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Bulletin of the Southern California Academy of Sciences.

Los Angeles, Calif. :The Academy,1902-1971.

<http://www.biodiversitylibrary.org/bibliography/4949>

v.40-41 1941-1942: <http://www.biodiversitylibrary.org/item/106670>

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A LIST OF THE ANTS OF CALIFORNIA WITH NOTES ON THEIR HABITS AND DISTRIBUTION

By ARNOLD MALLIS

INTRODUCTION

California, within her ample borders, contains areas of the greatest topographic and climatic diversity. Her seashores, her deserts, her mountains, her valleys, all support a fauna and flora that have been a constant source of joy to those individuals who delight in an abundant Nature. Ants, ever six-legged children of opportunity, respond to this diversity with an abundance of individuals and a profusion of forms.

It is to the foremost "ant-man" of our time, the late Dr. William Morton Wheeler, that we must acknowledge a debt of gratitude for much of our information on the ants of California. Although Dr. Wheeler was extremely interested in the California *Formicidae*, as evidenced by the number of his visits to this state, he naturally could devote his talents to but restricted areas, and thus, there are still great expanses where not a stone has been upturned or a nest excavated by that bipedal anteater, the myrmecologist.

Others, such as G. Mayr, T. Pergande, C. Emery, A. Forel, W. M. Mann, C. W. Woodworth, P. Leonard, M. R. Smith, W. S. Creighton, A. C. Cole, Jr. and the author, have concerned themselves with the ants in California to a lesser or greater degree. Yet, despite the efforts of all these, the lacunae in our knowledge of the California *Formicidae* are amazingly wide and abysmally deep.

In the pages to come, the writer proposes to summarize the available information on the ants of California, and wherever possible, to enlarge these contributions with his own observations. Where there is but one locality record for an ant in California, with the exception of the type localities, it would appear advisable to question the presence of this ant in California until further verification.

Invaluable aid was given to the author in the preparation of this annotated list by the eminent ant authority, Dr. M. R. Smith. The writer is also greatly indebted to Prof. E. O. Essig for constantly encouraging him in his studies on the ants. Drs. W. S. Creighton and A. C. Cole, Jr., kindly classified a number of the ants. Mr. J. Schwartz, who accompanied the author on his many collecting trips, as well as numerous other individuals recorded in the following pages, all rendered valuable service by the collections that they made.

NOTES ON THE ANTS

FAMILY FORMICIDAE

Subfamily DORYLINAE

Genus *Eciton* Latreille

Eciton (Acamatus) californicum Mayr

The nomadic army or legionary ants are for the greater part collected in the vicinity of Sacramento and the San Francisco Bay District. They are most active during the night when they prey upon insects gathered about lights. The writer has observed them to invade and pillage the nests of *Tetramorium caespitum* (L.). In rare instances they have been known to enter homes in Sacramento. For more extensive notes on the habits of this species, see Mallis (1938b.).

Localities: Palo Alto (H. Heath), Sacramento (Sewell), Davis (A. Mallis).

Eciton (A.) leonardi Wheeler

Three workers were taken by P. Leonard on Point Loma, near San Diego. This is the type locality.

Eciton (A.) minus Cresson

The winged males are often collected around lights in Southern California on warm summer evenings.

Localities: Alhambra (A. Mallis and J. Schwartz), Monrovia (J. Schwartz).

Eciton (A.) opacithorax Emery

Locality: Las Cruces Mts. (H. Heath).

Eciton (A.) sumichrasti Norton

Our only information on the occurrence of this ant in California is the statement by P. Leonard (1911) that the workers of this species raided a nest of *Myrmecocystus mexicanus mojave* Wheeler in Point Loma, near San Diego. A later notation cites the fact that his ants were classified by Wheeler.

Subfamily PONERINAE

Genus *Stigmatomma* Roger

Stigmatomma pallipes oregonense Wheeler

This ant, in the two instances that it was collected, was found beneath stones in moist and shaded situations. The two collections resulted in the capture of only 3 ants.

Localities: Napa Co. (A. Mallis), Berkeley Campus (J. MacSwain).

Genus *Ponera* Latreille

Ponera ergatandria Forel

J. Schwartz and the author collected this ponerine species under two rocks near Devil's Gate Dam, Pasadena. The soil was very moist, and the rocks were situated where much leaf mold had accumulated. Although the ground beneath the rocks was dug up, the nest was not found.

Ponera trigona var. *opacior* Forel

The author found this ant around the foundations of two homes in Bakersfield. In one case it was present in the moist soil beneath leaf mold that had accumulated near the foundation. The ants made small openings, about the size of a pinhead, in the ground. When these were excavated, the nest was not found, but 7 workers were collected.

Localities: Weed (A. C. Cole, Jr.), Bakersfield (A. Mallis).

Subfamily PSEUDOMYRMINAE

Genus *Pseudomyrma* Guérin

Pseudomyrma pallida (F. Smith)

E. P. Van Duzee collected this ant by beating willow.

Localities: Potholes, Imperial Co. (E. P. Van Duzee), Ukiah (F. H. Wymore), San Diego Co.

Subfamily MYRMICINAE

Genus *Pogonomyrmex* Mayr

Pogonomyrmex (P.) *barbatus* var. *nigrescens* Wheeler

J. Schwartz and the author found a nest of this variety in an unshaded area near a cultivated field some 10 miles south of Riverside. Within a radius of 18 in. there were 5 entrances, each about $\frac{1}{2}$ in. in diameter. There were no craters around any of the entrances. The ants were rather mild compared to some other species in the genus. *Thysanura* were found running in and out of the entrance.

Pogonomyrmex (P.) *barbatus curvispinosus* Cole.

This subspecies was collected in Riverside by A. C. Cole, Jr.

Pogonomyrmex (P.) *barbatus rugosus* Emery

Cole (1934) notes that the external evidence of the nests of this subspecies is merely a flat disc of gravel or sand, around which the ants clear the vegetation.

Type Locality: San Jacinto (T. Pergande).

Localities: Riverside (H. J. Quayle), Elsinore (C. F. Baker), Lakeside, Palm Springs, Jacumba (Wheeler), Needles (F. M. Carpenter), Victorville (E. C. Jaeger), San Diego (J. D. S.), Point Loma (P. Leonard), Perris (J. C. Bradley), Goffs (Cockerell).

Pogonomyrmex (P.) *californicus* (Buckley)

This is the ant whose sting is so respected by the inhabitants of Southern California. It constructs nests of low flat craters

some 6 in. across, or simple holes in the ground, and are usually found in dry arid country. The workers are very pugnacious, especially on hot days, and when disturbed near the nest. Cole (1932b) observed them harvesting seeds in the Mojave Desert in the early morning and late evening hours. They will also work at night. During the midday the nest will be closed with sand or pebbles and the ants will be found in shallow chambers from one to several feet beneath the surface of the soil. The dealated queens are often seen running about on the soil in July.

Localities: Lakeside, Claremont, Arroyo Seco, Pasadena, Needles, Coyote Wells, Saugas, Laguna Beach, Jacumba (Wheeler), San Jacinto (Pergande), Point Loma (P. Leonard), Upland, Lompoc, Mission, San Diego (J. C. Bradley), San Pedro (Cockerell), Altamont (McLane), Long Beach (H. Andrews), Mojave (Cole), Carbon Canyon (J. Schwartz), Borego Valley (J. Rayner), Los Angeles (A. Mallis), San Gabriel Canyon, Big Tujunga Canyon, Newhall, Alhambra (A. Mallis), Sierra Valley.

Pogonomyrmex (P.) californicus var. *hindleyi* Forel

Type Locality: Escondido (E. Hindley).

Locality: Elsinore (Craft).

Pogonomyrmex (P.) californicus estebanius Pergande

This beautiful ant with the blackish abdomen was found conveying seeds to a nest situated at the base of a shrub. There was no mound, and the sand was piled several inches from the nest opening which was irregular in shape and $\frac{1}{2}$ in. in diameter. The nest was located in the sandy soil of an open, arid country. Cole (1934) noted that brood and seed chambers were often interspersed throughout the mounds, and that the winged forms, particularly the males were found in a nest during July.

Localities: Mojave, Needles, Palm Springs, Hidden Springs Canyon, Little San Bernardino Mts. (Wheeler), Victorville (Jaeger), Otis, Mojave Desert, Perris, Indio (J. C. Bradley), El Centro (Cornell Expedition), Big Bear Lake (G. Ferguson), Ludlow (A. C. Cole, Jr.), Sherwin Hill, near Bishop (R. M. Bohart), near Palmdale (A. Mallis and J. Schwartz), Coachella Valley.

Pogonomyrmex (P.) californicus longinodis Emery

T. Pergande collected the types in the Colorado Desert of California.

Pogonomyrmex (P.) californicus maricopa Wheeler

Localities: Needles (Wheeler), Brawley (J. C. Bradley), El Centro (Cornell Univ. Exped.).

Pogonomyrmex (P.) desertorum Wheeler

Cole (1934) observed a colony in the sandy soil along the Colorado River, near Needles, Calif.

Pogonomyrmex (P.) huachucanus Wheeler

A nest of this species was found by Cole (1934) in the

Mojave Desert near Needles. He observed that the nest consisted of a minute crater mound in the sand, and that the colony was small and the workers were sluggish.

Pogonomyrmex (P.) occidentalis Cresson

Locality: Weed (A. C. Cole, Jr.).

Pogonomyrmex (P.) salinus Olsen

Soda Springs, Bridgeport, is the type locality for this species, and the ant was collected by E. C. Jaeger.

Pogonomyrmex (P.) subdentatus Mayr

The author observed this ant in Davis. The queens were most abundant during February, March, April, and October when they were seen excavating nests in the soil. The nests are mere holes in the ground without any craters. Apparently the colonies are not as populous as some of our other forms. Although the queens may be found in great numbers at certain times of the year, the number of colonies are very few due to the depredations of the Argentine ant. The females are often seen walking around in a very curious manner with their abdomens curled far beneath them. The workers are not very aggressive, and harvest seeds from the neighboring weeds. They will at times sink their mandibles into a leaf, shake it, and thus force the nearby seeds to fall earthwards. On one occasion they were observed to be quite active during noon hour of a cold day in November.

Localities: San Jacinto (H. Heath), Pacific Grove (J. C. Bradley), Palo Alto (W. M. Mann), Davis (T. W. Cook), Laguna Beach (Wheeler), Mojave, Tehachapi (A. C. Cole, Jr.), Grant (Silvestri), Long Beach (H. Andrews), Davis (A. Mallis).

Pogonomyrmex (P.) subnitidus Emery

Cole (1934) found a small mound on a gently-sloping hillside in the Mojave Desert.

Type Locality: San Diego Co. (T. Pergande).

