopes of the Imatongs but was much more abundant on the eastern slopes. Here it has exactly the range of the common termites (*Macrotermes natalensis* and *M. jeanneli*), being found along the lower slopes and above both Longoforok and Molongori to the *Acacia abyssinica* zone (6000 ft.). This is also the extent of the reddish clay soil. On the descent of the western slopes it was not encountered until the Lotti Forest was reached although doubtless it occurs more generally. It is commonly seen on the plains surrounding the Imatongs, northward to Terakeka on the Bahr-el-Jebel and westward to the Belgian Congo border.

M. foetens carries on well-organized raids on termite nests for the purpose of capturing its chief food, the relatively defenseless soft-bodied termites. The ants travel in columns several abreast and one to two meters long and march quickly and directly towards their objective, the entrance or entrances of termite nests. They stridulate loudly when disturbed. Just above Molongori what seemed to be the beginning of a raid was encountered at 6:50 a.m. of a bright, calm morning. On the west side of the mountains another start of a raid was witnessed at 7 a.m. Above Longoforok at about 3200 ft. the return of a raid was seen at 1:50 p.m. of a bright but cloudy afternoon following a rain. The raid was only partly successful since many workers had no termites. This column was preceded by a single worker at a distance of about 30 cm. from the main body. The ants were photographed with a ciné kodak as they pursued a direct path to the entrance to their nest, a hole about three centimeters in diameter at the base of a large, black rock. Much soil had been brought out from

under the rock and heaped against one side. At 5:50 p.m. in the Lotti Forest a particularly successful column of raiders was found. At this time the sun was behind a ridge and it was twilight in the high, dense forest. During the afternoon a heavy rain had fallen but at the present time the weather was calm, clear and warm. When found, the ants were quietly clustered together on a slope and feeding on a large mass of dead termites which they had carried to a well-drained patch of red clay with a scanty covering of moss. About 15 cm. from them was a tiny stream, about 7 cm. wide, of reddish water from the rain, which blocked their way to a clearing. I stood across this stream and started to pick some up with forceps, whereupon a number tried to attack me but the stream was an effective barrier. After about five minutes of my disturbing them the seething mass gradually formed into a column, except those trying to reach me, and picked up as many termites as they could in their jaws. It was astonishing how quickly order came out of the milling workers. Here is probably an example of orientation with respect to head and abdominal tip in ants. They marched in regular column to a position about four meters down the slope and parallel with the stream which they evidently were trying to pass. Here they deposited their loads of termites. At 6:10, when I had to leave, it was fast getting dark. No myrmecophiles were seen in the raiding party.

In excavating a nest of the fungus-growing termite, *Macrotermes natalensis* (Haviland), the *Megaponeras* were encountered inside the nest and under some of the fungus gardens. During our ascent from the east Dr. Myers took a worker carrying a soldier termite, *Macrotermes jeanneli* (Grassé). The ant was carrying the dead termite under its body and between its legs, head backwards.

OPHTHALMOPONE

OPHTHALMOPONE BERTHOUDI FOREL subsp. PUBESCENS Weber

The genus *Ophthalmopone* consists of five species, of which none have been recorded from the Belgian Congo or Sudan. One, *O. ilgi* is known from Southern Abyssinia and Somaliland. The island of San Thomé in the Gulf of Guinea contains two species (*depilis* and *mocquerysi*), one of which (*mocquerysi*) occurs also in Angola with *O. berthoudi*. *O. berthoudi* is also known from Transvaal, Rhodesia and Mozambique. The fifth species (*hottentota*) is South African.

The present form is closely related to *O. berthoudi* and differs from two workers of this species sent me from Victoria Falls, Rhodesia, by Mr. G. Arnold, in having the median dorsal epinotal groove reduced,

the crests of the posterior petiolar margin reduced and the pubescence more abundant.

One worker was taken near Longoforok on the mesophytic grass-woodland plains at an elevation of about 2800 ft. It resembled the common *Megaponera foetens* but was not travelling in a file; under a lens the head is much more elongate and the eyes much larger.

PHRYNOPONERA

PHRYNOPONERA GABONENSIS (E. André)

No genus more clearly illustrates the West African affinities of the Imatongs than *Phrynoponera*. Five species are known, all from a belt of about five degrees north and south of the Equator extending inland from the Atlantic Ocean to the eastern part of the Belgian Congo. All records are in the Belgian Congo except for single French Congo and Cameroons records. Doubtless these ants will be more generally found in these two latter colonies when they become as comparatively well explored as the Belgian Congo.

This species occurs on the west slopes of the Imatongs in rain forest from 3300 to 3500 ft. I found it in the Lotti Forest, walking singly over the ground, and Dr. Myers took it several hundred feet above this forest.

PHRYNOPONERA GABONENSIS var. UMBROSA Wheeler

A worker taken in the Lotti Forest agrees closely with Wheeler's description of the variety *umbrosa* from Medje, Belgian Congo, and runs to this form in his key. It differs from the other Lotti Forest workers in having the mandibles, frontal carinae, and antennal scapes blackish and in having the head and gaster more coarsely sculptured. The worker was walking over the forest floor in an open area after a rain.

BOTHROPONERA

BOTHROPONERA PACHYDERMA (Emery)

This large, coarsely sculptured ant was originally described from Cameroon and it or its forms have since been recorded from the French and Belgian Congo and Tanganyika.

It occurs on the western slopes of the Imatongs, where it was taken at about 4100 ft., above the Lotti Forest, by Dr. Myers (M10574) and in the Lotti Forest by myself. The ant moves sluggishly over the forest floor and is less abundant than *B. soror*.

BOTHROPONERA SOROR (Emery)

This species was originally described from Cameroon and has since been recorded from both French and Belgian Congo and Rhodesia. A subspecies is known from Abyssinia.

B. soror occurs on both the eastern and western slopes of the Imatongs at elevations up to nearly 6000 ft. but was not taken in the *Acacia abyssinica* zone. The workers are found on the ground both in grass-woodland and in rain forest; a colony found in the Lotti Forest was nesting under the bark of a sound tree 36 cm. in diameter resting on the ground. The larvae were lying on their sides and feeding on pieces of an unidentifiable insect. In the stomach of a toad taken at about 4200 ft. were two workers of *B. soror*, other ants and other insects. About half of the bulk consisted of ants.

EUPONERA

EUPONERA (BRACHYPONERA) SENNAARENSIS (Mayr)

This ant is one of the commonest ants of the Ethiopian Region and is widespread. It was originally described from Sennar, less than 700 miles north of the Imatongs in the Sudan. Other Sudan records, including a nest on a Nile steamboat, are given in a recent brief article (Weber, 1940).

Nests of this species were particularly abundant on the sandy flats at the east base of the Imatongs and workers were taken up to the *Acacia abyssinica* zone on the east lower slopes at about 6000 ft.

EUPONERA (MESOPONERA) INGESTA Wheeler

This species is characterized by its broad head, short, trigonal mandibles, finely reticulate integument and sparse pilosity with abundant appressed pubescence. It was originally described from northeastern Belgian Congo.

It occurs on both eastern and western slopes of the Imatongs at elevations of about 4100 ft. and 3300 ft. respectively. One worker found on the eastern slopes was in grass-woodland. A single dealate female was taken in the Lotti Forest under a piece of wood on the ground. Workers were taken in high rain forest above the Lotti Forest and in the Forest itself.

EUPONERA (MESOPONERA) SUBIRIDESCENS Wheeler

This species may easily be recognized by its long, narrow, and reddish mandibles with reduced dentation and the unusually high and narrowly compressed petiole. It was originally described from north-eastern Belgian Congo.

It occurs on the western slopes of the Imatongs where workers were taken at an elevation of about 4800 ft. in rain forest and at 3300 ft. in the Lotti Forest.

EUPONERA (MESOPONERA) DENTIS Weber

This species is characterized by the elongate apical tooth of the mandible, the long first joint of the funiculus and the petiolar scale which closely resembles that of the common *Euponera* (*Brachyponera*) *sennarensis*. The latter, however, has a much broader head and is, in the female caste, much larger.

A single dealate female was taken in the Lotti Forest under leaves on the ground.

EUPONERA (MESOPONERA) FLAVOPILOSA Weber

This species is characterized by its elongate, narrow mandibles, long first joint of the funiculus, shiny brown integument and numerous yellow hairs.

A single dealate female was taken in gallery forest above the Lotti Forest.

PONERA

PONERA COARCTATA (Latr.) subsp. IMATONGICA Weber

P. coarctata was originally described from France and the typical form is European and Mediterranean. The common *Ponera* of the United States is the subspecies *pennsylvanica*. Forel has described a subspecies *boerorum* from Natal. Santschi has described the species *ursa* and *jeanneli*, the former from Mt. Ruwenzori (2000 m.) and Mt. Elgon (2300 m.), the latter from Mt. Elgon (2100 m.), but the Imatong ant is a distinct, though related, form. The distinctions between many of the species of *Ponera* are slight and not easily conveyed by drawings and descriptions. Unfortunately no specimens of any of the African mountain *Poneras* are in collections in the United States and it seems advisable provisionally to attach the present ant to *P. coarctata* which it much resembles.

This ant was the commonest *Ponera* in the Imatongs and was found on both eastern and western slopes up to 8500 ft. Some of the workers vary slightly in color and size but the material is insufficient to ascribe any importance to the variation.

On the eastern side workers were found in humus at 6800 ft. and at about 8500 ft. in a mountain meadow.

On the western side workers were found at about 6200, 6100 and 4570 ft. At the highest locality the workers were under a rotted log on the ground in high forest containing *Dracaena fragrans*. Those at 6100 ft. were in exactly the same type of habitat. One worker was found at the lowest locality about the roots of a coffee tree.

PONERA MESOËPINOTALIS Weber

This species differs from the other Imatong species in having a distinct meso-epinotal impression and thick petiolar node.

Workers were found on the western slopes of the Imatongs at an elevation of 6400 ft. The ants were under the bark of a fallen tree in forest with numerous lianas and *Podocarpus*.

PONERA MUSCICOLA Weber

This species differs from all *Ponera* found in the Imatongs, except *P. lotti*, in its compressed petiole. It differs from the latter in having much paler color and proportionately larger size.

A single dealate female was taken on the east slopes of the Imatongs at 7200 ft. The ant was by itself in wet moss filling the cavity of a reclining tree trunk which was moss- and lichen-covered.

PONERA LOTTI Weber

This species is characterized by its slight meso-epinotal impression, compressed petiole and long antennal scapes.

Workers were found in the Lotti Forest. One was taken carrying an insect larva and was unusually agile. Others were under the bark of a large fallen tree trunk.

PONERA AMBIGUA Weber

This species is noteworthy in being like the genus *Euponera* in general habitus, having comparatively elongate mandibles and de-

pressed metanotum. It is placed with *Ponera* because it has but a single tibial spur instead of the two of *Euponera*.

A worker was found in the Lotti Forest under leaves on the forest floor.

LEPTOGENYS

LEPTOGENYS (L.) MAXILLOSA (F. Smith) subsp. SERICEUS Weber

L. maxillosa was originally described from the island of Mauritius and has since been recorded from Rhodesia and from widely separated localities of the world. I rediscovered the variety *falcata* Roger in Cuba and was sent a worker proving to belong to the variety *vinsonnella* (Dufour) by Mr. D. FitzGerald from Mahé, Seychelles Islands.

The Imatong workers differ from all these and from Kalahari Desert, Guam Is., and specimens from other regions in having a distinctly denser and longer appressed pubescence so that the body appears silky.

These ants were taken twice near Molongori. One worker was taken on the mesophytic grass-woodland plains east of the village crawling on the base of a tall termite chimney mound (*Macrotermes jeanelli* (Grassé)). A colony was found on the eastern slopes above Molongori at an elevation of about 4100 ft. A file of workers was seen returning to what proved to be their nest. Nothing was seen in their mandibles and it may have been an unsuccessful raiding expedition. Their nest was under a flattish stone about 30 x 40 x 10 cm. which was resting on small rocks and a little soil. The ants were exceedingly fast, darting under cover and manoeuvring away as I tried to pick them up. In the nest were pieces of their prey: Isopods and spiders. Live *Collembola* and *Thysanura* were present in numbers. They evidently fed on what the ants left of their prey. From a cocoon a worker was just emerging. The front legs and one antenna were sticking out. From the position of its mandibles in the cocoon it seemed unlikely that it could have sawed itself out and another worker must have been assisting it. The colony consisted of about one hundred workers.

Dr. Myers took a worker (No. 10545) at the south base of the Lafit Mts. north of the Imatongs, in low thorn-grass-woodland.

LEPTOGENYS (L.) STUHLMANNI Mayr

This species was originally described from Mozambique and has since been recorded elsewhere in East Africa and Natal. Dr. Myers

sent me a worker from south of Nelichu, Boma Plateau (No. 10469), near the Ethiopian frontier, and I found it at Mombasa, Kenya.

A worker was taken on the west slopes of the Imatongs at an elevation of about 4200 ft. The ant was in our hut at 6 a.m.

LEPTOGENYS (L.) AFRICANUS Weber

L. africanus is easily distinguished from the other and much commoner species by the petiole which ends in a spine like the ants of the genus *Acanthoponera*. The body is also coarsely sculptured. These ants cannot be mistaken for any other African ants.

All specimens were found on the western slopes in the Lotti Forest. One worker was captured while running down a tree at 30 cm. above ground. A colony was found in the Lotti Forest nesting in a piece of rotted wood 18 x 5 cm. which contained a nest of *Strumigenys escherichi lotti*. Like most *Leptogenys*, the ants were very active and took refuge under leaves and pieces of wood. When these latter were overturned the ants sometimes remained motionless until I tried to pick them up. What seemed to be nearly all the colony was collected and consisted of 25 workers. Perhaps like other species of *Leptogenys sensu strictu* the female is ergatomorphic, externally indistinguishable from a worker. The brood consisted of elongate, elliptical white eggs 1.52 x 0.39 mm., slender larvae with a neck whose body was covered with large tubercles bearing at or close to their apices eight or nine setae like a corona, and dark brown elliptical cocoons 6.9 mm. long.

ANOCHETUS

ANOCHETUS sp.

Over a dozen species of *Anochetus* have been described from Africa. The present species is sufficiently generalized so that it may belong to one of several species. These species are not represented by specimens in the United States and their descriptions are inadequate.

This species was found on the western slopes in the Lotti Forest. There are several hundred workers to the colony and the ants nest in rotted logs in the heavy rain forest.

ANOCHETUS SUDANICUS Weber

This new species is closely related to *A. ghilianii* Spinola of the Mediterranean region. The close relationship suggests that they have arisen from a common ancestor and that one of the species has migrated

through the valley of the Nile. It is possible that *A. ghilianii* is the species that has done the migrating and that *A. sudanicus* has remained closer to the ancestral home.

This ant was taken at the eastern base of the Imatongs at an elevation of about 2900 ft. in soil under a tree at Longoforok.

ODONTOMACHUS

ODONTOMACHUS HAEMATODA (L.)

This species is one of the common tropicopolitan ants and was originally described from "America meridionali." It is found throughout Africa.

While found only at the base of the eastern slopes of the Imatongs it has doubtless a wider distribution in these mountains. Workers were found in the vicinity of Molongori and above Longoforok at about 4000 ft. Beside a tributary of the Koss River on June 23 three separate nests were found under logs. Each consisted of a female with her first brood of eggs, larvae, and in one case cocoons. Each female formed a cell of humus under the log with a continuous wall. One cell was 28 mm. in diameter with a height of 5 mm.

ODONTOMACHUS ASSINIENSIS var. FURVIORE Wheeler

This variety of a widespread Ethiopian species has been recorded only from the Belgian Congo.

O. furvior occurs on both east and west slopes of the Imatongs below the *Acacia abyssinica* zone. In ascending the eastern slopes above Longoforok it was encountered only between about 4850 and 5000 ft., which at the time of this ascent was in the clouds. On the western slopes it was found at about 4800 and at 5500 ft. This variety was also collected at Khor Aba in gallery forest on the Nile-Congo divide at about 3700 ft.

MYRMICINAE¹

MESSOR

MESSOR BARBARUS GALLA var. RUFULA Forel.

The typical *barbarus* is found in North Africa. Various forms are recorded from East Africa, the Anglo-Egyptian Sudan and French Equatorial Africa. One subspecies is recorded from former German Southwest Africa. In general the genus belongs to the desert or xero-

¹ Formal descriptions of new species and subspecies will be found on pp. 355-379.

phytic plains. Two forms of this and the species *cephalotes* are recorded from comparatively high elevations in Kenya (Naivasha, 1900 m. and Nakuru, 1820 m.). I found both these Kenya localities strangely like the high, dry and rolling plains of Montana and Wyoming though less than one degree from the Equator. *M. barbarus* ssp. *galla* Emery was observed at Nakuru collecting seeds and nesting in similar fashion to its congener in western U.S.A., *Pogonomyrmex occidentalis*. The var. *rufula* was originally described from Eritrea and has since been recorded from Khartoum. The specimens which I collected at Khartoum were identified as *rufula* during my visit to the British Museum. These correspond closely to the Imatong specimens.

This ant occurs at the eastern base of the Imatongs and at 4640 ft. on the slopes. A single nest was also found at 6200 ft., on the southeast slopes of Mt. Garia. A large nest excavated at the village of Longoforok looked exactly like the nest of *Pogonomyrmex occidentalis* on the northwest plains of the United States. Externally the nest appeared as a low cone of gravel in a circular cleared area. In the sandy soil beneath were numerous small, horizontal chambers. Dealate females and a winged female were found in the upper 30 cm. of the chambers and the brood was still deeper.

A nest at 4640 ft. was at the corner of the resthouse above Longoforok and was sheltered by the overhanging thatch roof from vertically-falling rain. A trail led from the nest over which workers were passing in both directions. While I watched, it started to rain. The ants at first paid no attention to the drops and walked as usual. Then when the roof started to shed water a small pool formed on the path 40 cm. from the nest. Pebbles in it were only partly submerged. Some ants crawled through the pool, using the pebbles as stepping stones where they lay in a direct line to the nest. One worker was completely submerged in the pool but walked under water directly towards the nest. Evidently sight plays a part in their travelling. The ants were given Sudan date fruit which they cut up and carried down the nest. They ignored a small *Nylanderia* worker which walked among them.

The nest at 6200 ft. occurred well within the *Acacia abyssinica* zone but in a grassy, rocky area with cycads and aloes. The colony was found under a slab of rock too heavy for three blacks and myself to lift so that the nest could not be excavated. This slab was next to a slab under which a colony of *Camponotus maculatus* ssp. *melanocnemis* Santschi was nesting. Under a small piece of rock Messor workers had excavated tunnels in which both the ants and Thysanurans were running freely.

PHEIDOLE

PHEIDOLE MEGACEPHALA (Fabr.), subsp. near PUNCTULATA (Mayr)

The typical *megacephala* is found throughout the warmer parts of the world and is recorded from all parts of Africa. Eleven or twelve forms are also known from this continent, which is probably the original home of the species. This Imatong form is close to the ssp. *punctulata* (Mayr), described from Caffraria and since recorded from widespread African localities.

One nest was found on the eastern slope in a mountain meadow at an elevation of 7570 ft. Under a triangular rock about 15 cm. high and 20 x 30 x 30 cm. on the sides was a large colony of this small species. While irregular chambers extended into the wet black humus practically all of the brood and callows were stuck to the under surface of the rock. This was one of many lichen-covered rocks in a grassy glade that received sunlight when the skies momentarily cleared. The warming of the rock under sunshine would create a favorably warm environment for the ant brood and accelerate development. In the soil around the chambers were termites (*Anoplotermes* sp.) which were attacked by the ants when the rock was lifted.

PHEIDOLE MEGACEPHALA (Fabr.), subsp. 1402, 1384

The present form differs from the subspecies described above and the typical form in its larger size and darker color. The head of the soldier also is proportionately broader.

A colony was found on the western slopes at an elevation of about 6800 ft. The ants had an ordinary crater in the soil at the base of a flower stalk which was at the edge of a rock outcrop in a grass-cycad-aloe area. Brood was found in chambers in the crater itself, slightly above the general soil level. Probably the result of the brood being kept this close to the surface was to be warmed more effectively by the sun; the time of development would thus be shortened. Another colony, also found on the west slopes but at an elevation of about 6200 ft., is similar in appearance. Several ants are slightly paler but still distinctly darker than the two forms previously mentioned. The colony was nesting under a simple crater 20 cm. in diameter in black soil; when the nest was exposed workers ran off with live worker termites which were also unearthed. At a distance of only 46 cm. from this nest was a nest of another form of *P. megacephala* (ssp. 1384) which, even to the naked eye, was distinctly smaller in both worker and soldier

castes. The ants of the two subspecies mingled together in capturing termites.

PHEIDOLE MEGACEPHALA (Fabr.), subsp. 1384

This form is much the smallest form found in the Imatongs. In addition to the small size of both worker and soldier castes it is characterized by its very dark color and worker thorax being smoother than in the other forms.

A colony was found on the western slopes at an elevation of about 6800 ft. The crater nest of the ants was only 46 cm. from that of the ssp. 1402, 1384. The crater nest was 7.6 cm. in diameter, compared with 20 cm. in the other subspecies. Both sets of workers and soldiers mingled without hostility in capturing termites.

PHEIDOLE sp. near *LIENGMEI* Forel

This large species runs in Arnold's *Pheidole* keys (1920) to the *sculpturata* group and in this key to *liengmei* Forel. It agrees with his figure of the soldier *liengmei* head in general form except for the occipital corners being less sharply angulate and the transverse rugae being more reticulate. *P. liengmei* was originally described from Portuguese East Africa and it or its several forms have since been recorded from South Africa, Belgian Congo, and Tanganyika.

A soldier and probably conspecific workers were found on the east slopes above Molongori at an elevation of about 3300 ft. The ants were crawling over the ground in sparse grass-woodland.

PHEIDOLE sp. 1406

This dark brown to black species is characterized in the soldier caste by the finely and densely punctuate sides and occiput of the head. It differs from the species in collections in the U. S. and may well be new.

The ants occurred in the vicinity of a nest of *Meranoplus nanus* (q. v.) on the west slopes at an elevation of about 4900 ft. The ants were on the ground in the high (10 ft.) grass with scattered trees. The same species was found in humus in high rain forest of Khor Aba on the Sudan-Belgian Congo border west of the Imatongs, and on the plains in Long. 30° 37' E.

MYRMICARIA

MYRMICARIA EUMENOIDES OPACIVENTRIS var. CONGOLENSIS Forel

Plate 9

This polymorphic variety of a more widespread African species is reported from a belt of about five degrees north to twelve degrees south of the Equator across the continent. The maximum elevation recorded is 1400 m. on Mt. Ruwenzori (Wheeler, 1922, p. 825).

It was taken on the plains surrounding the Imatong Mountains and on the lower montane slopes but was especially abundant in the *Acacia abyssinica* zone. The maximum elevation where it was found nesting was about 7300 ft. which was here the upper margin of the *Acacia*. In this zone the *Myrmicaria* and *Dorylus molestus* (q.v.) were the co-dominant ants. It is essentially a forest insect though foraging freely at the margins of meadows and rocky outcrops. While usually the workers forage on the ground they were also observed climbing the *Acacia* trunks. The ant is insectivorous and workers were found carrying parts of adult and larval insects; one worker came to its nest carrying an ant of the genus *Crematogaster* which was still alive though missing its gaster (abdomen) and right hind femur.

The nests are formed either in the shape of earth mounds or simple craters, or under a flattish stone with no mound; all have subterranean galleries and chambers. The largest mound seen was one occupying an elliptical area 65 x 70 cm., having a maximum height of 15 cm. and with chambers extending down 70 cm. The queen and brood were in the bottom 10 cm. zone of chambers. Another large colony estimated to contain about 10,000 workers was found under a rock. The superficial galleries and chambers exposed by overturning the rock occupied a triangular area 30 x 40 x 49 cm. Chambers extended to 45 cm. and the queen was found at 42 cm. The subterranean chambers had a flat floor about 50 mm. in diameter with an arched ceiling a maximum of about 25 mm. high. In the large nests are found many Thysanurans, evidently scavengers usually ignored by the ants. A mound nest was seen which had been freshly trampled by what was probably a giant forest wart hog whose rootings were numerous thereabouts.

On the same day when *Dorylus molestus* (q.v.) files were unusually numerous, sample counts of *Myrmicaria* trenches across my trail showed them to occur from five to ten times in 1350 ft. of trail, an average of at least 20 to 40 per mile of trail. Every trench represented

a colony. The figures do not permit an accurate estimation but indicate a population of several hundred colonies per square mile.

CREMATOGASTER

CREMATOGASTER (C.) CASTANEA INVERSA var. FLAVIVENTRIS Sants.

C. castanea was originally described from Natal and it or its numerous forms are distributed generally throughout South and East Africa. It is apparently uncommon in West Africa. The variety *flaviventris* was originally described from the Belgian Congo and has since been recorded from Uganda.

Specimens agreeing well with Santschi determined Congo specimens except for darker head and thorax were taken in the Imatongs at elevations of about 6200 ft. and 6900 ft. in meadows on the western slopes. Those at 6200 ft. were nesting in the crevice of a rock situated amidst grass, aloes and cycads. They had walled 100 cm. of the crevice on one side and about 50 cm. on the other side with an unusually tough carton.

CREMATOGASTER (C.) CASTANEA F. Smith, subsp.

Workers belonging to an unknown subspecies of *castanea* were taken on the eastern slopes above Molongori at an elevation of about 2800 ft. These were in mesophytic grass-woodland.

CREMATOGASTER (C.) CHIARINII Emery, subsp.

C. chiarinii was originally described from Ethiopia. Varieties and subspecies have since been described from East Africa and the Congo. Khartoum, Sudan, is the type locality of the subspecies *subsulcata* Santschi, and I found a large colony of this ant in that city. The Imatong form differs both from *subsulcata* and workers from Tanganyika determined by Mr. Donisthorpe as *chiarinii*. It is lighter than either and differs in details of sculpture and pilosity.

Workers were taken on the eastern slopes above Molongori at an elevation of about 3300 ft. The ants were nesting in a clay nest of the common termite hereabouts, *Macrotermes natalensis*.

CREMATOGASTER (C.) sp.

This medium-sized dark and shiny species was found at the eastern base of the Imatongs near Molongori. The workers and ants of *Lep-*

togenys sp. were crawling on the base of a tall chimney mound of the termite, *Macrotermes jeanneli*.

CREMATOGASTER (C.) LATUKA spec. nov. (cf. p. 345)

This new species resembles in general habitus *C. gallicola* Forel described from Delagoa and *C. vulcania* Santschi from 2140 m. at Longonot Neck in Kenya. Specimens of the latter which I collected from *Acacia* galls at Nairobi, Kenya, are black and differ also in other characters. It has the color of *gallicola* but differs in spinosity and sculpturing.

A colony of this ant was found above Molongori on the eastern slopes at an elevation of about 4600 ft. The workers were found in a hollow twig 3½ ft. above ground on the slope of a ravine.

CREMATOGASTER (DECACREMA) LANGO spec. nov. (cf. p. 346)

This tiny new species is related to *C. liengmei* Forel of South Africa.

It was found on the eastern slopes above Longoforok at about 4000 ft. on the steep, rocky slopes covered with sparse grass-woodland. A worker was taken on a green leaf four feet above ground.

