THE ANTS OF UTAH

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The Ants of Utah[1]

A. C. Cole, Jr.

The state of Utah possesses a number of diversified habitats as to both topography and vegetation types. It lies entirely within the arid region of the United States, but there are high mountains separated by arid valleys and mesas. Sagebrush *(Artemisia tridentata)* ranges over a large portion of the State at the lower elevations. On the foothills of the mountain ranges is the pinyon-juniper community. Western yellow pine *(Pinus ponderosa)* dominates the plateaus. Above the yellow pine are areas of aspens, and at still higher elevations Engelmann spruce and subalpine fir abound. The alpine belt is reached at elevations of about 10,800 feet. Bordering Great Salt Lake on the west is the saltbush desert shrub region—a vegetation type which is unique in the State.

Rees and Grundmann[2] have published a list of 83 different ants from Utah. Five subfamilies of Formicidae containing a total of 104 different species, subspecies and varieties are now known from the State. The number of forms in each subfamily is as follows: Formicinae, 60; Myrmicinae, 34; Dolichoderinae, 8; Ponerinae, 1; and Dorylinae, 1. In the Formicinae the genus *Formica* alone accounts for 35 forms—more than twice the total number in the subfamily. Best represented in species, subspecies and varieties of Myrmicinae are the genera *Pogonomyrmex, Myrmica* and *Leptothorax,* whose forms number more than half the total of those in the subfamily as occurring in Utah. The dominant ants of the State are as follows: *Pogonomyrmex occidentalis, Formica rufa obscuripes, F. subpolita, F. fusca* var. *neorufibarbis, F. fusca* var. *subaenescens, F. fusca* var. *gelida, F. obtusopilosa, Lasius niger* var. *neoniger, Dorymyrmex pyramicus, Solenopsis molesta* var. *validiuscula* and *Monomorium minimum.*

Several forms have been described from the State. These, together with the type locality for each form, are as follows: *Pheidole pilifera artemisia* Cole (30 Mi. S. Provo), *Crematogaster coarctata* var. *mormonum Emery* (East Mill Creek Canyon in Salt Lake Co.), *Aphaenogaster uinta* Wheeler (East Mill Creek Canyon), *Pogonomyrmex occidentalis utahensis* Olsen (Zion National Park), *Myrmica sabuleti americana* Weber (Bryce Canyon), *Leptothorax nitens* Emery (American Fork Canyon in Utah Co.), *Symmyrmica chamberlini* Wheeler (near Salt Lake City), *Formica wheeleri* Creighton and *F. rufa laeviceps* Creighton (Warner Ranger Station in La Sal Mts.).

The ants range from boreal and humid elements to true desert types. In the

1. Contribution no. 3, Department of Zoology and Entomology, University of Tennessee, Knoxville.

2. Rees, D. M. and A. W. Grundmann, "A preliminary list of the ants of Utah," *Bull. Univ. of Utah Biol. Ser.,* VI (1940) 1-12.

sagebrush areas the dominant ants seem to be the occidental harvester *(Pogonomyrmex occidentalis)* and the thatching ant *(Formica rufa obscuripes)*. Mounds of these ants are common and prominent. In the mountains, especially in cool shady canyons, nests of *Formica* spp. are abundant. At the highest elevations ants are relatively scarce, while in many of the arid valleys colonies are rather abundant and species numerous. The stone-strewn slopes of the foothills appear to be quite rich in species.

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Those who have collected specimens upon which this paper is based are the following: G. F. Knowlton, A. W. Grundmann, D. M. Rees, J. A. Rowe, F. C. Harmston, E. G. Titus, A. M. Woodbury, J. Vasquez, T. O. Thatcher, R. V. Chamberlin, W. H. Marshall, C. F. Smith, D. E. Hardy, W. A. Hooker, E. H. Klamback, C. English, R. C. Shannon, R. L. Janes, W. L. Thomas, J. A. Meacham, W. S. Creighton, H. F. Thornley, R. Shaw, V. M. Tanner, N. A. Weber, K. Fox, H. Gold, K. W. Whitelock, R. C. Roskalley, T. Spalding, W. P. Nye, R. E. Nye, E. W. Anthon, H. Armstrong, C. J. Sorenson, A. Wetmore, T. H. Parks, W. L. Thomas, E. Gardner, J. B. Duncan, A. C. Burrill, G. S. Stains, D. L. Bischoff, H. R. Harmston, C. Schaeffer, I. M. Hawley, M. J. Janes, W. M. Allen, L. Greene, L. Cutler, H. R. Hagan, L. Davidson, H. B. Stafford, J. S. Stanford, C. Emory, R. W. Fautin, W. J. Gertsch, Grace Olsen, W. D. Fronk, Moffett, Bradley and A. C. Cole.

KEY TO THE SUBFAMILIES OF FORMICIDAE IN UTAH[3]

1. Pedicel distinctly two-segmented 2
   Pedicel not two-segmented 3
2. Frontal carinae very closely approximated, not covering the antennal insertions ..... *Dorylinae*
   Frontal carinae covering the antennal insertions ..... *Myrmicinae*
3. Gaster constricted between its first two segments ..... *Ponerinae*
   Gaster not constricted between its first two segments 4
4. Anal orifice terminal, circular and fringed with hairs ..... *Formicinae*
   Anal orifice ventral, slit-shaped and not fringed with hairs ..... *Dolichoderinae*

Subfamily PONERINAE

Genus PONERA Latreille

Ponera trigona var. *opacior* Forel

Apparently the only member of the genus known from Utah, it can be recognized by the petiole's being distinctly narrower dorsally than ventrally when viewed in profile, and by the slender graceful body. The external mandibular borders are simple. The body is 2-2.3 mm. in length, and it varies from light brown to deep black.