Localities: Mt. Lowe, Arroyo Seco near Altadena, Tejon Pass, Del Mar, Warren's in San Diego Co. (Wheeler), Los Gatos Canyon, Diablo Range (J. C. Bradley), La Jolla (C. T. Brues), Mojave Desert (A. C. Cole, Jr.).

Genus MYRMICA Latreille

Myrmica (M.) bradleyi Wheeler

The writer found the craters of this ant in Yosemite Valley. The perfectly shaped mounds which are about $\frac{1}{2}$ in. in height were situated in unshaded, sandy soil. This species is also known to nest beneath rocks. As a whole, it appears to be a slow-moving ant that is easily collected.

Type Locality: Alta meadows, in Tulare Co. (J. C. Bradley).

Localities: Glacier Point in Yosemite, 8000 feet, and Tallac near Lake Tahoe, 6000 feet, (Wheeler), Yosemite Valley, Bass Lake in Madera Co. (A. Mallis).

Myrmica (M.) *brevinodis* var. *sulcinodoides* Emery

Localities: Lake Tahoe, 6000 feet (Wheeler), Sisson (Silvestri).

Myrmica (M.) *parasitica* Creighton

Creighton (1934) collected the types on Polly Dome, 8600 feet, on the Tioga Pass Road in Yosemite National Park. The nest was found in a gravel pocket, and the following notes are his: "When first discovered only five *parasitica* workers were taken since, at that time, the author had nothing with which to excavate the nest. These five workers together with a number of workers of the host, *bradleyi*, were taken back to camp alive and the relations between the two species observed. These were to every appearance perfectly normal, the *parasitica* workers taking their share of the activities and being treated as ordinary nest mates by the *bradleyi* workers". "As the matter stands it is impossible to state with certainty whether the new species is a slave maker or a temporary social parasite."

Myrmica (M.) *scabrinodis schencki* var. *tahoensis* Wheeler.

Wheeler (1917a.) collected the types at Lake Tahoe (Tallac, Angora Lake, Glen Alpine Springs, Fallen Leaf Lake). He observed that the colonies were small and that they are to be found under stones in shady places.

Genus STENAMMA Westwood

Stenamma brevicorne diecki Emery

Locality: Pacific Grove (H. Heath).

Stenamma brevicorne heathi Wheeler

Wheeler (1915) described the types from a single colony collected in King's River Canyon by H. Heath. He believes that this form may possibly rank as a distinct species when the winged forms are collected.

Stenamma brevicorne sequoiarum Wheeler

H. Heath who collected the types of this subspecies found them nesting under stones among the large redwood trees in Muir Woods.

Stenamma nearcticum Mayr

There is no information concerning this ant other than the type locality, which is California.

Genus APHAENOGASTER Mayr

Aphaenogaster (A.) *patruelis bakeri* Wheeler

Wheeler (1904) described this subspecies from the workers of two colonies collected by C. F. Baker on Catalina Island in the spring of 1904.

Aphaenogaster (A.) *patruelis willowsi* Wheeler

Wheeler (1934a) described this subspecies from ants collected on San Nicolas Island, one of the Santa Barbara Islands off California. M. Willows was the collector.

Aphaenogaster (A.) subterranea occidentalis Emery

This subspecies is widely distributed throughout the State from sea level to 6000 feet, and was found by the author at an altitude of 3000 feet at Bass Lake, Madera Co., beneath pine needles. The ants were slow, and when disturbed, hid in crevices.

Localities: Pacific Grove, Mt. Tamalpais, Yosemite, Lake Tahoe (Wheeler), Palo Alto, King's River Canyon (H. Heath), Corte Madera Creek, Santa Cruz Mts. (W. M. Mann), Yuba City (T. D. Urbahms), Colusa (A. Mallis), Mountain View.

Genus NOVOMESSOR Emery

Novomessor cockerelli (Ern. Andre)

Cole (1934) states that they are common in the deserts near Barstow, Ludlow, and Tehachapi where they construct large, rude, crater nests of pebbles with a single, large, irregular nest entrance.

Genus VEROMESSOR Forel

Veromessor andrei (Mayr)

Veromessor andrei (Mayr) ranges from the extreme north of California to as far south as San Diego, and usually in less arid country than *V. pergandei* (Mayr). As a rule it constructs no craters, although crater mounds may be found near Bakersfield, Calif. J. Schwartz and the author observed this species emerging in enormous numbers from a nest situated between the crevices of a boulder well-imbedded in the ground. This boulder was located in rocky, hilly country. The workers of *andrei* do not approach the pronounced polymorphism found in *pergandei*. These ants forage in long, often winding files, and gather seeds which they store in their nests. A ring of chaff often surrounds their nest entrance. Mann (1911b) found the ant cricket, *Myrmecophila oregonensis* Bruner, and the Scarabs *Cremastochilus pilisicollis* Horn and *Cremastochilus schaumii* Lec. as their guests.

Type Locality: California.

Localities: Antelope in Sacramento Valley (C. D. Cook), Berkeley, La Jolla, San Ysidro, Tejon Pass (Wheeler), Claremont (C. F. Baker), Edendale, Perris, Ramona, Whittier (J. C. Bradley), Eldridge (J. A. Kusche), Laguna Beach (E. O. Essig), Palo Alto (H. Heath and I. McCracken), Point Loma, San Diego (Wheeler), Riverside (H. J. Quayle), Santa Catalina Island (C. F. Baker), Weaverville (W. S. Creighton), Sacramento, Tehachapi, Bakersfield, Sequoia Nat'l Park (A. C. Cole, Jr.), Brentwood (A. Mallis), Pico Canyon near Newhall, Carbon Canyon in Orange Co. (A. Mallis and J. Schwartz), Descanso, Santa Isabel, San Jacinto.

Veromessor andrei castaneus Wheeler and Creighton

Wheeler (1934) collected a large series of workers at Jacumba, and San Diego, in Southern California, which are the type localities.

Veromessor andrei flavus Wheeler and Creighton

The types were collected by Wheeler (1934) at Jacumba in Southern California.

Veromessor chamberlini (Wheeler)

Wheeler (1915) described this species from 18 workers collected by R. V. Chamberlin on Santa Cruz Island, off the coast of California.

Veromessor pergandei (Mayr)

The beauty of this jet-black, patent-leather-colored ant when active in the field, will always arouse the admiration of the collector. The workers vary greatly in size, and form crater-like nests with one or several large oblong or oval openings in very arid, and often adobe-like soil. These nests are often, but not always, surrounded by a ring of chaff, and Wheeler (1934) has found them to extend to a depth of 2 feet. The ants move swiftly and are active during the hottest time of the day in regions where the summer temperatures may go as high as 130° F. While they move in long files, they may be observed collecting seeds from the desert shrubs. In the field they will often run into some species of *Pogonomyrex*, and the contact does not reveal the slightest hostility on the part of either ant. Apparently they are better adapted for dry-arid conditions than *V. andrei* (Mayr) as is evidenced by their desert distribution. The author has on occasions observed a small *Tenebrionid* emerging from the nest of this insect.

Type Locality: California.

Localities: Mojave (J. C. Bradley and A. Wetmore), Apple Valley (E. C. Jaeger), Santa Barbara (F. E. Clements), Palm Springs, Needles, Lakeside, Claremont, (W. M. Wheeler), Coachella Valley (S. F. Light), Elsinore (C. F. Baker), Otis, Perris (J. C. Bradley), Victorville (W. S. Creighton), Fresno (C. W. Woodworth), Corona (F. Platt), Borego Valley in Little Colorado Desert (J. Rayner), Barstow, Ludlow (A. C. Cole, Jr.), Bakersfield (A. Mallis), Palm Canyon (A. Mallis and J. Schwartz), Salton Sea, San Jacinto, Moore Canyon, Menifee, San Diego Co. (No Collector).

Veromessor stoddardi (Emery)

Type Locality: San Diego Co. (Pergande).

Locality: Jacumba near Mexican border (W. M. Wheeler).

Genus PHEIDOLE Westwood

Pheidole (Ph.) *barbata* Wheeler

Wheeler (1908a) described this species from a single soldier and several workers that he collected from a small crater nest on the Mojave desert near Needles.

Pheidole (Ph.) *californica* Mayr

The tiny workers and the soldiers with their comparatively huge heads are frequently found in California. They nest under stones, boards, in oak galls, and are known to form small craters

in the sandy soil. Cole (1934) notes that this ant is a true harvester for he found seeds stored in the nest, and chaff around the crater peripheries. Mann (1911b) observed that *Solenopsis molesta* (probably var. *validiuscula* Emery) shares the nest with this ant. A Staphylinid guest, *Conosoma heathi* Wasmann also occurs here.

Type Locality: San Francisco.

Localities: Palo Alto (H. Heath, W. M. Mann, W. M. Wheeler), Brookdale, Santa Cruz Island (R. V. Chamberlin), Needles (A. C. Cole, Jr.), Devil's Gate Dam, Pasadena (A. Mallis, J. Schwartz, H. Taylor), Griffith Park in Los Angeles (A. Mallis and H. Taylor), Ukiah in Mendocino Co. (No Collector).

Pheidole (Ph.) *californica* var. *incenata* Wheeler

H. Heath collected the types (soldiers and workers) at Palo Alto, Calif.

Pheidole (Ph.) *californica* var. *satura* Wheeler

Wheeler (1915) described this variety from workers and soldiers collected on Santa Cruz Island, California, by R. V. Chamberlin, and at Palo Alto, California, by H. Heath.

Pheidole (Ph.) *californica oregonica* Emery

Cole (1934) found a small colony of these ants nesting under a flat rock near Weed, California.

Pheidole (Ph.) *grallipes* Wheeler

J. Schwartz and the author found a nest at the very base of a shrub on a sandy arid slope in Mint Canyon. The entrance to the nest was an irregular opening about 1 in. by 1½ in. in diameter, and somewhat hidden by the branches of the shrub. Upon disturbing the nest, the workers commenced to appear, but they made no attempt to sting. Later, two soldiers were captured. The nest was so situated that the excavated earth sloped downwards several inches from the entrance. Pergande described the above species as *Ph. susannae* race *longipes*, which name Wheeler found to be preoccupied.

Localities: La Jolla (H. Andrews), San Jacinto (Emery), Lakeside (Wheeler), Mint Canyon in Los Angeles Co. (A. Mallis and J. Schwartz).

Pheidole (Ph.) *hyatti* Emery

Pheidole hyatti Emery, commonly known as the "big-headed" ants, are often a pest in Southern California, and in the Sacramento and San Joaquin Valleys. They invade the kitchens, and are usually found foraging around the sink. *Solenopsis xyloni maniosa* Wheeler, when present, may drive *hyatti* from the vicinity and then invade the house in their stead. The big-headed ants nest under the siding and in and around cracks in the concrete steps. Out in the field they are very commonly found nesting under rocks, and may form crater nests about the roots of

chaparral. *Terapus infernalis* (Fall), a Histerid, is often found as a guest in the nests of this ant.