CREMATOGASTER (ORTHOCREMA) SORDIDULA Nyl,

MOLONGORI subsp. nov. (cf. p. 347)

The typical *C. sordidula* occurs in the region of the Mediterranean and in Turkestan and the Caucasus. Several forms are described from South Africa, one of which (*rectinota*) occurs also in Tanganyika.

Workers of the new subspecies were taken on the eastern slopes above Molongori at an elevation of about 4000 ft.

CREMATOGASTER (ORTHOCREMA) sp.

This ant, only 1.8 mm. long, belongs to a subgenus containing but few African ants.

A worker was found on the eastern slopes above Molongori at an elevation of about 4000 ft. in grass-woodland.

CREMATOGASTER (ATOPOGYNE) AFRICANA Mayr, POLYMORPHICA
subsp. nov. (cf. p. 347)

C. africana was originally described from Cameroon. Over a dozen varieties and subspecies have since been described but the distribution of them has been entirely West African except for a Rhodesian record. There are several Belgian Congo forms, including *tibialis*, *fickendeyi schumanni*, *laurenti*, and *zeta*. The Imatong new subspecies differs from all chiefly in its larger size, and for *Crematogaster*, extreme polymorphism. The genus *Crematogaster* is formally characterized as having monomorphic workers yet the Imatong subspecies is as polymorphic as many polymorphic ants. This striking condition was distinctive in the field and far exceeds that found in any of the hundreds of species of this world-wide genus I have encountered in the field or seen in collections. As they walk, the workers range in size from 3.3 to 6.4 mm. Of the numerous South African *Crematogaster*s described by Arnold only one (*C. acaciae victoriosa* Sant.) has a worker varying as much as two millimeters (3–5 mm.).

A dense file of workers was crossing a log on the western slopes at an elevation of about 4500 ft. in high rain forest.

CREMATOGASTER (ATOPOGYNE) DEPRESSA Latr., var. FUSCIPENNIS Em.

C. depressa was originally described from the Guinea Coast and it and its two varieties are recorded from only West African localities. The subgenus itself is West African.

Workers of *fuscipennis* were taken on the western slopes of the Imatongs at an elevation of about 4700 ft. The ants were about 30 ft. up in a tree and had erected carton sheds between small lianas and the tree trunk. Their bite could be felt distinctly and made my position in the tree uncomfortable. They were seen only in one khor of high rain forest and some were striking in appearance because of their dark brown head and thorax and bright yellow gaster. In others the gaster (abdomen) was darker and contrasted less with the rest of the body.

CREMATOGASTER (SPHAEROCREMA) GAMBIENSIS (E. André), subsp.

The typical *gambiensis* is recorded from West and East Africa. A variety is known from Natal and the var. *transversiruga* Santschi is described from Lado and Redjaf on the upper White Nile.

Workers of this sub-species and *Pheidole* came to a nest of *Myrmecaria congolensis* which I was observing. The nest was found at 6790 ft. in the *Acacia abyssinica* zone.

CREMATOGASTER (SPHAEROCREMA) sp.

Workers of this unknown species were taken at Longoforok at the eastern base of the Imatongs at an elevation of about 3200 ft. The ants may be recognized by their shiny, ferruginous body with stout, recurved epinotal spines.

CREMATOGASTER (SPHAEROCREMA) LOTTI spec. nov. (cf. p. 358)

This dark, shiny species with a smoothly concave pronotum is related to *C. bequaerti*. It appears to be common in the Lotti Forest and was taken a number of times. A colony was found at a height of 80 cm. in a hollow stub of a branch. The stub was eight centimeters long and contained a queen with 66 workers, pupae, larvae and eggs. These workers were mostly much paler than those collected elsewhere in the forest.

CREMATOGASTER (SPHAEROCREMA) ZONACACIAE spec. nov. (cf. p. 359)

This species is close to *C. bequaerti*, *kneri* and *striatula*, all described from West Africa. Varieties of *bequaerti* and *kneri* have since been described from East and South Africa. It might perhaps be attached to any one as an extreme subspecies. From *striatula* var. *obstinata* Santschi of the Congo it differs chiefly in distinctly larger size and darker color.

Workers were taken on both the eastern and western slopes of the Imatongs. At an altitude of 6800 ft., well within the *Acacia abyssinica* zone, several were under a stone in a clearing. One was taken as it came to a nest of *Myrmecaria congolensis* which I was examining. To this same nest a *Myrmecaria* worker came with a *Crematogaster* which was still alive though its gaster and right hind leg were missing. At an altitude of about 4700 ft. on the western slopes a colony was found nesting in a hollow liana from 60 to 90 cm. above ground.

A female, doubtless conspecific with the above workers, was taken on the eastern slopes at 6400 ft. She was in a rotted twig 30 cm. above a boulder beside a waterfall and starting her colony. The twig was 12 mm. in diameter with a central cavity 5.5 mm. in diameter and 18 mm. long. Several elliptical white eggs 0.57 x 0.34 mm. and nine small larvae were found.

MONOMORIUM

MONOMORIUM (M.) MINUTUM Mayr, KINETI subsp. nov. (cf. p. 359)

Plate 10

M. minutum was originally described from Italy. One of the numerous subspecies and varieties since described is the subspecies *minimum* Buckley which is common and widespread in North America. Other forms have been described from as widely separated localities as Hawaii, Brazil, and Java. Several forms have been described in Africa, from Eritrea to South Africa.

The only ant extending to the top of the highest peak in the Imatongs, Mt. Kineti (10,458 ft.), proved to be a new subspecies of *minutum*. It is related to the subspecies *pallidipes* Forel of Eritrea, Kenya, and the lower Sudan but clearly distinct from the latter and other forms. *M. pallidipes* was recorded from 1700 m. (5576 ft.) in Kenya. No other species of *Monomorium* has been recorded before from over 2800 m. (9190 ft.) in Africa but this is probably due to the small size and inconspicuousness of the ants. It is probably a characteristic ant of higher altitudes in African mountains in general.

M. kineti was abundant on the very top of Mt. Kineti. Immediately after reaching and photographing the cairn at the highest point on the peak I sought for ants in the turfy ground. Most of the time the sun was hidden by low clouds which eventually enveloped us and the temperature was so cool that it seemed unlikely that ants would be scurrying about. Only after some search was the first colony found. It was nesting 10 ft. from the south base of the cairn at the base of a ten-inch dead, woody stem. None of the ants were above ground and it was only by pulling up the stem that the ants were discovered. They occupied cavities in the rotted base which was one to three centimeters in the soil, or in irregular chambers in the surrounding rich, black soil. Besides brood the nest contained a single male, a winged female and two dealate females. After discovering that ants were not exposing themselves to the clouds of Mt. Kineti but were in their nests, seven more nests of *Monomorium* were found on the summit during a systematic search. These nests were in the soil under small stones or among roots of grasses growing as small hummocks with a south, east or open exposure. Five of the nests were about roots of several species of grasses on which the ants were pasturing coccids and at depths up to seven centimeters. In some cases the coccids were in the same chambers as the brood of the ants; in other cases the two were separate but

in adjacent chambers. When one nest was exposed the ants sluggishly carried away their own brood and left the coccids in an adjacent chamber to walk away by themselves. Six queens were taken from this nest and there were possibly more. In another nest the exposed tunnels reached a depth of nine centimeters and went down still deeper; most of the coccids here were in rootless chambers with ant brood and on bare rock forming one of the walls.

About 200 ft. below the top of Mt. Kineti on the west slope a colony was found, pasturing coccids on the roots of a moderately coarse grass. At an elevation of about 250 ft. still lower, workers were found running at four to five feet over damp, decayed bark of a tree standing in grass about 100 feet from cloud forest on the steep west slope. In the forest itself a large colony was seen on the southwest side of a tree in dead wood at a height of three feet.

At an elevation of 8785 ft. this subspecies was found running on a moss-lichen covered tree trunk four to five feet above the ground in cloud forest that contained no terrestrial ants. The ants crawled sluggishly. Careful search in the surrounding soil revealed only snails, earthworms, spiders, centipedes, beetles and an ichneumon-like wasp. Though mid-day the air was cool and except in direct sunlight the ground was cold.

The lowest elevation at which this ant was found was 8180 ft. Four nests were found at the edge of a *Podocarpus* forest. Three were in herbaceous stems in the margin of the mountain meadow. One of these was in a stem 15 mm. in diameter lying in bracken. The inside of the brood cavity was wet. Another was in a vertical stem. The ants occupied various parts of the rotted pithy cavities to a height of 25 cm. One of the four nests was in a rotted knot of a lichen-covered dead tree at a height of five feet.

The coccids from the Mt. Kineti nests have been identified by Dr. Harold Morrison as a probable new species belonging to what European workers have regarded as the genus *Ripersia*. The coccids are closely related to *Ripersia glandulosa* James of Nyeri, Kenya. The same species of coccid was tended by the ant, *Tetramorium squaminode nubis* (q. v.) at an elevation of 9200 ft.

MONOMORIUM (M.) MINUTUM Mayr, ARBOREUM subsp. nov. (cf. p. 360)

The palest *Monomorium* found in the Imatongs proved to be this new subspecies. A single colony was taken at an elevation of about 6200 ft. on the west slopes in forest of moderate height but of a peculiar

open type. The ants were nesting in humus about the roots of a large fern plant growing from a tree at a height of about 16 ft. A single worker of the remarkable new dolichoderine genus, *Axinidris acholli* Weber, was also found here.

MONOMORIUM (M.) MINUTUM Mayr, subsp. 1365

This form was taken once at an elevation of 4640 ft. on the east slope of the Imatongs. While I was taking refuge from a rain under the thatch of the resthouse above Longoforok a worker crawled over my hand and another was observed on the mud wall. The yellow-tipped antennae contrast with the dark shiny body which is darker than that of *kineti*. The color, even and feebly convex basal surface of the epinotum and the proportions of the postpetiole distinguish it from the other forms of *minutum*.

MONOMORIUM (M.) ESTHERAE spec. nov. (cf. p. 361)

This new species is close to *minutum* but differs from the forms of *minutum* found in the Imatongs in shape of head and pedicel, in length of scape, and in color.

A single colony was found on the west slopes at the lower level of the *Acacia abyssinica* zone at an elevation of about 5000 ft. The ants had formed a tiny crater in the soil of an open grass-woodland slope. A single worker which appears to be this species was taken on the west slopes in heavy forest at an elevation of about 6100 ft. The forest was characterized by the presence of *Dracaena fragrans*. The ant was under the bark of a log on the ground.

MONOMORIUM (XEROMYRMEX) BICOLOR, near subsp. NITIDIVENTRE

Emery

This bicolored small *Monomorium* was originally described from Aden, Arabia, and has since been reported from Egypt to the Orange Free State. I took it at Atbara (Lat. 17° 40') on the Nile and at Ed Dueim (Lat. 13° 59') on the White Nile. A single worker, now headless, taken in the Imatongs appears to be a small form close to *nitidiventre*. It was found at an elevation of about 6000 ft. on the western slopes in the lower limit of the *Acacia abyssinica* zone.

SOLENOPSIS

SOLENOPSIS PUNCTATICEPS Mayr, JUBA subsp. nov (cf. p. 362)

Plate 11

The typical *punctaticeps* is known from various parts of South Africa with one record from the southern part of the Belgian Congo. Seven varieties or subspecies are known from South and East Africa.

This new and tiny yellow subspecies, dedicated to Juba, king of Numidia in Pompey's time, is one of the most abundant and characteristic ants of the meadows of the cloud forest-mountain meadow zone. A number of nests were found under or beside rocks in exposed grassy situations at elevations of 7570 to about 9200 ft. One colony was taken in the upper margin of the *Acacia abyssinica* zone at 6790 ft. under a stone in a grassy area, a habitat consistent with those higher up. It evidently demands a cool, moist and open situation and was never found in forests or under heavy shrubbery. As is true of many species of *Solenopsis*, this species is probably clestobiotic for galleries of their nests were found anastomosing with galleries of *Tetramorium simillimum isis*, *Tetramorium squaminode nubis* and *Camponotus maculatus nubis*. They may rob the larger ants of food and brood, be simple carnivores, or may "milk" coccids which lived on the roots of grasses extending into at least one nest. While they showed no hostility towards the sluggish *Tetramorium*, one *Camponotus* was firmly gripped on each mesothoracic leg by two *Solenopsis* when the two nests were exposed. The colonies are sometimes very large, certainly of many thousands, and the numerous galleries may ramify through an area of several square feet. Commonly the brood is kept in the superficial chambers immediately beneath a rock and segregated according to size and stage (egg, larva or pupa). Alate and dealate females were taken in one nest July 28 at about 9200 ft. The workers have the habit of holding the gaster upright at about a 45° angle when disturbed, like *Crematogaster*.

ANELEUS

ANELEUS POLITUS Santschi

This species has been known only from the original collection made in Kenya at an elevation of 1520 m. Nothing on the ecology is recorded.

At higher elevations, 6200 to 6400 ft., this ant was found upon several occasions in the Imatongs. While the localities were in the

Acacia abyssinica zone the forest in these localities was of a different nature and appeared more like rain forest. Lianas, mostly less than 10 cm. in diameter, festooned the medium-sized trees and looped to the ground. The conifer, *Podocarpus*, occurred but was nowhere dominant. Also characterizing the forest was the palm-like liliaceous plant, *Dracaena fragrans* (Plate 7).

In this moist habitat the *Aneleus* occurred under bark of rotted logs on the ground. Occupying the same micro-habitat were *Tetramorium simillimum* and *Ponera mesoëpinotalis*. All were comparatively sluggish and of small size.

PAEDALGUS

PAEDALGUS SUDANENSIS spec. nov. (cf. p. 365)

Two species of the genus *Paedalgus* are known from Africa, *infimus* Santschi of French Guinea and *termitolestes* Wheeler of the Belgian Congo. Only one other species, *escherichi* Forel, is recorded in the *Genera Insectorum*. This is the genotype and is from Ceylon. The two African species are known only in the worker castes and are 0.8 to 1.0 mm. in length.

What is probably a female of this genus was taken at the east base of the Imatongs at an elevation of 2530 ft. Since no African females are known, it is impossible to correlate it with either of the two species. It agrees with paratype workers of *termitolestes* in general sculpturing of the head and thorax and in the structure of the pedicel but is, of course, much larger, is much darker, has differently shaped funicular joints though 10 in number, epinotal tubercles, gastric sculpturing and pilosity. The whole ant is covered with a fine, dense, whitish pilosity which is very short and upright. The ant was captured as it crawled about in the evening and had probably been attracted by the camp light.

HYLIDRIS

HYLIDRIS MYERSI Weber

I recently described this distinct new genus and species from specimens which I found in Khor Aba on the Belgian Congo-Anglo-Egyptian Sudan border. These ants were in humus on the floor of high gallery forest.

One worker was collected in the Lotti Forest. The ant was crawling over an open place in the forest floor after the regular afternoon rain.

MERANOPLUS

MERANOPLUS NANUS subsp. SORICULUS Wheeler

M. nanus was originally described from the French Congo and the subspecies *soriculus* from the Belgian Congo.

A polymorphic colony was taken on the western slopes of the Imatongs at an elevation of 4900 ft. The slopes were covered with grass over ten feet high with scattered trees, including *Acacia*. The ants looked like hairy spiders because their telescoped thorax made the body resemble the cephalothorax of spiders. They were nesting at the base of a clump of grass and had their brood in a chamber 35 mm. below the entrance. The hairy larvae stuck to the sides of the small chamber; the ants moved slowly and had it not been for approaching rain and a long trek ahead the colony could easily have been collected in entirety.

CALYPTOMYRMEX

CALYPTOMYRMEX (C.) BREVIS spec. nov. (cf. p. 366)

The genus *Calyptomyrmex* includes two subgenera, *Calyptomyrmex s. str.* and *Dicroaspis*. Both include rare and tiny ants with the general habitus and behaviour of *Strumigenys* except for normal myrmicine mandibles. The resemblance is the more marked because of the large, squamate body hairs.

The species of *Calyptomyrmex s. str.* are West African except for a Rhodesian species. The present species appears related to *C. piripilis* Santschi, judging from the original description, but is smaller and with epinotal and petiolar structural differences.

Collections of this species were made twice on the western slopes of the Imatongs at elevations of about 3300 and 4200 ft. Workers were taken in the Lotti Forest in a rotted log on the ground. The ants were in red clay filling the hollow shell and above the general soil level. A colony was taken at 4200 ft. in the grass-woodland margin of a khor filled with rain forest. The ants were nesting in the red clay above the brood chambers of a colony of the large ant *Camponotus (Dinomyrmex) pompeius cassius*. The *Calyptomyrmex* nested several centimeters beneath the soil in irregular tiny chambers. They were slow-moving, "feigning death" momentarily when disturbed and greatly resembled neotropical dacetonines.

MACROMISCHOIDES

MACROMISCHOIDES VIRIDIS spec. nov. (cf. p. 367)

The genus *Macromischoides* was erected by Wheeler in 1920 for two closely related and distinctive species (*aculeatus* and *africanus*) which Mayr in 1866 described and placed in the neotropical genus *Macromischa*. These species were placed by Emery in 1896 in the genus *Tetramorium*. They differ from *Tetramorium* morphologically and in their habit of building carton nests in trees. Both are recorded from various West African localities and the basin of the Congo. Santschi has recently (1937) recorded a third species from Cameroon.

The present new species was taken to the British Museum on my return from Africa and my colleague, Mr. Donisthorpe, and I endeavored to determine it. He had received workers from the Musée Belge from the Congo and determined these as new. Mine appeared conspecific and in view of the fact that I had taken male, female and worker castes he suggested that I describe them.

This species is notable in having the gaster (abdomen) a distinct metallic bluish-green in color. The color is more noticeable in life than when preserved dry or in alcohol though it is not alcohol-soluble and is probably a structural color.

The species occurs on the western slopes of the Imatongs where it was taken at elevations of about 4200 and about 4700 ft. Carton nests of five colonies were found in rain forest. Five nests were on leaves of *Afromum* and two on leaves of a large tree, *Pseudospondias microcarpa*.

Three nests were found on leaves of a plant 2 meters high of *Afromum*, one at a height of about 1.5 m. Four other nests were on leaves of other specimens of the same species of plant. This plant grew in a rank growth of herbs, small trees, vines, and scattered large trees in a khor that was elsewhere covered with high rain forest. The *Macromischoides* was the dominant ant as well, perhaps, as the dominant insect in an area of this rank, low growth about 7.5 m. long and 2 m. wide. They overran the vegetation in large numbers and stung viciously. The ants did not make for the head especially as a related species has been reported to do in the Belgian Congo (Wheeler, 1922, p. 189). The sting of the ants in this locality lasted only momentarily, hardly a minute, but those nesting in *Pseudospondias* some miles away stung much more fiercely.

The nests in *Afromum* were chiefly on the underside but also on top of the long leaves. They varied in length from 95 to 300 mm. and in width from 40 to 110 mm. with an average length and width of 195 x 76

mm. The carton was vegetal in origin and some gave off a green color in alcohol. Plant fibers of various kinds were used. The nest consisted of walls and either a top or bottom of carton, depending upon whether the leaf afforded a floor or a roof. The height of the space thus available varied from 0 to 13 mm. Much brood was found in several nests, also winged males which did not attempt flight when the nests were disturbed. The plant was so dependent on a constant water supply for its turgidity in this humid khor that, when one was cut and taken out to a clear area for photographing, the leaves curled up in the five or ten minute interval. While hunting hornbills about one-half mile distant many plants of *Afromum* were examined but they contained no ants.

The two nests on the *Pseudospondias* tree were 2.1 and 2.4 meters above the ground. Many other nests were seen higher up on the tree on the same west side. The ants used a curled-up leaf for nesting, walling up the openings with carton, or suspended a nest of carton from the under surface of a fresh green leaf.

The stings of these ants were more painful and more virulent than those on *Afromum*. A number stung me at 12 noon and from 12 to 12:40 p.m. a score of lesions became apparent on the medial surface of the right forearm where the hair was comparatively scanty. The lesions were 3-5 mm. in diameter and in color like a mosquito "bite." At 1:30 p.m. the pain was gone but the lesions still apparent.

OCYMYRMEX

OCYMYRMEX WEITZECKERI Emery, CELER subsp. nov. (cf. p. 368)

The genus *Ocymyrmex* has not hitherto been recorded from this part of Africa, being known only from about 15° S. Lat. southwards and from a strip of East Africa extending to the Gulf of Aden. The present record extends the range markedly towards the West African rain forest. The range of the genus, however, still includes only the deserts and dry plains. The ants are particularly well adapted to life in these regions because of the rapidity with which they can move over the hot ground and because of the psammophore or beard of long hairs which probably tends to reduce evaporation from the mouth.

O. weitzeckeri was originally described from Basutoland and has since been recorded generally from South Africa, except the southern part, and up to Angola and Tanganyika.

This new subspecies inhabits the dry plains with scanty, short grass and thorn scrub immediately to the north of the Imatongs and

may well be found on the dry lower slopes. They were collected at Torit, Muragatika, and several miles north of the northern base of the mountains.

The ants form a crater type of nest on the plains. One crater was 21 cm. in diameter and 15 mm. high, with brood kept in chambers deep in the soil. A nest was excavated to a depth of 40 cm. without finding brood. At a depth of only 3.8 cm. in another nest, however, a small chamber was found containing flower parts and remains of eight workers of *Euponera* (*Brachyponera*) *sennaarensis* (Mayr). This is evidence that they not only are harvesters, as has been supposed, but also insectivorous.

Astonishingly "intelligent" behavior was exhibited by workers of one colony. On a calm, hot and clear afternoon at 4:35 p.m. when I came to within 27 cm. of their nest they ran for their crater nest entrance in great agitation and disappeared down it. I then stood still with the forward foot 27 cm. from the entrance but my shadow was cast toward it. One worker quickly rushed out and began dragging down pebbles (3-4 mm.) in diameter up to half the length of the ant. After several minutes of this frenzied activity it not only filled up the hole but made a slight mound above. The ant stood with its posterior end toward the hole and, using its fore legs as a dog would, sent a shower of sand and small pebbles towards this entrance. It actually cleared away all loose soil on the side of the nest opposite from me in the form of a semicircle. At 4:45 I moved to a point 100 cm. away. At 4:48 it circled the top of the mound several times. At 4:53 a native called my attention to something and when I momentarily looked away the ant disappeared. After an intensive search it seemed possible the ant had gone down a small hole nearby which may have been a side entrance. The original hole, of course, was entirely filled up. The ant may, however, have wandered off to spend the night under any shelter available until the nest would be reopened by the ants in the nest.

A possible interpretation of this behavior is that ordinarily the setting sun causes scrub on the west side to cast a shadow over the entrance, and stimulates the ants to fill it up for the night. When I cast a shadow at 4:35, when the sun was already low in the sky, this was the same kind of stimulus but merely premature. The ants, however, responded so quickly that they seemed to act in a purposeful or "intelligent" manner to protect their nest from the threatened danger.

TETRAMORIUM

TETRAMORIUM VITICOLA spec. nov. (cf. p. 372)

This species is remarkable in being an arboreal species, the species of *Tetramorium* being terrestrial like *Myrmica* of the Holarctic Region and closely resembling the latter also in appearance. The genus *Leptothorax*, resembling both genera, contains many twig inhabiting species and is found rarely in Africa. That the present anomalous species cannot belong to *Leptothorax* is indicated by the sharply trenchant ridge of the clypeus in front of the antennal insertions.

A colony was found on the western slopes of the Imatongs at an elevation of about 4700 ft. The ants nested in high rain forest of a khor in a dead hollow liana attached to a tree at a height of 30 feet above the ground.

TETRAMORIUM SIMILLIMUM (F. Smith)

The Imatong specimens agree well with specimens from Java, Fiji, Queensland, Jamaica and Cuba of this tropicopolitan species except in slightly darker color. No less than six varieties and subspecies from African localities are recorded in the Wheeler catalogue and in addition, recorded in the *Genera Insectorum*, are an Indian subspecies and varieties each in Ceylon and Madagascar. The preponderance of African forms points to Africa as the original home of this tropicopolitan species, and this is further attested by the present and other Central African records. All of the Imatong specimens were found on the west slopes at elevations of 6100 to 6600 ft. While within the *Acacia abyssinica* zone the ants were not found in this forest but always in a peculiar type with *Dracaena fragrans*, *Podocarpus* and other trees with numerous lianas looping to the ground.

A colony was found nesting in the juicy white stump of a *Dracaena* about two feet from the ground. Part of the nest was under moss in humus filling the depressed upper end of the stump. Another colony was nesting under the mossy bark of a fallen tree. A third colony, also under bark of a fallen tree, had irregular chambers in which larvae were scattered and held in place by their hairs. The workers "feign death" momentarily but can move comparatively fast.

TETRAMORIUM SIMILLIMUM (F. Smith) ISIS subsp. nov. (cf. p. 373)

This new subspecies of *simillimum*, dedicated to the Egyptian goddess Isis, is distinctly darker than the typical form and differs in details

of structure. It also occurs mostly at higher elevations in the Imatongs, and on both slopes, though colonies were found at elevations from 4900 ft. to 8700 ft.

At 4900 ft. a colony nested in a grass-woodland area with grass 10 ft. high and scattered *Acacia* trees. The nest was under thin moss on dark red slippery soil 11 cm. from the nest of *Meranoplus soriculus* (q.v.). The *Tetramorium* occupied superficial galleries 2–4 cm. down. Workers at 6800 ft. were crawling on wet ground in weedy growth of an open area in *Acacia abyssinica* forest.

Those ants found at 8500–8700 ft. were in grassy areas or on lichen-covered rocks of rocky outcrops. Several nests were in the form of irregular chambers in the black humus under flattish rocks.

TETRAMORIUM SQUAMINODE Santschi, *NUBIS* subsp. nov. (cf. p. 369)

This new subspecies and the typical form are of particular interest in that they seem to be confined to cloud forests at comparatively high altitudes. Alluaud and Jeannel made a number of collections of *squaminode* in the alpine zone of Mt. Kilimanjaro (2600–3800 m.). The highest collections were recorded from the "zone des bruyeres superieures, altitude" 3,800 m. (Santschi, 1910, p. 356). There are three additional forms of this species (ssp. *do* Forel, vars. *flaviceps* and *mus* Arnold) from hills in Rhodesia, the altitudes not being stated but presumably being much lower.

The Imatong collection was made at about 9200 ft. in a meadow. The ants were nesting in black humus beside a rock. Their galleries were exposed to a depth of 70 mm. and a breadth also of 70 mm. On grass roots (Myers No. 11580) penetrating the galleries were coccids tended by the ants. The coccids, "*Ripersia*" probably n. sp. near *glandulosa* James, were of the same species as those tended by *Monomorium kineti* (q.v.).

In the nest was a small ferruginous beetle, evidently a myrmicophile, which had trichomes or coarse hairs bordering the head and pronotum.

TETRAMORIUM SERICEIVENTRIS var. *ARENARIUM* Santschi

The variety *arenarium* of a widespread African species was described from Tunis and has since been recorded from Algeria, Senegambia and Abyssinia. Santschi also has recorded both this variety and his variety *hori* from Khartoum, Anglo-Egyptian Sudan. As

probably only one variety occurs in this city and as both were described originally at the same time and on the same page the name of the first one is used. My specimens from the Imatong region and those I took at Khartoum are of the same form.