Distribution.—Springville (Grundmann).

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3 All keys in this paper are for the identification of the workers, unless otherwise indicated.

A single specimen was taken with workers of *Myrmica mutica* from a nest of the latter. Ordinarily these ants inhabit the soil beneath stones. Colonies are always small.

Subfamily DORYLINAE

Genus ECITON Latreille

This genus contains the so-called "legionary ants" of the United States. Members of the genus do not construct nests of their own, but occupy temporarily those of other ants, raid the colonies and feed upon the inmates. Colonies are generally populous, and they move from place to place frequently.

Eciton sp.

A few small workers were collected in Milford Co. by Fautin, and were sent to Dr. Smith, of the U. S. Bureau of Entomology and Plant Quarantine, for identification. A determination to species was impossible because of the absence of the larger workers.

Subfamily MYRMICINAE

KEY TO THE GENERA OF MYRMICINAE IN UTAH

1. Postpetiole articulated to dorsal surface of gaster which is flattened dorsally, more convex ventrally and acutely pointed ..... *Crematogaster* Lund
   Postpetiole inserted at anterior end of gaster which is of the usual shape 2
2. Antennae 10-segmented, with a 2-segmented club ..... *Solenopsis* Westwood
   Antennae with more than 10 segments; club, when developed, with more than 2 segments 3
3. Antennae 11-segmented 4
   Antennae 12-segmented 6
4. Thorax and petiole without any traces of teeth or spines; pronotum never angular) ..... *Monomorium* Mayr
   Epinotum armed with spines or teeth 5
5. Mesoepinotal constriction distinct ..... *Symmyrmica* Wheeler
   Mesoepinotal constriction faint or lacking ..... *Leptothorax* Mayr
6. Workers strongly dimorphic, usually without intermediates between the extreme forms; antennal club 3-segmented, longer than remainder of funiculus ..... *Pheidole* Westwood
   Workers monomorphic or polymorphic, i.e., with intermediates between the major and minor forms; antennal club indistinct or shorter than remainder of funiculus 7
7. Last three antennal segments, considered together, much shorter than remainder of funiculus and not forming a distinct club 8
   Last three antennal segments forming a distinct club nearly as long as remainder of funiculus ..... *Leptothorax* Mayr
8. Thoracic dorsum impressed at mesoepinotal suture; (promesonotal suture usually distinct) 9
   Thoracic dorsum without suture or impression ..... *Pogonomyrmex* Mayr
9. Posterior tibial spurs pectinated ..... *Myrmica* (Latreille)
   Posterior tibial spurs simple 10
10. Small hypogaeic species with vestigial eyes and two keels on the clypeus ..... *Stenamma* Westwood
    Medium sized species with well developed eyes and no keel on the clypeus: (thorax and legs slender) ..... *Aphaenogaster* Mayr

Genus MONOMORIUM Mayr

Monomorium minimum (Buckley)

This small, shining, jet-black species, which is the only member of the genus known from Utah, is readily distinguishable from species in allied genera.

Distribution.—Clover, Little Valley Ranger Sta., Fishers Pass, Orr's Ranch—all in Tooele Co., Hooper (Knowlton); Salt Lake City (Rowe); Salt Lake Co. (Rowe, Rees); Little Willow Canyon in Salt Lake Co. (Chamberlin); Blanding (Woodbury); Swasey Springs in Millard Co. (Rees); American Fork (Rees and Moffett); 20 Mi. N. Kanab (Cole).

These ants nest beneath stones in rather moist places, or they construct small crater mounds. Some have been found nesting beneath the bark or in the wood of decaying logs.

Genus SOLENOPSIS Westwood

KEY TO THE SPECIES OF SOLENOPSIS IN UTAH

Body rather uniformly light tan or yellow, appendages lighter.....*molesta* (Say)
Body distinctly infuscated .....*molesta* var. *validiuscula* Emery

Solenopsis molesta (Say)

About 1.3 mm. long, smooth and shining and with sparse and rather long hairs.

Distribution.—White Valley in Millard Co. (Fautin).

Apparently only this record is known from Utah. The ants nest beneath stones and logs, or under bark of decaying logs, in moist places. They have also been found occupying nest galleries of other species of ants.

Solenopsis molesta var. *validiuscula* Emery

Differs from the typical species chiefly in color and size (being as long as 2 mm.). It is apparently rather abundant and widely distributed in the State.

Distribution.—Kaysville, Logan Canyon in Cache Co., Ogden (Knowlton and Stains); Orr's Ranch, Iosepa and Vernon Creek—all in Tooele Co., Current Creek in Duchesne Co., Benson in Cache Co., Moab (Knowlton); Ft. Douglass Reservation, mouth of Emigration Canyon, East Bench near Parleys Canyon. Little Willow Canyon and Lake Blanche trail—all in Salt Lake Co. (Grundmann); Salt Lake City (Rowe, Rees); La Sal Creek in La Sal Mts. in San Juan Co. (Rees); Greenriver in Emery Co. (Knowlton and F. C. Harmston); Leeds (Vasquez); Kanab, Provo (Cole).