Localities: San Jacinto (Pergande), Catalina Island (C. F. Baker), Livermore (G. Ferguson), Griffith Park in Los Angeles, E. Bakersfield (A. Mallis), Devil's Gate Dam, Pasadena (A. Mallis and J. Schwartz).

Pheidole (Ph.) *hyatti solitanea* Wheeler

Wheeler (1915) described this subspecies from some workers and soldiers that he collected on Point Loma, near San Diego, and from a soldier and three females collected in the same locality by P. Leonard. The writer collected the workers in Griffith Park in Los Angeles.

Pheidole (Ph.) *xerophila pacifica* Wheeler

The habits of this ant are known only from Wheeler's (1915) notes which are presented here: "Described from numerous specimens of all four phases taken at Pasadena and Lakeside, Southern California, during late November, 1910. The colonies were found on dry, unshaded hills in small crater nests, the periphery of which was often covered with the discarded chaff and seed, proving that the species is a harvester. Only a few soldiers were found in each nest. The presence of males and winged females in late November shows that these phases are probably retained in the nests throughout the winter as in *Prenolepis imparis*, *Camponotus americanus* etc., and that the nuptial flight as in these ants probably occurs in the very early spring."

Type Locality: Pasadena and Lakeside (Wheeler).

Genus CREMATOGASTER Lund

Crematogaster (*Atopogyne*) *lineolata laeviuscula* var. *californica*
Emery

J. Schwartz and the author found enormous numbers of this ant clinging in a cluster to the underside of a stone in a rather rocky area. Another colony was located beneath the bark of a recently-felled poplar in Bakersfield during the month of December. Many of the ants appeared to be incapacitated by the cold and some of the ants were evidently dead. One live male was collected. The workers were seen emerging from the tunnels made by Cerambycid larvae. There were a number of living bark beetles and many dead workers of *Solenopsis xyloni* var. *maniosa* Wheeler under the bark of the same tree trunk.

Type Locality: Encinitas and Los Angeles (Pergande).

Localities: Auburn (L. S. Jones), Pacific Grove (W. M. Mann), Bakersfield (A. Mallis), Big Dalton Canyon near Glendora (A. Mallis and J. Schwartz).

Crematogaster (A.) *lineolata laeviuscula* var. *clara* Mayr

Locality: Laguna Beach (E. O. Essig).

Crematogaster (A.) *lineolata coarctata* Mayr

The author discovered a nest of this species beneath a rock

in Griffith Park, Los Angeles, during the month of December. But one main entrance hole was visible. The ants clung to the underside of the stone in one huge cluster. When separated, the ants were sluggish; this was undoubtedly due to the cool weather that prevailed at this time. J. Schwartz and the author collected another colony of these ants beneath a boulder in Eaton's Canyon, and this time there were five entrance openings into the soil. Each of these entrances were approximately $\frac{3}{8}$ in. in diameter. Two winged males, two myrmecophilous weevils, and one ant cricket were found in the nest with these ants.

Localities: Palo Alto (W. M. Mann), Oakland Hills (E. C. Van Dyke), Berkeley, Muir Woods, Napa Valley, Griffith Park in Los Angeles (A. Mallis), Eaton's Canyon in Altadena (A. Mallis and J. Schwartz).

Crematogaster (A.) *vermiculata* Emery

Type Locality: Los Angeles (Pergande).

Genus *Monomorium* Mayr

Monomorium (M.) *minimum* (Buckley)

In all probability, this tiny black ant was much more prominent until the advent of the Argentine ant. In California it is not very commonly found to invade homes as it does in the East. Essig (1926) states that they construct nests with small craters in the soil, or in rotten wood, and that they are common in the San Francisco Bay region. The writer has come upon their tiny craters, approximately $1\frac{1}{2}$ in. to 2 in. across in the Berkeley Hills where they were in a dry unshaded area.

Localities: Mojave Desert (Cole), Claremont (M. R. Smith).

Monomorium (M.) *minimum* var. *ergatogyna* Wheeler

Wheeler (1904) named this ant from a series of workers collected by C. F. Baker on Catalina Island, California. The workers are smaller than the typical *minimum* and the females are ergatoid, that is, they lack all signs of ever having had wings. Although this variety has been reported from the mainland of California, it is possible that in some instances it has been confused with the typical *minimum*.

Type Locality: Catalina Island, California (C. F. Baker).

Localities: Berkeley, Mt. Tamalpais (A. Mallis), Los Angeles (A. Mallis and J. Schwartz), Sonoma Co. (S. F. Bailey).

Monomorium (M.) *pharaonis* (L.)

Although the writer has no definite locality records of this cosmopolitan ant, it is believed to occur in this State.

Genus *Solenopsis* Westwood

Solenopsis (S.) *geminata rufa* Jerdon

Wheeler (1908a) states that this subspecies occurs in small numbers in the sandy soil along the Colorado River near Needles,

California. *Solenopsis geminata* var. *diabola* Wheeler is a synonym of the above subspecies.

Solenopsis (Diplorhoptrum) molesta (Say)

The records of this ant in California probably refer for the most part to the very common variety *validiuscula* Emery.

Locality: Glendale (A. W. Smith).

Solenopsis (D.) molesta var. *validiuscula* Emery

It is this ant that is a common pest in homes in California, often invading the kitchen through crevices around the sink. Here it feeds on greases, meats, and cheese. In the fields it may be very common in moist grassy situations or beneath rocks in sandy, and arid areas. The males and females were observed in Los Angeles towards evening in the month of June, in great mating flights. Several pair *in copula* were seen upon the ground. On another occasion during the month of July the author observed them in enormous numbers on blades of grass in a lawn on the campus in Davis; here the neuters were very excited since workers of *Eciton californicum* Mayr were carrying off many of the sexual forms. Mann (1911b) observed *Solenopsis molesta* (Say) (probably var. *validiuscula* Emery) in nests with *Tapi-noma sessile* (Say), *Camponotus sansabeanus maccooki* Forel, and *Prenolepis imparis* (Say) (probably var. *californica* Whlr.), as well as in their own independent nests.

Type Locality: Los Angeles and San Jacinto (Pergande).

Localities: Sacramento (H. H. Kiefer), Oakland Hills (E. C. Van Dyke), Madison in Yolo Co. (B. E. White), Glendale (A. J. Basinger), Fairfield (S. F. Bailey), Davis, Los Angeles (A. Mallis), Little Tujunga Canyon (A. Mallis and J. Schwartz), Santa Inez Mts. near Santa Barbara (No Collector).

Solenopsis (D.) texana catalinae Wheeler.

Wheeler (1904) described this subspecies from several workers and dealated females collected by C. F. Baker on Catalina Island, California, during the spring of 1904.

Solenopsis (S.) xyloni McCook

Locality: Fenner (A. C. Cole, Jr.).

Solenopsis (S.) xyloni var. *aurea* Wheeler

Locality: Visalia (Wheeler)

Solenopsis (S.) xyloni var. *maniosa* Wheeler

Of all the native ant pests in California, this is probably the most important. For a detailed account of its depredations and its control, see Mallis (1938c). It is widespread throughout Southern California and the interior valleys of California where it ranges at altitudes below 2000 feet. In the past it was undoubtedly much more common around cities until driven away by the Argentine ants. In the field it will be found nesting under stones, cow chips, and under wood debris, or it may form sponge-like crater nests in arid areas or about the base of some plant.

Around homes it may establish itself in cracks and crevices in the concrete foundation or steps, or directly under the home near the furnace. The ants tend Homopterous insects, and feed on foods and crops of all kinds. Because of their efficient sting they are very greatly respected. Swarming occurs most commonly from May through September, but the winged forms may be seen long before or long after this period. Their nests harbor many interesting Staphylinid myrmecophiles.

Type Locality: San Ysidro, near Santa Barbara (Wheeler).

Localities: Pasadena, Claremont, La Jolla, San Diego, Needles (Wheeler), Los Gatos, Mt. Diablo Range (J. C. Bradley), Whittier (H. J. Quayle), Visalia (Culbertson), Eaton's Canyon, Fresno, Brookdale, Friant (R. V. Chamberlin), Davis, Antioch, Capay, 1500 feet, Putah Canyon, Bakersfield (A. Mallis), Big Tujunga Canyon in Los Angeles Co., near Newhall, Mint Canyon, Palm Canyon, Los Angeles (A. Mallis and J. Schwartz), Alhambra (B. Hall), Fenner, Needles (A. C. Cole, Jr.), Jacinto Barranca (J. C. Bradley).

GENUS LEPTOTHORAX Mayr

Leptothorax acervorum canadensis var. *calderoni* Forel

Wheeler (1917a) states that the variety *calderoni* is common in nests in the bark of large pine logs and stumps often in close association, almost approaching symbiosis, with the ant *Camponotus herculeanus* var. *modoc* Wheeler.

Type Locality: Lake Tahoe (Wheeler).

Leptothorax andrei Emery

Mann (1911b) collected very small colonies in Palo Alto where they were either associated with *Formica rufibarbis* var. *occidua* Wheeler, or formed independent nests.

Leptothorax eldoradensis Wheeler

Wheeler (1915) described this species from two workers that were collected by J. C. Bradley on the summit of Mt. Wilson, near Pasadena, California.

Leptothorax nevadensis rudis Wheeler

Wheeler (1917a) described the workers and one queen from several small colonies he found beneath the edges of stones in Tenaya Canyon, Yosemite Valley, and Angora Peak, 8600 feet near Lake Tahoe.

Leptothorax nitens Emery

Wheeler (1903a) states that H. Heath found a colony of this species hibernating in a termite burrow in the ground at Pacific Grove, California,

Leptothorax nitens var. *heathi* Wheeler

According to Wheeler (1903a) H. Heath found a colony nesting under a stone at Pacific Grove; this is the type locality.

Leptothorax nitens var. *mariposa* Wheeler

The workers of this variety were collected by Wheeler

(1917a) under the edges of stones in dry places in Tenaya Canyon, Yosemite Valley, the type locality.

Leptothorax rugatulus var. *mediorufus* Wheeler

Type Locality: Lake Tahoe (Tallac, Glen Alpine) and Camp Curry, Yosemite Valley (Wheeler).

Locality: Volcano Creek in Southern California (J. C. Bradley).

Genus TETRAMORIUM Mayr

Tetramorium caespitum (L.)

According to Essig (1926) this species is fairly common in Central California along the Sacramento and San Joaquin Rivers. The author once observed them in combat with *Eciton californicum* Mayr in Davis. It nests in cracks and crevices along sidewalks. Quite a number of moundless nests in sandy soil about $\frac{1}{4}$ in. in diameter were observed along the sides of the approach leading to the Sacramento River Bridge. The ants are slow-moving, and tend aphids and other honeydew-secreting insects. Essig (1926) notes that they injure many truck crop plants, and that they will also store grass seeds and feed on animal matter.