This ant is an ant of the xerophytic plains and was found on the plains immediately north of the Imatongs. Like *Ocymyrmex* it probably occurs on the dryer slopes. At Khartoum it had the curious habit of using the feces of small birds, especially the Sudan race of *Passer domesticus*, on its craters. Probably the function of the small bird feces was to act as a barrier to the swirling sand of the desert which would tend to fill the nest entrance.

TETRAMORIUM GUINEENSE subsp. MEDJE Wheeler

The subspecies *medje* of the cosmopolitan *guineense* was described from Medje, Belgian Congo. It occurs on the eastern slopes only in the sparse grass-woodland of the lower slopes to 6000 ft., the level of the *Acacia abyssinica*. Workers were found at 6000 ft., carrying live nymphs of the termite, *Cubitermes* (?) sp.

TETRAMORIUM JEANAE spec. nov. (cf. p. 371)

This distinct new species with comparatively smooth integument belongs to the distinctive ant fauna of the peculiar forest of *Podocarpus*, *Dracaena* and lianas on the west slopes. The species was taken at an elevation of about 6400 ft. Other ants occurring here were *Ponera mesoëpinotalis*, *Tetramorium simillimum*, *Aneleus politus*, and *Plagiolepis sudanica*.

TETRAMORIUM BREVIS spec. nov. (cf. p. 370)

An unusually small worker found at an elevation of about 5600 ft. on the western slopes proved to represent a new species. The ant was among grass more than six feet tall.

XIPHOMYRMEX

XIPHOMYRMEX WEITZECKERI Emery

This species was originally described from Natal and has since been recorded from Rhodesia, Angola, and the Belgian Congo. Two forms

are present in the Imatongs, one of which is probably the typical form or very close to it. The latter is distinct from the new subspecies in having shorter antennal scapes, smaller size and paler color.

A dealate female was found on the western slopes at an elevation of about 3500 ft. The ant was in high rain forest above the Lotti Forest and was under leaves on the forest floor. A worker which agrees well with the female except for naturally smaller size was taken on the western slopes at an elevation of about 4800 ft. It was in open forest on the ground among leaves.

XIPHOMYRMEX WEITZECKERI Emery, *EDITHAE* subsp. nov. (cf. p. 375)

The present new subspecies, as mentioned above, differs from the typical form in having longer antennal scapes and much darker color. Compared with Orange Free State specimens it has also the sides of the petiolar node less convex, the postpetiolar node thicker and the hairs distinctly longer. The size is about the same.

This ant occurs on the western slopes of the Imatongs at the lower edge of the *Acacia abyssinica* zone (about 5700 ft.) and at about 4800 ft. Like other *Xiphomyrmex*, it is terrestrial.

XIPHOMYRMEX MINUSCULUS Santschi, *AMEN* subsp. nov. (cf. p. 376)

X. minusculus was described from Cameroonia and has not been recorded elsewhere. The present ant, dedicated to the Egyptian god Amen, agrees well with Santschi's description and figures, being similar in small size, dark color and general habitus. It differs, however, in shape of the epinotal spines, acute metasternal angles and proportions of the pedicel.

A worker was taken on the western slopes of the Imatongs at an elevation of about 4200 ft. The ant was found while excavating the nests of the *Calyptomyrmex-Camponotus cassius* association in grass-woodland near a khor of high rain forest.

XIPHOMYRMEX ZONACACIAE spec. nov. (cf. p. 376)

This new species appears to be one of the *Xiphomyrmex* species transitional to *Pristomyrmex* in having a carinate clypeal margin in front of the antennal insertions and a distinct transverse mesoepinotal carina. Santschi (1923, p. 286) considers two African species, *fossulatus*

Forel and *orbiceps* Santschi, as belonging to *Pristomyrmex* which has been supposed to be a genus belonging to the Indomalayan, Papuan and Australian Regions. These were originally described as *Xiphomyrmex*. The Imatong species differs markedly from either of these.

The ants belong to the *Acacia abyssinica* zone where they were found at 6800 and 7100 ft. A colony found at the higher elevation was nesting in the soil at the side of an imbedded rock. Irregular chambers extended to a depth of about five centimeters and in one side view extended over an area 40 x 40 mm. The ants were timid and walked moderately slow.

TRIGLYPHOTHRIX

TRIGLYPHOTHRIX GABONENSIS E. André

T. gabonensis was originally described from Gaboon and has since been recorded from Cameroon and the Belgian Congo.

The Imatong ants resemble Congo specimens closely but are slightly darker and somewhat smaller in size. The species occurs in the Lotti Forest. Workers were found walking on the ground after a rain.

TRIGLYPHOTHRIX MUCIDUS Forel

T. mucidus was originally described from the Belgian Congo and has since been recorded from several localities in that country. A Congo new record is just within its boundary with the Anglo-Egyptian Sudan on the Aba-Nile road where I took it in 1939.

Ants agreeing well with Congo specimens were taken in the Lotti Forest. Workers were taken on top of a fallen log. Others were taken crawling on the ground.

TRIGLYPHOTHRIX CINEREUS spec. nov. (cf. p. 377)

This small, coarsely sculptured ant is characterized by the feeble antennal scrobe and the postpetiolar node which, from above, is over two and one-half times wider than long. It resembles *T. marleyi* Forel of Natal in general habitus but is specifically distinct.

The species occurs on the eastern slopes of the Imatongs at elevations of about 3800 and 4100 ft. A colony nested in the soil between rocks on a steep, rocky, grass-woodland slope at the former elevation. Entrance was a simple hole leading to the chambers in the dry soil. They moved with moderate slowness and were gray in appearance because of their dense multifid hairs.

CATAULACUS

CATAULACUS TRAEGAORDHI Santschi

This species was originally described from Zululand and varieties are recorded from the Belgian Congo and Uganda. The Imatong material is insufficient to determine whether it represents a form of *traegaordhi* but it differs in distinct details from the Congo var. *plectroniae* Wheeler and Santschi's figure of the Uganda variety. I have received the same species from Mafia Is., Tanganyika (D. Vesey FitzGerald).

It occurs on the western slopes in the Lotti Forest. A worker was found on a leaf about eight feet above ground.

CATAULACUS PYGMAEUS E. André, subsp.

This species was originally described from Sierra Leone and has since been recorded from the Belgian Congo. A number of subspecies and varieties are recorded from West and South Africa. I took a subspecies in the vast papyrus swamps of the White Nile or Sudd in about Latitude 8°N. which is smaller than the Imatong form (Weber, 1942a).

The present form was taken on the east slopes above Molongori at an elevation of about 4100 ft. The ant was on a dead grass stem at the margin of a bamboo thicket. When I made for it, it shifted to the opposite side of the stem and dropped down to the green grass below.

CATAULACUS sp. 1445

This species is striking because of its triangular head, antero-posteriorly compressed postpetiole, and almost circular outline of the gaster when viewed from above.

A worker was taken in the Lotti Forest on a leaf about eight feet above the ground.

CATAULACUS sp. 1445, 1447

This small species has a distinctive gaster which is elliptical, deeply and regularly rugose, and with numerous short pale bristles contrasting with the black integument.

Workers were taken in the Lotti Forest on leaves of trees.

STRUMIGENYS

STRUMIGENYS (CEPHALOXYS) ESCHERICHII Forel, LOTTI
subsp. nov. (cf. p. 378)

The genus *Strumigenys* is cosmopolitan and contains a large number of species. They are small, rare, hypogaeic ants and sometimes are taken while examining leaf mold or rotted wood. There are probably a score of species of the subgenus *Cephaloxys* known from all parts of Africa. *S. escherichi* was described from Eritrea and at least five varieties and subspecies have been described from South and West Africa. The species has been taken oftener than any other species of the entire genus in Africa.

The Imatong specimens appear to be a new subspecies differing from a cotype of *escherichi* in the American Museum of Natural History in having the petiolar node less squarish, the median pronotal carina more distinct, the mandibles rougher and the color darker. Several workers were compared in the British Museum with *S. alluaudi* Santschi and this species is also close.

The ants were taken only in the Lotti Forest on the western slopes. They were found twice in rotted wood on the ground. They looked and acted exactly like their neotropical congeners.

DOLICHODERINAE¹

AXINIDRIS

AXINIDRIS ACHOLLI Weber

This remarkable new genus and species of ant has been recently described (Weber, 1941 a). It differs strikingly from all known ants from Africa or elsewhere and the new tribe *Axinidrini* was proposed for it. It belongs to the subfamily *Dolichoderinae* which contains only one other endemic genus in Africa. Outstanding characteristics are the notched clypeus, six- and four-jointed maxillary and labial palpi, respectively, epinotal spines, and nodiform petiole. The character at once distinguishing it from other ants is the single projection rising from the epinotum, between the spines, which in profile resembles an axe blade, to which the generic name alludes.

It is known only from the Imatong Mountains. Workers were taken on the western slopes at elevations of about 4800 and 6200 ft. One was taken on the leaf of a liliaceous plant about seven feet above the ground. It probably dropped from the surrounding trees which were at

¹ Formal descriptions of new species and subspecies will be found on pp. 379-381.

least 100 ft. high. Another worker was taken from a branch which had just fallen 16 ft. from a tree. The forest here consisted of *Podocarpus*, lianas, etc.

TAPINOMA

TAPINOMA CARININOTUM spec. nov. (cf. p. 379)

This pale brown ant, only 1.9 mm. long, is distinctive in having a transverse carina separating the basal and declivous surfaces of the epinotum.

A worker was taken at the eastern base of the Imatongs at Longorok (elev. 2900 ft.). Others were taken at the eastern base at an elevation of 2500 ft. (Lat. 4°4'N., 32°57'E.).

TAPINOMA sp. 1447a

This large, dark brown *Tapinoma* is distinctive with its white coxae, anterior part of the femora and tarsal joints.

Single workers were taken in the Lotti Forest.

TAPINOMA sp. 1447b

This species resembles sp. 1447a in general habitus, differing in smaller size, paler tibiae and angular epinotum.

It occurs also in the Lotti Forest.

TECHNOMYRMEX

TECHNOMYRMEX ALBIPES (F. Smith) TRUNCICOLUS

subsp. nov. (cf. p. 380)

The typical *albipes*, originally described from Celebes, seems to be spreading throughout the tropics and warmer parts of the world. Three forms have been recorded from Africa, one variety being from 1900 m. at Naivasha, Kenya. After leaving the Sudan I passed through Naivasha; it appeared distinctly more arid, the grass sparser and the temperature fully as cool as the conditions under which the Sudan subspecies was collected.

Two colonies were taken on the west slopes in open areas of the *Acacia abyssinica* zone at 6200 ft. One nested in a twig of a lichen-covered gnarled tree with apple-like leaves. The other nested along about 18 inches of a dead flower stalk. A single worker taken at an elevation of about 4800 ft. on the west slopes appears to be this form and was taken in open forest.

TECHNOMYRMEX MOERENS Santschi, subsp.

T. moerens was originally described from French Congo and has since been recorded from French Guinea and Belgian Congo. The Imatong form is smaller (2 mm.) and differs, according to Santschi's figures (1923, figs. 40-42), in having the mandibles less convex and the epinotum descending more abruptly.

The Imatong form was found only in the Lotti Forest, where a worker was found on a leaf.

TECHNOMYRMEX INCISUS spec. nov. (cf. p. 380)

This species is distinctive in its deeply incised meso-epinotal suture. It is related in this to *T. rusticus* Santschi of the Belgian Congo but is smaller and the head much narrower.

A worker was found in the Lotti Forest on a leaf.

TECHNOMYRMEX LONGISCAPUS spec. nov. (cf. p. 381)

This species is near *T. moerens* Santschi of West Africa but the scapes are much longer and the epinotum lower. It is of the same length (2.6 mm.).

A worker was found in the Lotti Forest on top of a fallen log.

FORMICINAE¹**PLAGIOLEPIS****PLAGIOLEPIS (P.) SUDANICA** spec. nov. (cf. p. 381)

This species is related to *P. (P.) exigua abyssinica* Forel of Abyssinia but is noticeably darker and in other ways different. Africa is the home of at least eight species of this subgenus.

It was taken at elevations of 6400 and 6800 ft. in open situations in the *Acacia abyssinica* zone. The tiny workers forage through grass or over the lichen-covered rocky outcrops of steep slopes.

ACANTHOLEPIS**ACANTHOLEPIS CAPENSIS ANCEPS** Forel

A. anceps was described from Belgian Congo and has been recorded from various localities in that country.

¹ Formal descriptions of new species and subspecies will be found on pp. 381-389.

Workers of this form were taken on the mesophytic plains at the east base of the Imatongs.

ACANTHOLEPIS CAPENSIS Mayr, *ISSORE* subsp. nov. (cf. p. 383)

A. issore was found in the *Acacia abyssinica* zone nesting in the dead stub of a branch of this tree at an elevation of 6200 ft. The tree had just fallen, as proven by the freshness of its leaves, and the ant nest was in a branch at the top of the crown. The colony consisted of between 200 and 300 workers, 5 queens and brood.

Workers of this form were found also on the west slopes at about 5100 ft. where the *Acacia* zone dipped down a valley.

ACANTHOLEPIS CAPENSIS MINUTA Forel

A. minuta was described from Transvaal. The Imatong form is either *minuta* or a form very close to it, a question which cannot be settled at the present time by material now in the United States.

Workers were taken on the mesophytic plains at the east base of the Imatongs.

ACANTHOLEPIS CAPENSIS SIMPLEX Forel

This tiny black ant is recorded from widely separated localities along the African East Coast and as far inland as Uganda and Southern Rhodesia.

It was found in the lower part of the *Acacia abyssinica* zone in grassy or rocky outcrops at elevations of 6000 and 6200 ft. Like most *Acantholepis*, *A. simplex* nests in the ground. One colony with brood in a tiny cell lived so close to a colony of *Pheidole megacephala* subspecies that their galleries in places must have anastomosed.

ACANTHOLEPIS CAPENSIS Mayr, *THOTH* subsp. nov. (cf. p. 383)

The present new subspecies, dedicated to the Egyptian god Thoth, inhabits the eastern base of the Imatongs where a colony was found at 2800 ft. under a rock. The rock, 10 cm. in diameter, was lying on an open ridge of decomposed rock or gravel in a xerophytic area. The queen and brood were in irregular chambers in the well-drained soil.

ACANTHOLEPIS CAPENSIS VALIDIUSCULA Emery

This soil-inhabiting variety, originally described from Abyssinia, seems distributed over a large part of Africa. Arnold reports it very common in the Cape Province and Rhodesia and Wheeler records it from the Belgian Congo.

Workers were found in the Lotti Forest of the west slopes and a nest was found in the cloud forest-mountain meadow zone at an elevation of 7570 ft. The next was in grass surrounding a stone beneath which was a *Solenopsis punctaticeps juba* nest.

ACANTHOLEPIS CAPENSIS Mayr, ACHOLLI subsp. nov. (cf. p. 382)

Plates 12, 13

A. acholli occurs on the east slopes at elevations from 4640 to 6440 ft. Though the lower elevation is below the *Acacia abyssinica* zone the ecological conditions were similar to those above where a number of large colonies were found. The ants were found only in situations having abundant moisture from both rain and clouds. Except for one huge colony found nesting in soil at the base of plants creeping over a boulder the ants nested under flattish rocks in exposed situations. In the photograph (Plate 13) the carton made by the ants shows clearly. This carton, exposed when the small rock covering it was overturned, was strong enough to withstand the intermittent rain that fell while I photographed and collected the nest. It crumbles easily, however, under the finger and is not as tough as *Azteca* and some *Crematogaster* carton. Many queens are found in the large colonies which comprise several thousand workers. The nests may be polydomous, that is under a number of nearby rocks.

OECOPHYLLA

OECOPHYLLA LONGINODA (Latr.)

Ants of the genus *Oecophylla* construct nests by using their larvae as shuttles and weaving together leaves with the silk the larvae emit. The sole African species, *O. longinoda*, is found across Africa from Gambia to Abyssinia and south to Mozambique. The type locality is Senegal.

Though this ant was not found actually in the Imatongs it was common in various mango trees at Torit, a few miles north, and likely will

be found on the lower slopes. It was also found directly west, a few miles from the Belgian Congo border, at Kagelu. Scattered nests of this species were numerous on some mango trees and the ants clearly dominated the entire crown. When disturbed they cause a rattling sound like dry peas dropping on a plate by striking their bodies against the leaves and the nest. Such behavior is also exhibited by *Camponotus senex* and *Dendromyrmex apicalis* in the South American Guianas. When the mangos were disturbed the ants swarmed quickly over the intruder, biting human skin appreciably but not drawing blood. In nests were found various prey, mostly insects such as grasshopper, beetle, bee and ponerine ant parts. In one nest were found a Dipterous larva 12 mm. long and 3.5 mm. in diameter when alive and a live adult Dipteran. Quite possibly they were myrmecophilous but the nature of the relationship was not obvious. They may live between the leaves of the nest and feed upon the ant brood or pieces of insects brought by the ants.

CAMPONOTUS

CAMPONOTUS (DINOMYRMEX) LONGIPES (Gerst.)

This species was originally described from Mozambique but has since been recorded from East Africa generally, west to Sankisia, eastern Belgian Congo (lat. 26°), and south to Southern Rhodesia.

A few workers agreeing well with a damaged worker determined as this species in the Museum of Comparative Zoölogy were taken at elevations of about 3800 to 4000 ft. on the eastern slopes of the Imatongs. One was carrying what seemed to be a lump of starchy substance.

CAMPONOTUS (DINOMYRMEX) POMPEIUS subsp. CASSIUS Wheeler

This subspecies has been known only from the original collections at Yakuluku and Medje, Belgian Congo.

It was found on the western slopes of the Imatongs at elevations of about 4200 ft., 3300 ft., and 3500 ft. Both Dr. Myers and myself took this ant in high forest in and above the Lotti Forest (M. 10559, 10574, 10639) and I found a colony at the 4200 ft. elevation.

The colony had an oval entrance 20 x 11 mm. in diameter in red soil in a native pathway. From the entrance a trail of dropped soil particles extended in a straight line 37 mm. to the base of the crater which was of red clay. This crater was in the form of a semicircle

20 cm. in diameter and 12 cm. height at the crest. From the crest soil particles had tumbled down the outer slope for a distance of 32 cm. The nest was exposed to a depth of 45 cm. and extended still deeper. The nest consisted of simple irregular chambers and tunnels. Minima workers stood on guard in several exposed chambers but the maxima workers rushed out to attack. My Sudanese helper was bitten by one maxima on the forefinger which bled freely from a cut of 5.5 mm. length.

Under the slanting tunnel leading to the entrance and above the first chambers a colony of the rare genus *Calypatomyrmex* which proved to belong to a new species, *brevis*, was found. Also in the soil adjacent to the chambers was a tiny *Xiphomyrmex minusculus amen* and a small *Monomorium*.

CAMPONOTUS (MYRMOTURBA) MACULATUS SSP. MELANOCNEMIS Santschi

C. maculatus and its numerous forms have a remarkable distribution which includes the entire tropical world and in addition all Australia and much of the temperate part of Eurasia and the western United States. The typical form is African. The subspecies *melanocnemis* is recorded from French and Belgian Congo and Natal. Its varieties are described from an equatorial belt across the continent, one, *semi-spicatus* Santschi, being recorded from heights up to 2100 m. in Kenya. Because no one has worked out normal variation within this subspecies it seems futile at present to attempt to ascribe the Imatong form to one of the varieties, which itself may not be valid.

This subspecies seems the commonest *Camponotus* in the Imátongs and many specimens were taken from the surrounding plains to 6440 ft., well within the *Acacia abyssinica* zone. Both Dr. Myers and myself took it also on the Aloma Plateau close to the Sudan-Congo-Uganda junction at 3700 ft. (M. 10627) and he took it in the Azza Forest (M10734). I found this subspecies also 24 miles east of Jinja and at the Kawanda Experimental Station (4000 ft.) nesting in a sugar cane field, both localities in Uganda. At Kijabe, Kenya (6787 ft.) I found a worker of this subspecies under a piece of volcanic rock. On the south-west slopes of Mt. Garia at 6200 ft., in a grassy, rocky area with cycads and aloes, though within the *Acacia abyssinica* zone, a colony was found under a slab of rock 3.5 ft. in diameter. Many shallow chambers were exposed by overturning the slab and in these were many cocoons. The colony probably contained several thousand workers. The soldiers

were very aggressive and could bite the skin effectively, though not drawing blood.

On the eastern lower montane slopes a colony was found nesting under a stone and its surrounding tuft of grass. Other colonies were observed nesting in the ground with a simple entrance hole.

A colony at about 4200 ft. on the western slopes nested in the carton hemispherical nest of a termite, *Amitermes* (A.) *evuncifer* Silvestri. A third insect inhabitant was a colony of the driver ant, *Aenictus mentu*, under which this association is more fully described in this paper.

A toad taken on the mud floor of the mud-walled and thatched rest house at Longoforok 8:30 a.m. July 30 had in its stomach parts of six soldiers of *melanocnemis* and in addition part of a spider and 56 soldier and worker heads of three termite species (*Macrotermes jean-neli*, *Odontotermes* (O.) *nilensis* Emersom MS and *Acanthotermes* (*Pseudacanthotermes*) *spiniger* (Sjostedt).

CAMPONOTUS (MYRMOTURBA) MACULATUS subsp. BRUTUS Forel

The large, red *brutus* was originally described from the Portuguese Congo and has since been found to be generally distributed in West Africa and the Belgian Congo.

A soldier of this striking subspecies was taken in the Lotti Forest and a large worker in high forest on the western slopes of the Imatongs at an elevation of about 4500 ft. Both ants were in the same type of high, luxuriant forest. Dr. Myers took this in similar forest above the Lotti Forest (No. 10559) one or two hundred feet.

CAMPONOTUS (MYRMOTURBA) MACULATUS ssp. AEGYPTIACUS Emery

This subspecies was originally described from Egypt and has since been recorded from Eritrea.

Though the form generally found on the plains of the eastern base of the Imatongs and in the mountains themselves is clearly the subspecies *melanocnemis*, the workers of one colony clearly are similar to workers from Egypt determined as *aegyptiacus* in the British Museum.

This colony was found on the plains at the foot of the eastern slopes of the Imatongs at the place known as Molongori. The ants were observed migrating during the bright moonlight of July 30 at 8:45 p.m. and later. The moon was nearly full, the temperature warm and there

was a moderate breeze. Cumulus clouds were forming and lightning occurred intermittently. The ants were moving their brood from a nest entrance to a new entrance five meters away. Some of the brood was arranged in a semicircle around the old entrance but 8 to 15 cm. away from it. The ants moved in a steady column a few abreast and the soldiers were not observed to carry brood. The cause of this migration was not determined but I have observed migrations of ant colonies in the Neotropical Region caused by excessive parasitism, raiding doryline ants and excessive moisture in the nest.

CAMPONOTUS (MYRMOTURBA) MACULATUS (Fabr.), NUBIS
subsp. nov. (cf. p. 385)

Plate 11

This new subspecies is particularly interesting because it seems the Imatong congener of *C. maculatus kersteni* Gerst., originally described from Mt. Kilimanjaro, Tanganyika, at 8,000 ft. and since recorded from the same peak at 2740–3000 m. by Santschi. *C. kersteni* is apparently a true mountain ant like the Imatong congener.

In climbing Mt. Kineti from the eastern side five colonies were found, all at elevations from 8500 to 8700 ft, and at widely separated localities. Every nest was in a meadow and consisted of irregular chambers and tunnels in the black humus under stones or among grass roots.

The first nest found was at 10 a.m. at 8500 ft. and though the temperature seemed warm in the open, the damp soil felt cool. The ants seemed as sluggish as any *Camponotus* I ever collected. Chambers extended to 18 cm. and the brood was found from 3–18 cm. below the surface. 40 cm. away was a nest of *Tetramorium simillimum isis* and workers of *Monomorium* (*M.*) *minutum* ssp. and *Ponera coarctata imatongica*.

Workers at 8700 ft. were found under a rock which contained a colony of the same *Tetramorium*.

Three nests were found anastomosing with nests of *Solenopsis punctaticeps juba*, the latter apparently living in cleptobiosis with them. The *Camponotus* were attacked by their tiny thieves who could grasp the far larger *Camponotus* only by a leg or antenna. The galleries of two of the *Solenopsis* were above the *Camponotus* galleries or in moss surrounding the entrance to the larger nest. The chambers of the *Camponotus* were 1.5 to 3 cm. high and horizontal.

CAMPONOTUS (MYRMOTURBA) MACULATUS (Fabr.), SUDANICUS
subsp. nov. (cf. p. 385)

Most of the numerous forms of *maculatus* nest on or close to the ground in rotted wood, under stones, etc. This new subspecies is arboreal.

A single colony was found on the western slopes in luxuriant forest at an elevation of 6300 ft. The ants nested in the stub of a branch about 25 ft. up in a tree. Every effort was made to get the entire colony and probably not more than two or three escaped, among which must have been the queen. The queen in many ant species often rushes out the moment her nest is disturbed. There were 165 workers which were polymorphic though without a well-defined soldier caste. Brood consisted of eggs, larvae and worker pupae.

CAMPONOTUS (MYRMOTURBA) ACVAPIMENSIS Mayr

This species was originally described from the Gold Coast and has since been recorded from a large number of localities throughout the Ethiopian Region except in South Africa.

Stray workers were found on the eastern slopes of the Imatongs from the plains up to about 4000 ft. Mostly the ants were crawling over the rocky slopes in sparse grass-woodland and were one of the commonest ants in such localities.

Three colonies were found at an elevation of about 3700 ft. within 5.5 meters, two being 1.5 meters apart. Each was nesting under small rocks which were lying upon larger rocks except for thin layers of humus. Galleries honeycombed the humus and the brood was kept in the deeper chambers.

CAMPONOTUS (MYRMOSERICUS) RUFOGLAUCUS CINCTELLUS var.

RUFIGENIS Forel

Camponotus rufoglaucus in its many forms is found over the entire Ethiopian Region except West Africa and over the continental Indo-Malayan Region to Southern China. The subspecies *cinctellus* is widespread. The variety *rufigenis* Forel has been recorded only from the Belgian Congo.

C. rufigenis was found on the grass-woodland plains 60 miles east of

Juba on the Nile and on the eastern lower montane slopes of the Imatongs to about 3850 ft. The ant nests in the soil and may form a crater entrance. One entrance was under a small rock.

CAMPONOTUS (MYRMOSERICUS) RUFOGLAUCUS
subsp. FLAVOMARGINATUS (Mayr)

The subspecies was originally described from the Gold Coast and has since been recorded across Africa to Eritrea and south to Natal.

Workers taken on the eastern slopes at about 4000 ft. and the western slopes of the Imatongs at 4900, 5500, and 6200 ft. agree well with Belgian Congo specimens determined as *flavomarginatus* by Dr. W. M. Wheeler. There is not enough material for determining with certainty whether the Imatong may not be a variety of this subspecies. Those at 4900 ft. were taken on the ground in grass over ten feet high near a nest of *Meranoplus nanus* ssp. *soriculus*. Those at 5500 and 6200 ft. were taken in short grass areas and the latter extended into the *Acacia abyssinica* zone. A dealate female taken on the east slopes at between 5200 ft. and 6000 ft. appears to be this form. Another ant which I took at Er Renk (Lat. 11°45'N.) on the White Nile agrees well with these except for its more reddish head.