Numerous colonies have been found nesting in the same kinds of habitats as those of the typical *molesta*.

Genus PHEIDOLE Westwood

Four species, subspecies and varieties are known from Utah, but none seems to be at all well represented. These ants are essentially seed-eaters, but some attend aphids, and most feed upon some dead insects. Seeds are stored in the chambers of most of the nests. There is marked dimorphism in the wingless castes. One caste, the worker, is comparatively small and has a body of rather normal proportions. The other wingless caste, the soldier, has its head much out

of proportion to the remainder of the body, the head's being large and provided with powerful mandibles. Since the workers of allied species exhibit no marked structural differences, the soldiers are necessary for a proper identification of the populations.

KEY TO THE SPECIES OF PHEIDOLE IN UTAH, FOR IDENTIFICATION OF THE SOLDIERS

1. Antennal scapes long, extending the full length of the head; legs very long and slender ..... *desertorum* Wheeler
   Antennal scapes much shorter, not extending the full length of the head; legs not exceedingly long and slender 2
2. Body length, 3.5-4 mm.; upper portion of head coarsely reticulate; a prominent connulate process near the center of the lateral surface of the postpetiole; color deep reddish brown ..... *pilifera artemisia* Cole
   Body length, 2.3-2.5 mm.; upper portion of head not coarsely reticulate; center of the lateral surface of the postpetiole without a prominent connulate process; color reddish testaceous 3
3. Head as long as broad; transverse occipital rugae rather numerous and coarse ..... *californica* Mayr
   Head broader than long; transverse occipital rugae sparser and finer ..... *californica oregonica* Emery

Pheidole pilifera artemisia Cole

Distribution.—Springdale, Gusher (Knowlton); 30 Mi. S. Provo, *type locality* (Cole).

Apparently only a single colony is known from the State. It was observed by the writer on a hillslope covered with *Artemisia tridentata*. The nest was a small chamber in the soil beneath a large flat stone. The two other collections represent two stray soldiers which I have referred to this subspecies.

Pheidole desertorum Wheeler

Distribution.—Castle Cliff in Washington Co. (Knowlton).

Only a few soldiers were found, and they were strays.

Pheidole californica Mayr

This small ant has abundant and rather long yellowish hairs which are of uneven length on the body, suberect on the body and scapes and short and subappressed on the legs.

Distribution.—Ironton (Knowlton); Moab, La Sal (Knowlton and M. J. Janes); Salt Lake City (Chamberlin, Grundmann).

A few colonies were found beneath stones in rather dry grassy areas.

Pheidole californica oregonica Emery

Distribution.—Moab, Fishers Pass in Tooele Co. (Knowlton); Clover (Knowlton and M. J. Janes); Ft. Douglass Reservation in Salt Lake Co. (Grundmann); Kanab (Cole).

Nests are in the same general habitats as those of the typical *californica*. The Kanab specimens were nesting in very dry sandy soil.

Genus CREMATOGASTER Lund

Characterized chiefly by the cordate gaster which is carried somewhat curled

over the thorax when the ants are moving. Colonies are generally rather large, and nests are usually constructed beneath stones or in or under the bark of decaying logs. Many species attend aphids and coccids on plants.

KEY TO THE SPECIES OF CREMATOGASTER IN UTAH

1. Antennal scape short, scarcely surpassing the posterior border of the head; promesonotum with exceedingly coarse reticulate sculpturing in addition to the very fine reticulae; (epinotal spines short, somewhat subparallel).....*vermiculata* Emery

2. Prothoracic humeri angular; sides of prothorax distinctly compressed .....
.....*coarctata* var. *mormonum* Emery

Prothoracic humeri rounded; sides of prothorax not distinctly compressed .....
.....*lineolata* var. *cerasi* (Fitch)

Crematogaster lineolata var. (near *cerasi* Fitch)

Distribution.—Low, Clover, Park Valley (Knowlton); Fishers Pass in Tooele Co., Delle (Knowlton and M. J. Janes); Logan (Thatcher); Salt Lake Co. (Grundmann); Swasey Springs in Millard Co. (Rees); Provo (Cole).

Colonies are beneath logs, bark and stones.

Crematogaster coarctata var. *mormonum* Emery

Distribution.—Salt Lake City, East Mill Creek Canyon in Salt Lake Co., *type locality* (Chamberlin); Stansbury Island in Great Salt Lake (Titus, Grundmann).

Colonies live beneath stones and logs.

Crematogaster vermiculata Emery

Distribution.—30 Mi. S. Provo (Cole).

A single colony was found beneath a stone in a dry area of sagebrush.

Genus STENAMMA Westwood

Stenamma brevicorne (Mayr) var.

A single specimen of an undetermined variant of *brveicorne* was found in the State.

Distribution.—Logan (Thatcher).

Genus APHAENOGASTER Mayr

Members of this genus can readily be distinguished from those of *Myrmica* by their unpectinated spurs of the hind tibiae. These ants move more rapidly than those of *Myrmica,* and their colonies are generally much more populous. They nest in moist areas beneath stones and in decaying logs.