Localities: Sacramento, Davis (A. Mallis).

Genus CYPHOMYRMEX Mayr

Cyphomyrmex rimosus var. *comalensis* Wheeler

Woodworth (1910b) notes that this very small soil-colored ant grows a fungus in the excrement of caterpillars, in nests under rocks and logs in the dense shade of trees and shrubs. Their nests are to be found along the banks of dry and flowing streams and irrigation ditches in Southern California. It is a rather rare ant, and probably occurs for the most part in the arid regions near the Arizona border.

Locality: Southern California (Woodworth).

Cyphomyrmex wheeleri Forel

Although there are no notes from California on this species, Wheeler (1907c) found this ant in Texas where it occurs in areas of great aridity, and always under stones. "Each colony comprises only a few dozen workers and a single dealated female except during the spring and early summer, when one finds also several callow workers, males and females and a variable number of eggs, larva and pupa. The workers are nocturnal, at least during the warm seasons of the year, a peculiarity which is indicated by their yellow color. They are very slow in their movements and readily "feign death". Males and females were collected by Wheeler during the month of June.

Locality: Three Rivers (Culbertson).

Genus ATTA Fabricius

Atta (M.) *versicolor* Pergande

Wheeler (1907c) states that this ant builds craters of coarse sand in arroyo beds. During the intense heat of midday the

ants do not leave the nest, but towards evening they will slowly move in long files and cut and carry the leaves from nearby desert shrubs. The colonies consist of but a few hundred workers who cultivate fungus gardens.

Localities: Yucca (Wheeler), Mojave Desert (A. C. Cole, Jr.).

Subfamily DOLICHODERINAE
Genus LIOMETOPUM Mayr

Liometopum apiculatum luctuosum Wheeler

This subspecies is commonly found above altitudes of 4000 feet and appears to be associated with pine trees. The writer collected them from a dying western yellow pine (bug tree) from which sap was exuding due to the attacks of *Dendroctonus* sp. This is a very active and pugnacious form.

Localities: Baldy Peak in the San Gabriel Mts., 6500 feet (Brewster, Joos, Crawford); Tenaya Canyon in Yosemite, 5000 feet (Wheeler); Lake Tahoe (Calderon); St. Helena (O. T. McClay); Yosemite Park, 4000 feet (A. Mallis); Hackamore, Modoc Co. (No Collector).

Liometopum occidentale Emery

The author has found this ant to be very widely distributed throughout the State, in the lowlands about Sacramento, in the foothills of Southern California, and at 6000 feet on Mt. Baldy. It dwells under the bark and in the cavities of trees, and is extremely common along the sides of streams where it attends aphids and other honeydew-secreting insects. At times the ants may be a pest in homes by invading these in a constant annoying stream, apparently attracted by some food or other. These ants are very pugnacious, and readily swarm over any individual that disturbs them. They bite and then spray an irritating fluid into the wound; this colorless fluid is discharged when they raise their abdomens. The queens come to light in May, and have been found beneath bark. The Mirid, *Dacerla inflata* Uhler, will often be found running in the trails of this species, which it superficially resembles in color and structure.

Type Locality: San Jacinto, 1533 feet, (Pergande).

Localities: Pasadena, Yosemite, 4000 feet, Wawona (Wheeler), Baldy Peak in the San Gabriel Mts. (Brewster, Joos, and Crawford), Claremont (C. F. Baker and W. M. Wheeler), Coalinga, below 500 feet, Ontario, Alpine (J. C. Bradley), San Diego (Calif. Dept. Agr.), San Bernardino Co. (G. Ferguson), Santa Cruz (E. O. Essig), Bass Lake in Madera Co., Capay, Davis, Putah Canyon (A. Mallis), Devil's Gate Dam in Pasadena, Big Dalton Canyon near Glendora, Big Tujunga Canyon in Los Angeles Co., Eaton's Canyon, Mt. Baldy, 6000 feet, Arroyo Seco in Pasadena, Pico Canyon near Newhall, Base of Mt. Baldy, 1500 feet (A. Mallis and J. Schwartz), Carrville in Trinity Co. (F. Platt), Fort Seward (B. E. White), Mendocino Co. (J. Helfer), Sacramento, (A. C. Cole, Jr.).

Genus DORYMYRMEX Mayr

Dorymyrmex pyramicus (Roger)

This very widely distributed species in California forms small crater-like nests about two to four inches across. In the lowlands, the nests are to be found in hard, vegetation-free soil, or in dry sandy areas; however, at Bass Lake, altitude 3000 feet, the nest was found some 75 feet from the lake in a grove of western yellow pine. The author has observed this *Dorymyrmex* tending mealybugs on succulents, and in all probability they attend aphids and other scale insects. In Davis, the ants foraged until the end of November, and then disappeared during the rainy season, only to emerge at the end of February. During the hot summer months the ants cease all outside activity during the midday hours. The sexual forms were seen preparing for mating flights at the beginning of March; and the queens were found excavating their nests in April.

Localities: Davis, Bass Lake in Madera Co., Capay, Griffith Park in Los Angeles, Putah Canyon (A. Mallis), near Newhall, near Palmdale (A. Mallis and J. Schwartz), Glendale (Cockerell).

Dorymyrmex pyramicus var. *bicolor* Wheeler

Previous to the advent of the Argentine ant, this variety was an annoying house ant in Southern California. It makes small crater mounds up to six inches across in dry, hard, arid soil in the lowlands of California. At times the ants become pests due to their habit of tending Homopterous insects on ornamentals. The author reduced them in numbers by placing poison-syrup containers in those areas where they were accustomed to forage. The control is accomplished not so much by the toxic material in the syrup as by the ants drowning in enormous numbers in each of the poison cans. They have been observed attacking *Pogonomyrmex californicus* (Buckley) in enormous numbers, and in Bakersfield heaps of *Solenopsis xyloni maniosa* Wheeler were often found at the base of their crater mounds. It should be noted that *D. pyramicus* (Roger), the typical form, which hides during midday in the warm season, was not found in so hot and arid a region as Bakersfield. Whereas, the var. *bicolor* which is fast and active even in the hot sun, occurred in great abundance in this area. The dealated queens were captured in Davis during the months of April and May. One male was captured in Brookside Park in Pasadena during the month of December while emerging from the nest entrance.

Localities: San Pedro (Cockerell), Glendora, Needles (Wheeler), Whittier, Dinuba (E. O. Essig), Mojave, near Sequoia Nat'l Park (A. C. Cole, Jr.), Davis, Bakersfield, Hollywood, Fresno, Putah Canyon (A. Mallis), Big Tujunga Canyon, Carbon Canyon in Orange Co., Brookside Park in Pasadena, Morongo Valley in San Bernardino Co. (A. Mallis and J. Schwartz).

Dorymyrmex pyramicus var. *niger* Pergande

Locality: Fresno (E. O. Essig).

Genus IRIDOMYRMEX Mayr

Iridomyrmex humilis Mayr

In 1905 the Argentine ant, *Iridomyrmex humilis* Mayr was first reported in California, and since that time it has become one of our most important and widely distributed household and farm pests. It is strictly a water-loving ant and is limited in its distribution by its moisture requirements, and by an inability to thrive where it cannot be protected from long periods of cold weather, such as is encountered at the higher altitudes. The ants in the more humid portions of the State, and those around our artificially watered regions, have been driven out by the irresistible Argentine ant; whereas, those ants that live in the more arid, or at the higher altitudes, have no competition from the Argentine ant. For more complete information on this species, see Eckert and Mallis (1937), and Mallis (1938a).

Locality: Throughout the State where sufficiently moist and not too high.

Iridomyrmex pruinosus var. *analis* (Ern. Andre)

In all probability this ant is more common than the collections show, for it has possibly been confused with *Forelius* Spp. and *Iridomyrmex humilis* Mayr. It differs from the latter in its paler color, its more noticeable odor upon being crushed, and in not confining its foraging to distinct trails.

Locality: Orange County Park (A. C. Davis).

Iridomyrmex pruinosus (Roger)

Localities: Needles (A. C. Cole, Jr.), Mt. Wilson (J. C. Bradley).

Genus FORELIUS Emery

Forelius foetidus (Buckley)

The nests of this species are often found beneath boulders in arid, sandy regions. They may also make crater nests of fine white sand some 3 inches across and $\frac{1}{2}$ inch high. Several of these nests are often in close proximity to one another, and each nest may contain many queens. Apparently they are extremely xerophilous since the forage in long definite trails in the hot summer sun, in desert areas.

Localities: Lake Elsinore (Bottel), Bakersfield (A. Mallis), Pico Canyon near San Fernando, near Riverside (A. Mallis and J. Schwartz).

Forelius maccooki Forel

Locality: Mojave (A. C. Cole, Jr.).

Genus TAPINOMA Forster

Tapinoma sessile (Say)

Tapinoma sessile (Say) is a common ant in California, and has been collected from sea level to 7000 feet. This ant nests

under rocks, in wood excavated by termites and fungi, beneath the rim covers of beehives where it does the bees no harm, and in homes where it may become an important household pest. The nest contains many queens, and huge numbers of workers and immature young. According to Woodworth (1910b) this species was much more common before the advent of the Argentine ant, and this observer further states that they have an odor that "is produced by a liquid secretion which can be ejected from the abdomen as an appreciable drop and which is used in its contests with the Argentine species. As long as the supply of this secretion lasts the *Tapinoma* has no difficulty in keeping the Argentine off, but after having put four or five of the Argentines out of the combat in this way finally the *Tapinoma* is put to rout and the Argentines are invariably victorious, because they always attack in sufficient numbers." Besides invading houses, these ants make pests of themselves by attending aphids on fruit trees and ornamentals. At times the workers may be seen with turgid gasters looking like the repletes of our honey ants, but of course much smaller. The winged sexuals, as well as the wingless females were found beneath the top board of a beehive in May, in Davis. Mann (1911b) noted that *Solenopsis molesta* (Say) (probably var. *validiuscula* Emery) nests with *T. sessile* (Say). The ant cricket, *Myrmecophila oregonensis* Bruner has been found in their nest.

Localities: San Jose, Palo Alto (H. Heath), Lompoc, Mt. San Jacinto, Harris, Humboldt Co., and summit of Mt. Wilson (J. C. Bradley), Whittier, Azusa (H. J. Quayle), Yosemite, Lake Tahoe (Wheeler), McCloud (Silvestri), Lookout Mt. (Cockerell), Julian (U. S. Biological Survey), Weed, Sequoia Nat'l Park (A. C. Cole, Jr.), Carrville, Trinity Co. (F. Platt), Geyserville, Sonoma Co. (S. F. Bailey), Alameda Foothills (W. M. Gifford), Soquel Road in Madera Co., 6000 feet, Bass Lake in Madera Co., Davis, Brentwood, in Sonoma Co., Mt. Baldy, 7000 feet (A. Mallis), Big Tujunga Canyon in Los Angeles Co., Devil's Gate Dam in Pasadena (A. Mallis and J. Schwartz), Griffith Park in Los Angeles (A. Mallis and H. Taylor).