CAMPONOTUS (MYRMAMBLYS) CHAPINI Wheeler, GANZII
subsp. nov. (cf. 386)

C. chapini is known only from the original collections in northeastern Belgian Congo. This new subspecies differs distinctly in its larger size and darker color.

The single colony upon which the subspecies is based was found above Molongori on the eastern slopes of the Imatongs at an elevation of about 4100 ft. A small hole beside a rock led down into irregular tunnels between and around stones to many small chambers in which was the brood. The ants were not aggressive and there were probably about two hundred workers. Stray workers were collected a week before above Longoforok, also on the eastern slopes, at an elevation of about 4000 ft.

CAMPONOTUS (MYRMAMBLYS) HAPI spec. nov. (cf. p. 386)

This new species, named for the Egyptian term for the deified Nile, is particularly interesting because, judging from Santschi's description and figure, it is closely related to his *C. orinobates* of Mt. Kenya and the Kikuyu Escarpment at Kijabe (6800 ft.), both in Kenya. The

altitude on the slopes of Mt. Kenya is not specified. *C. orinobates* has five instead of six mandibular teeth and is in other ways different.

A single colony was found on the eastern slopes of the Imatongs at an elevation of 6700 ft. The ants were nesting in a dead twig 9 mm. in diameter and about 30 cm. long which had a central cavity of 3 mm. diameter. The twig was standing at the edge of the forest in a ravine of black humus. Fourteen workers and two alate females were recovered from the colony but many escaped. The brood recovered consisted only of elliptical, colorless young eggs 0.70 x 0.43 mm. and elongated-elliptical egg-like objects with a smooth membrane but opaque internally which were much larger, being 1.43 x 0.40 mm. These may have been eggs of another insect.

CAMPONOTUS (ORTHONOTOMYRMEX) SERICEUS (Fabr.)

C. sericeus like *C. rufoglaucus* is common to both the Indomalayan and Ethiopian Regions but the distribution is not exactly the same. *C. sericeus* is absent from South Africa but present in West Africa; the reverse is true of *rufoglaucus*. *C. sericeus* was originally described from Senegal.

Workers of this species were taken on the eastern slopes of the Imatongs at elevations of about 3800 ft. as well as on the plains below.

CAMPONOTUS (ORTHONOTOMYRMEX) VIVIDUS subsp. CATO Forel

C. vividus was originally described from Sierra Leone and has since been found to be generally distributed in West Africa, including the Belgian Congo, and there are records from Angola and Portuguese East Africa. The subspecies *cato* has been reported only from the Belgian Congo.

C. cato was found in the Lotti Forest and seemed not uncommon. Stray workers were picked up on the forest floor on fallen trunks and on leaves.

CAMPONOTUS (MYRMOTREMA) BAYERI Forel

This finely punctate black species with white hairs is recorded only from the Belgian Congo.

Single workers were picked up on the eastern slopes of the Imatongs at elevations from about 3900 ft. to 6000 ft., just below the very margin of the *Acacia abyssinica* zone. The ants were always found crawling over the rocky slopes where the grass and scattered trees were scanty.

CAMPONOTUS (MYRMOTREMA) sp. 1301-3

This black ant with finely punctate body and sparse, short, black bristles belongs to the group including *grandieri* For. and *olivieri* For.

It has the same distribution in the Imatongs as *C. bayeri*, the lower eastern slopes, but was not taken above 4100 ft. though doubtless it ascends to the *Acacia abyssinica* zone. The workers were found crawling over the rocky slopes amid sparse grass and trees.

CAMPONOTUS sp. 1447

This distinct species was taken in the Lotti Forest. It is characterized by its long, yellowish appressed pubescence and upright white bristles. These latter form a striking corona around the margin of the petiole.

CAMPONOTUS sp. 1442, 5

This species may be new but the material is insufficient for description. It is characterized chiefly by its high epinotum, very sparse white bristles, and the long, silvery pubescence appressed to the body.

Stray workers were taken in the Lotti Forest.

CAMPONOTUS (MYRMOPIROMIS) TRICOLOR spec. nov. (cf. p. 387)

This new species appears close to Santschi's recent (1935) *C. rotundinodes* of Belgian Congo, judging by his description and figure. He likens the latter to *C. conradti* Forel of Cameroon. The Imatong species however is clearly different in pilosity, sculpturing and probably head proportions. It is striking in appearance, being dark brown, almost black, with yellow antennae and leg joints, and has coarse white hairs on the body. The species was taken in the Lotti Forest.

POLYRHACHIS

POLYRHACHIS (MYRMA) SCHISTACEA var. DIVINA Forel

Plate 14

This variety, of a more widespread species, is recorded from East Africa and the Belgian Congo. The highest altitude reported is 1050 m. in Kenya.

This purple ant is more properly an ant of the lower montane slopes and the surrounding plains. Two large colonies, however, were seen just inside the lower level of the *Acacia abyssinica* zone at an altitude

of 5900 ft. where the *Acacia* dipped down into a valley. On the same slope but at an elevation of 4100 ft. occurred a particularly large colony which had formed a mound 60 cm. long, 30 cm. wide and 20 cm. high. It probably contained at least 20,000 workers. Males and cocoons were present.

POLYRHACHIS (MYRMA) CUBAËNSIS Mayr, IMATONGICA
subsp. nov. (cf. p. 388)

P. cubaënsis was described originally as from Cuba but the type locality was later determined as Port Natal, Natal. The genus *Polyrhachis* does not occur in Cuba or the New World. Several forms have since been described from Natal and East Africa.

Stray workers were taken on the east lower montane slopes at elevations of 3800 to 4000 ft. One was taken on a blade of grass, the others as they ran over the soil.

PSEUDOLASIUS

PSEUDOLASIUS MYERSI spec. nov. (cf. p. 389)

The genus *Pseudolasius* is represented by a number of species in the Indomalayan Region, at least one in Northern Australia, and four species in West Africa, Belgian Congo and Uganda.

This new species was found twice, once in the Lotti Forest and once in the gallery forest above it. One colony was under a log, the other under the bark of a fallen log on its under surface. The workers are strongly photophobic and remind one strongly of the northern *Lasius* (*Acanthomyops*).

PRENOLEPIS

PRENOLEPIS (NYLANDERIA) ALBIPES Emery, subsp.

This species has been known only from the original record of two workers taken in the Cameroons in 1899.

A worker taken in the Lotti Forest agrees in most respects with Emery's original description but is somewhat larger. It probably represents a new subspecies but the material is insufficient for description.

PRENOLEPIS (NYLANDERIA) sp.

Over a dozen species of *Nylanderia* have been recorded from Africa, including two common tropicopolitan species.

Several workers taken in the Lotti Forest probably represent a new species.

WORLD ANTS RECORDED FROM HIGH ALTITUDES

The scattered records of ants found at high elevations indicate that few species ascend above 10,000 ft. anywhere. Unfortunately specific records at the high elevations are not common and these are sometimes complicated by the failure to mention the ant caste involved. The winged castes, especially males, are likely to be carried to much higher altitudes by wind currents than are the colonies themselves and such records are of no particular significance.

An examination of Emery's parts of the *Genera Insectorum*, the world ant catalogue, revealed only 17 species of ants recorded from specified elevations of 2000 m. (6560 ft.) or more. These belonged to the genera *Myrmica*, *Aphaenogaster*, *Pheidole*, *Crematogaster*, *Dolichoderus*, *Brachymyrmex*, *Camponotus* and *Formica*. A search of other literature, however, revealed many more. In particular, Forel's study (1906) of ants of the Himalayas and Wheeler's work (1917) on the mountain ants of Western North America contained additional specific altitude records. These records of 2000 m. (6560 ft.) and some from lower altitudes from regions not otherwise represented are listed below. The North American records are those above 10,000 ft. in Wheeler (1917). Winged castes are omitted. It should be realized, of course, that such a list does not represent all of the species to be found at such elevations. It does represent, however, a large sample of the fauna. From personal observations in Western North America, for example, it is clear that more species occur here than are listed. No records are included for Eastern North America since the highest elevation east of the Rocky Mountains is only 7242 ft. (at Harney Peak, Black Hills, South Dakota). I found *Camponotus herculeanus whymperi* on the top of this peak and conditions were probably suitable for other species here. The peaks in North America east of the Mississippi River are 6,711 (6,684) ft. (Mt. Mitchell, North Carolina) or lower. Cole (1940) records only one species (*Stenamma brevicorne diecki impressum*) occurring at 6000 ft. in the Great Smoky Mountains and none above this altitude. On the summit of Mt. Washington (6293 or 6288 ft.), New Hampshire, Wheeler (1905) recorded no worker ants though nine species of the winged castes were found.

HIMALAYA MOUNTAINS

<i>Leptogenys</i> (<i>Lobopelta</i>) <i>diminuta</i> Smith	1000-2400 m.	(to 7870 ft.)
<i>Platythyrea</i> <i>sagei</i> Forel	1500-2000 m.	(to 6560 ft.)
<i>Euponera</i> (<i>Brachypone</i>) <i>luteipes</i> Mayr	1500-2160 m.	(to 7080 ft.)
" " <i>nigrita</i> Emery	1000-2400 m.	(to 7870 ft.)
<i>Aenictus</i> <i>ambiguus</i> Shuckard	2160 m.	(7080 ft.)
" <i>fergusoni montanus</i> Forel	900-2400 m.	(to 7870 ft.)
" <i>wroughtoni sagei</i> Forel	1500-2000 m.	(to 6560 ft.)
<i>Dorylus</i> (<i>Typhlopone</i>) <i>labiatus</i> Shuckard	1500-2000 m.	(to 6560 ft.)
" (<i>Alaopone</i>) <i>orientalis</i> Westwood	2160 m.	(7080 ft.)
<i>Tetramorium</i> <i>christiei</i> Forel	1200 m., 2160 m.	(to 7080 ft.)
" <i>elisabethae</i> Forel	2590 m.	(8500 ft.)
" <i>caespitum himalayanum</i> Viehmeyer	2800 m.	(9190 ft.)
<i>Crematogaster</i> <i>sagei</i> Forel	600-2000 m.	(to 6560 ft.)
" <i>himalayana</i> Forel	1500-2100 m.	(to 6890 ft.)
<i>Pheidole</i> <i>indica himalayana</i> Forel	1500-2160 m.	(to 7080 ft.)
" <i>jucunda fossulata</i> Forel	2000 m.	(6560 ft.)
" <i>javana dharmasana</i> Forel	1500-2000 m.	(to 6560 ft.)
" <i>sagei</i> Forel	1500-2000 m.	(to 6560 ft.)
" <i>bhavanae</i> Bingham	2500 m.	(8200 ft.)
<i>Monomorium</i> <i>sagei</i> Forel	1500-2000 m.	(to 6560 ft.)
<i>Leptothorax</i> <i>inermis</i> Forel	1500-2000 m.	(to 6560 ft.)
" <i>fultoni</i> Forel	1500-2000 m.	(to 6560 ft.)
" <i>rothneyi</i> Forel & var.	2160 m.	(to 7080 ft.)
" <i>wroughtoni</i> Forel	1981 m.	(6500 ft.)
<i>Myrmica</i> <i>pachei</i> Forel	3600 m.	(11,810 ft.)
" <i>smythiesi</i> Forel & forms	914-3600 m.	(to 11,810 ft.)
" <i>rugosa</i> Mayr & var.	1000-2600 m.	(to 8530 ft.)
<i>Aphaenogaster</i> <i>sagei</i> Forel & ssp.	2800-3600 m.	(to 11,810 ft.)
" <i>rothneyi</i> Forel	2100 m.	(6890 ft.)
" <i>cristatum</i> Forel	2000 m.	(6560 ft.)
" <i>smythiesi</i> Forel	2400-2700 m.	(to 8860 ft.)
<i>Messor</i> <i>barbarum himalayanus</i> Forel	2800 m.	(9190 ft.)
<i>Tapinoma</i> <i>wroughtoni</i> Forel	2000 m.	(6560 ft.)
<i>Acantholepis</i> <i>frauenfeldi integra</i> Forel	1500-2000 m.	(to 6560 ft.)
<i>Prenolepis</i> <i>aseta</i> Forel	2100 m.	(6890 ft.)
<i>Lasius</i> <i>alieno-flavus</i> Forel	2400 m.	(7870 ft.)
" <i>niger alieno-brunneus</i> Forel	1800-2700 m.	(to 8860 ft.)
" " <i>alienus</i> Först.	2700 m.	(8860 ft.)
" <i>brunneus himalayanus</i> Forel	1800-2700 m.	(to 8860 ft.)
<i>Formica</i> <i>rufibarbis</i> Forel	1600-3000 m.	(to 9840 ft.)
" " <i>kashmirica</i> Stäcker	3000-4125 m.	(to 13,530 ft.)
" <i>picea lochmatteri</i> Stäcker	2600-4800 m.	(to 15,740 ft.)
" " <i>orientalis</i> Ruzsky	3200-4500 m.	(to 14,760 ft.)
<i>Polyrhachis</i> <i>menelas</i> Forel	2160 m.	(7080 ft.)
<i>Cataglyphis</i> <i>cursor senescens kuenlunensis</i> Stäcker	1350-3700 m.	(to 12,140 ft.)
<i>Camponotus</i> <i>barbatus albosparsus</i> Forel	2160 m.	(7080 ft.)
" <i>buddhae</i> Forel	4000 m.	(13,120 ft.)
" <i>fallax himalayanus</i> Forel	2800 m.	(9190 ft.)
" <i>wroughtoni</i> Forel	2400-3600 m.	(to 11,810 ft.)
" <i>maculatus kattensis</i> Forel	1500-2000 m.	(to 6560 ft.)
" " <i>aethiops cachmiriensis</i> Forel	2438 m.	(8000 ft.)
" <i>dolendus</i> Forel	1000-2000 m.	(to 6560 ft.)
" <i>truncorum</i> Fabr.	1600-2900 m.	(to 9510 ft.)
" <i>glebaria rubescens</i> Forel	2000-2800 m.	(to 9190 ft.)

OTHER ASIATIC RECORDS

<i>Messor barbarus meridionalis</i> André	Turkestan	to 2438 m.	(to 8000 ft.)
<i>Pheidole allani</i> Bingham	Birmanie	500-2000 m.	(to 6560 ft.)
" <i>pallida arenarum</i> Ruzsky	Caucasus	to 1830 m.	(to 6000 ft.)
<i>Crematogaster desecta</i> Forel	Ceylon	2000 m.	(6560 ft.)
" <i>sordidula</i> Nyl.	Turkestan	to 2593 m.	(to 8500 ft.)
<i>Myrmica rubra</i> v. <i>khamensis</i> Ruzsky	Tibet	3477 m.	(11,400 ft.)
" <i>tibetana</i> v. <i>furva</i> Ruzsky	Tibet	3813 m.	(12,500 ft.)
" <i>kozlovi</i> Ruzsky	Tibet	3965 m.	(13,000 ft.)
<i>Aphaenogaster obsidiana</i> Mayr	Caucasus	to 3000 m.	(to 9840 ft.)
<i>Tapinoma emeryanum</i> M.	Turkestan	2400 m.	(7870 ft.)
" <i>erraticum</i> Latr.	Turkestan	to 2593 m.	(to 8500 ft.)
<i>Plagiolepis pygmaeus</i> Latr.	Turkestan	to 2438 m.	(to 8000 ft.)
<i>Myrmecocystus cursor aenescens</i> Nyl.	Turkestan	to 2741 m.	(to 9000 ft.)
" " <i>alpina</i> N. K.	Turkestan	3050 m.	(10,000 ft.)
" <i>bicolor setipes turkomanicus</i> Em.	Turkestan	to 2745 m.	(to 9000 ft.)
<i>Formica fusca picae</i> Ny.	Semiretshje	to 2500 m.	(to 8200 ft.)
" <i>rufibarbis montana</i> N. K.	Turkestan	to 2438 m.	(to 8000 ft.)
" (<i>Proformica</i>) <i>nitida</i> Kusnetzov	Turkestan	to 1980 m.	(to 6500 ft.)
<i>Camponotus buddhae</i> Forel	Pamir	2800 m.	(9190 ft.)
" <i>herculeanus</i> L.	Semiretshje	1700-2000 m.	(to 6560 ft.)

ALPS

<i>Formica fusca</i> L.	to 3000 m.	(to 9840 ft.)
<i>Myrmica myrmecoxena</i> Forel	2000 m.	(6560 ft.)
" <i>lobicornis</i> Nyl.	2000 m.	(6560 ft.)

MADAGASCAR

<i>Camponotus</i> (<i>Myrmoturba</i>) <i>radamae becki altior</i> Santschi	Highest point of island (9449 ft.?) (Mt. Adirgintra top)
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NORTH AMERICA*

<i>Myrmica brevinodis sulcinodoides</i> Emery	New Mexico	3965 m.	(13,000 ft.)
" <i>lobicornis fracticornis</i> Emery	Arizona	3965 m.	(13,000 ft.)
<i>Leptothorax acervorum canadensis</i> Prov.	Colorado	4304 m.	(14,110 ft.)**
" " " <i>convivialis</i>			
	Wheeler New Mexico	3355 m.	(11,000 ft.)
<i>Tapinoma sessile</i> Say	Colorado	3202 m.	(10,500 ft.)
<i>Lasius niger sitkaensis</i> Perg.	Colorado	3050 m.	(10,000 ft.)
" " <i>alienus americanus</i> Emery	Colorado	3050 m.	(10,000 ft.)
<i>Formica sanguinea subnuda</i> Emery	Colorado	3965 m.	(13,000 ft.)
" <i>bradleyi</i> Wheeler	Colorado	3660 m.	(12,000 ft.)
" <i>truncicola integroides coloradensis</i>			
	Wheeler Colorado	3965 m.	(13,000 ft.)
" <i>ciliata</i> Mayr	Colorado	3355 m.	(11,000 ft.)
" <i>whymperi alpina</i> Wheeler	Colorado	3355 m.	(11,000 ft.)
" <i>fusca</i> L.	Colorado	4270 m.	(14,000 ft.)
" <i>fusca neoclara</i> Emery	Colorado	3660 m.	(12,000 ft.)
" <i>neogagates lasiodes vetula</i>			
	Wheeler Colorado	3660 m.	(12,000 ft.)
<i>Camponotus laevigates</i> F. Smith	California	3355 m.	(11,000 ft.)
" <i>herculeanus whymperi</i> Forel	Colorado	3965 m.	(13,000 ft.)

* Ants from 10,000 ft. or more in Wheeler (1917) or from my *Myrmica* collection.

** Personal collecting.

CENTRAL AMERICA

<i>Ponera gracilicornis</i> Menossi	Costa Rica	2000 m.	(6560 ft.)
<i>Euponera</i> (<i>Trachymesopus</i>) <i>obsoleta</i> Menossi	Costa Rica	2000 m.	(6560 ft.)
<i>Pheidole innupta</i> Menossi	Costa Rica	2000 m.	(6560 ft.)
<i>Stenamamma schmidtii</i> Menossi	Costa Rica	2000 m.	(6560 ft.)

SOUTH AMERICA

<i>Eciton</i> (<i>Labidus</i>) <i>coccum</i> L., ssp.	Ecuador	3000 m.	(9840 ft.)
" " <i>praedator</i> F. Smith	Colombia	1830 m.	(6000 ft.)
<i>Cheliomyrmex andicola</i> Emery	Colombia	to 2588 m.	(8490 ft.)
<i>Pseudomyrma</i> sp.	Mt. Roraima top (Ven.-B.G.-Brazil)	2745 m.	(9000 ft.)
<i>Pheidole riveti</i> Santschi	Ecuador	3000 m.	(9840 ft.)
<i>Solenopsis pylades</i> Forel	Argentina	4000 m.	(13,120 ft.)
<i>Dolichoderus tener</i> Mayr	Chile	2000-3000 m.	(to 9840 ft.)
<i>Brachymyrmex bruchi</i> Forel	Argentina	4300 m.	(14,100 ft.)
" <i>laevis andina</i> Santschi	Argentina	4000 m.	(13,120 ft.)
<i>Camponotus</i> (<i>Tanaemyrmex</i>) <i>bruchi</i> Forel	Argentina	4300 m.	(14,100 ft.)
" " "			
" <i>lysistrata</i> Santschi	Argentina	4500 m.	(14,760 ft.)
" " <i>mus Roger</i>	Argentina	4000 m.	(13,120 ft.)
" <i>punctulatus termitaria</i> heliades Santschi	Argentina	2500 m.	(8200 ft.)

AFRICA

<i>Dorylus</i> (<i>Dorylus</i>) <i>brevipennis</i> Emery	Mt. Elgon	2470 m.	(8100 ft.)
" " <i>affinis</i> Shuckard	Mau Escarp.	2100 m.	(6890 ft.)
" (<i>Rhogmus</i>) <i>fimbriatus</i> Shuckard	Mau Escarp.	2400 m.	(7870 ft.)
" " <i>laevipodex</i> Santschi	Mt. Elgon	2470 m.	(8100 ft.)
" (<i>Anomma</i>) <i>nigricans</i> Ill.	Mt. Ruwenzori	2135 m.	(7000 ft.)
" " <i>burmeisteri</i> (Shuck.)	Fernando Po	2400 m.	(7870 ft.)
" " <i>burmeisteri</i> <i>molestus</i> (Gerst.)	Mt. Meru	3000 m.	(9840 ft.)
" " <i>stanleyi</i> Forel	Mau Escarp.	2420 m.	(7940 ft.)
<i>Ponera ursa</i> Santschi	Mt. Elgon	2300 m.	(7540 ft.)
" <i>jeanneli</i> Santschi	Mt. Elgon	2100 m.	(6890 ft.)
" <i>coarctata imatongica</i> Weber	Imatong Mts.	2593 m.	(8500 ft.)
" <i>mesoëpinotalis</i> Weber	Imatong Mts.	1962 m.	(6400 ft.)
" <i>musciola</i> Weber	Imatong Mts.	2196 m.	(7200 ft.)
<i>Bothroponera crassa</i> Emery	Abyssinia	to 2438 m.	(7000-8000 ft.)
" " <i>ilgi</i> Forel	Kenya	1800-2000 m.	(6560 ft.)
<i>Tetraponera scotti</i> Donisthorpe	Abyssinia	to 2745 m.	(8000-9000 ft.)
<i>Sima mocquerysi emacerata</i> Santschi	Kenya	2100 m.	(6890 ft.)
<i>Messor barbarus galla</i> Emery	Abyssinia	2438 m.	(8000 ft.)
" " <i>rufula</i> Forel	Imatong Mts.	1891 m.	(6200 ft.)
" <i>sublaeviceps hoggarensis</i> Santschi	Hoggar, Sahara	2310 m.	(7580 ft.)

<i>Pheidole megacephala</i> ilgi Forel	Abyssinia	2438 m.	(8000 ft.)
" " ssp. 1402, 1384	Imatong Mts.	2074 m.	(6800 ft.)
" " ssp. 1384	Imatong Mts.	2074 m.	(6800 ft.)
" " ssp. nr. punctulata	Imatong Mts.	2309 m.	(7570 ft.)
<i>Melissotarsus emeryi</i> pilipes Santschi	Mt. Kilimanjaro	2740 m.	(8990 ft.)
<i>Myrmicaria eumenoides</i> opaciventris			
congolensis For.	Imatong Mts.	2227 m.	(7300 ft.)
<i>Crematogaster amabilis</i> Santschi	Mt. Longonot	2450 m.	(8040 ft.)
" castanea ferruginea Forel	Mt. Elgon	2400 m.	(7870 ft.)
" " inversa			
flaviventris Sants.	Imatong Mts.	2105 m.	(6900 ft.)
" " inversa elgona			
Sant.	Mt. Elgon	2100 m.	(6890 ft.)
" foraminiceps Santschi	Mt. Kenya	2400 m.	(7870 ft.)
" mimosae Santschi	Mt. Kenya	2000 m.	(6560 ft.)
" vulcania Santschi	Longonot Neck	2140 m.	(7020 ft.)
" buchneri nasina Santschi	Kenya	2100 m.	(6890 ft.)
" gambiensis ssp.	Imatong Mts.	2071 m.	(6790 ft.)
" (Sphaerocrema) zonacaciae			
Weber	Imatong Mts.	2074 m.	(6800 ft.)
" auberti laestrygon striati-			
ceps Forel	Hoggar, Sahara	2400 m.	(7870 ft.)
" neuvillei Forel	Abyssinia to	2438 m.	(7000-8000 ft.)
<i>Monomorium minutum</i> kineti Weber	Imatong Mts.	3190 m.	(10,458 ft.)
" " arboreum Weber	Imatong Mts.	1891 m.	(6200 ft.)
" gracilimum Smith	Hoggar, Sahara	2700 m.	(8860 ft.)
" bicolor ssp. nr. nitidiventre			
Em.	Imatong Mts.	1830 m.	(6000 ft.)
" salomonis L.	Hoggar, Sahara	2050 m.	(6720 ft.)
" " areniphilum			
Santschi	Hoggar, Sahara	2800 m.	(9190 ft.)
" " obscuriceps			
Santschi	Hoggar, Sahara	2800 m.	(9190 ft.)
" crawleyi Santschi	Abyssinia	2438 m.	(8000 ft.)
<i>Solenopsis punctaticeps</i> juba Weber	Imatong Mts.	2806 m.	(9200 ft.)
" " erythraea Emery	Abyssinia	2438 m.	(8000 ft.)
<i>Oligomyrmex alluaudi</i> Santschi	Kenya	2100 m.	(6890 ft.)
<i>Aneleus politus</i> Santschi	Imatong Mts.	1962 m.	(6400 ft.)
<i>Tetramorium simillimum</i> F. Smith	Imatong Mts.	2013 m.	(6600 ft.)
" " isis Weber	Imatong Mts.	2644 m.	(8700 ft.)
" squaminode Santschi	Mt. Kilimanjaro	3800 m.	(12,470 ft.)
" " nubis Weber	Imatong Mts.	2806 m.	(9200 ft.)
" caespitum altivagans			
Santschi	Aberdare Mts.	3100 m.	(10,170 ft.)
" jeanae Weber	Imatong Mts.	1962 m.	(6400 ft.)
" semilaeve hoggarensae			
Santschi	Hoggar, Sahara	2800 m.	(9180 ft.)
<i>Xiphomyrmex zonacaciae</i> Weber	Imatong Mts.	2166 m.	(7100 ft.)
<i>Leptothorax nigrita</i> saharensis Santschi	Hoggar, Sahara	2500 m.	(8200 ft.)
<i>Engramma ilgi</i> stygium Santschi	Mt. Kilimanjaro	2740 m.	(8990 ft.)
<i>Technomyrmex albipes</i> affinis Santschi	Mau Escarp.	2080 m.	(6820 ft.)
" " truncicolus Weber	Imatong Mts.	1891 m.	(6200 ft.)
<i>Axinidris acholli</i> Weber	Imatong Mts.	1891 m.	(6200 ft.)
<i>Plagiolepis custodiens</i> F. Smith	Kenya	2250 m.	(7380 ft.)
<i>Plagiolepis sudanica</i> Weber	Imatong Mts.	2074 m.	(6800 ft.)