KEY TO THE SPECIES OF APHAENOGASTER IN UTAH

1. Epinotal spines prominent: antennal scapes not or but slightly surpassing the the posterior corners of the head; node of petiole not conical when viewed in profile, its apex flattened, angle formed by its anterior surface and the peduncle rounded; body chestnut brown .....*subterranea occidentalis* Emery

Epinotal spines represented by small tubercles; antennal scapes distinctly surpassing posterior corners of the head for about 1/6 their length; node of petiole conical, its apex convex, angle formed by its anterior surface and the peduncle sharp; head and thorax yellowish red, gaster dark brown or black....*uinta* Wheeler

Aphaenogaster subterranea occidentalis Emery

Distribution.—Providence Canyon, Logan Canyon—both in Cache Co. (Knowlton and Stains); Holliday, Logan, Logan Canyon, Big Cottonwood Canyon in Salt Lake Co., Brigham (Knowlton); Univ. campus in Salt Lake City, mountain S. of Dry Canyon, Ft. Douglass Reservation, Butterfield Canyon—all in Salt Lake Co. (Grundmann); Little Willow Canyon in Salt Lake Co. (Chamberlin; Grundmann and Whitelock); Salt Lake Co. (Grundmann and Rees; Gertsch); Mantua Mt. in Box Eldler Co. (Knowlton and Bischoff); Thompsons (Titus?).

These well distributed ants are rather numerous in the State. Nests were found in moist areas beneath stones and in ditch banks. The colonies are moderately large.

Aphaenogaster uinta Wheeler

Although closely related to the preceding form, this species is very distinct from it. It has longer scapes and funicular joints, the eyes are much larger, the head is more rectangular and the epinotum lacks distinct and typical spines.

Distribution.—East Mill Creek Canyon in Salt Lake Co., *type locality* (Chamberlin); Salt Lake City, mountain S. of Dry Canyon in Salt Lake Co. (Grundmann); Point of Mountain in Salt Lake Co. (Titus); Dolphin Island in Great Salt Lake (Marshall).

Only a few nests have been found, and they were in moist soil beneath stones. The colonies are not large.

Genus POGONOMYRMEX Mayr

This interesting genus contains a number of forms which have been collected in Utah. All members feed upon seeds, and store them in the nests. Colonies are generally large, and both domed and crater mounds are constructed, depending upon the species concerned. The workers are monomorphic with the exception of those of *P. badius,* a species which does not occur in Utah. All species known from the State possess a more or less well developed beard of long recurved hairs on the gular region and on the lower surface of the mandibles. All species can sting, and the toxic fluid emitted by some is sufficiently potent to produce a considerable amount of pain and subsequent swelling of the lymphatics.

KEY TO THE SPECIES OF POGONOMYRMEX IN UTAH

1. Epinotum without distinct spines; body shining, light ferruginous red ..... *californicus* (Buckley)
   Epinotum with a pair of distinct spines; head and thorax generally opaque or subopaque; color variable 2
2. Head distinctly concave posteriorly; densely rugose, rugae but little divergent posteriorly, interrugal spaces indistinctly or not at all sculptured; large forms 3
   Head not distinctly concave posteriorly, not densely rugose, rugae distinctly divergent posteriorly, interrugal spaces distinctly sculptured: small to medium sized forms 6
3. Head, thorax and legs deep blackish red; petiole and postpetiole brown; gaster yellowish red, often with a dark band traversing distal margin of basal segment; interrugal spaces of head and thorax finely punctate; (beard full) ..... *barbatus* var. *marfensis* Wheeler
   Color not as above 4
4. Bright ferruginous red throughout; rugae of head especially and of thorax fine and rather dense ..... *barbatus* var. *molefaciens* (Buckley)

Color and sculpture different 5
5. Head and thorax brownish red, gaster in part or entirely brown; cephalic rugae coarser than in *molefaciens*, interrugal speces with delicate punctures ..... *barbatus* var. *fuscatus* Emery
Color from ferruginous to black; head and thorax very coarsely rugose, interrugal spaces of head with traces of 2-3 fine rugules, node of petiole rather coarsely and irregularly rugose ..... *barbatus rugosus* Emery
6. Epinotal spines at least 1½ times as long as their interbasal distance; node of petiole as broad as long, or nearly so; body opaque ..... *occidentalis* (Cresson)
Epinotal spines shorter than their interbasal distance; node of petiole distinctly longer than broad; body subopaque ..... *occidentalis utahensis* Olsen

Pogonomyrmex occidentalis (Cresson)

This is by far the most widely distributed species of the entire genus. It can be readily separated from all other members of the genus in Utah, with the exception of its subspecies *utahensis,* by the rather densely rugose head, the interrugal spaces of which are distinctly punctate; by the presence of a pair of epinotal spines; and by its ferruginous color.