Subfamily CAMPONOTINAE

Genus PRENOLEPIS Forel

Prenolepis (P.) *imparis* var. *californica* Wheeler

This is the variety that is so common in California where it evidently prefers the moister situations. These ants have been collected from sea-level to 4000 feet. The ants usually nest beneath boulders where the soil is moist. They are active in cool weather long after other species have ceased foraging. The workers tend aphids on all kinds of coniferous and deciduous plants and will also feed on fruit buds and succulent tissue of fruit and ornamental plants. Some of the workers gorge themselves so much on nectar and honeydew that their abdomens become greatly enlarged and amber in color. The males are seen swarming in great numbers during February, March, and April.

Mann (1911b) found *Myrmecophila oregonensis* Bruner and *Solenopsis molesta* (Say) (probably var. *validiuscula* Emery) in the nest of this variety.

Type Locality: Stanford University (H. Heath, W. M. Mann, C. F. Baker).

Localities: San Jose (H. Heath), Marin Co., Eldridge, Sonoma Co. (J. A. Kusche), Piedmont, Berkeley (J. C. Bradley), mountains near Claremont (C. F. Baker), Santa Cruz Island (R. V. Chamberlin), Point Loma near San Diego (P. Leonard), Santa Inez Mts., San Ysidro, near Santa Barbara, Pasadena, Mt. Lowe, Yosemite Village (W. M. Wheeler), Santa Paula (H. J. Quayle), Portola, La Verne (E. Becker), Placerville, Berkeley Foothills, Bass Lake in Madera Co., 3000 feet, Davis, Grass Valley, Putah Canyon, Eaton's Canyon near Altadena (A. Mallis), Devil's Gate Dam in Pasadena, Big Dalton Canyon near Glendora, Base of Mt. Baldy, 1500 feet (A. Mallis and J. Schwartz), Woodland (L. M. McQuestin), San Diego (A. J. Basinger), Newport (Davis), Kenwood, Calistoga in Napa Co. (S. F. Bailey).

Genus LASIUS Fabricius

Lasius (L.) *brevicornis* Emery

Localities: San Jacinto, Lake Tahoe (Wheeler).

Lasius (L.) *brevicornis* var. *microps* Wheeler

Type Locality: Yosemite Village, 4000 feet (Wheeler).

Lasius (*Acanthomyops*) *interjectus californicus* Wheeler

Type Locality: Palmer's Canyon, San Gabriel Mts., near Claremont (F. Grinnell).

Lasius (A.) *latipes* Walsh

The ants of this species nest in rather dry, sunny places.

Localities: Mt. Tamalpais (C. G. Hewitt), Mountain View (W. M. Wheeler).

Lasius (L.) *niger alienus* var. *americanus* Emery

Locality: Glacier Point in Yosemite, 8000 feet (Wheeler).

Lasius (L.) *niger* var. *neoniger* Emery

J. J. duBois and the author collected this variety on a tree, which the ants were ascending, probably in order to attend honeydew-secreting insects. Their queens were very abundant during the summer months in Davis.

Localities: Lake Tahoe (Wheeler), Giant Forest (J. C. Bradley), Davis (A. Mallis and J. J. duBois), McCloud (No Collector).

Lasius (L.) *niger* var. *sitkaensis* Pergande

Ants of this variety are widely distributed throughout the Canadian Zone.

Localities: Giant Forest, 6500 feet (J. C. Bradley), Lake Tahoe, 6000-7000 feet, Camp Curry and Glacier Point, 4000-8000 feet, Yosemite (Wheeler), King's River Canyon (H. Heath), Carrville in Trinity Co. (F. Platt), Caspar (J. Helfer).

Lasius (C.) umbratus subumbratus Viereck

Locality: Angora Peak near Lake Tahoe, 8000 feet (Wheeler).

Genus MYRMECOCYSTUS Wesmael

Myrmecocystus lugubris Wheeler

J. C. Bradley sent some of these ants to Wheeler (1909a) from Otis, in the Mojave Desert; this is the type locality. As several of the ants were in a semi-replete condition, it is thought that they are honey-storing ants.

Myrmecocystus melliger depilis Forel

Locality: Needles in Mojave Desert (Wheeler).

Myrmecocystus melliger lomaensis Wheeler

This subspecies was described by Wheeler (1912b) from six workers, three repletes and two females taken by P. Leonard on Point Loma, near San Diego, California.

Myrmecocystus melliger mimicus Wheeler

The subsp. *mimicus* Wheeler constructs crater nests with circular openings about 1 in. in diameter. These ants work during the day, prey upon insects, and are not known to have repletes.

Localities: Goshen Junction (J. C. Bradley), Riverside, Whittier, Mojave Desert (No Collector).

Myrmecocystus melliger mimicus var. *californicus* Cole

Type Locality: Weed (A. C. Cole, Jr.)

Myrmecocystus melliger semirufus Emery

The nests are common in and around Bakersfield in burnt-over, adobe-like, vacant lots. There are no mounds about the nest, but the sand is piled in flat heaps several inches from the nest entrance. The opening to one nest was approximately $\frac{1}{2}$ in. in diameter and somewhat oval. This nest had no guard of workers around the entrance, and it was entirely free of stones and chaff. Around the entrances of some other nests rings of chaff and the dismembered bodies of *Veromessor pergandei* (Mayr), *Pogonomyrmex* sp., and *Solenopsis xyloni maniosa* Wheeler, were found in great abundance. At times they construct regular craters about their nest entrances. This subspecies is very active, diurnal, and difficult to capture. They appeared to be attending aphids on some prostrate weeds.

Type Locality: San Jacinto (Pergande).

Localities: Needles (Wheeler), Point Loma near San Diego (P. Leonard), Morongo Valley (H. Green), Lodi (H. H. Kiefer), E. Bakersfield (A. Mallis).

Myrmecocystus melliger semirufus var. *testaceus* Emery

Some five miles from Bakersfield in an arid sandy area devoid of vegetation, a nest of this species was found. The semi-circular crater was some 5 in. high, and there was but a single entrance, about $\frac{1}{2}$ in. in diameter. However, when this nest was observed two days later, two entrances, about 1 in. apart were seen. The ants vary greatly in size, forage during midday, and move rapidly over the surface of the sand. One ant was observed conveying the abdomen of a honey bee towards the nest.

Type Locality: San Jacinto (Pergande).

Localities: Claremont (C. F. Baker), Perris (J. C. Bradley), Bakersfield (A. Mallis), Mojave Desert (No Collector).

Myrmecocystus mexicanus Wesmael

Leonard (1911) discovered a nest in the soil of disintegrated shale. There were many semi-repletes moving about the galleries, and about eight laying females. The females were friendly with one another. According to Leonard, "It is quite common to find dead insects, termites, flies, etc., lying among the larvae, and in wild nests two to three repletes hanging from the ceilings of the nursery chambers. Sometimes the larger larvae remain for a long time with their heads thrust into the thoraces of dead flies, devouring the muscular tissue." This species shows a preference for moister soil where it is available.

Locality: Point Loma near San Diego (P. Leonard).

Myrmecocystus mexicanus horti-deorum McCook

For a very detailed account of this ant, see McCook (1882).

Localities: Claremont (W. A. Hilton), near Needles (A. C. Cole, Jr.), El Centro in Imperial Co. (No Collector).

Myrmecocystus mexicanus mojave Wheeler

The notes on this subspecies are from Leonard (1911) who studied these insects at Point Loma near San Diego. The entrance hole to their nest was comparatively large, being the size of a "ten cent piece". Repletes occurred some four inches below the surface of the soil. They were nocturnal, predacious on other insects, and attended aphids and gathered nectar from flowers. The legionary ants, *Eciton* (*A.*) *sumichrasti* Norton raided their nest in June. Leonard states, "I have seen the ants at work at 9 p. m. in the pouring rain at a temperature as low as 44° Fahr. They do not leave their holes until about half an hour after sunset." During a hot dry spell in August the ants stayed underground. Their large entrance was closed with little clods of earth. The queens were obtained in the middle of October through simulating the effect of nightfall by covering the entrance of the nest with a box.

Type Locality: Ontario, California (J. C. Bradley).

Localities: Colorado and Mojave Deserts (Wheeler), Point Loma (P. Leonard), Pasadena (E. Grinnell), Claremont (C. F. Baker), Sunland (J. Schwartz).

Genus POLYERGUS Latreille

Polyergus rufescens breviceps Emery

The habits of these "amazon" ants were studied in great detail by Wheeler (1916b) at Fallen Leaf Lake, 7000 feet, near Lake Tahoe during the summer of 1915. This subspecies dwells under logs and small flat stones, and makes forays to the nests of *Formica fusca* L. var. where they capture the pupae. These are carried back to the nest, and in the adult stage they become slaves of the *breviceps*. The females in a winged or dealated condition would, in some instances, accompany the workers on their raids. Should the ants to be plundered show any resistance, they are quickly dispatched by the amazons, who pierce the heads of workers with their ice-tong mandibles. Wheeler found winged males and females in the nest during July.

Localities: Santa Cruz (H. Heath), Kern Lake (J. C. Bradley), Fallen Leaf Lake and Glen Alpine near Lake Tahoe (Wheeler), Soquel Road in Madera Co., 6000 feet (A. Mallis).

Polyergus rufescens breviceps var. *silvestrii* Santschi

Type Locality: Yosemite (Silvestri).

Polyergus rufescens breviceps var. *umbratus* Wheeler

Wheeler (1915) described this variety from a single colony collected by H. Heath at Brookdale, California, and the slave ant that accompanied it belonged to *Formica fusca* near the var. *argentea* Wheeler.

Type Locality: Brookdale, California (H. Heath).

Polyergus rufescens laeviceps Wheeler

These "amazons" were collected by Wheeler (1915) on the slopes of Mt. Tamalpais near San Francisco where they raided the nest of *Formica subpolita* Mayr, and plundered their brood.

Type Locality: Mt. Tamalpais (Wheeler).

Localities: Laws (A. Wetmore), Fallen Leaf Lake near Lake Tahoe (No Collector).

Genus FORMICA Linnaeus

Formica (F.) *cinerea* var. *lepida* Wheeler

Type Locality: Blue Lake in Humboldt Co. (J. C. Bradley).

Localities: Lemon Cove in Tulare Co. (J. C. Bradley), Los Angeles (A. Mallis).