<i>Acantholepis capensis simplex</i>	Forel	Imatong Mts.	1891 m.	(6200 ft.)
"	" <i>incisa</i>	Forel	Kenya	2100 m. (6890 ft.)
"	" <i>validiuscula</i>	Emery	Imatong Mts.	2309 m. (7570 ft.)
"	" <i>issore</i>	Weber	Imatong Mts.	1891 m. (6200 ft.)
"	" <i>acholli</i>	Weber	Imatong Mts.	1964 m. (6440 ft.)
"	" <i>hirsuta</i>	Santschi	Mau Escarp.	2420 m. (7940 ft.)
"	" <i>subspecies</i>	Abyssinia	to 2438 m.	(6500-8000 ft.)
<i>Camponotus maculatus erythraeus</i>	Emery	Mt. Elgon	2400 m.	(7870 ft.)
"	" <i>kersteni</i> (Gerst.)	Mt. Kilimanjaro	2740-3000 m.	(to 9840 ft.)
"	" <i>pulvinatus</i>	Mary	Abyssinia	2438 m. (8000 ft.)
"	" <i>mathildae</i>	Forel	Kenya	2000 m. (6560 ft.)
"	" <i>melanocnemis</i>			
"	"	Santschi	Imatong Mts.	1964 m. (6440 ft.)
"	" <i>nubis</i>	Weber	Imatong Mts.	2644 m. (8700 ft.)
"	" <i>sudanicus</i>	Weber	Imatong Mts.	1922 m. (6300 ft.)
"	" <i>semispicatus</i>			
"	"	Santschi	Kenya	2100 m. (6890 ft.)
"	<i>thraso assabensis</i>	Emery	Abyssinia	2745 m. (9000 ft.)
"	<i>rufoglaucus flavomarginatus</i>			
"		Mayr	Imatong Mts.	1891 m. (6200 ft.)
"	<i>ligea</i>	Donisthorpe	Abyssinia	2745 m. (9000 ft.)
"	<i>orinobates</i>	Santschi	Kenya	2100 m. (6890 ft.)
"	<i>hāpi</i>	Weber	Imatong Mts.	2044 m. (6700 ft.)
"	<i>cleobulus</i>	Santschi	Natal	3355 m. (11,000 ft.)
"	<i>moderatus</i>	Santschi	Abyssinia	2438 m. (8000 ft.)
"	<i>compressus thoracicus</i>			
"	" <i>tahatensis</i>	Santschi	Tahat, Sahara	3000 m. (9840 ft.)
"	<i>atlantis</i>	Forel	Hoggar, Sahara	2400 m. (7870 ft.)
"	<i>seurati hoggarensis</i>	Santschi	Hoggar, Sahara	2000 m. (6560 ft.)
<i>Cataglyphis albicans targuis</i>	Santschi	Hoggar, Sahara	2700 m.	(8860 ft.)
"	" <i>livida arenaria</i>	Forel	Hoggar, Sahara	2000 m. (6560 ft.)
<i>Polyrhachis schistacea rugulosa</i>	Mayr	Mt. Kilimanjaro	1000-3000 m.	(to 9840 ft.)

SUMMARY

1. This study deals largely with the Imatong Mountains, Anglo-Egyptian Sudan. Records from other Central African mountains are also included. The Imatongs consist of an isolated igneous massif on the Central African plain rising to 10,458 ft. They are surrounded by mesophytic grass-woodland. The slopes may be divided into the following zones:

Lower Montane Slopes (2500–6000 ft., east side; 3000–5600 ft., west side). Climate tropical. Plants mesophytic to xerophytic on east, mesophytic to gallery or rain forest on west.

Acacia abyssinica Zone (6000–7200 ft., east side; 5600–7200 ft., west side). Climate temperate. Characterized by the conspicuous flat-topped tree, *Acacia abyssinica*.

Cloud Forest-Mountain Meadow Zone (7200–10,250 ft.). Climate cool temperate to subalpine. Forests of *Podocarpus*, etc. with heavy moss and lichen growth interspersed with meadows of grass and herbs.

Mt. Kineti Summit (10,250–10,458 ft.). Climate alpine. Summit with short grass and herbs; heavy lichen growth on rocks.

2. Of 125 species, subspecies or varieties of ants found in the Imatong Mountains, 113 are confined to single zones, as follows:

Lower Montane Slopes	89 species
<i>Acacia abyssinica</i> Zone	21 species
Cloud Forest-Mountain Meadow Zone	3 species
Mt. Kineti Top	0 species

The association of ants with plant zones is thus not fortuitous. Since, however, nearly all of the ants are carnivorous the ants and plants are probably best considered as members of a definite biocoenose with altitudinal limits. A more direct relationship between ants and plants is that between *Monomorium kineti* and *Tetramorium nubis* since they tend coccids ("*Ripersia*" n. sp.) on the roots of grasses found only in the two highest zones.

The east lower slopes have 39 species not found elsewhere, nearly all of which belong to the mesophytic grass-woodland. The west lower slopes have 45 species not found elsewhere, most of which belong to the closed rain forest.

3. No species of ant occurs in all zones. The army ant, *Dorylus* (*Anomma*) *molestus*, however, invades all zones but Mt. Kineti summit.

It is not only the dominant ant but one of the clearly dominant animals of the mountains because of its great numbers and predatory habits. The *Dorylus* and *Myrmicaria congolensis* are co-dominant ants of the *Acacia abyssinica* zone. A single ant, *Monomorium minutum kineti*, a new subspecies of a cosmopolitan species, is found on the summit of Mt. Kineti (10,458 ft.). The ant exists by pasturing coccids ("*Ripersia*" n. sp.) on the roots of short grasses.

4. Most of the characteristic African genera such as *Paltothyreus*, *Megaponera*, *Ocymyrmex*, *Macromischoides*, *Oecophylla*, *Camponotus* (*Dinomyrmex* and *Orthonotomyrmex*), *Polyrhachis* (*Myrma*) and *Pseudolasius* do not leave the tropical zone. The genera found in the temperate *Acacia abyssinica* Zone are

<i>Dorylus</i> (<i>Anomma</i>)	<i>Tetramorium</i>
<i>Ponera</i>	<i>Xiphomyrmex</i>
<i>Messor</i>	<i>Axinidris</i>
<i>Pheidole</i>	<i>Technomyrmex</i>
<i>Myrmicaria</i>	<i>Plagiolepis</i>
<i>Crematogaster</i>	<i>Acantholepis</i>
<i>Monomorium</i>	<i>Camponotus</i>
<i>Solenopsis</i>	

which are mostly cosmopolitan or with many Holarctic species. Except for the widely ranging predator, *Dorylus* (*Anomma*), the only genera found in the cool temperate Cloud Forest-Mountain Meadow Zone are *Ponera*, *Pheidole*, *Monomorium*, *Solenopsis*, *Tetramorium*, *Acantholepis* and *Camponotus* which are important genera of temperate regions. The single genus, *Monomorium*, which occurs on the summit of Mt. Kineti is not only cosmopolitan but an ancient genus since it has many species in Australia and New Zealand, areas isolated since the Mesozoic.

The Imatong fauna must be derived from the lowlands from the very nature of the mountains. The ants of few genera are adaptable enough to leave the tropical lowlands. The species found in the temperate zones, however, may have reached their present stations at different times in the past when these stations were connected climatically with the lowlands, such as perhaps in the Tertiary or as recently as Pluvial II, a wet stage in Africa possibly thirty thousand years ago.

5. Fourteen species of the cosmopolitan genus *Crematogaster* occurred in the Imatongs of which eight were from the east lower montane slopes; the wealth of Africa in species of this genus is thus illustrated as also their great development in mesophytic regions. Nineteen

species of the cosmopolitan genus *Camponotus* occurred in the Imatongs; these were distributed through all zones but Mt. Kineti summit.

The occurrence of the cosmopolitan *Odontomachus haematoda*, *Pheidole megacephala*, *Monomorium minutum*, *Tetramorium guineense*, *T. simillimum* and *Camponotus maculatus* on the isolated Imatongs in Central Africa suggests that Africa may be the home of these species.

6. Four of the Imatong species were known only from South Africa. These are: *Aenictus merwei*, *Opthalmopone berthoudi*, *Acantholepis minuta*, and *Ocymyrmex weitzackeri*. The last named species is known by a single record from Tanganyika. All were found only on the eastern slopes in mesophytic to xerophytic grass-woodland.

An additional four species were known only from East Africa. These are: *Dorylus (Anomma) molestus*, *Platythyrea cribrinodis*, *Camponotus (Dinomyrmex) longipes*, and *Aneleus politus*. The *Dorylus* occurs on all sides of the mountains as the dominant ant. The *Platythyrea* and the *Camponotus* were found only on the eastern slopes in grass-woodland. *Aneleus politus* was found in forest on the western slopes and is known only from the other and original record in Kenya.

Twenty species were known only from West Africa, including the Belgian Congo. The fourteen found only on the west slopes were all in rain forest; the six found only on the east lower slopes were from mesophytic grass-woodland and their West African congeners very likely were found in the same type of habitat.

7. Characteristically West African rain forest genera or subgenera found in the Imatongs are *Phrynoponera*, *Crematogaster (Atopogyne)*, *Macromischoides*, *Paedalgus* and *Pseudolasius*. Characteristically East and South African is the genus *Ocymyrmex*. Two genera were new, *Hylidris* and *Axinidris*, the former found also on the Nile-Congo watershed south of Yei, Sudan.

8. 55 out of the 125 species are new and so far known only from the Imatongs. Other species are probably new but are not at present determinable with material available in the United States. At least 45% are thus endemic and this percentage is much higher than in mountains of the temperate regions such as the Rocky Mountains.

9. It is evident that the Imatongs are at the crossroads of ant migrations in Africa. The mountains contain West, East and South African elements of the ant fauna. Situated at the upper part of the Nile basin, the mountains also have connections with the Mediterranean

and at least one ant, *Anochetus sudanica*, is so close to *A. ghiliani* of the Mediterranean region, as to suggest direct relationships between the ant faunas.

10. Many of the species or subspecies of Imatong ants found in the cooler, damper and cloudier zones are distinctly darker than their closely related species or subspecies found on the tropical lower slopes.

11. Mound-building ants are rare in the Imatongs and include *Messor*, *Myrmecaria* and *Polyrhachis*. The last named does not occur in the temperate zones. *Messor* forms a mound in the lowlands but at 6200 ft. nested under a slab of rock. *Myrmecaria* forms merely a loose pile of soil. The predominantly cloudy and wet weather in temperate zones probably explains the scarcity of mound-building.

12. Though few ants are known from temperate zones of other Central African mountains, certain comparisons are significant. *Dorylus* (*Anomma*) *molestus* occurs at similar elevations on the Imatongs and on Mts. Meru, Kenya, Kilimanjaro, Ruwenzori and the Aberdare Mts. as well as on the connecting lowlands. *Tetramorium squaminode* occurs on Mt. Kilimanjaro and a closely related new subspecies, *nubis*, is found at a comparable elevation on the Imatongs. *Camponotus maculatus melanocnemis* is found up to 6440 ft. on the Imatongs and at 6787 ft. on the plateau at Kijabe, Kenya. *Camponotus maculatus kersteni* is confined to 8000 to 9840 ft. on Mt. Kilimanjaro and a closely related new subspecies, *nubis*, is found on the Imatongs from 8500 to 8700 ft.

When it is possible to examine more African species other significant similarities may be found among Central African mountain faunas. The fact that closely related forms of *Tetramorium* and *Camponotus* are found at comparable elevations on distinctly separated mountains may indicate that they were once part of a continuous population when the lowland climate was cool and moist. With a change to a hotter and dryer lowland climate the intermediate population may have become extinct (or developed into another form) and the new separated populations evolved into distinct subspecies. Migration is probably not possible for these species under present conditions because of the mesophytic country separating them, and migration by air of fecundated females is still less probable. The heavy-bodied females are comparatively feeble flyers (especially *Camponotus*) and lose their wings quickly after fecundation.

13. Though far fewer collections of other animals were made in the Imatongs than of ants, the following generalizations are suggested:

Species of terrestrial vertebrates, except perhaps birds, are comparatively as few in the higher zones as ant species. Two species found only in the Cloud Forest-Mountain Meadow Zone are the giant forest hog and the Colobus monkey. A new subspecies of chameleon was observed only on the summit of Mt. Kineti.

More genera of termites were found in the lower tropical zone than in the higher temperate zones. Two common termites (*Macrotermes natalensis* and *M. jeanneli*) are restricted to the lower slopes as is the ant *Megaponera foetens*, which preys upon them.

Spiders are distributed through all zones; the genera taken on Mt. Kineti summit were not taken at lower elevations. Spiders are much more common in the cold, wet and dark cloud forests than are ants.

14. Such information on the biology of the ants of the Imatongs as could be gathered on safari is given. Most of the species form irregular nests in the soil. Most of the species prey upon insects, including other ants; two tend coccids; *Messor* is probably a harvester. Many species harbor as guests Thysanurans and other insects; a small thief ant lives with two other species. The cyclic activities of the dominant ant (*Dorylus*) may depend ultimately on the moon, whose waxing light added to sunlight may build to a threshold value affecting the activity of the ants. An *Ocymyrmex* worker exhibited complicated reflex behavior simulating intelligence.

15. The first compilation of world ants found at elevations of 2000 m. (6560 ft.) or more shows that, while many species may be found at the 2000 m. level, the numbers decrease rapidly with increase in altitude. Few ants are found at 3000 m. (9840 ft.), and at 4000 m. (13,129 ft.) or more only nine species are known. The world altitudinal record is of *Formica picea lochmatteri* Strcke at 4800 m. (15,740 ft.) in the Himalayas.

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PART II—TAXONOMY^{1, 2}

NEW MYRMICINAE

CREMATOGASTER

CREMATOGASTER (C.) LATUKA spec. nov.

Plate 15, Fig. 11

Worker. Length extended 3.5–3.9 mm. (of thorax, not including “neck,” 0.77–1.0 mm.). Head in front view, excluding mandibles, broader than long in maxima, as long as broad in minima, occipital margin distinctly impressed, sides and anterior clypeal margin convex; frontal carinae short, feebly raised, antennal fossae well developed, eyes moderately convex, situated nearer posterior than anterior head margin; mandibles short, strongly curved and with 4 well-developed teeth; antennal scapes extending to occipital corners, club 3-jointed, 2nd funicular joint longer than broad and distinctly longer than 3rd. Thorax from above flattish on top, the sides marginate, the mesonotal carina reduced to a faint gibbosity almost absent on the minima. Epinotal spines short, conic, directed slightly backwards and downwards. Petiolar node from above broader than long in maxima, longer than broad in minima with dorsal surface flattened and depressed, the sides produced as rounded lobes. Post-petiole from above broader than long and divided by a deep furrow into two lobes. Gaster and legs of normal proportions.

Shining, microscopically reticulate basally, head feebly striate, mandibles rugose, thorax striate on margins, the striae running transversely on pronotum. Pilosity of sparse, fine appressed hairs most numerous and coarsest on appendages. Brownish ferruginous, the minima being darkest, posterior margin of gastric segments infuscated.

Cotypes: workers of one colony (No. 1379) which I took July 31 on the east slopes of the Imatong Mts., A.–E. Sudan at an elevation of about 4600 ft. The ants nested in a hollow twig a meter above ground.

¹ Holotypes of the new Imatong ants will be deposited in the Museum of Comparative Zoölogy, Harvard. Cotypes will be divided between this museum and my collection.

² For descriptions of other Imatong new species see Weber 1941 a and b.

CREMATOGASTER (C.) MENILEKI Forel, SUDDENSIS subsp. nov.

Worker. Length extended 3.5–4.1 mm. (of thorax, excluding “neck” 0.9–1.1 mm.). Head in front view, excluding mandibles, as broad as long to slightly broader than long, occipital margin feebly impressed, sides strongly convex, anterior clypeal margin convex; eyes moderately convex, situated closer to occipital than to clypeal margin; mandibles strongly convex and with 4 stout teeth; antennal scape distinctly exceeding occipital corners. Mesonotum with a feeble median gibbosity. Epinotal spines of variable shape but always conic, short, more or less acutely pointed. Petiolar node broader than long; postpetiole divided by a median furrow into two lobes.

Shining, basally microscopically reticulate, front of head and thorax striate, mandibles rugose. Pilosity of scanty, fine, appressed hairs and sparse, longer and upright hairs. Yellowish ferruginous, head and thorax variably infuscated.

Female. Length extended 8.2 mm. (of thorax 2.2 mm.). Head in front view broader than long, antennal scapes fail to reach occipital corners, mandibles 5-toothed. Epinotal declivity convex and without spines or tubercles. Sculpture and pilosity as in worker. Ferruginous, darker than in worker.

Workers similar to the ssp. *proserpina* Santschi but darker, more strongly sculptured and with stouter and shorter epinotal spines.

Cotype workers: several (No. 1243) taken 9.vii.39 on the Upper White Nile, A.–E. Sudan from papyrus (*Cyperus papyrus*) in the swamp known as the Sudd.

Holotype female: one female (No. 1245) taken 10.vii.39 in the above region.

CREMATOGASTER (DECACREMA) LANGO spec. nov.

Plate 15, Figs. 6–7

Worker. Length extended about 1.9 mm. (of thorax, excluding “neck,” 0.47 mm.). Head in front view, excluding mandibles, barely longer than broad, occipital margin faintly impressed medially, sides and anterior clypeal margin convex; frontal carinae short, feeble, antennal fossae well developed; eyes 0.11 mm. in diameter, convex, situated closer to anterior than posterior head margin; mandibles strongly convex, with 4 distinct teeth; antennal scapes bowed, not reaching occipital corners, antennae 10-jointed, the terminal 2 forming a club, funicular joints 3–5 strongly transverse. Thorax proportions

as in figures. Petiolar node from above broader than long, the dorsal surface concave, sides marginate and produced as convex lobes, ventral surface of petiole toothed. Postpetiolar node from above broader than long, divided into two lobes by a median furrow, anterior margin of gaster with angular corners. Femora incrassate.

Smooth and shining but for scattered, fine punctulations chiefly on thorax. Pilosity of sparse, fine appressed hairs and longer, coarser, more numerous and more upright hairs on appendages. Bright brown, posterior margins of gastric segments infuscated, appendages yellow brown.

Holotype: one worker (No. 1301) which I took July 24 on the east slopes of the Imatong Mts., A-E. Sudan at an elevation of about 3800 ft.

CREMATOGASTER (ORTHOCREMA) SORDIDULA Nyl., MOLONGORI
subsp. nov.

Worker. Length extended 2.4–2.8 mm. (of thorax, excluding “neck,” 0.53–0.73 mm.). Differing from the typical form chiefly in smaller size, coarser sculpturing and much shorter and sparser pilosity. Compared with a cotype of the subspecies *natalensis* the present form is darker, is not smooth back of the antennal fossae and is more distinctly sculptured on the thorax. Middle section of clypeus and frons smooth and shining, elsewhere on head striate-punctate; thorax and pedicel striate-punctate, gaster finely reticulate. Pilosity on body of sparse, appressed fine hairs and scattered longer and more upright hairs. Color variably brown to dark brown, darkest on head and gaster.

Cotypes: several workers (No. 1375) which I took July 31 at an elevation of about 4000 ft. on the east slopes of the Imatong Mts., A.-E. Sudan.

CREMATOGASTER (ATOPOGYNE) AFRICANA Mayr, POLYMORPHICA
subsp. nov.

Worker. Length extended 4–8 mm. (of thorax, excluding “neck,” 1.1–2.14 mm.). Head of maxima, excluding mandibles, broader than long, head of minima about as long as broad; occipital margin broadly impressed, sides convex, anterior clypeal margin truncate. Pronotum of maxima rounded, of minima gibbous on each side. Epinotal spines of maxima short, acutely conic, of minima much longer and more

slender. Postpetiole of maxima broader than long, bilobed posteriorly, more flattened above than in minima.

Close to the forms *fickendeyi* and *schumanni* in general habitus but differing from these and the other numerous forms of *africana* in larger size and extreme polymorphism. The only other *Crematogaster* of comparable polymorphism recorded by Arnold is *C. acaciae victoriosa* with a worker range in length of 3-5 mm.

Cotypes: Workers of one colony (No. 1408) which I took August 2 on the west slopes of the Imatong Mts., A.-E. Sudan at an elevation of about 4500 ft.

CREMATOGASTER (SPHAEROCREMA) LOTTI spec. nov.

Plate 15, Fig. 2

Worker. Length extended 3.3-3.7 mm. (of thorax, excluding "neck," 0.9-1.0 mm.). Head in front view, excluding mandibles, broader than long, occipital margin almost straight, faintly impressed, sides convex, anterior clypeal margin truncate, feebly convex; frontal carinae short, feebly raised, fossae distinct; eyes large, convex, situated almost entirely on posterior half of head; mandibles strongly convex, 4-toothed; antennal scapes exceeding occipital corners by about $\frac{1}{4}$ their length, club 3-jointed, all funicular joints except 3rd clearly longer than broad, the latter about as broad as long. Pro- and meso-notum sharply marginate to carinate dorso-laterally, dorsum slightly concave; epinotal spines diverging from above, longer than the interval between their bases, slender and acutely pointed. Petiolar node from above with expanded lateral lobes so as to be over $1\frac{1}{2}$ times broader than long, dorsum feebly concave. Postpetiole with globose and entire node antero-posteriorly compressed. Gaster short, anterior margin truncate. Legs long and slender.

Shining, microscopically reticulate basally, the latter vestigial on head, front of head between eyes and mandibles striate, the striations concentric about antennal fossae, mandibles coarsely striate. Pilosity of sparse, fine, appressed hairs and the customary thicker, longer and reclinate hairs of appendages. Brown to dark brown, the appendages paler.

Cotypes: several workers (No. 1444) which I took August 5 in the Lotti Forest on the west slopes of the Imatong Mts., A.-E. Sudan.

Near *C. bequaerti* and *kneri* but smooth and shiny instead of densely punctate-striate and dull.

CREMATOGASTER (SPHAEROCREMA) ZONACACIAE spec. nov.

Plate 15, Fig. 3

Worker. Length extended 4.0–4.2 mm. (of thorax, excluding “neck,” 1.1 mm.). Head in front view, excluding mandibles, broader than long, occipital margin impressed, sides convex, anterior clypeal margin truncate; frontal carinae continued back to a level with the eyes; eyes situated closer to occipital than to anterior clypeal margin, moderately large and convex; mandibles strongly convex, 4-toothed, the basal tooth smallest; antennal scapes reaching or slightly exceeding occipital corners, funicular club 3-jointed. Pronotum from above marginate, pro- and meso-notum separated by a V-shaped suture directed forward and bisecting the pronotum, a feeble, rounded carina being present in the apex, mesonotum submarginate on sides, meso-epinotal suture deep and complete; epinotal spines long, narrow, acute, about as long as the interval between their bases. Petiolar node from above with convex lobate sides, over $1\frac{1}{2}$ times broader than long. Postpetiolar node entire, antero-posteriorly compressed. Gaster short, anterior margin truncate. Legs moderately long and slender.

Sub-lucid, basally reticulate, front of head shining, rest striate-punctate, front divided by a median furrow extending from clypeus to occiput; mandibles rugose; thorax striate with shallow punctations. Pilosity of fine, moderately abundant, appressed hairs, appendages with longer and reclinate hairs. Castaneous, appendages brown.

Cotypes: workers from a colony of several hundred (No. 1420) which I took August 3 at an elevation of about 4700 ft. on the west slopes of the Imatong Mts., A.-E. Sudan.

Near *striatula* but with head less impressed occipitally and with a distinct median furrow, with epinotal spines less curved and with frons of head smoother.

MONOMORIUM

MONOMORIUM (M.) MINUTUM Mayr, KINETI, subsp. nov.

Plate 15, Figs. 10, 19

Worker. Length extended 2.4–2.6 mm. (of thorax 0.64 mm.). Funicular joints 3–8 as broad or broader than long. Pronotum from above broader than long, subglobose in outline to mesonotum; meso-epinotal suture distinct and laterally and dorsally; epinotal declivity faintly

marginate on sides. Petiolar node from above sub-globose; postpetiole from above broader than long. Gaster from above truncate anteriorly.

Smooth and shining with piligerous punctations. Pilosity of scattered fine, long hairs reclinate to upright interspersed with shorter, sub-appressed hairs most numerous on head. Dark brown, appendages apically yellowish brown.

Female. Length extended 3.9 mm. (of thorax 1.1 mm.). Head in front view, excluding mandibles, broader than long, occipital margin convex, anterior clypeal margin emarginate medially, eyes situated at middle of sides of head, mandibles 4-toothed, antennal scapes exceeding occipital corners. Epinotal declivity marginate on each side. Petiolar node from above antero-posteriorly compressed, smaller and less broad than postpetiolar node. Gaster with anterior margin truncate. Legs long and slender.

Shining, smooth except for sparse punctations most numerous on pedicel. Pilosity of numerous long, fine, reclinate to upright hairs. Dark brown, head and gaster somewhat infuscated, appendages paler.

Male. Length extended 2.5 mm. (of thorax 0.75 mm.). Head in front view, excluding mandibles, longer than broad, occipital margin impressed, sides and anterior clypeal margin convex, eyes large, situated closer to mandibular insertions than their diameters; mandibles bent apically and prolonged into 3 acute teeth; all funicular joints distinctly longer than broad. Epinotum smooth and without tubercles. Petiole rising smoothly into a convex node which is more than $\frac{1}{2}$ as high as the petiole and flattened dorsally. Legs long and slender. Wings with numerous hairs and pale, thick veins.

Shining, head punctate, thorax sparsely and irregularly punctate, gaster smooth. Pilosity of scattered long, fine, upright hairs which are most numerous on gaster. Dark brown, gaster infuscated, appendages paler brown.

Type colony: one colony (No. 1334) of all castes which I took July 27 on the summit of Mt. Kineti, 10,458 ft. Imatong Mts., A. E. Sudan. The ants nested in soil and tended coccids ("*Ripersia*" sp.) on the roots of grasses.

MONOMORIUM (M.) MINUTUM Mayr, ARBOREUM, subsp. nov.

Worker. Length extended 2.1–2.3 mm. (of thorax, excluding "neck," 0.54–0.58 mm.). Head in front view, excluding mandibles, $1\frac{1}{4}$ times longer than broad, occipital margin impressed, sides convex, anterior

clypeal margin produced as a convex lobe; frontal carinae extending to a level with the eyes; eyes convex, situated slightly closer to anterior clypeal than to occipital margin; mandibles convex and with 4 large teeth; antennal scapes distinctly not reaching occipital corners; funicular joints 3-8 broader than long. Mesoëpinotal impression distinct laterally and dorsally. Petiolar node from above with convex sides, narrower than postpetiole; postpetiole transversely elliptical. Gaster narrowed anteriorly and truncate. Legs long and slender.

Shining; thorax on sides above middle and hind legs punctate. Pilosity of long, fine, scattered upright hairs. Brownish yellow, head and gaster infuscated.

Female. Length extended 3.7 mm. (of thorax, excluding "neck," 0.95 mm.). Head in front view, excluding mandibles, longer than broad occipital margin faintly impressed, sides convex, anterior clypeal margin produced as a convex lobe which is feebly emarginate medially; frontal carinae extending to a level with the eyes; eyes situated about midway between anterior clypeal and occipital margins; mandibles with 4 distinct teeth; antennal scapes reach occipital corners; epinotal declivity feebly marginate on each side. Petiolar node higher than postpetiole, with dorsal margin somewhat truncate and anteroposteriorly compressed. Postpetiole from above transversely elliptical. Gaster narrowed anteriorly and truncate. Legs long and slender.