Distribution.—Brigham, Promontory Point, Iosepa, Elberta, La Sal, Westville, Mt. Sterling in Cache Co., Blue Bench and Current Creek—both in Duchesne Co., Farmington, Little Mountain west of Ogden, Little Valley in Tooele Co., Mendon, Ouray, Big Cottonwood Canyon in Salt Lake Co., Hardup, Low, Locomotive Springs and Promontory Ridge—both in Box Elder Co., Blue Creek, Lucin, Meadow, Wild Cat Canyon in Beaver Co., Bovine, Howell, Elsinore, Salt Lake City, Virgin, Orr's Ranch in Tooele Co., Springdale, Brigham, Fillmore (Knowlton); Blue Creek (Knowlton and Fronk); Willard, Howell (Knowlton and Stains); Riverdale, Santaquin (Knowlton and Smith); Granite in Salt Lake Co. (Knowlton and Allen); Greenriver (Knowlton and F. C. Harmston); Cove in Cache Co. (Knowlton and Hardy); Logan (Knowlton and R. L. Janes; Meacham); Tintic (H. R. Harmston); Thompsons, Point of Mountain, Stansbury Island in Great Salt Lake, Mt. Pleasant, Cache Jc. (Titus); Ft. Douglass Reservation in Salt Lake Co. (Grundmann); Salt Lake Co., Summit Co. (Grundmann and Rees); Lehi (Hooker); Bluff (Stafford); Sandy, Kaysville (Klamback); Ft. Duchesne (R. L. Janes); Grantsville (Shannon); Beaver (Rowe); Brigham (Olsen); Millard Co., La Sal, La Sal Jc., Wales, Brush Creek, St. George (Rees); Leeds (Vasquez); Providence (R. L. Janes); Hardup (Thomas); Salt Lake Co. (Chamberlin); Snowville, Delle, Brigham, Ogden, Tooele, Zion Natl. Park, Kanab (Cole); Elsinore, Collinston (collectors unknown).

This is undoubtedly the most prevalent mound-building ant of the sagebrush plains. The cone-shaped pebble mounds, which are scattered about in the open areas, are frequently several feet in diameter and a foot or so in height. Surrounding each mound is a denuded area which results after the workers have cleared away the plants that grow there. The mound contains chambers in which seeds are stored and into which the brood is placed by the workers during periods of optimum mound temperatures. The nests, which continue underground, may contain thousands of individuals. The winged castes appear usually during July. At high elevations colonies are generally scarce or absent.

Pogonomyrmex occidentalis utahensis Olsen

I prefer to regard these ants as representing a subspecies rather than a variety of *occidentalis*. In both structure and habitat the requirements of the subspecific category are met.

It differs from the typical species by its shorter epinotal spines and its petiolar node which is distinctly longer than broad. The body surface is somewhat more shining than that of the typical *occidentalis*, and the interrugal punctures of the head and thorax are less pronounced.

Distribution.—Zion Natl. Park, *type locality* (Creighton, Cole); Kanab, St. George (Rees).

The ants were found inhabiting rather small pebble mounds in dry canyons.

Pogonomyrmex barbatus rugosus Emery

Distribution.—Greenriver (Knowlton and F. C. Harmston); Hurricane (Grundmann); St. George (Rees); Thompsons (Titus?).

Apparently not well represented in the State, this subspecies constructs crater mounds of pebbles. The workers can sting severely.

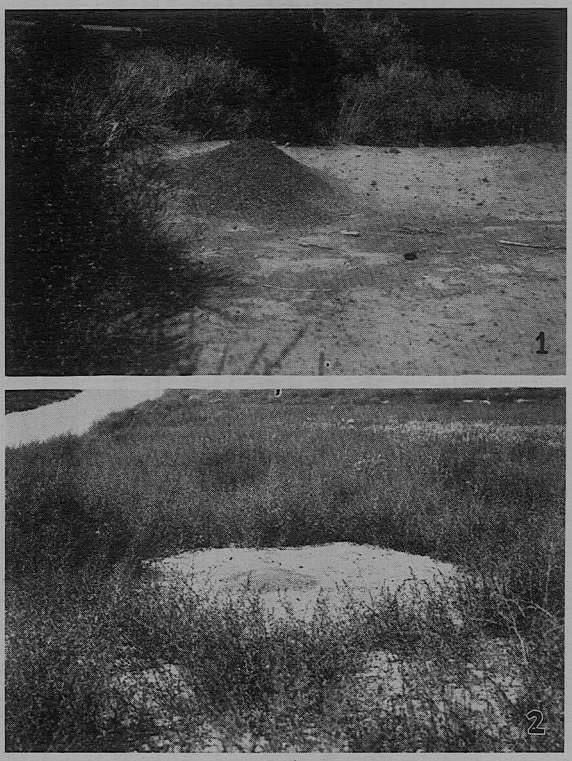

Fig. 1. Typical conical pebble mound of *Pogonomyrmex occidentalis* (Cresson) in an area of greasewood [*Sarcobatus vermiculatus* (Hook.)].

Fig. 2. Small pebble mound of *Pogonomyrmex occidentalis* (Cresson) in an area of Russian thistle (*Salsola pestifer* A. Nels.), showing the characteristic denuded area.

Pogonomyrmex barbatus var. *marfensis* Wheeler

Distribution.—Greenriver (Rowe).

Large crater mounds of pebbles are constructed in unshaded areas.

Pogonomyrmex barbatus var. *fuscatus* Emery

Distribution.—Goulding Mountain (Shaw).

Like other members of the *barbatus* group, these ants make crater mounds of pebbles.

Pogonomyrmex barbatus var. *molefaciens* (Buckley)

Distribution.—St. George (Tanner).

The pebble mounds frequently have rather greatly elevated craters which are more oval than spherical.

Pogonomyrmex californicus (Buckley)

This species lacks epinotal spines and is less robust than the forms of *barbatus*.

Distribution.—Hurricane (Rees); St. George (Tanner).

The ants frequently construct small craters of sand, but there may be nothing but an obscure hole marking the entrance to the nest in the ground. Colonies are not large.