Formica (F.) *cinerea* var. *neocinerea* Wheeler

Their irregular nest mounds are often found in dry, hard soil, usually devoid of vegetation in the Sacramento and San

Joaquin Valleys as well as in Southern California. The winged apterous females were fairly common during the month of March in Davis. Although this variety is actively predacious on other insects, it will often attend aphids and other honeydew-secreting insects. In citrus orchards they may become important pests due to their habit of tending mealybugs and scale insects, and protecting these from their natural parasites. Moreover, they will at times invade homes. The Argentine ant has forced them from much of their former territory. This variety is often confused with *F. pilicornis* Emery which it closely resembles. *Hetaerius tristriatus* Horn is a guest in the nest of this ant.

Localities: San Jose (H. Heath), Palo Alto, Santa Cruz Mts. (W. M. Mann), Mesa Grande, Russian River (J. C. Bradley), Antioch, Davis (A. Mallis).

Formica (*F.*) *fusca* L.

This, one of the most widely distributed of all ants, occurs in the United States, in Canada, and in North and Central Eurasia. In California the species occurs in the mountains at altitudes above 4000 feet, and forms rather large colonies. The timid workers nest under stones or logs, or in small earthen mounds, and are often the hosts for other parasitic *Formica*.

Localities: Kern Lake (J. C. Bradley), Lake Tahoe, 6200-9000 feet (Wheeler), Camp Curry and Glacier Point in Yosemite, 4000-8000 feet, Muir Woods, Mt. Tamalpais (Wheeler).

Formica (*F.*) *fusca* var. *argentea* Wheeler.

The variety *argentea* is rare at the lower altitudes where it occurs in damp locations, and is more commonly found at elevations above 7000 feet. Mann (1911b) found the Histerids, *Hetaerius strenuus* Fall and *Hetaerius tristriatus* Horn in their nests.

Localities: Palo Alto (H. Heath), Corte Madera Creek, Santa Cruz Mts. near Palo Alto (W. M. Mann) Harris, Humboldt Co. (J. C. Bradley), Angora Peak near Lake Tahoe (Wheeler).

Formica (*F.*) *fusca* var. *blanda* Wheeler

According to Wheeler (1917a) the species recorded from California are probably not this variety at all.

Localities: Yosemite Valley (J. C. Bradley), and Lemon Cove in Tulare Co. (No Collector).

Formica (*F.*) *fusca* var. *gelida* Wheeler

Wheeler (1913) found the variety *gelida* nesting under stones, in logs in woods, and in shady canyons, at high altitudes just below the timberline.

Localities: Alta Peak in Sequoia Nat'l Park, 9,500-11,000 feet, Blue Lake in Humboldt Co. (J. C. Bradley), Fallen Leaf

Lake near Lake Tahoe (Wheeler), and Upper Echo Lake (E. O. Essig).

Formica (F.) fusca var. *marcida* Wheeler

This is an alpine variety like *gelida* and Wheeler (1917a) states that J. C. Bradley, who collected some of these ants, noted that they nested under a stone from which the snow had recently receded. The quick and agile workers hide under the stones and in the moss, and the nests are found at the timber line.

Localities: Summit of Angora Peak near Lake Tahoe, 8650 feet (Wheeler).

Formica (F.) fusca var. *neorufibarbis* Emery

Ants of the above variety, according to Wheeler (1917a), that have been recorded from California may be referable to the variety *gelida*. The ant cricket, *Myrmecophila oregonensis* Bruner occurs in the nest of this ant.

Localities: Lake Tahoe, 6000-7000 feet, and Glacier Point in Yosemite (Wheeler).

Formica (F.) fusca var. *subaenescens* Emery

These ants are commonly found at altitudes above 8000 feet in the various mountains of the State where they nest under stones. The Scarabaeid beetle *Cremastochilus kochi* Lec. is found in the nests of this form.

Localities: King's River Canyon, 8000 feet (H. Heath), Alta Peak in Sequoia Nat'l Park, 9500-11000 feet (J. C. Bradley), Angora Peak near Lake Tahoe, 8600 feet (Wheeler), McCloud and Yosemite (Silvestri), Camp Kelly on Mt. Baldy 8500 feet (A. Mallis and J. Schwartz).

Formica (F.) fusca var. *subsericea* Say.

According to Wheeler (1913) the colonies of this ant "are often rather large, nest in sunny places under stones or in low, flat 'beds,' or mounds, often a meter or more in diameter." This variety is an exceedingly timid ant, and is often a slave of other *Formica*. Essig (1926) states it attends plant lice in California.

Localities: Mojave Desert near Bakersfield (A. C. Cole, Jr.), El Dorado Co. (W. M. Gifford).

Formica (F.) manni Wheeler

Locality: Owens Lake (H. F. Wickham).

Formica (F.) microgyna californica Wheeler

Type Locality: Glen Alpine Springs near Lake Tahoe, 6500 feet (Wheeler).

Formica (F.) microgyna californica var. *hybrida* Wheeler

Type Locality: Angora Peak near Lake Tahoe, 6500 feet (Wheeler).

Formica (F.) microgyna rasilis var. *pinetorum* Wheeler

Wheeler (1917a) notes that this variety has rather populous colonies that live under stones and logs, and that the nests are banked with vegetable detritus.

Type Locality: Angora Peak near Lake Tahoe, 7500-8600 feet (Wheeler).

Formica (F.) neogagates lasioides var. *vetula* Wheeler

This is a fairly common ant at Lake Tahoe, and Wheeler (1913) found it to be the summer host of the Staphylinid, *Xenodusa montana* Casey.

Localities: Giant Forest in Sequoia Nat'l Park, 6000-7000 feet (J. C. Bradley), Pacific Grove (H. Heath), Fallen Leaf Lake near Lake Tahoe, 6000-8000 feet, and Glacier Point in Yosemite, 8000 feet (Wheeler), Mt. Tamalpais State Park (A. Mallis).

Formica (F.) perpilosa Wheeler

Cole (1934) came upon this species in the periodical river bottoms of the Mojave Desert where they constructed nests with low mounds, or with craters at the bases of shrubs. These active ants have populous colonies.

Localities: Mojave Desert, in periodical river bottoms (A. C. Cole, Jr.), Hemet (A. J. Basinger).

Formica (F.) pilicornis Emery

The habits of *F. pilicornis* Emery are very similar to those of *F. cinerea* var. *neocinerea* Wheeler. However, the latter does not inhabit such arid areas as does the subspecies *pilicornis* which is commonly found under large boulders in the dry sandy arroyos of Southern California, especially along the foothills. Wheeler (1913) states that they form scattered nests in and around El Cajon Valley. The feeding habits of this subspecies are similar to those of *neocinerea* Wheeler. Often many queens, winged and dealated, may be found under one boulder, and J. Schwartz and S. Shalevitz collected 43 queens under one stone during the month of December near Riverside.

Type Locality: San Jacinto and Tres Pinos (Pergande).

Localities: Mount Pinos (F. Grinnell), Point Loma in San Diego Co. (P. Leonard and Wheeler), Arroyo Seco in Pasadena, Lakeside (Wheeler), Escondido in San Diego Co., Jacumba (J. C. Bradley), Claremont (C. F. Baker), Lake Merced near San Francisco (F. X. Williams), Salinas (L. S. Selvin), Glendale (Cockerell), Pasadena (H. C. Fall), Mojave Desert near Barstow (A. C. Cole, Jr.), Fish Canyon near Monrovia, Soledad, Ridge Route (A. Mallis), Riverside (J. Schwartz and S. Shalevitz).

Formica (F.) rufa var. nr. *coloradensis* Wheeler

According to Mann (1911b), several mounds along Corte Madera Creek in Marin Co. were seen. The nests contained the ant guest *Batrisus zephyrinus* Casey, a pselaphid, and *Myrmecophila oregonensis* Bruner.

Formica (F.) rufa obscuripes Forel

Mound nests of small sticks, leaves, and pine needles occurring at altitudes between 4000-7000 feet in the mountains of the northern part of the State are built by this subspecies. It ranges up and down the trees where it attends honeydew-secreting insects, and where it preys upon any insect that comes its way. As these ants are very pugnacious, they will readily attack intruders who disturb them near their nesting sites. *Formica rufa aggerans* Wheeler is a synonym of the above subspecies.

Localities: Tallac near Lake Tahoe (Wheeler), McCloud (No Collector).

Formica (F.) rufibarbis var. *gnava* Buckley

Ants of this variety are recorded from the more arid southeastern part of the State where it has been collected beneath large flat rocks. Wheeler (1913) notes that it is very aggressive, and that it nests under stones and in nests without craters. These ants occur at low altitudes in shady canyons. Although the populous colonies resemble the variety *occidua*, they have a bronzy appearance when seen in masses.

Localities: Needles (Wheeler), Coachella Valley in Riverside Co. (No Collector).

Formica (F.) rufibarbis var. *occidua* Wheeler

Large colonies of this variety are often found beneath stones in open unshaded areas. The workers are fiercely aggressive and predacious on other insects, and the author has seen them bearing workers and sexual forms of subterranean termites in great numbers towards the nest. They have also been observed guarding a long slit-like entrance near a sidewalk from the equally pugnacious *Liometopum occidentale* Emery. At times one may come upon them while they are conveying their brownish cocoons, or when they transport their fellow workers by grasping them by the mandibles. Apparently they are active throughout the year, the weather permitting. In certain instances they become annoying through their habit of attending honeydew-secreting insects on cultivated and ornamental plants. Mann (1911b) discovered colonies of the ant *Leptothorax andrei* Emery to be associated with this ant under stones. Histerid ant guests *Hetaerius wheeleri* Mann and *Hetaerius californicus* Horn are at times found clinging to the underside of stones that harbor the colonies of this variety.

Type Locality: Palo Alto (T. Heath and W. M. Mann).

Localities: Pasadena, San Ysidro near Santa Barbara, Palmer's Canyon, San Gabriel Mts. (Wheeler), Mt. Wilson, Three Rivers, Sissons, Berkeley, Wild Cat Canyon near San Pablo, Lemon Cove in Tulare Co. (J. C. Bradley), Los Angeles (F. Grinnell), San Jose (H. Heath), Santa Cruz Island (R. V. Chamberlin), Sacramento, Weed (A. C. Cole, Jr.) Davis, Berkeley (A. Mallis), Pico Canyon near San Fernando (A. Mallis and J. Schwartz), Niles Canyon (J. F. Lamiman), Calaveras Co. (W. M. Gifford).

Formica (F.) sanguinea subnuda Emery

This alpine species, as far as is known, forms large slaveless colonies in California.

Localities: Fallen Leaf Lake and Glen Alpine Springs near Lake Tahoe (Wheeler), Sugar Pine in Madera Co. (J. C. Bradley).

Formica (F.) sibylla Wheeler

Wheeler (1913) states that he observed "Numerous colonies, each comprising a rather small number of workers and nesting in craters 6 to 8 inches in diameter in sandy soil fully exposed to the sun. The workers, who run very rapidly, were seen outside the nests only during the early morning and late afternoon hours of the hot days of July and August."