Shining, smooth but for piligerous punctations, striate-punctate epinotum on sides and lower declivous surface, and punctate pedicel; clypeus feebly bicarinate. Pilosity of moderately abundant fine, reclinate hairs. Brownish yellow; head, thorax and gastric segments except anterior portion, infuscated.

Type colony: one colony (No. 1397) which I took August 2 on the west slopes of the Imatong Mts., A.-E. Sudan at an elevation of about 6200 ft. The ants nested at the base of large ferns growing from a tree at a height of 16 ft.

Easily separated from the subspecies *pallidipes* and *kineti* by pale color and sculpture; resembling somewhat *M. andrei fur* Forel but distinctly larger, head and scapes longer and the petiolar node is less compressed.

MONOMORIUM (M.) ESTHERAE spec. nov.

Plate 15, Fig. 18

Worker. Length extended 2.2-2.4 mm. (of thorax, excluding "neck" 0.56-0.58 mm.). Head in front view, excluding mandibles, rectangular,

occipital corners rounded, occipital margin feebly impressed, sides subparallel, anterior clypeal margin produced as two distinct teeth; mandibles with 4 teeth of variable development. Thorax in profile with evenly convex pro-mesonotum, distinct mesoëpinotal impression and epinotum descending smoothly; thorax from above appears laterally in the form of two convexities, a stronger and broader promesonotum and a feebler and narrow epinotal. Petiole in profile with distinct peduncle and evenly rising node which is higher than the postpetiole; petiolar node antero-posteriorly compressed and with convex dorsum. Postpetiole from above transversely elliptical. Anterior margin of gaster concave and obtusely angulate laterally. Legs moderately long and slender.

Shining, smooth except for piligerous punctations. Pilosity of moderately abundant long, fine hairs and a shorter and thicker pilosity on appendages.

Cotypes: three workers (No. 1423) which I took August 4 on the west slopes of the Imatong Mts., A.-E. Sudan, at an elevation of about 5050 ft. The ants had formed a tiny crater in the soil.

This species is dedicated to the memory of the late Dr. Esther W. Wheeler, an admired friend and fellow myrmecologist. Her last studies were on the ants of North Dakota.

SOLENOPSIS

SOLENOPSIS PUNCTATICEPS Mayr, JUBA, subsp. nov.

Plate 15, Figs. 5, 8, 14

Worker. Length extended 2.0–2.8 mm. (of thorax, excluding “neck”, 0.48–0.75 mm.). A subspecies which differs from the typical form and the forms *caffra* and *kibaliensis* in smaller size of minima as well as maxima workers and in darker color. The clypeal teeth are differently shaped than in typical *punctaticeps* and the middle pair of mandibular teeth better developed. Minima worker slightly darker and with larger eyes than the corresponding worker in *caffra* which has also the occiput less impressed. Differing from the forms *africana*, *cyclops*, *indocilis*, *maligna*, *cleptomana* and *erythraea* in clypeal and mandibular teeth proportions. The *erythraea* and *africana* maxima workers have the sides of head more strongly convex; the *cyclops* worker has the head much broader.

Shining, smooth except for piligerous punctations. Pilosity of moderately abundant fine yellowish hairs of short to moderate length

which are mostly reclinate to subappressed; all parts of body bear the pilosity. Minima worker brownish yellow with the head and thorax variably darker. Maxima worker variably brown with infuscated dorsal surfaces of head and gaster and, to a less extent, the thorax.

Female. Length extended 5.2–5.5 mm. (of thorax 1.6 mm.). Head in front view, excluding mandibles and eyes, approximately as broad as long, occipital margin transverse, feebly impressed, sides convex, anterior clypeal margin prolonged into 2 acute and well-developed teeth; eyes large, convex, situated closer to the mandibular insertions than their diameters; antennal scapes failing to reach occipital corners by more than their distal diameters; mandibles with 4 well-developed teeth. Epinotal declivity concave between the smoothly marginate sides. Petiole pedunculate with smoothly rising node appearing conic in side view and with medially impressed dorsum when viewed from behind. Postpetiole lower than petiole, transversely elliptical when viewed from above. Anterior margin of gaster concave, not angulate. Legs moderately long and slender.

Shining, body generally smooth except for piligerous punctations; head with a smooth median groove running to occiput; punctate in front of eyes; striate between frontal carinae except for smooth posterior part of clypeus; sides of pedicel finely striate-punctate. Pilosity of abundant, fine, yellowish upright hairs. Dark brown, appendages paler.

Cotypes; workers and females of one colony (no. 1356) which I took July 28 at an elevation of 9200 ft. in the Imatong Mts., A.-E. Sudan. The ants nest in soil, often about other ant nests.

OLIGOMYRMEX

OLIGOMYRMEX SANTSCHII spec. nov.

Plate 15, Figs. 4, 16

Soldier. Length fully extended 1.7 mm. (of thorax 0.41 mm.). Head in front view with closed mandibles 0.66 mm. long by 0.40 mm. wide. Eyes minute, mandibles 5 toothed, antennae 9-jointed, a median ocellus in middle of head. Thorax from above with promesonotum globular in outline and 0.24 mm. broad; basal surface of epinotum 0.11 mm. broad, concave between lateral carinae. Petiole from above twice as thick through node as through peduncle. Postpetiole from above distinctly broader than petiole and transversely elliptical. Gaster small and ovate. Legs short, femora and tibiae inflated.

Head in front view densely punctate, closely striate except for the smooth bicarinate clypeus and frons and merely punctate occipital corners, the corners bearing also a transverse carina; occiput striate-punctate; sides of head posteriorly shining, sparsely punctate; mandibles smooth. Thorax and pedicel densely punctate, especially laterally and on epinotum, pro-mesonotum also striate above; dorsum of petiolar and postpetiolar nodes shining, sparsely punctate; gaster shining, with piligerous punctations. Pilosity of moderately abundant fine, yellowish short reclinate hairs covering body generally, and a few longer and coarser curved hairs chiefly on thorax. Light ferruginous, appendages paler.

Worker. Length fully extended 1.03–1.06 mm. (of thorax 0.30 mm.), length in straight line as they crawl 0.55–0.64 mm. Head in front view including closed mandibles 0.37 mm. long by 0.26 mm. wide. Eyes minute, mandibles 5-toothed, antennae 9-jointed. Mesoëpinal suture faint, epinotal teeth distinct, acute, triangular. Postpetiole slightly less than twice as broad as petiole.

Head, thorax and pedicel densely and coarsely punctate; clypeus bicarinate, frons of head and mandibles smooth and shining, gaster with piligerous punctations. Pilosity of moderately abundant short, fine and reclinate hairs with a few scattered much longer, coarser and curved hairs chiefly on thorax and gaster. Pale ferruginous.

Cotype workers and holotype soldier: 17 workers and one soldier (No. 1475) which I took August 11 in the forest of Khor Aba on the Nile-Congo watershed south of Yei, A.-E. Sudan.

Near *O. jeanneli* Santschi and of comparable size in soldier and worker but *jeanneli* soldier has 10-jointed antennae, nothing is said in the description about pre-occipital carinae and the epinotum is unarmed. The worker *jeanneli* has mandibles 4-toothed, head finely striolate, epinotum unarmed and is in other ways different.

Dedicated to my late colleague, Dr. F. Santschi, in recognition of his studies on *Oligomyrmex* and African ants in general.

CAREBARA

CAREBARA BARTRUMI spec. nov.

Plate 15, Figs. 17, 20

Female. Length 14 mm. (of thorax from anterior extension of mesonotum to episternal angle in a straight line 4.7 mm.). Scutum of mesonotum with a sharply marginate furrow medially and anteriorly

which disappears gradually posteriorly; epinotum carinate on each side, the carinae dorsally projecting as rounded lobes when viewed from the side. Petiole in side view with node rising smoothly to a dorsal thickness of 0.5 mm. and truncate above, posterior margin sharply descending to postpetiole, the latter feebly concave above and distinctly lower than the petiole.

Shining, finely punctate, the punctations separated by smooth areas, anterior part of head with punctations tending to be connected by striae. Pilosity of minute, scattered, yellowish hairs. Mahogany brown.

Male. Length 8 mm. (of thorax, as measured in female, 3.0 mm.). Scutum of mesonotum with an antero-median furrow as in female but less sharp. Dull, densely punctate, punctations coarsest on head. Pilosity a dense, backwardly directed reclinate pubescence. Dirty yellowish brown head and thorax infuscated, wings dirty pale brown, the veins margined in dark brown. Clypeus produced antero-medially as a distinct hump or gibbosity.

Holotype female and male: one pair (No. 1486) which I took *in copula* August 13 at 6 a. m. at Yei, Equatoria, A.-E. Sudan. The ants were crawling on the ground before sunrise.

Probably near *C. sudanica* Santschi, which is not figured, but the male is very different and the female smaller and with differently shaped epinotum. This species is much too small for *C. vidua* and its var. *dux*; The female is distinctly larger than that of *C. osborni*. The female is close to *langi* but this is paler and has the petiole evenly rounded above. *C. bartrumi* is dedicated to Mr. J. E. Bartrum, Assistant District Commissioner at Yei in memory of his cordial hospitality.

PAEDALGUS

PAEDALGUS SUDANENSIS spec. nov.

Plate 15, Figs. 12, 15

Female. Length extended 5.6 mm. (of thorax, from antero-dorsal margin in straight line to episternal angle, 1.76 mm.). Scutum of thorax with an antero-median furrow disappear in anterior third of scutum; declivous surface of epinotum marginate on each side and dorsally produced as an obtuse tooth. Petiole with a sharply rising node which is antero-posteriorly compressed and feebly convex above. Postpetiole in side view broader than petiolar node and from above distinctly broader than the former, as well as longer, somewhat trans-

versely elliptical from above with straightened anterior margin and slightly angular sides. Anterior margin of gaster concave for the reception of the postpetiole and obtusely angulate on each side. Gaster elongate-ovate. Legs of moderate length, slender, 1st tarsal joint nearly $1\frac{1}{2}$ times as long as the terminal 4, the latter longer than broad. Wings 4.2 mm. long.

Dull, densely punctate, head and, to a lesser extent, the thorax also vermiculate. Pilosity of a fine, dense, reclinate pubescence giving a gray cast to the ant when viewed under low magnification. Dark ferruginous, appendages paler. Wings pale with pale brown veins margined with dark brown.

Holotype: one winged female (No. 1293) which I took July 22 at the east base of the Imatong Mts., A.-E. Sudan.

CALYPTOMYRMEX

CALYPTOMYRMEX (C.) BREVIS spec. nov.

Plate 15, Fig. 1

Worker. Length extended 2.5–2.6 mm. (of thorax, excluding “neck,” 0.6 mm.). Head in front view, excluding mandibles, slightly broader than long, broadest behind, occipital margin impressed, clypeus sharply depressed so that in front view the anterior head margin is divided into a convex lobe on each side by the lowered clypeus; lateral margins of clypeus produced anteriorly as a sharp pair of teeth; antennal scape extending back of eyes but falling far short of occipital corners; mandibles trigonal with 3 distinct apical teeth and about 3 denticles basally. Thorax from above trapezoidal, the anterior pronotal margin high and convex, humeri angulate, sides feebly convex and converging posteriorly to the epinotum. Epinotum with subparallel sides, about half as broad as pronotum, declivity slightly angulate. Petiolar node from above transversely elliptical. Postpetiole from above transversely elliptical with truncate anterior margin, broader than petiole. Anterior margin of gaster impressed for reception of postpetiole.

Sculpture, which is basally punctate, largely obscured by squamate hairs, head reticulate, the reticulations tending to become striae in front, mandibles striate; thorax vermiculate-reticulate, pedicel above reticulate, gaster finely but densely punctate. Body covered densely with a uniform pilosity of narrow-squamate hairs which extend to the femora, tibiae and, sparsely, to the scapes and 1st tarsal joint; ap-

pendages with a fine, dense, appressed to reclinate pilosity of short hairs. Pale ferruginous, hairs pale yellowish.

Cotypes: several workers of a small colony (No. 1441) which I collected August 5 in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan. Two workers of this colony were left with my colleague, Mr. Donisthorpe, at the British Museum (Natural History) during my visit in October.

MACROMISCHOIDES

MACROMISCHOIDES VIRIDIS spec. nov.

Plate 15, Fig. 9

Worker. Length extended 3.4–4.1 mm. (of thorax, excluding "neck," 0.98–1.15 mm.). Thorax from above with a pronounced pronotal tubercle on each side which is obtuse and variably pointed; meso-epinotal suture pronounced above and for a short distance laterally; epinotal spines diverging, slender, acute, much longer than interval between their bases. Petiolar node from above appears thin and strongly antero-posteriorly compressed. Postpetiole from above slightly broader than petiole, broader than long. Gaster ovate. Legs long and slender.

Shining, head finely and shallowly punctate, with sparse rugae of irregular lengths which tend to become joined so as to be somewhat reticulate, especially posteriorly; thorax reticulate-vermiculate; thorax and pedicel finely and shallowly punctate; gaster and legs smooth. Pilosity of moderately abundant long, fine, upright hairs which are longest and most numerous on the head and thorax. Head and thorax dark brown, appendages paler, gaster metallic bluish-green, a color which is particularly distinct in the living ant.

Female. Length extended 4.9 mm. (of thorax, excluding "neck," 1.3 mm.). Similar to the worker except for the usual sexual differences. Pronotum laterally with distinct tubercles though blunter and lower; epinotal spines long, slender, acute, about twice as long as the interval between their bases. Petiolar node antero-ventrally compressed, postpetiole broader. Sculpture, pilosity and color as in worker.

Male. Length extended 4.6–4.8 mm. (of thorax, from antero-dorsal extension of scutum to episternal angles, 1.9–2.1 mm.). Mandibles with 6 teeth of which the apical 2 or 3 are most distinct, the others of irregular development; eyes hemispherical, closer to mandibular insertions than their diameters; 2nd funicular joint longer than antennal scape

and as long as funicular joints 3-5 taken together. Epinotal declivity with a tiny tubercle on each side. Crest of petiolar node compressed antero-posteriorly and irregularly tuberculate; postpetiole broader. Sculpture much as in worker but feebler and more striate on thorax. Pilosity as in worker but hairs shorter and scantier. Color as in worker. Wings hyaline with pale brown veins.

Cotypes: workers, females and males of one colony (No. 1419) which I took August 3 at an elevation of about 4700 ft. on the west slopes of the Imatong Mts., A.-E. Sudan. The ants formed a carton nest on leaves of *Afromum*.

OCYMYRMEX

OCYMYRMEX WEITZECKERI Emery, CELER, subsp. nov.

Worker. Length extended 8-9 mm. (of thorax 2.3-2.6 mm.). Head, excluding mandibles, slightly longer than broad, occipital margin distinctly impressed, sides diverging to the mandibular insertions, anterior clypeal margin convex, notched medially with a distinct tooth on each side; frontal carinae raised, convex; eyes 0.35-0.37 mm. in diameter, moderately convex, situated slightly medial to lateral outline; antennal scapes exceeding occipital corners by their distal diameters; mandibles 5-toothed, the basal 2 small. Pro-mesonotal suture above marked by a tubercle or raised spiracle opening on either side. Petiole with a slender peduncle which at its insertion is about $\frac{1}{3}$ the height of the node, the node in side view globose, from above longer than broad. Postpetiole from above longer than broad, broader than petiole and broader behind than in front. Gaster distinctly constricted anteriorly. Legs long and slender.

Shining; head striate, feebly and shallowly punctate, occiput somewhat smooth; thorax striate, feebly punctate, pronotum above partly smooth; petiolar peduncle transversely striate, the node feebly and sparsely striate-punctate; postpetiole above mostly smooth; gaster microscopically reticulate anteriorly, more feebly behind. Pilosity of moderately abundant stoutish hairs most numerous on head and thorax and a pilosity of shorter and finer hairs on gaster and legs; psammophore well developed. Reddish ferruginous, gaster infuscated.

Cotypes: several workers (No. 1462) which I took August 6 at Torit, north of the Imatong Mts., A.-E. Sudan.

This subspecies differs from the typical form and the vars. *hirsutus* and *arnoldi* especially in having less deeply punctate head and the pedicel more shallowly punctate.

TETRAMORIUM

TETRAMORIUM SQUAMINODE Santschi, NUBIS subsp. nov.

Plate 16, Fig. 24

Worker. Length 2.6 mm. (of thorax 0.95 mm.). Head in front view, excluding mandibles, slightly less than one-tenth longer than broad back of eyes, faintly impressed at occipital margin, occipital corners moderately rounded; sides convex, wider back of eyes than in front; eyes convex, situated distinctly in front of middle of sides; anterior clypeal border medially emarginate; frontal carinae distinct, sinuate, with a small convex lobe above antennal insertions; mandibles strong, trigonal, with a large apical tooth and about six irregular smaller teeth; scapes elongate-clavate, extending to occipital corners; funiculus with a three-jointed club longer than remaining joints. Thorax without sharp humeri, in dorsal view with irregularly sinuate lateral margins and feeble mesoepinotal impression; in side view evenly convex, epinotal spines acute, slender, longer than the intervening distance between them and the episternal lobes. Petiole pedunculate in side view with a squamate node which is about one-half higher than the length of the exposed peduncle; node viewed from behind with a transverse crest, feebly impressed medially, and convex sides. Postpetiole about eight-tenths as high as petiole, from above transversely elliptical, one-sixth wider than postpetiole, three-fourths wider than long. Gaster ovate, anterior margin feebly impressed at postpetiolar junction. Legs of moderate length, femora and tibiae swollen.

Shining; head moderately rugose, sparsely and shallowly punctate; thorax rugose, becoming vermiculate to reticulate at margins, sparsely and shallowly punctate; pedicel faintly punctate, gaster smooth. Pilosity of upright, coarse and truncate hairs; shorter, finer, pointed and reclinate hairs on the appendages and anterior and inferior portions of head. Dark brown, appendages a more yellowish brown.

Cotypes: two workers (No. 1355) which I took July 28, at an elevation of about 9200 ft. in the Mt. Kineti massif of the Imatong Mts. Additional workers from the same colony were collected. The ants were tending coccids on ("*Ripersia*" sp.) on roots of grass (Myers No. 11580) and nested in irregular chambers extending down 70 mm. into black humus.

The typical *squaminode* was collected on Mt. Kilimanjaro at elevations of 2850 to 3800 m. Comparing with Santschi's original description and his and Arnold's figures of the typical *squaminode*, *nubis*

differs in having seven instead of six mandibular teeth, a greater space between the epinotal spines and episternal lobes, less acute apex of petiolar node, lower postpetiole and its anterior face more sloping. It differs from the race *do* Forel in that its clypeus is not tricarinate and the sides of the pronotum are not smooth.

TETRAMORIUM BREVIS spec. nov.

Worker. Length 1.4 mm. (of thorax 0.55 mm.). Head in front view, excluding mandibles, one-sixth longer than broad back of eyes; occipital margin distinctly impressed; sides slightly convex; anterior clypeal margin feebly convex; frontal carinae distinctly more feebly developed than in *simillimum*, subparallel; eyes moderately convex, situated on anterior half of head so that their posterior portion slightly extends past the middle; mandibles trigonal, with about five teeth of which only the two apical are well-developed; antennal scapes fail distinctly to reach the occipital corners; funicular club three-jointed, markedly longer than the preceding joints taken together. Thorax in side view evenly convex except for slight mesoepinotal impression; from above humeri angulate, mesoëpinotal region distinctly impressed; epinotal spines reduced to a pair of small, blunt teeth, much smaller than in *simillimum* or *pusillum*. Petiole pedunculate; node massive, in side view the anterior face rising in an even concavity, feebly convex dorsum forming slightly obtuse angles with anterior and posterior descending. Postpetiole lower than petiole, convex above; seen from above transversely elliptical, about one-quarter broader than petiole. Gaster ovate, anterior margin impressed at postpetiolar junction. Legs of moderate length, femora swollen.

Head with numerous shallow punctations, striate in front, reticulate on sides. Thorax and pedicel punctate, dorsally vermiculate-reticulate. Gaster smooth and shining. Pilosity sparse, of short, mostly thick, hairs. Dark brown, appendages light brownish-yellow.

Holotype: one worker (No. 1405) which I took Aug. 2 at an elevation of about 5600 ft. on the western slopes of the Imatong Mts. The ant was among grass more than six feet tall through which were scattered *Acacia abyssinica* trees.

This very small species is related to the *simillimum* group but is noticeably smaller, darker, and with greatly reduced epinotal spines. It must be one of the very smallest species in this large genus.

TETRAMORIUM JEANAE spec. nov.

Plate 16, Fig. 29

Worker. Length about 2.8 mm. (of thorax 0.91 mm.). Head in front view, excluding mandibles, one-sixth longer than broad; occiput distinctly impressed, angles rounded; sides feebly convex, widest back of eyes; anterior clypeal margin convex, not emarginate; frontal carinae distinct, sub-parallel, feebly divergent in middle, forming a feeble and elongate lobe over antennal insertions; eyes moderately convex, situated in front of middle; mandibles stout, trigonal with three distinct teeth apically and three shorter teeth basally; antennal scapes slightly enlarged distally and exceeding occipital angles by nearly their distal diameters; funicular club three-jointed and longer than remaining joints taken together. Thorax in side view slightly convex at pronotum and nearly plane behind; mesoëpinotal impression very faint in side view but from above the thorax is distinctly impressed laterally at this point; epinotal spines short, stout, acutely pointed and directed upwards about 50 degrees from the epinotal basal surface, distinctly shorter than the distance between them and the episternal lobes. Petiole pedunculate, in side view with a high node which is over a half longer than exposed peduncle, the node forming with peduncle a smoothly concave surface, the anterior and dorsal surfaces meeting in a right angle, the posterior angle more rounded, viewed from behind with truncate top and convex sides. Postpetiole transversely elliptical, one-third wider than long. Gaster ovate, feebly impressed anteriorly at postpetiolar junction. Legs of moderate proportions, femora slightly incrassate.

Shining: sparsely and shallowly punctate except on gaster; clypeus with only one distinct carina which is median and a faint carina on each side; frons with about five low and irregular carinae, sides of head with large, shallow reticulations; sides of thorax with sparse carinae, medially with numerous distinct punctations, thorax and pedicel dorsally mostly smooth, with sparse vermiculate or reticulate carinae, pilosity of moderately long, scattered, acutely pointed yellowish hairs and much finer and more appressed hairs chiefly on the appendages. Dark brown, appendages more yellowish brown.

Holotype: one worker (No. 1395) which I took Aug. 2, at an elevation of about 6400 ft. on the western side of the Imatong Mts. The ant was crawling over an open grassy margin of forest.

This species differs distinctly from any in American museums. It

resembles somewhat *T. setigerum* ssp. *quaerens* Forel but is smaller, darker, much shinier since with less punctation, the epinotal spines are much shorter and it is in other ways different. In Arnold's key to African *Tetramorium* it runs to *T. frenchi* but this species has a longer head which is parallel-sided and with a straight occipital margin; the clypeus with three carinae, petiolar peduncle as long or longer than the node with a vertical anterior and oblique posterior face, etc.

T. jeanae is dedicated to my wife in recognition of her assistance during the taxonomic investigations on these African ants in American museums.

TETRAMORIUM VITICOLA spec. nov.

Plate 16, Fig. 31

Worker. Length 3.1–3.3 mm. (of thorax 1.1 mm.). Head in front view, excluding mandibles, one fifth longer than broad back of eyes; occipital margin shallowly impressed, sides sub-parallel, anterior clypeal margin convex, faintly emarginate in middle, frontal carinae very feeble, eyes convex, situated in front of middle, mandibles trigonal, with three strong apical teeth and three feebly developed basal teeth; antennal scapes not quite reaching occipital corners, funicular club three-jointed, the club a little shorter than remainder of funiculus. Thorax in side view evenly convex, the mesoëpinotal impression feebly indicated but from above distinct as a lateral impression; basal epinotal surface in side view forming with declivity a sloping, feebly convex surface, spinotal spines short, acutely conic, curved upward, a trifle longer than the stout, acutely pointed episternal angles. Petiole with very short peduncle and massive node, the node rising as an even convexity to the posterior face which is vertical and feebly concave, peduncle ventrally with a minute tooth, in front above a trifle broader than long, elliptical. Postpetiole distinctly higher than the petiole, in side view rising as an even convexity to the abruptly descending posterior face, from above, three-tenths broader than petiole, transversely elliptical. Gaster ovate. Legs moderately short, femora incrassate.

Head reticulate-vermiculate, densely but shallowly punctate, clypeus with a strong median and one or two lateral carinae on each side; thorax and pedicel coarsely reticulate with fine, shallow punctations between; gaster densely punctate, with a few setigerous, large, carinate punctations anteriorly which become confluent at the anterior margin. Pilosity of moderately abundant upright yellow hairs which are shortest on head. Pale ferruginous.

Cotypes: one colony (No. 1409) which I took Aug. 3 at an elevation of 4900 ft. on the west slopes of the Imatong Mts. The ants were 30 ft. up in a dead, hollow liana on a tree in a rain forest khor.

TETRAMORIUM SIMILLIMUM (F. Smith), *ISIS*, subsp. nov.

Worker. Length extended 2.7-2.8 mm. (of thorax 0.7 mm.). Head in front view, excluding mandibles, longer than broad, antennal scapes distinctly not reaching occipital corners, mandible with 6 teeth of which the basal 4 are variable and indistinct. Thorax in profile evenly convex, epinotal spines in form of short, acute, triangular teeth. Petiolar node large, its anterior margin in profile being a sharp right angle and from above appearing truncate. Postpetiole, from above transversely elliptical, broader than petiole. Anterior gastric margin truncate.

Differing from the typical tropicopolitan form largely in color and sculpture. Head, thorax, pedicel gaster dark brown, almost black, only the margins of the segments being brown; mandibles, antennal and legs yellowish brown so that they contrast distinctly with the body; all parts of the body are much darker than the corresponding parts in the typical form, such as is found in Cuba, Australia, Java, Philippine Is., etc. Head, thorax and pedicel distinctly more sparsely and shallowly punctate above, head less regularly striate.

Cotypes: workers of one colony (No. 1350) which I took July 28 at an elevation of 8700 ft. in the Imatong Mts., A.-E. Sudan.

XIPHOMYRMEX

XIPHOMYRMEX SUDANENSIS spec. nov.

Plate 15, Fig. 40

Worker. Length extended 2.3 mm. (of thorax 0.64 mm.). Head in front view, excluding mandibles, slightly larger than broad, occipital margin broadly and feebly impressed, sides feebly convex; anterior clypeal margin convex, lateral margins carinate, not reduced to a mere ridge, feebly emarginate medially; frontal lobes shallowly convex, carinae distinct and extending posterior to antennal scapes; eyes situated on the sides, moderately convex, closer to occipital than to clypeal margin; mandibles strongly convex, with 3 distinct apical teeth and 2-3 indistinct and irregular teeth basally; antennal scapes fail to reach occipital corners by a distance equal to about twice their distal diameters, funicular club 3-jointed. Thorax from above with angular

humeri, feebly convex anterior margin and sides converging to epinotum with two emarginations on each side, mesoëpinotal suture not impressed, epinotal spines straight, diverging, as long as the interval between their bases; thorax in side view evenly convex above and with long, acute, straight spinotal spines. Petiole with massive and squarish node, which, seen from the side, forms a sharp angle anteriorly; node from above rectangular, longer than broad, corners rounded. Postpetiole convex dorsally, from above transversely elliptical, broader than petiole. Gaster short, ovate. Legs short, femora thick.