Genus MYRMICA (Latreille)

Several forms occur in Utah. They can be distinguished readily from those of *Aphaenogaster* by the pectinate spurs on the hind tibiae. Colonies inhabit, for the most part, the soil beneath stones in moist places, or they occupy decaying logs. The workers are rather sluggish. Determination of workers to the proper subspecies and subspecies is very difficult. The following key has been adapted from one by Dr. N. A. Weber.

KEY TO THE SPECIES OF MYRMICA IN UTAH

1. Epinotal spines present 2
   Epinotal spines absent ..... *mutica* Emery
2. Antennal scapes evenly bent at base and without a dorsal lamina 3
   Antennal scapes with a distinctly angular bend at base and with a dorsal lamina.... 4
3. Epinotal spines long, robust, straight, blunt; head and gaster dark brown or black; thorax, petiole and postpetiole deep red to nearly black..... *brevinodis sulcinodoides* Emery
   Epinotal spines rather slender, pointed, curved inward; color of body lighter..... *brevinodis* Emery
4. Bend of antennal scapes with a suberect lamina at base; postpetiole with a comparatively flat ventral surface ..... *sabuleti americana* Weber
   Bend of antennal scapes otherwise 5
5. Bend of antennal scapes with a high thin lamina produced anteriorly and ventrally ..... *schencki emeryana* Forel
   Bend of antennal scapes otherwise 6
6. Bend of antennal scapes compressed laterally ..... *scabrinodis mexicana* Wheeler
   Bend of antennal scapes compressed dorso-ventrally: (postpetiole distinctly convex ventrally) ..... *lobicornis fracticornis* Emery

Myrmica sabuleti americana Weber

Distribution.—Bryce Cannyon, *type locality* (Weber).

Nests are in the soil beneath stones in moist areas.

Myrmica brevinodis Emery

Distribution.—Salt Lake City (Emery); Big Cottonwood Canyon in Salt Lake Co. (Grundmann).

Colonies inhabit the same type of habitat as that of the preceding ant.

Myrmica brevinodes sulcinodoides Emery

Distribution.—Logan, Woodland (Knowlton); Salt Lake City (Emery); River Heights in Cache Co. (Smith).

The ants nest beneath stones in moist areas.

Myrmica lobicornis fracticornis Emery

This appears to be the most prevalent member of the genus in Utah. Although there is a considerable variation of color among the workers, in general the thorax is reddish brown, the head considerably darker and the gaster black.

Distribution.—S. Fork of Big Cottonwood Canyon in Salt Lake Co. (Grundmann and Fox); Alta, Camas in Uinta Mts. and Soapstone Canyon in Uinta Mts.—both in Summit Co. (Grundmann); Wales, Henrys Fork Basin in Summit Co. (Rees); Salt Lake Co. (Chamberlin); Neola in Duchesne Co. (Knowlton and F. C. Harmston).

Colonies were found beneath stones and in decaying logs.

Myrmica schenecki emeryana Forel

Distribution.—Leki (Hooker); Bryce Canyon (Weber).

Myrmica scabrinodis mexicana Wheeler

Distribution.—Salt Lake Co. (Chamberlin).

Myrmica mutica Emery

It can be distinguished readily from all other forms of *Myrmica* in Utah by its lack of epinotal spines. The workers are about 9-11 mm. in length and have quite a uniform reddish brown color, but the gaster may be paler than the rest of the body in some specimens.

Distribution.—Chester, Hyrum, Plain City, Blue Creek, Lake Point (Knowlton); Corrine (Knowlton and Smith); Tremonton (Knowlton and Rowe); Salt Lake City (Chamberlin, Grundmann, Cole); Salem, Woods Cross, Springville (Grundmann); Iosepa (Knowlton and Janes); Tooele, Fayette, Ogden (Cole).

The ants nest in moist places in ditch banks and under stones. Sometimes they construct small craters.

Genus LEPTOTHORAX Mayr

These ants are all small. The antenna of the worker bears usually a prominent 3-segmented club. The thorax is slender and does not possess a promesonotal suture. The epinotum bears a pair of teeth or spines. The petiole has a median ventral tooth, but the postpetiole is unarmed ventrally. The gaster is

broadly elliptical, compressed dorsoventrally and its basal three-fourths is formed by the first segment. The spurs of the median and hind legs are not pectinate. Species in the State are usually dark in color, being yellowish or reddish brown or black. Most of them have the head, thorax and pedicel sculptured and opaque. The gaster is always smooth and shining.

Apparently none of the species is at all common in the State. Those colonies which are present are difficult to find because of the diminutive size of the workers and the rather secluded locations of the nests. Colonies may be found in cavities in the soil beneath stones, in decaying wood and in the dry hollow stems of plants. Nests were found for the most part in rather moist areas, and they are undoubtedly very scarce on the sagebrush plains.