Localities: Yosemite Valley, 4000 feet to Glacier Point, 8000 feet; and Tallac near Fallen Leaf Lake and the Moraine east of Angora Park (Wheeler), Huntington Lake (H. Green).

Formica (F.) subpolita Mayr

Is common at low altitudes (especially in the San Francisco Bay Region), but it may ascend up to 6400 feet in Southern California. This species is known to nest under stones in grassy places. The writer found them moving over hot sidewalks in Yosemite Valley during the month of June. Such honeydew-secreting insects as aphids and mealybugs are attended by these ants. Wheeler (1913) found many small colonies of this timid ant on the seashore near Point Joe, at Pacific Grove. Coccids, the pseudoscorpion, *Chelanops dorsalis* Banks, and the histerid, *Hetaerius tristriatus* Horn have been found in their nests.

Type Locality: San Francisco.

Localities: Mt. Tamalpais (Wheeler), Pacific Grove (H. Heath, W. M. Mann, W. M. Wheeler), Mount Lowe, summit 6400 feet (H. J. Quayle and W. M. Wheeler), Palo Alto, Corte Madera Creek (W. M. Mann), Felton, Santa Cruz Mts. (J. C. Bradley), King's River Canyon (H. Heath), Baldy Peak in the San Gabriel Mts. (Brewster, Joos, Crawford), Muir Woods, Berkeley Hills, Anaheim Landing (A. Mallis), Sierra Nevada, Marin Co., Goat Island, San Gregorio (No Collector).

Formica (F.) subpolita camponoticeps Wheeler

The author found this ant foraging around a building at 3000 feet in the San Bernardino Mts. Numerous nest entrances were widely distributed in a rather shaded situation. There were no nest craters apparent here. Ants of this subspecies were also found foraging in a dry stream bed, and were seen ascending willow branches, probably to attend aphids. Wheeler (1917a) found them nesting under stones on the dry slopes of a canyon wall near Yosemite Village. The nests contained workers of varying size.

Localities: Yosemite Village, 4000 feet, (Wheeler), Mt. Tamalpais (Cockerell), Camp Seeley in the San Bernardino Mts., 3000 feet (A. Mallis and J. Schwartz).

Formica (F.) truncicola integroides Emery

Wheeler (1917a) observed the populous colonies of this subspecies in the woods beneath large accumulations of vegetable detritus about stumps and logs in Tallac and Fallen Leaf Lake, Lake Tahoe.

Type Locality: Coastal Mts. of California.

Localities: San Gabriel Mts. near Claremont (C. F. Baker), Felton in Santa Cruz Mts., 300-500 feet, Santa Cruz Beach, Giant Forest (J. C. Bradley). Loma Prieta in Santa Cruz Mts., 3800 feet (V. L. Kellogg), King's River Canyon (H. Heath), Corte Madera Creek (W. M. Mann), Pine Lake (J. D. Johnson), Lake Tahoe (Wheeler), Carrville in Trinity Co. (B. Hall), Timber Mts. in Modoc Co. (No Collector).

Formica (F.) truncicola integroides var. *haemorrhoidalis* Emery

This variety nests under and in stumps and logs, and Wheeler (1913) states that it fills the interstices of these with vegetable detritus. The colonies are encountered in pine woods on the tops of mountains. The presence of this ant in California may be questioned at the present time.

Locality: Mt. Whitney in Inyo Co., 8300 feet (J. J. du Bois).

Formica (F.) truncicola integroides var. *propinqua* Wheeler

According to Wheeler (1917a) *propinqua* is to be found in the hot moraine region between Fallen Leaf Lake and Lake Tahoe whereas the variety *tahoensis* prefers the elevations around 7000 to 7500 feet.

Type Locality: Lake Tahoe (Tallac, Glen Alpine Springs, Fallen Leaf Lake, Angora Peak) (Wheeler).

Formica (F.) truncicola integroides var. *subfasciata* Wheeler

Type Locality: Mills Creek Canyon, Wilson Peak, 7500 feet, San Bernardino Mts., Southern California (F. Grinnell).

Formica (F.) truncicola integroides var. *tahoensis* Wheeler

The habits of this form are similar to those of the variety *propinqua*, although it does occur at a slightly higher altitude.

Type Locality: Lake Tahoe (Tallac, Glen Alpine Springs, Fallen Leaf Lake, Angora Peak) (Wheeler).

Locality: Angel's Peak near Lake Tahoe (E. P. Van Duzee).

Genus CAMPONOTUS Mayr

Camponotus (Myrmentoma) anthrax Wheeler

Wheeler (1917a) named this ant from a colony that he found nesting under a stone at an altitude of 1000 feet in the Santa Inez Mts., near Santa Barbara.

Camponotus (M.) caryae (Fitch)

Localities: Glen Alpine Creek near Lake Tahoe (E. P. Van Duzee), Angora Peak near Lake Tahoe, 7000 feet, Shasta Co. (Wheeler), St. Helena (O. T. McClay).

C. caryae nearcticus Emery is a synonym of the above.

Camponotus (M.) caryae var. *essigi* M. R. Smith

This ant was found foraging along the shore in debris in a salt marsh area. It was very alert and difficult to catch.

Type Locality: Lagunitas (E. O. Essig).

Localities: Antioch, Davis (A. Mallis).

Camponotus (M.) caryae discolor Buckley

Locality: Coronado (A. Leing).

Camponotus (M.) caryae discolor var. *clarithorax* Emery

J. Schwartz and the author collected the winged females, 2 males, numerous workers, and the immature forms in the center of a very moist and decayed willow trunk which was about 1 foot in diameter. These ants have also been collected in an oak gall, and Leonard (1911) found them in the stems of manzanita at Point Loma.

Type Locality: San Jacinto and Los Angeles (Pergande).

Localities: Point Loma in San Diego Co. (P. Leonard), Whittier (H. J. Quayle), Felton in the Santa Cruz Mts., Three Rivers, Santa Inez Mts. near Santa Barbara (J. C. Bradley), Spanish Canyon near Monrovia (A. Mallis), Davis (B. E. White), Sacramento (J. J. duBois).

Camponotus (M.) caryae discolor var. *cnemidatus* Emery

Woodworth (1910) records this ant in his list, but its presence in California is doubtful since it is an eastern species.

Camponotus (M.) caryae minutus Emery

Locality: Bass Lake at altitude of 6000 feet (A. Mallis).

Camponotus (M.) caryae subbarbatus Emery

Locality: Los Angeles (Pergande).

Camponotus (T.) fumidus var. *fragilis* Pergande

This pale ant was sent in from the hot and arid Coachella Valley where it invaded a house at night, and thereby annoyed the residents.

Camponotus (M.) herculeanus var. *modoc* Wheeler

Very large colonies of this common mountain ant will usually be found in stumps and in the rotten centers of butts of fir trees. It often follows the decayed wood in the stumps, but does little damage to the living tissue. These ants are pugnacious and can bite viciously when annoyed. At times they will work from nearby stumps into the timber of houses; the attack occurring for the most part on the sunny side. They are more common in the northern part of the State where they occur in the mountains at an altitude commencing at 3000 feet.

Localities: King's River Canyon (H. Heath), Marin County, Fallen Leaf Lake, Giant Forest, Alta Meadow Trail (J. C. Bradley), Sierra Nevada (American Mus. Nat. Hist.), Tahoe City (A. Fenyes), Upper Echo Lake (E. O. Essig), Modoc Co., 5000 feet (A. Mallis), Carrville in Trinity Co. (F. Platt), Nevada Falls in Yosemite (T. Williams), Yosemite Village, 4000 feet to Glacier Point, 8000 feet and Lake Tahoe, 6000 to 9000 feet, (Wheeler), Sequoia Nat'l Park (A. C. Cole, Jr.), Sierra Nat'l Forest, McCloud (No Collector).

Camponotus (M.) herculeanus pennsylvanicus (DeGeer)

Santschi (1909) records this species from McCloud and Yosemite, but this is in all probability the preceding species since *pennsylvanicus*, as far as is known, does not extend its range as far west as California.

Camponotus (M.) hyatti Emery

This is a somewhat rare ant in California which Cole (1934) states he found on the moist slopes of the Mojave Desert.

Type Locality: San Jacinto (E. Hyatt).

Localities: Fort Seward (K. F. Wilson), Palo Alto (W. M. Mann), moist slopes of Mojave Desert (A. C. Cole, Jr.).

Camponotus (M.) hyatti var. *bakeri* Wheeler

Type Locality: Catalina Island (C. F. Baker).

Camponotus (M.) laevigatus (F. Smith)

The species *laevigatus* (F. Smith) is common at high altitudes throughout the State, and its large colonies are to be found in dry stumps or logs. *Myrmecophila oregonensis* Bruner is a common guest in the nest of this ant.

Localities: Yosemite, Sierra Nevada, Sierra Valley, San Jacinto Mts., 6000 feet (F. Grinnell), Baldy Peak in San Gabriel Mts. (Brewster, Joos, Crawford), Blue Lake, Humboldt Co., Felton in Santa Cruz Mts., Alta Peak, 9500-11000 feet, Giant Forest to Marble Fork, Sissons (J. C. Bradley), McCloud, Castle Crag (A. Fenyes), Yosemite Village, Tallac near Lake Tahoe (Wheeler), Carrville in Trinity Co. (F. Platt), Mt. Baldy (A. Mallis and J. Schwartz).

Camponotus (M.) sansabeanus dumetorum Wheeler

According to Wheeler (1910d) this subspecies appears to be the dominant insect of the chaparral up to an altitude of

2000 feet in the San Gabriel and Santa Inez Mts. of Southern California, which is the type locality. Its nests, which are in the form of flat craters, vary from a few inches to a foot in diameter, and are to be found among the bushes. During the warm summer days these ants remain in the nest. *C. maculatus* var. *berkeleyensis* Forel is a synonym of the above species.

Type Locality: San Gabriel and Santa Inez Mts. up to 2000 feet (Wheeler).

Locality: Berkeley (No Collector).

Camponotus (M.) *sansabeanus maccooki* Forel

Large colonies are to be found beneath rocks in moist habitats, and are common in and about Sacramento and the San Francisco Bay Region. The large, pretty, reddish-yellow and black queens are commonly captured by collectors. The Scarab, *Cremastochilus planatus* Lec., and the ant cricket, *Myrmecophila oregonensis* Bruner are guests in the nest of this ant.

Localities: Palo Alto (H. Heath and W. M. Mann), San Jose, Alameda Co., Marin Co. (H. Heath), San Ysidro, Carpinteria, Tenaya Canyon in Yosemite, 5000 feet, Pasadena (Wheeler), Ukiah in Mendocino Co., Berkeley (J. C. Bradley), Point Loma near San Diego (P. Leonard), Grant (Silvestri), Weed, Tehachapi (A. C. Cole, Jr.), Woodland (J. J. duBois), Sonoma Co. (S. F. Bailey), Davis (A. Mallis), Descanso (No Collector.)