Shining; head and thorax above with numerous longitudinal striae between which are sparse, shallow punctations; sides of head and thorax reticulate-striate and punctate as above; pedicel reticulate-punctate, dorsum of postpetiole with a smooth median area. Pilosity of short, fine, curved hairs which are abundant on the gaster and much sparser on the head and thorax. Ferruginous, dorsum of head and gaster infuscated.

Holotype: one worker (No. 1291) which I took near Torit, north of the Imatong Mts., A.-E. Sudan July 22. This and *papyri*, described from the female caste, are closely related.

XIPHOMYRMEX PAPYRI spec. nov.

Plate 16, Fig. 36

Female (alate). Length extended 3.2–3.3 mm. (of thorax 0.90–0.96 mm.). Head in front view, excluding mandibles, slightly longer than broad, occipital margin broadly impressed, sides feebly convex, anterior clypeal margin convex, emarginate medially; frontal lobes low and convex, carinae distinct and bordering a distinct scrobe long enough to accommodate the antennae; eyes convex, 0.20 mm. in diameter, situated closer to mandibular insertions than their diameters; mandibles convex, 7-toothed, the apical 3 teeth strong, the basal 4 weak and of variable development, antennal scapes failing to reach occipital corners by a distance greater than their distal diameters, club 3-jointed. Humeri of pronotum angulate, scutum flat dorsally, epinotal spines long, stout, acutely pointed; episternal angles in form of acutely pointed triangular teeth directed upwards. Petiole with short peduncle and massive node which in side view is squarish and from above is transversely rectangular. Postpetiole from above about twice as broad as long, sides convex. Gaster short, ovate, truncate in front. Legs of moderate length, femora swollen.

Shining; head striate-punctate above, reticulate-punctate on sides. Pronotum and pedicel coarsely reticulate-punctate; scutum striate-punctate; gaster smooth but for piligerous punctations. Pilosity of moderately dense short, fine upright hairs. Ferruginous, dorsum of head infuscated, gaster dark brown. Wings hyaline, iridescent, with pale, yellowish-gray stigma and veins.

Cotypes: Four females (No. 1242) which flew to the S.S. Gedid July 8 on the Upper White Nile, A.-E. Sudan while we were passing through the Sudd. These closely resemble the worker of *X. sudanensis* but for the proportions of the petiole, except for the usual sexual differences.

XIPHOMYRMEX WEITZECKERI Emery, *EDITHAE*, subsp. nov.

Worker. Length extended 3.5 mm. (of thorax, excluding "neck," 1.0 mm.). Head in front view, excluding mandibles, longer than broad back of eyes, occipital margin broadly impressed, sides convex, anterior clypeal margin convex, notched medially; eyes situated in the middle of head, antennal scapes extending to or slightly beyond occipital corners, mandibles with 3 distinct apical teeth and 4 irregular denticles. Mesoöpinotal suture impressed, bordered posteriorly above by a carina. Petiolar node antero-posteriorly compressed strongly, viewed from behind broader than high, sides subparallel, dorsal border truncate, feebly convex. Postpetiole from above strongly compressed anteroposteriorly. Head above striate-punctate, reticulate-punctate at sides. Thorax punctate, above anteriorly vermiculate transversely, longitudinally vermiculate posteriorly, the vermiculations diverging behind, sides vermiculate; rest of body smooth and shining. Pilosity of sparse fine, moderately short, upright hairs. Dark brown, gaster brownish black, appendages lighter brown.

Holotype: one worker (No. 1405) which I took August 2 at an elevation of 6000 ft. in the Imatong Mts., A.-E. Sudan. Another worker taken the next day at an elevation of 4800 ft. belongs to this form. This ant is dedicated to Mrs. Edith B. Christianson in token of her long, friendly interest in these studies.

This subspecies differs from the typical *weitzeckeri* in being much darker in all parts of body, in having the hairs distinctly longer, the antennal scapes longer, sides of petiolar node less convex and the post-petiolar node thicker.

XIPHOMYRMEX MINUSCULUS Santschi, AMEN, subsp. nov.

Worker. Length extended 2.3 mm. (of thorax 0.64 mm.). Head in front view, excluding mandibles, slightly longer than broad, broadest back of eyes, occipital margin convex, sides convex, anterior clypeal margin convex, notched medially; antennal scapes extending about half ways from eyes to occiput, club 3-jointed; eyes convex, situated closer to clypeal than occipital margin; mandibles strongly convex, with 3 distinct teeth apically and about 3 indistinct denticles. Thorax from above with feebly convex anterior margin, straight sides converging posteriorly except for two emarginations, stout, acutely pointed, straight epinotal spines which are about as long as the interval between their bases; thorax in side view with feebly convex dorsum, epinotal spines curved slightly and large episternal angles. Petiole in side view with short peduncle and high, squarish node with rounded posterior face, from above node longitudinally rectangular. Postpetiole from above angularly and transversely elliptical. Gaster sub-globular, anterior margin truncate. Legs of moderate proportions.

Shining; head and thorax above sparsely and shallowly striate-punctate, sides of head, thorax and pedicel mostly smooth, striate- to reticulate-punctate, gaster with piligerous punctations. Pilosity of moderately abundant short, fine, upright hairs. Body black, the margins of segments dark brown, appendages dark brown.

Holotype: one worker (No. 1430) which I took August 4 at an elevation of about 4200 ft. in the Imatong Mts., A.-E. Sudan. It is dedicated to the Egyptian god Amen.

XIPHOMYRMEX ZONACACIAE spec. nov.

Plate 16, Fig. 34

Worker. Length extended 3.5–3.7 mm. (of thorax, excluding “neck”, 0.98–1.0 mm.). Head in front view, excluding mandibles, slightly longer than broad back of eyes, occipital margin feebly impressed, sides and anterior clypeal margin feebly convex, the latter feebly notched medially; eyes convex, situated closer to occipital than clypeal margin; mandibles convex, with 3 distinct apical and 3 or 4 indistinct more basal denticles; antennal scapes barely or not quite reaching occipital corners, club 3-jointed. Thorax from above with rounded humeri, anterior margin slightly convex, mesoëpinotal suture marked by a distinct depression and bordered laterally by a raised, transverse carina

appearing in side view as a tubercle; epinotal spines straight, acute, about as long as the interval between their bases. Petiole in side view with a short peduncle and high node narrowed dorsally and descending posteriorly in a convexity; node from above and behind with sides convex and narrowing dorsally. Postpetiole from above transversely elliptical, broader than petiole. Gaster short, ovate, truncate anteriorly. Legs moderately long and slender.

Shining; head striate-punctate above; remainder of head, thorax and pedicel reticulate-punctate, gaster smooth except for piligerous punctations. Pilosity of reclinate, short hairs which are most numerous on gaster. Brownish black appendages dark brown.

Cotypes: workers of one colony (No. 1315) which I took July 25 at an elevation of 7100 ft. in the Imatong Mts., A.-E. Sudan.

TRIGLYPHOTHRIX

TRIGLYPHOTHRIX CINEREUS spec. nov.

Plate 16, Fig. 25

Worker. Length extended 2.7–2.9 mm. (of thorax 0.73–0.75 mm.). Head in front view, excluding mandibles, slightly longer than broad, occipital margin approximately straight medially, convex at corners, sides convex, narrowed anteriorly slightly; eyes large, convex, situated as far from the mandibular insertions as their diameters; antennal scapes failing to reach occipital angles by a distance about equal to their distal diameters, club 3-jointed; mandibles trigonal with 3 distinct apical teeth and 3–4 denticles basally of irregular development. Thorax from above, excluding epinotum, as broad through pronotum as long, sides and anterior margin feebly convex; in side view convex above, flattened at basal surface of epinotum, epinotal teeth sharp, triangular, directed backwards and upwards. Petiole from above with node $1\frac{1}{2}$ times broader than long, anterior margin angularly convex, sides narrowed; in side view with short peduncle and high, squarish node. Postpetiole from above as long as petiolar node but distinctly broader and with sides produced more as convex lobes, in side view with convex dorsal margin. Gaster short, ovate. Legs moderately short and slender.

Coarsely, deeply and densely reticulate on head, thorax and pedicel. Pilosity of dense, multifid whitish hairs of which many are quadrid, others quinquid. Dark brown, appendages yellowish brown.

Cotypes: workers (No. 1304) which I took July 24 at an elevation of about 4000 ft. on the east slopes, Imatong Mts., A.-E. Sudan.

Runs to *hepburni* in Arnold key but *hepburni* with postpetiole almost 2 times wider than long and hairs trifold.

CATAULACUS

CATAULACUS PYGMAEUS E. André, SUDDENSIS, subsp. nov.

Worker. Length extended 3–4 mm. (of thorax 0.9–1.1 mm.). Thorax from above with pronotum transversely rectangular bordered with irregular setigerous tubercles and with mesonotal sides converging to the epinotum, these segments similarly setigerous. Epinotal spines from above stout, straight, bluntly pointed, in side view high and deflected forward, from above slightly broader than long with convex sides and anterior and posterior margins straight. Postpetiole from above wider than petiole, sides constricted posteriorly, anterior margin irregularly convex. Gaster emarginate anteriorly.

Sculpture basally a dense punctation which is overlain on head by loose reticulations, on thorax and pedicel by coarser reticulate-vermiculations and on gaster by fine vermiculations which are most distinct and convergent anteriorly. Pilosity of moderately abundant short, whitish setae, finest on gaster. Black, appendages dark brown.

Male. Length extended 4.1 mm. (of thorax 1.2 mm.). General habitus, except in thorax, as in worker. Mandibles trigonal, stout, with 2 distinct apical teeth; antennae 11-jointed; eyes not markedly longer than in worker but distinctly wider; epinotal spines shorter than in worker. Body finely and densely punctate as in worker but more reduced on gaster, overlying reticulations much less prominent. Color similar. Wings hyaline with pale yellowish-brown stigma and veins.

Similar in color to *C. pymaeus lujae* Forel but distinctly smaller and with the epinotal spines deflected sharply near the base.

Cotypes: several workers and one male (No. 1244) which I took July 10 in the Sudd above Adok on the Upper White Nile, A.-E. Sudan.

STRUMIGENYS

STRUMIGENYS (CEPHALOXYS) ESCHERICHII Forel, LOTTI, subsp. nov.

Plate 15, Fig. 13

Worker. Extended length 2.2–2.3 mm. (of thorax 0.6 mm.). Thorax in side view raised in uneven convex hump through the pro-mesonotum

and lowered through the epinotum; epinotum in side view with feebly convex basal surface and strong, acute and straight epinotal spines which are directed upwards and backwards. Petiole with a long peduncle and node which in side view appears high and convex, antero-posteriorly compressed, and from above appears transversely elliptical. Postpetiole from above transversely elliptical, about $1\frac{1}{2}$ times broader than petiole.

Densely and deeply punctate except on gaster which is finely shagreened at base, smooth distally; pro-mesonotum with a distinct longitudinal carina and superficial, feeble vermiculations, gaster with a few striae at the base. Pilosity of a few scattered long, coarse, upright, truncate to clavate hairs, moderately abundant narrow-squamate hairs on head and scape, and an appressed pubescence on appendages. Pale yellowish ferruginous.

Female. Extended length 2.5 mm. (of thorax 0.7 mm.). Similar to the worker except for the usual sexual differences. Antennal scapes failing distinctly to reach occipital corners; humeri of pronotum angulate. Sculpture as in worker except for smoother gaster with more striae at base. Color darker, being ferruginous with dark brown gaster.

Cotypes: workers and female of one colony (No. 1451) which I took August 5 in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan.

Runs in Arnold key to *escherichi boerorum* but this 2.2 mm., mandibles half as long as head and sculpture quite different. Compared with a cotype of *escherichi* the new subspecies has the petiolar node less squarish from above, the pronotal carina more distinct, longer antennal scapes and darker color.

NEW DOLICHODERINAE

TAPINOMA

TAPINOMA CARININOTUM spec. nov.

Plate 16, Fig. 32

Worker. Length extended 2 mm. (of thorax 0.6 mm.). Head in front view distinctly longer than broad, occipital margin and sides convex, anterior clypeal margin broadly and distinctly impressed medially, eyes 0.14 mm. in diameter, moderately convex, situated less than 0.14 mm. from the mandibular insertions; mandibles large, trigonal, with 2 distinct apical teeth, a denticle, a 3rd tooth, then 3-4 indistinct denticles completing the biting margin, all teeth of variable development

so that there may be merely a distinct apical tooth and 8-9 denticles; antennal scapes exceeding occipital angles by a distance about equal to 2 times their distal diameters; all funicular joints longer than broad. Thorax from above convex anteriorly and at sides of pronotum, sides converging to epinotum; basal and declivous surfaces of epinotum separated by a complete, sharp, transverse carina. Gaster short. Legs long and slender.

Finely and shallowly reticulate. Pilosity a fine, whitish, appressed pubescence. Grayish brown, appendages paler.

Cotypes: several workers (No. 1293) which I took July 22 at the east base of the Imatong Mts., A.-E. Sudan.

TECHNOMYRMEX

TECHNOMYRMEX ALBIPES (F. Smith), TRUNCICOLUS, subsp. nov.

Worker. Length extended 2.4-2.6 mm. (of thorax 0.69-0.75 mm.). Head in front view ovate, narrowed anteriorly; excluding mandibles distinctly longer than broad; occipital margin distinctly impressed in larger workers, less distinctly in smaller workers; anterior clypeal margin broadly impressed; eyes 0.15-0.16 mm. in diameter, feebly convex; antennal scapes exceeding occipital corners by about twice their distal diameters; funicular joints 2-3 as broad as long. Thorax in side view with feeble pro-mesonotal suture and deep mesoëpinotal impression; basal surface of epinotum convex, obtusely angulate.

Pilosity a fine, yellowish white appressed pubescence, and a few, scattered, long, upright hairs. Dark brown, appendages paler.

Cotypes: workers of one colony (No. 1382) which I took nesting in a twig of a gnarled tree at an elevation of 6200 ft. in the Imatong Mts., A.-E. Sudan, August 1.

Differing from workers placed under the typical form (Br. Solomon Is., Mann) in finer sculpture and paler appendages, differing from the var. *brunneipes* of India especially in paler color, differing from ssp. *foreli* of Natal in having shorter scapes and darker color, especially of antennae, differing from var. *affinis* of Kenya in paler color, clypeus more distinctly impressed and scapes longer.

TECHNOMYRMEX INCISUS spec. nov.

Plate 16, Fig. 37

Worker. Length extended 2.8 mm. (of thorax 0.79 mm.). Head in front view ovate, excluding mandibles distinctly longer than broad,

occipital margin feebly impressed, anterior clypeal margin broadly impressed; eyes 0.14 mm. in diameter, feebly convex, situated closer to the mandibular insertions than their diameters; mandibles trigonal with a series of fine denticles and an apical tooth; antennal scape exceeding occipital corners by over twice their distal diameters, funicular joints 2-6 clearly longer than broad. Thorax from above $1\frac{1}{2}$ times longer to mesoëpinotal impression than broad through pronotum. Gaster elongate-ovate. Legs of moderate proportions.

Finely and densely punctate. Pilosity of a fine yellowish-white appressed pubescence and a few, scattered, upright and coarse hairs most numerous on the gaster distally. Dark brown, appendages paler, coxae and trochanters of middle and hind legs and trochanter of fore leg ivory white.

Holotype: one worker (No. 1445 a) which I took August 5 in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan. Easily distinguished by the deep incision between the mesonotum and epinotum.

TECHNOMYRMEX LONGISCAPUS spec. nov.

Plate 16, Fig. 41

Worker. Length extended 2.5 mm. (of thorax 0.88 mm.). Funicular joints 2-6 longer than broad. Thorax from above distinctly constricted laterally at pro-mesonotal and mesoëpinotal sutures; in side view convex except for feeble impression at pro-mesonotal suture, mesoëpinotal impression deep and obtuse, epinotum convex above. Gaster ovate. Legs of moderate proportions.

Finely and densely punctate. Pilosity a fine, yellowish-white appressed pubescence, and coarse, upright grayish hairs which are scanty on head and thorax, much more numerous on gaster. Blackish brown, appendages dark brown, tarsi paler.

Holotype: one worker (No. 1446) which I took August 5 in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan. Easily distinguished by the long antennal scapes.

NEW FORMICINAE

PLAGIOLEPIS

PLAGIOLEPIS (P.) SUDANICA spec. nov.

Plate 16, Fig. 38

Worker. Length extended 1.4-1.5 (of thorax 0.41-0.44 mm.). Clypeus produced medially as a gibbosity partly covering mandibles;

mandibles small, trigonal, with 4 fine teeth. Thorax in side view flattened on top, convex anteriorly and at epinotum, pro-mesonotum raised as a feeble convexity. Meso-epinotal impression distinct and continuous laterally and dorsally, bordered posteriorly by a spiracular tubercle on either side dorso-laterally; epinotum feebly marginate on each side and intercepted by a slightly protuberant spiracle laterally. Petiole from behind with subparallel sides and convex dorsum. Gaster from above short, ovate. Legs moderately slender.

Shining, smooth but for setigerous punctations. Pilosity a fine, sparse, appressed pubescence most abundant on head, and a few scattered, coarse, upright hairs chiefly on thorax. Medium brown, appendages yellowish brown.

Cotypes: four workers (No. 1402) of one colony which I took August 2 at an elevation of 68000 ft. in the Imatong Mts., A.-E. Sudan. Near *P. mediorufa* of B. Congo but head larger and more impressed at occiput, appressed pubescence more abundant but gastric hairs less numerous, color of thorax and appendages darker.

ACANTHOLEPIS

ACANTHOLEPIS CAPENSIS Mayr, ACHOLLI, subsp. nov.

Plate 16, Fig. 26

Worker. Extended length 2.2-2.4 mm. (of thorax 0.79-0.81 mm.). Head in front view, excluding mandibles, slightly longer than broad, occipital margin feebly impressed, sides and anterior clypeal margin convex; antennal scapes exceeding occiput by over $\frac{1}{3}$ their length. Epinotum bluntly bi-tuberculate. Petiolar scale with feeble though distinct teeth. Shining, meso-epinotal region and sides of epinotum sparsely rugose, epinotum above and behind punctate. Pilosity of a sparse, white, appressed pubescence and moderately abundant long, yellowish-white hairs most numerous on gaster. Black, appendages blackish brown.

Female (deälate). Length extended 4.0-4.3 mm. (of thorax 1.4-1.5 mm.). Head in front view triangular, excluding mandibles approximately as broad as long, antennal scapes exceeding occiput by over $\frac{1}{3}$ their length. Petiolar scale feebly bituberculate above. Finely and densely punctate. Pilosity of an abundant fine, yellowish-white pubescence and longer but fine hairs which are most numerous on gaster where they border the margins of the segments. Blackish brown, appendages dark brown.

Cotypes: workers and females of one colony (No. 1309) which I took July 24 at an elevation of 6400 ft. in the Imatong Mts., A.-E. Sudan.

Resembling *simplex* and *issore* but differing from both chiefly in having distinct teeth on the petiolar scale; smaller than *issore*.

ACANTHOLEPIS CAPENSIS Mayr, ISSORE, subsp. nov.

Plate 16, Fig. 27

Worker. Length extended 2.4 mm. (of thorax 0.84–0.86). Resembling the subspecies *simplex* Forel (comparing with a cotype in the Museum of Comparative Zoölogy). The size, however, is distinctly larger, the head is less rectangular, the long hairs more numerous, and the appendages darker. Head broadest through the posterior margin of eyes, sides convex, occipital margin feebly impressed; antennal scapes surpassing head by about $\frac{1}{3}$ their length. Sides of epinotum prolonged as blunt tubercles. Node of petiole expanded latterly, dorsally emarginate. Shining, microscopically reticulate, sides of epinotum mostly smooth, sparsely and shallowly sculptured. Black, appendages dark brown, funiculi and tarsi yellowish brown.

Cotypes: workers of one colony (No. 1404) nesting August 2 in a dead stub of a branch of an *Acacia abyssinica* tree at an elevation of 6200 ft., west slope of Imatong Mts., A.-E. Sudan, near the locality known as Issore.

Syntypes: workers (No. 1423) taken Aug. 4 near the above locality at an elevation of 5050 ft.

According to Arnold all South African species of *Acantholepis* nest in the ground; the present form is thus aberrant in its ecology.

ACANTHOLEPIS CAPENSIS Mayr, THOTH, subsp. nov.

Plate 16, Figs. 28, 39

Worker. Length extended 2.1–2.4 mm. (of thorax 0.70–0.73 mm.). Head in front view, excluding mandibles, clearly longer than broad, occipital margin medially straight; sides broadest through eyes, convex, anterior clypeal margin somewhat truncate medially; eyes moderately convex, situated closer to occipital than to clypeal margin; antennal scapes exceeding occiput by between $\frac{1}{3}$ and $\frac{1}{2}$ their length; mandibles with 5 acute teeth. Epinotum bluntly bituberculate; dorsal margin of petiole entire, truncate dorsally.

Shining, sides of mesonotum and to a slight extent the epinotum, shallowly rugose. Pilosity of minute, scattered appressed hairs and moderately abundant, long, whitish hairs most numerous on gaster. Dark brown, appendages slightly paler.

Female (deälate). Length extended 5 mm. (of thorax 1.9 mm.). Head, excluding mandibles, approximately as long as broad back of eyes; eyes closer to occipital than clypeal margin; antennal scapes exceeding occipital corners by nearly $\frac{1}{2}$ their length; mandibles 5-toothed. Petiolar scale entire, feebly convex above. Densely and finely punctate. Pilosity of an abundant, long, fine, yellowish-white appressed pubescence and a few long, fine, upright hairs chiefly on gaster. Blackish-brown, appendages paler.

Cotypes: workers and female (No. 1297) of one colony which I took July 23 at an elevation of 2900 ft. at the east base of the Imatong Mts., A.-E. Sudan.

This form, dedicated to the Egyptian god, Thoth, is noteworthy in having long antennal scapes.

ACANTHOLEPIS MEGACEPHALA spec. nov.

Plate 16, Fig. 23

Worker or Soldier. Length extended 4.3 mm. (of thorax 1.2 mm.). Head in front view, including closed mandibles, 1.54 mm. long x 1.45 mm. wide, occipital margin strongly impressed as in some *Camponotus* soldiers, sides convex, anterior clypeal margin truncate; eyes 0.26 mm. in diameter, situated closer to mandibular than to occipital margin, frons with 3 distinct ocelli; antennal scapes extending about $\frac{2}{3}$ the distance of the occipital angles, all funicular joints longer than broad; mandibles stout, strongly convex, with 4 stout teeth showing when mandibles are closed. Pronotum from above about as broad as long, the sides strongly convex, 1.6 times broader than broad through mesoepinotal region; epinotum bluntly bituberculate. Petiolar scale prolonged into a pair of acute spines about as long as the interval between them. Gaster short, ovate. Legs long and slender.

Head densely and finely punctate, thorax more sparsely and shallowly punctate; mesonotum rugose laterally and posteriorly above; epinotum rugose-punctate; gaster smooth but for setigerous punctations. Pilosity of a fine, appressed pubescence most numerous on head, and numerous long, whitish, upright hairs chiefly on the thorax and

gaster. Head mahogany red, infuscated about mandibles and occiput; thorax, petiole and gaster black, legs and antennae dark brown.

Holotype: one worker taken by Dr. J. G. Myers (No. 10662) 15.iii.39 in the Azza Forest, Equatoria, A.-E. Sudan. In the vial with this unique were ordinary looking *Acantholepis capensis* ssp. workers.

A soldier caste seems not recorded before in this genus but the present worker has every characteristic of this caste.

CAMPONOTUS

CAMPONOTUS (MYRMOTURBA) MACULATUS (Fabr.), NUBIS, subsp. nov.

Plate 16, Fig. 30

Worker major. Length extended 9.7 mm. (of thorax 3.3 mm.). Thorax in side view with convexity interrupted by anterior raised mesonotal margin and by mesoëpinotal impression; petiolar scale cuneate, convex in front, flat behind except converging at apex. Finely and densely punctate, slightly vermiculate. Pilosity of numerous fine, yellowish, upright hairs on clypeus and scattered, minute, appressed hairs on head and rest of body; head, thorax and petiole with a few long, brownish hairs; posterior margin of gastric segments each with a row of upright, brownish yellow hairs. Brownish black, appendages dark brown.

Worker minima. Length extended 6.4 mm. (of thorax 2.5 mm.). Punctuation feebler than in maxima, hence vermiculations more distinct and body shinier. Pilosity and color as in maxima.

Cotypes: workers of one colony (No. 1351) which I took July 28 at an elevation of 8700 ft. in the Imatong Mts., A.-E. Sudan.

Smaller, less polymorphic and with darker legs, thorax and petiole than *melanocnemis*; with less extreme maxima caste; minima caste much darker. Maxima caste smaller and darker than *solon*, *ballioni boera*, *brutus*, *guttatus*, *hannae* or *aegyptiacus*. Both castes much darker and larger than *miserabilis pessimus*. Shinier, thorax less deeply punctate and somewhat darker than *congolensis*.

CAMPONOTUS (MYRMOTURBA) MACULATUS (Fabr.), SUDANICUS,
subsp. nov.

Worker maxima. Length extended 9.1 mm. (of thorax 3.3 mm.). Head in front view, excluding mandibles, longer than broad, occiput

feebly and broadly impressed; antennal scape exceeding occiput by about 3/10 its length; anterior clypeal margin truncate. Shining, finely and shallowly vermiculate-punctate. Pilosity of sparse, fine, minute, appressed hairs; numerous upright short to moderate length, yellowish hairs on anterior portion of head; a few long, fine, yellowish hairs on thorax and petiole; long, fine, yellowish hairs bordering margins of gastric segments. Body dark brown to almost black; legs and funiculi brownish yellow becoming brown distally.

Worker minima. Length extended 6.4 mm. (of thorax 2.6 mm.). Head and thorax dark brown, thorax and petiole brown, legs brownish yellow; shining.

Cotypes: workers of one colony (No. 1396) which I took August 2 at an elevation of 6300 ft. in the Imatong Mts., A.-E. Sudan. Nesting in branch of tree at a height of about 25 ft.

Smaller than *melanocnemis*, especially in maxima and the latter caste without soldier head, also paler; darker than *aegyptiacus* and without spots, maxima much smaller; paler and smaller than *congolensis* and *solon*; unusual because of arboreal nest.

CAMPONOTUS (MYRMAMBLYS) CHAPINI Wheeler, GANZII, subsp. nov.

Worker maxima. Length extended 7.5 mm. (of thorax 2.5 mm.). Distinctly larger than typical *chapini*; thoracic sutures less impressed, epinotum less angulate; frontal carinae more evenly convex.

Worker minima. Length extended 4.2 mm. (of thorax 1.4 mm.). Frontal carinae more convex and body slightly darker than two cotypes of *chapini* but otherwise closely similar.

Cotypes: workers of one colony (No. 1378) which I took July 31 at an elevation of about 4100 ft., east slopes of Imatong Mts., A.-E. Sudan. Dedicated to Ganzi, ex-soldier and faithful Sudanese servant.