KEY TO THE SPECIES OF LEPTOTHORAX IN UTAH

1. Antennae 11-segmented 2
   Antennae 12-segmented 5
2. Thorax with a faint but distinct mesoepinotal impression 3
   Thorax without a meoepinotal impression; (upper surface of head and gaster, with exception of posterior edges of gastric segments, dark brown; thorax yellow or yellowish brown) ..... *rugatulus* Emery
3. Tibiae and antennal scapes without clavate hairs 4
   Tibiae and antennal scapes with short, erect, clavate hairs; (body bright testaceo-ferruginous, gaster and middle of frons infuscated ..... *hirticornis* Emery
4. Body dark brown, almost black ..... *acervorum canadensis* Provancher
   Body color much lighter ..... *acervorum canadensis* var. *yankee* Emery
5. Head very largely smooth and shining; epinotal spines very small, tooth-like, scarcely as long as the space between their bases; body yellow, in some specimens the vertex, antennal club and dorsum of gaster lightly infuscated ..... *nitens* Emery
   Head subopaque, with a satiny luster; epinotal spines robust, distinctly shorter than the spaces between their bases; body dark reddish brown, ventral portions of head, thorax and pedicel yellowish ..... *nevadensis* Wheeler

Leptothorax rugatulus Emery

Distribution.—Delle (Knowlton); Clover, Park Valley in Box Elder Co., Fishers Pass in Tooele Co. (Knowlton and M. J. Janes); White Valley in Millard Co. (Fautin).

Nests are found in the soil beneath stones in rather moist areas. Colonies are small.

Leptothorax acervorum candensis Provancher

Distribution.—Salt Lake Co. (Chamberlin); S. Fork of Big Cottonwood Canyon, Little Cottonwood Canyon—both in Salt Lake Co. (Grundmann and Fox).

Colonies nest in or beneath decaying wood. Nests were found in decaying pine logs, in a conifer stump and in holes in dead conifers. Colonies are generally small, but some may consist of a hundred or more workers.

Leptothorax acervorum canadensis var. *yankee* Emery

Differs from the typical *canadensis* in its lighter coloration and somewhat longer epinotal spines. The sculpturing is finer and less rugose than in the typical form.

Distribution.—Utah, *one of the type localities* (Emery); Logan (Knowlton).

Apparently colonies are rare in the State. The ants nest in the same type of habitat as that of the typical *canadensis*.

Leptothorax hirticornis Emery

The head, thorax and pedicel are opaque and densely foveolate-punctate. The upper surface of the head is finely longitudinally rugose. The postpetiole is small, a little broader than long and almost trapezoidal. The hairs are erect, clavate, very short and cover the antennal scapes and legs as well as the body.

Distribution.—Salt Lake Co. (Chamberlin).

Information on the habitat of this species is unavailable.

Leptothorax nitens Emery

The head is mostly very smooth and shining; the thorax, petiole and postpeiole are opaque and finely and regularly foveolate-reticulate. In some specimens parts of the pro- and mesonotum are shining. The gaster is very smooth and shining.

Distribution.—American Fork Canyon in Utah Co., *type locality* (Collector?); Providence Canyon in Cache Co. (Knowlton and M. J. Janes).

Colonies nest in the soil, generally beneath stones.

Leptothorax nevadensis Wheeler

Distribution.—Blacksmith Fork Canyon in Cache Co. (Smith and Rowe).

These ants nest in the soil beneath stones.

Genus SYMMYRMICA Wheeler

This unique genus is known to contain but a single species, which has been found only in Utah.

Symmyrmica chamberlini Wheeler

The head, mandibles, thorax, petiole and postpetiole are opaque; the clypeus, frontal area, gaster and legs are shining. The antennae and legs are covered with coarse piligerous punctures. The antennae, legs and body, except the lower surfaces of the thorax and pedicel, are covered with suberect, coarse, abundant yellow hairs. There is no pubescence. The body is rich ferruginous red throughout. The gaster and legs are somewhat paler than the head, thorax and pedicel. The workers are about 3 mm. in body length.

Distribution.—near Salt Lake City, *type locality* (Chamberlin).

This is an inquiline species which colonizes in nests of *Myrmica mutica*. The ants are apparently very rare.

Subfamily DOLICHODERINAE

KEY TO THE GENERA OF DOLICHODERINAE IN UTAH

1. Scale of petiole well developed 2
   Scale of petiole vestigial or absent ..... *Tapinoma* Förster
2. Epinotum with a conical elevation ..... *Dorymyrmex* Mayr

Epinotum without a conical elevation 3
3. Body densely pubescent, ocelli usually present in large workers.....*Liometopum* Mayr
Body not conspicuously hairy or pubescent, ocelli absent.....*Iridomyrmex* Mayr

Genus LIOMETOPUM Mayr

Liometopum apiculatum luctuosum Wheeler

The entire surface of the body is rather smooth and shining. The upper surface bears only a few rather short erect hairs. Hairs are absent from the legs and antennal scapes. The body is very dark brown or black. In some specimens the antennae are dark red or yellowish red. The body length is 2.5-4.5 mm.

Distribution.—Myton (Grundmann, Gold); Moab, Hatch Wash near La Sal (Rees); Greenriver, Gunnison Butte in Sanpete Co. (Rowe).

The ants nest beneath stones, for the most part at high elevations (above 4,000 ft.). The workers attend aphids and coccids upon whose excretions they feed. Colonies may be very large, and the nest runways are frequently found beneath stones at an appreciable distance from the nest itself.

Genus DORYMYRMEX Mayr

These small ants nest in the open sandy soil and construct rather symmetrical craters. They move very swiftly.