Camponotus (M.) *sansabeanus vicinus* Mayr

It is this *Camponotus* and its varieties that are commonly encountered under stones in rather dry, sunny places. The ants are very widely distributed throughout the State in both lowlands and the mountains. The winged forms may be found in the nest at practically any time of the year.

Localities: Tenaya Canyon in Yosemite, 5000 feet, and Lake Tahoe (Tallac, Glen Alpine Springs and moraine east of Angora Peak, 6000-7000 feet, San Gabriel Mts. near Claremont, Point Loma near San Diego, Palmer's Canyon near Claremont, Mt. Lowe, 5000 feet (Wheeler), Alpine, Alameda, Harris, Humboldt Co., Felton in Santa Cruz Mts. (J. C. Bradley), San Jacinto Mts., 6000 feet (F. Grinnell), Palo Alto (W. M. Mann), Bass Lake in Madera Co., 3000 feet (A. Mallis).

Camponotus (M.) *sansabeanus vicinus* var. *infernalis* Wheeler

Localities: Tenaya Canyon and Camp Curry in Yosemite, 4000-5000 feet, Lake Tahoe, 6000-7000 feet, Wilson Peak in San Bernardino Mts., 7500 feet (Wheeler), Santa Cruz Mts. (J. C. Bradley), Palo Alto (W. M. Mann), Carrville in Trinity Co., 2400-2500 feet (F. Platt).

Camponotus (M.) *sansabeanus vicinus* var. *luteangulus* Wheeler

J. Schwartz and S. Shalevitz collected a colony of this variety, including queens, workers, one winged male, and the immature stages, in a very wet stump, during the month of Feb-

ruary, in the Arroyo Seco, Pasadena. When the nest was opened, the ants were unable to move until warmed by the sun. The nest was composed of some eight chambers, and these were crowded with queens, workers, and the immature forms. Each chamber was approximately 1 in. long and about $\frac{3}{4}$ in. wide, with inter-connecting galleries between the chambers. A colony of subterranean termites were situated in the same log immediately on the outside of the ant excavations.

Localities: Mt. Home (H. Green), Arroyo Seco in Pasadena (J. Schwartz and S. Shalevitz).

Camponotus (M.) sansabeanus vicinus var. *maritimus* Wheeler

Localities: Santa Cruz Island (R. V. Chamberlin), Santa Cruz Mts. and Santa Inez Mts. near Santa Barbara (Wheeler), Catalina Island (C. F. Baker), Pacific Grove and San Jose (H. Heath).

Camponotus (M.) sansabeanus vicinus var. *nitidiventris* Emery

Notes on this form in California are lacking, however, in the Rockies it is known to occur on the high plains and slopes.

Localities: Catalina Island (C. F. Baker), Santa Rosa in Marin Co. (H. Green).

Camponotus (M.) sansabeanus vicinus var. *plorabilis* Wheeler

Localities: Pacific Grove (H. Heath), Beckwith, 5000 feet (No Collector).

Camponotus (M.) sansabeanus vicinus var. *semitestaceus* Emery

Type Locality: Plumas Co., 5000 feet (Pergande).

Localities: San Jacinto Mts. (F. Grinnell), Claremont (Metz), Friant (R. V. Chamberlin), Ramona (J. C. Bradley), Mt. Wilson, 2000 feet (No Collector)

Camponotus (M.) sansabeanus vicinus var. *subrostrata* Forel

Type Locality: Lake Tahoe, California.

Camponotus (M.) ocreatus Emery

Type Locality: Panamint Mts. in California (Pergande).

Camponotus (C.) yogi Wheeler

According to Wheeler (1915), *yogi* was described from a single major and minor worker taken by P. Leonard from a hollow twig of manzanita near the Raja Yogi Institute on Point Loma near San Diego. Wheeler further states that, "This species is unlike any of our other North American *Camponoti*. It clearly approaches the species of *Colobopsis* and should, perhaps, be included in that subgenus."

N. B. Emery in his fascicles on the *Formicidae* in the "Genera Insectorum" noted a number of ants as occurring in California when as a matter of fact they are known only from Lower (Baja) California, Mexico.

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KEY TO THE SUBFAMILIES AND GENERA OF ANTS IN CALIFORNIA

(Modified after W. M. Wheeler, 1910)

1. Cloacal orifice ventral, slit-shaped; sting well developed or vestigial; abdominal pedicel consisting of one or two segments 2
 Cloacal orifice terminal, circular, surrounded by fringe of hairs; abdominal pedicel consisting of only a single segment; no constriction between the first and second gastric segments
 Subfamily *Formicinae* (*Camponotinae*)
2. Sting developed; sometimes very small but nevertheless exerted; abdominal pedicel consisting of one or two segments; when of only one there is a distinct constriction between the first and second gastric segments 3
 Sting vestigial; abdominal pedicel consisting of a single segment; no constriction between the first and second gastric segments; anal glands which produce a secretion with a peculiar rancid-butter odor ("Tapi-noma odor") are often present
 Subfamily *Dolichoderinae*
3. Abdominal pedicel consisting of a single segment; gaster with a distinct constriction between its first and second segments; frontal carinae separated or close together; when close together they are dilated to form oblique or horizontal laminae partly covering the insertions of the antennae Subfamily *Ponerinae*
 Abdominal pedicel consisting of two segments in the California species4
4. Frontal carinae very close together, almost vertical, not at all covering the antennal insertions. Eyes always very small or absent; tropical and subtropical
 Subfamily *Dorylinae*
 Frontal carinae of a different conformation and covering the antennal insertions; eyes rarely vestigial or absent 5
5. Clypeus not extending back between the frontal carinae; antennae 12-segmented Subfamily *Pseudomyrminae*
 Clypeus almost always extending back between the frontal carinae; in the opposite case the antennae are 11-segmented Subfamily *Myrmicinae*

Subfamily PONERINAE

- Mandibles long and slender, with coarse bidenticulate teeth *Stigmatomma*
Mandibles of a different conformation *Ponera*

Subfamily DORYLINAE

- Reddish ants; army ants *Eciton*

Subfamily PSEUDOMYRMINAE

- Elongated pale reddish bodies; comparatively large eyes;
present in reeds and on plants *Pseudomyrma*

Subfamily MYRMICINAE

1. Postpetiole articulated to the dorsal surface of the gaster
which is flattened dorsally, more convex ventrally,
and acutely pointed *Crematogaster*
Postpetiole inserted at the anterior end of the gaster
which is of the usual shape 2
2. Antennae 11-segmented; without a distinct club, or with
a club consisting of only a single segment 3
Antennal club consisting of several segments, or the an-
tennae not 11-segmented 5
3. Hairs scale-like and appressed *Cyphomyrmex*
Hairs of a different conformation 4
4. Thoracic dorsum with three or more pairs of spines or
tubercles *Atta*
Thoracic dorsum of a different conformation 5
5. Antennae with a 2-segmented club; antennae 10-segment-
ed; epinotum unarmed *Solenopsis*
Antennal club, when developed, with more than two seg-
ments 6
6. Posterior margin of clypeus elevated in the form of a
welt or ridge bordering the antennal fossa in front;
antennae 12-segmented *Tetramorium*
Posterior border of clypeus not thus elevated 7
7. Antennae 11-segmented 8
Antennae 12-segmented 9

8. Thorax and petiole without any traces of teeth or spines;
very small ants, 1-1.5 mm. in length *Monomorium*
Epinotum armed with spines or teeth; mesoepinotal con-
striction faint or lacking *Leptothorax*
9. Workers strongly dimorphic, usually without intermedi-
ates connecting the extreme forms; antennal club
3-segmented, longer than the remainder of the fu-
niculus *Pheidole*
Workers monomorphic or polymorphic, i.e, with mediae
intermediate between the major and minor forms;
antennal club indistinct or shorter than the re-
mainder of the funiculus 10
10. Last three antennal segments much shorter than the re-
mainder of the funiculus and not forming a distinct
club 11
Last three antennal segments forming a distinct club
nearly as long as the remainder of the funiculus 16
11. Thoracic dorsum more or less impressed at the mesoe-
pinotal suture; promesonotal suture usually distinct .. 13
Thoracic dorsum without any traces of suture or impres-
sion 12
12. Workers very slender, and extremely long-legged; un-
common in California *Novomessor*
Workers of usual conformation; very common in Cali-
fornia *Pogonomyrmex*
13. Posterior tibial spurs pectinate (under high magnifica-
tion) *Myrmica*
Posterior tibial spurs simple 14
14. Small species, with vestigial eyes and two keels on the
clypeus *Stenamma*
Medium-sized species, with well-developed eyes and no
keels on the clypeus 15
15. Workers monomorphic; length of workers for most
part less than 5 mm.; not xerophilous *Aphaenogaster*
Workers at least feebly polymorphic; length of workers
for most part over 5 mm. (excepting workers minor
of *Veromessor pergandei* (Mayr); usually xero-
philous *Veromessor*
16. Clypeus armed with a pair of ridges which project for-
ward in the form of teeth, rarely without teeth, but
then the epinotum is quite unarmed; mesoepinotal
suture marked; very small ants, 1-1.5 mm. in length
..... *Monomorium*

Clypeus of a different conformation; rarely 2 toothed,
but then the mesoepinotal suture is indistinct.....
..... *Leptothorax*

Subfamily DOLICHODERINAE

1. Scale of petiole very small, strongly inclined forward,
or even altogether absent 2
Scale of petiole more or less inclined but well-developed 3
2. Scale of petiole small but indistinct; pale red color *Forelius*
Scale vestigial or absent; dark brown or black color.....
..... *Tapinoma*
3. Epinotum with a conical elevation *Dorymyrmex*
Epinotum without a conical elevation 4
4. Body not conspicuously hairy or pubescent; ocelli ab-
sent *Iridomyrmex*
Body densely pubescent; ocelli usually present in large
workers *Liometopum*

Subfamily FORMICINAE (CAMPONOTINAE)

1. Workers polymorphic *Camponotus*
Workers not polymorphic 2
2. Clypeal fossa separated from antennal fossa; antennal
scapes and tibiae without erect hairs; mesonotum
strongly constricted and subcylindrical *Prenolepis*
Clypeal fossa confluent with the antennal fossa 3
3. Segments 2-5 of the funiculus shorter or not longer than
the succeeding segments; ocelli usually absent; max-
illary palpi 6-segmented *Lasius*
Segments 2-5 of the funiculus longer than the succeeding
segments; ocelli distinct 4
4. Fourth segment of maxillary palpi longer than the fifth
..... *Myrmecocystus*
Fourth segment of maxillary palpi shorter than the fifth 5
5. Mandibles with broad, dentate, masticatory border; very
common in California *Formica*
Mandibles narrow, falcate and pointed; uncommon in
California *Polyergus*