CAMPONOTUS (MYRMAMBLYS) HĀPI spec. nov.

Plate 16, Fig. 21

Worker maxima. Length extended 7.4 mm. (of thorax 2.05 mm.). Head in front view, excluding mandibles, quadrangular, broadest back of eyes, occipital margin convex, anterior clypeal margin convex, feebly notched medially; frontal carinae convex, terminating before midlevel of eyes; eyes large, feebly convex, situated much closer to occiput than to clypeal margin; mandibles stout, strongly convex,

6-toothed; antennal scapes distinctly exceeding occipital corners, all funiculi longer than broad. Thorax from above like an elongate triangle with convex base at the anterior pronotal margin; feebly impressed laterally at mesoëpinotal suture. Petiolar scale from above less than 3 times broader than long, sides acutely convex; dorsal crest from behind transverse, faintly impressed medially. Gaster elongate-ovate. Legs slender, moderately short.

Shining; finely and shallowly vermiculate-punctate. Pilosity of a few reclinate to upright yellowish hairs of moderate height of which there are several each on the frons, mesonotum, epinotal angle, petiolar scale and a few on the gaster, especially on the margins; and scattered, minute, fine appressed hairs. Head black, rest of body dark brown except for the appendages which are paler.

Worker. Length extended 5.8 mm. (of thorax 1.8 mm.). Similar to the maxima worker except for smaller size; clypeal margin and petiolar scales not impressed.

Female (alate). Length extended 7.3 mm. (of thorax 2.3 mm.). Similar to the worker but for the usual sexual differences. Head in front view, excluding mandibles, clearly longer than broad, occipital margin evenly convex to the eyes, sides sub-parallel, a trifle widest back of eyes; eyes closer to the occipital angles than their diameters; anterior clypeal margin convex; antennal scapes exceeding occiput by their distal diameters; ocelli very small; mandibles 6-toothed. Epinotal declivity sub-vertical as in worker. Petiolar scale from behind with broad impression dorsally and corners rounded angles. Wings 6.5 mm. long, hyaline, veins and stigma brownish yellow.

Cotypes: workers and alate females of one colony (No. 1310) which I took July 24 at an elevation of 6700 ft. in the Imatong Mts., A.-E. Sudan. This species is near *C. orinobates* Santschi and is dedicated to the Egyptian god, Hāpi, the deified Nile.

CAMPONOTUS (MYRMOPIROMIS) TRICOLOR spec. nov.

Plate 16, Fig. 33

Worker. Length extended 5.7 mm. (of thorax 2.1 mm.). Head in front view, excluding mandibles, clearly longer than broad, occipital margin sharply and broadly concave; sides convex, broadest back of eyes; anterior clypeal margin produced as a crenulate, convex lobe; eyes large, feebly convex, closer to occipital than clypeal margins; mandibles strongly convex, when closed 5 teeth are visible; antennal

scapes slender, nearly straight, exceeding occipital corners by about $\frac{1}{4}$ their length; all funicular joints clearly longer than broad, the terminal joint distinctly shorter than the next 2 taken together. Thorax from above appearing as a narrow triangle with the convex base at the anterior pronotal margin; pro-mesonotal and mesoëpinotal impressions faint at the sides, the former a distinct suture. Petiolar scale from above thick, hemispherical, the plane margin being posterior. Gaster from above elongate-ovate. Legs moderately long and slender.

Shining; finely and densely vermiculate-reticulate. Body black, appendages yellowish brown, darker proximally. Pilosity of a few long, fine, yellowish hairs on the head, thorax and gaster where most numerous at the margins; of 4 long, white setae on the epinotal declivity, 5 on the posterior margin of the petiolar scale and 6 or 7 partly yellow setae on the first gastric segment; of a fine, moderately abundant, long pubescence.

Holotype: one worker (No. 1445) which I took in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan August 5. This striking species, colored in black, yellowish brown and with white setae, is probably near *rotundinodis* Santschi.

POLYRHACHIS

POLYRHACHIS (MYRMA) CUBAËNSIS Mayr, IMATONGICA, subsp. nov.

Plate 16, Fig. 22

Worker. Length extended 6.2–6.9 mm. (of thorax 2.1–2.5 mm.). Near a cotype worker of the ssp. *gallicola* Forel in the American Museum of Natural History. *Imatongica*, however, is more robust and the middle pair of petiolar spines is much shorter. Antennal scapes suddenly clavate distally; funicular joints 1–5 clearly longer than broad, joints 6–9 about as broad as long, terminal joint and the preceding 2 taken together subequal. Thorax from above trapezoidal, the sides converging and scalloped at the pro-mesonotal and meso-epinotal sutures, anterior corners (humeri) spinose, posterior corners (epinotal) in the form of low, rounded teeth. Dull, densely and finely punctate, superficially vermiculate on head and thorax. Fine, whitish, appressed pubescence on appendages. Black.

Cotypes: 4 workers (Nos. 1301–3) which I took at elevations of 3800–4000 ft. on the east slopes of the Imatong Mts., A.-E. Sudan, July 24.

PSEUDOLASIUS

PSEUDOLASIUS MYERSI spec. nov.

Plate 16, Fig. 35

Worker. Extended length 2.9–3.2 mm. (of thorax 0.70–0.92 mm.). Head in front view, excluding mandibles, distinctly longer than broad, occipital margin concave, sides convex, anterior clypeal margin produced as a feebly sinuate convex lobe; eyes minute, variably pigmented situated slightly posterior to a level with the posterior extension of the frontal carinae; mandibles trigonal with 6 stout teeth; antennal scapes extending to occipital corners in maxima workers and exceeding them slightly in minima workers; funicular joints 2–6 about as broad as long, remainder longer than broad. Petiolar scale feebly bituberculate above. Gaster short, ovate. Legs moderately long and slender, femora compressed.

Feebly shining; faintly punctate. Pilosity of a dense, whitish, appressed pubescence and much coarser and longer, upright, yellowish hairs most numerous on clypeus and gaster, scattered on head and thorax. Minima workers yellow with a brownish tinge, mandibular teeth dark brown; maxima workers brownish yellow.

Cotypes: several workers (No. 1441) which I took August 5 in the Lotti Forest, west slopes of Imatong Mts., A.-E. Sudan. Dedicated to my host on this safari, Dr. J. G. Myers.

Larger than *gowdeyi* cotypes and with longer scapes, etc.; paler than *bufonum* cotypes which have 5 mandibular teeth, etc.; with shorter scapes than *weissi sordidus* which have 5 mandibular teeth, etc.

PLATES

PLATE 1

WEBER — Ants of the Imatong Mountains

PLATE 1

Outline map of Africa showing position of Imatong Mountains, Anglo-Egyptian Sudan, by an X.



PLATE 2

WEBER — Ants of the Imatong Mountains

PLATE 2

**Map of Imatong Mountains in thousand foot contours beginning with 4000
ft. contour. Route of the expedition in dotted lines.**

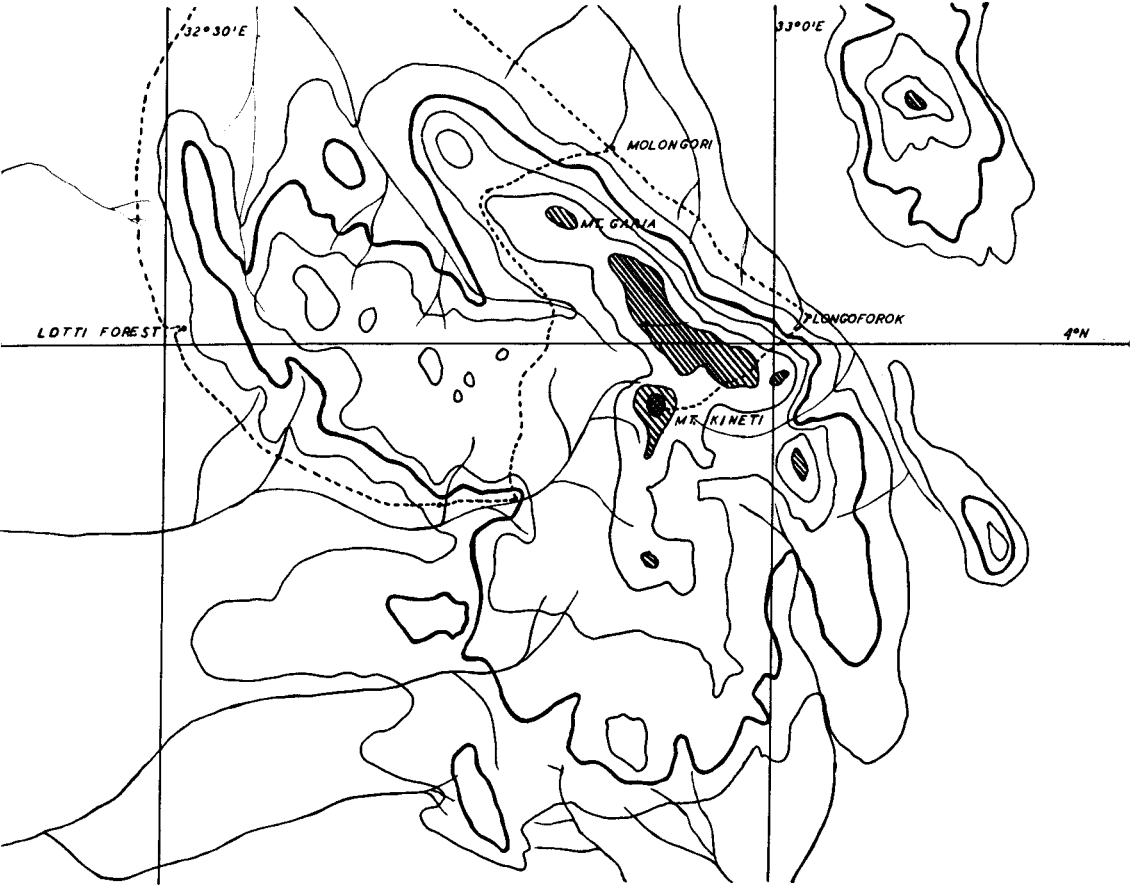


PLATE 3

WEBER — Ants of the Imatong Mountains

PLATE 3

Lotti Forest, west lower slopes of Imatong Mountains, showing high forest allied to the West African rain forest. El. about 3300 ft.



PLATE 4

PLATE 4

Acacia abyssinica Zone of Imatong Mountains. El. 6800 ft. Characteristic tree is the flat-topped *Acacia*.



PLATE 5

PLATE 5

Cloud Forest-Mountain Meadow Zone of Imatong Mountains. El. 8700 ft.
Aloe in flower in foreground.



PLATE 6

WEBER — Ants of the Imatong Mountains

PLATE 6

Mt. Kineti summit, Imatong Mountains. El. 10,548 ft. Cairn marks the highest spot.

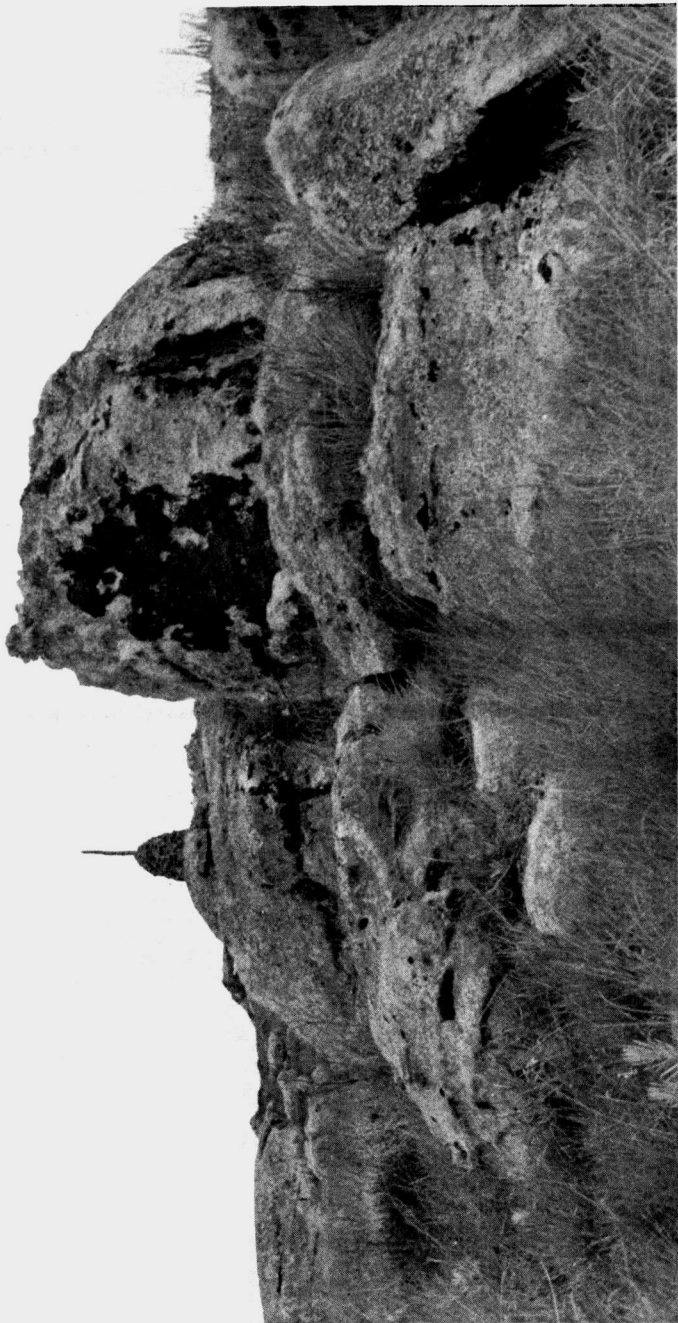


PLATE 7

WEBER — Ants of the Imatong Mountains

PLATE 7

Dracaena fragrans forest of west lower slopes, Imatong Mountains. El.
about 6000 ft.



PLATE 8

PLATE 8

Trench and craters made by the dominant ant and one of the dominant animals of the Imatong Mountains, *Dorylus* (*Anomma*) *nigricans burmeisteri molestus*. Ruler 15 cm. long. El. 6000 ft.



PLATE 9

PLATE 9

Excavated nest of *Myrmicaria eumenoides congolensis*. Ruler 15 cm. long.
El. 7300 ft.



PLATE 10

PLATE 10

Nest of *Monomorium minutum kineti* as revealed when the rock beside it was overturned. White objects are coccids (*Ripersia* n.sp.) tended by the ants. Ruler 15 cm. long. Summit of Mt. Kineti, 10,458 ft.

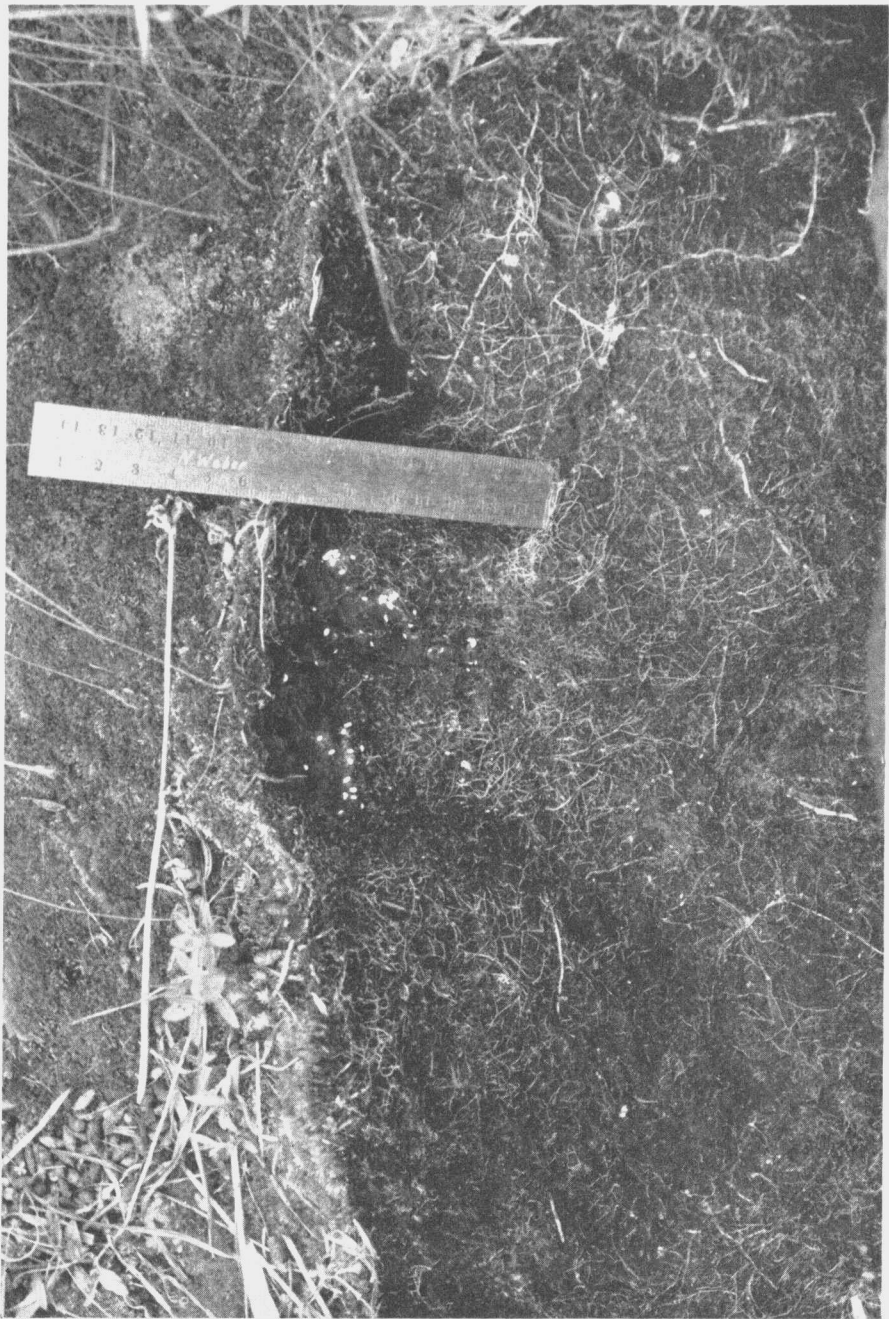


PLATE 11

PLATE 11

Nest of *Camponotus maculatus nubis* as revealed when the rock beside it was removed. Tiny chambers of the thief ant, *Solenopsis punctaticeps juba*, anastomosed with the *Camponotus* nest. Ruler 15 cm. long. El. 8700 ft.



PLATE 12

PLATE 12

Site of enormous polydomous colony of *Acantholepis capensis acholli*. The ants nested under loose slabs of scaling rock. El. 6440 ft.



PLATE 13

PLATE 13

One of the nests of plate 12 exposed when the overlying rock was overturned and showing the carton used in construction of the chambers. Ruler 15 cm. long.



PLATE 14

PLATE 14

Nest of *Polyrhachis (Myrma) schistacea divina* partly excavated and showing workers crawling on the 15 cm. ruler. El. 4100 ft.



PLATE 15

PLATE 15

- Fig. 1 *CalRYPTomyrmex* (C.) *brevis* Weber. Lateral view of worker showing antennal scrobe.
- Fig. 2 *Crematogaster* (*Sphaerocrema*) *lotti* Weber. Lateral view of worker thorax and pedicel.
- Fig. 3 *Crematogaster* (*Sphaerocrema*) *zonacaciae* Weber. Lateral view of worker thorax and pedicel.
- Fig. 4 *Oligomyrmex* *santschii* Weber. Frontal view of soldier head.
- Fig. 5 *Solenopsis punctaticeps* Mayr, *juba* Weber. Frontal view of maxima worker head.
- Fig. 6 *Crematogaster* (*Decacrema*) *lango* Weber. Dorsal view of worker thorax.
- Fig. 7 *Crematogaster* (*Decacrema*) *lango* Weber. Lateral view of worker thorax.
- Fig. 8 *Solenopsis punctaticeps* Mayr, *juba* Weber. Frontal view of minima worker head.
- Fig. 9 *Macromischoides viridis* Weber. Lateral view of worker thorax and pedicel.
- Fig. 10 *Monomorium* (M.) *minutum* Mayr, *kineti* Weber. Frontal view of worker head.
- Fig. 11 *Crematogaster* (C.) *latuka* Weber. Lateral view of worker thorax.
- Fig. 12 *Paedalgus sudanensis* Weber. Wing of female.
- Fig. 13 *Strumigenys* (*Cephaloxys*) *escherichi* Forel, *lotti* Weber. Frontal view of worker head.
- Fig. 14 *Solenopsis punctaticeps* Mayr, *juba* Weber. Lateral view of female epinotum and pedicel.
- Fig. 15 *Paedalgus sudanensis* Weber. Lateral view of female epinotum and pedicel.
- Fig. 16 *Oligomyrmex* *santschii* Weber. Lateral view of worker thorax and pedicel.
- Fig. 17 *Carebara bartrumi* Weber. Frontal view of male head.
- Fig. 18 *Monomorium* (M.) *estherae* Weber. Frontal view of worker head.
- Fig. 19 *Monomorium* (M.) *minutum* Mayr, *kineti* Weber. Lateral view of worker thorax.
- Fig. 20 *Carebara bartrumi* Weber. Frontal view of female head.

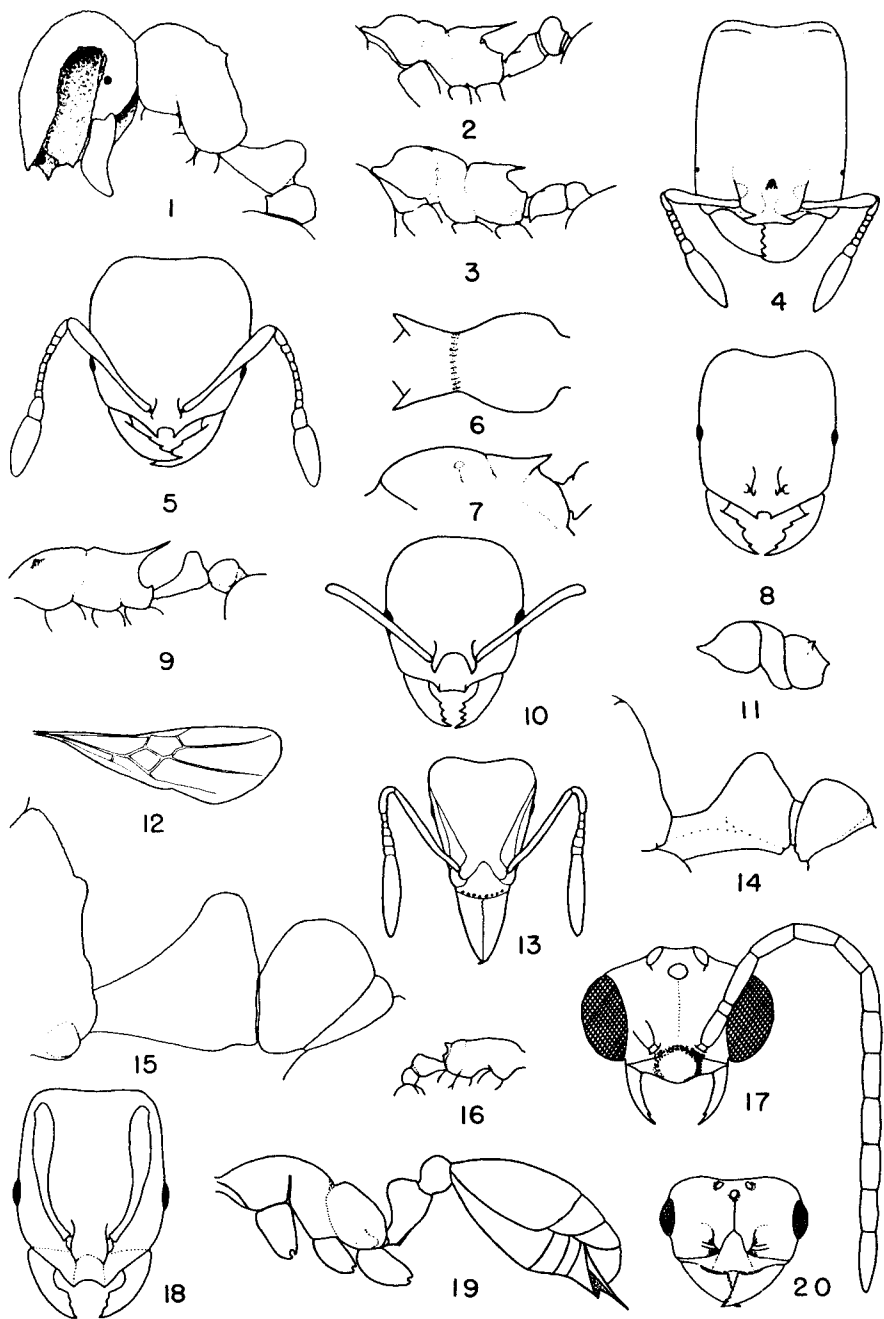


PLATE 16

PLATE 16

- Fig. 21 *Camponotus (Myrmamblys) hāpi* Weber. Lateral view of maxima worker.
- Fig. 22 *Polyrhachis (Myrma) cubaënsis* Mayr, *imatongica* Weber. Anterior view of worker petiolar scale.
- Fig. 23 *Acantholepis megacephala* Weber. Lateral view of soldier.
- Fig. 24 *Tetramorium squaminode* Santschi, *nubis* Weber. Lateral view of worker thorax and abdomen.
- Fig. 25 *Triglyphothrix cinereus* Weber. Dorsal view of worker pedicel nodes.
- Fig. 26 *Acantholepis capensis* Mayr, *acholli* Weber. Dorsal outline of worker thorax and pedicel.
- Fig. 27 *Acantholepis capensis* Mayr, *issore* Weber. Dorsal outline of worker thorax and pedicel.
- Fig. 28 *Acantholepis capensis* Mayr, *thoth* Weber. Dorsal outline of worker thorax and pedicel.
- Fig. 29 *Tetramorium jeanae* Weber. Lateral view of worker thorax and pedicel.
- Fig. 30 *Camponotus (Myrmoturba) maculatus* (Fabr.), *nubis* Weber. Lateral view of maxima worker thorax.
- Fig. 31 *Tetramorium viticola* Weber. Lateral view of worker thorax and pedicel.
- Fig. 32 *Tapinoma carininotum* Weber. Lateral view of worker thorax.
- Fig. 33 *Camponotus (Myrmopiromis) tricolor* Weber. Lateral view of worker thorax and pedicel.
- Fig. 34 *Xiphomyrmex zonacaciae* Weber. Lateral view of worker thorax and pedicel.
- Fig. 35 *Pseudolasius myersi* Weber. Lateral view of worker thorax and petiole.
- Fig. 36 *Xiphomyrmex papyri* Weber. Lateral view of female epinotum and pedicel.
- Fig. 37 *Technomyrmex incisus* Weber. Lateral view of worker thorax.
- Fig. 38 *Plagiolepis (P.) sudanica* Weber. Frontal view of worker head.
- Fig. 39 *Acantholepis capensis* Mayr, *thoth* Weber. Frontal view of female head.
- Fig. 40 *Xiphomyrmex sudanensis* Weber. Dorsal view of worker pedicel nodes.
- Fig. 41 *Technomyrmex longiscapus* Weber. Frontal view of worker head.