KEY TO THE SPECIES OF DORYMYRMEX IN UTAH

1. Body light brown to dark brown .....*pyramicus* (Roger)
Color of body different..... 2
2. Head and thorax red, gaster black .....*pyramicus* var. *bicolor* Wheeler
Head, thorax and gaster yellow, the latter more or less infuscated especially toward the apex .....*pyramicus* var. *flavus* McCook

Dorymyrmex pyramicus (Roger)

Distribution.—Gusher, Orr's Ranch in Tooele Co., Clive, Granite, Goshen, Blue Bench in Duchesne Co., Ft. Duchesne, Lapointe, Ouray Valley in Uinta Co. (Knowlton); Greenriver (Knowlton and F. C. Harmston); Orem (Knowlton and R. L. Janes); Granite (Knowlton and Allen); Lehi (Knowlton and Fronk); St. George (Knowlton and M. I. Janes, Grundmann, Rees); White Valley in Millard Co. (Fautin); Butterfield Canyon, Parleys Canyon—both in Salt Lake Co. (Grundmann); Hurricane (Rees); Kanab (Rees, Cole); Provo, Tooele (Cole).

This is a common ant in the drier sandy parts of the State. Usually the crater nests are aggregated in an area which may be rather circumscribed. The colonies frequently contain several hundreds of workers.

Dorymyrmex pyramicus var. *flavus* McCook

Distribution.—Gusher, Clive, Orem, Ft. Duchesne, Clover, Orr's Ranch in Tooele Co., Moab (Knowlton).

I have assigned to *flavus* workers collected at the localities cited. While these ants are not quite so pale as those from colonies in the southeastern United States, they are nevertheless consistently more like *flavus* than like the typical *pyramicus* in color.

Dorymyrmex pyramicus var. *bicolor* Wheeler

Distribution.—Moab (Knowlton and M. J. Janes); 30 Mi. S. Provo, Kanab (Cole).

Colonies seem to be uncommon in Utah although they abound in the true southwestern deserts. The small crater nests are in areas of nearly pure sand and are apparently not in those which are colonized by the typical *pyramicus*.

Genus TAPINOMA Förster

Tapinoma sessile (Say)

This is a small dark brown or black ant. The petiolar scale is apparently absent.

Distribution.—Farmington, Logan Canyon near Logan, Cowley Canyon in Cache Co., Draper (Knowlton); Big Cottonwood Canyon in Salt Lake Co. (Grundmann and Fox, Smith, Grundmann); White Valley in Millard Co. (Fautin); S. Fork of Raft River in Box Elder Co. (Rees); Leeds (Vasquez); Logan (Stanford); Kanab (Cole).

The ants nest in the soil beneath stones in rather moist areas, in decaying logs and under bark of logs.

Genus IRIDOMYRMEX Mayr

Members of this genus colonize the drier areas and construct their nests in sandy soil. The nests, which are generally marked by small craters, are frequently aggregated. Some colonies are beneath stones. The workers are small and very active, and they are often rather difficult to collect.

KEY TO THE SPECIES OF IRIDOMYRMEX IN UTAH

1. Body rather uniformly brown or blackish; (covered with a dense pubescence which gives a pruinose effect) ..... *pruinosus* (Roger)
   Body not uniformly brown or blackish 2
2. Head and thorax brown, gaster paler, giving the body a bicolored appearance ..... *pruinosc* var. *ana'is* André
   Body testaceous, vertex of head darker, tip of gaster infuscated, legs and base of gaster yellow to testaceous ..... *pruinosus* var. *testaceus* Cole

Fig. 3. Crater mound of *Dorymyrmex pyramicus* var. *bicolor* Wheeler.

Iridomyrmex pruinosus (Roger)

The body is smooth and about 3 mm. in length. Hairs are very sparse.

Distribution.—Gusher, Lucin (Knowlton); Logan Canyon in Cache Co. (Knowlton and Stains); Hurricane, mountain S. of Dry Canyon, East Bench near Parleys Canyon, Ft. Douglass Reservation—all in Salt Lake Co. (Grundmann); Johns Canyon in San Juan Co. (Rees).

A number of crater nests was found in sandy soil, and one colony nested beneath a stone.

Iridomyrmex pruinosus var. *analis* André

Distribution.—Bovine, Willow Springs, Lucin, Clover, La Sal, Big Cottonwood Canyon in Salt Lake Co., Gusher, Roosevelt (Knowlton); Moab, Clover (Knowlton and M. J. Janes); Pelican Point in Utah Co., East Bench of Parleys Canyon in Salt Lake Co. (Grundmann); Kanab, Zion Natl. Park (Cole).

The habitat and nests of this variety are like those of the typical *pruinosus*. Both forms are frequently found in the same area.

Iridomyrmex pruinosus var. *testaceus* Cole

Distribution.—Clover, Park Valley, Gusher, Lucin, Deseret, Iosepa, Valley Junction (Knowlton and M. J. Janes).

The habitat and nests are similar to those of the two preceding two forms.

Subfamily FORMICINAE

KEY TO THE GENERA OF FORMICINAE IN UTAH

1. Workers polymorphic ..... *Camponotus* Mayr
   Workers not polymorphic, but often of variable size 2
2. Funicular segments 2-5 shorter or not longer than succeeding segments; ocelli usually absent 3
   Funicular segments 2-5 longer than succeeding segments; ocelli distinct 4
3. Maxillary palpi 6-segmented ..... *Lasius* Fabricius, *s. str.*
   Maxillary palpi 3-segmented ..... *Lasius* (*Acanthomyops* Mayr)
4. Fourth segment of maxillary palpi distinctly longer than fifth.. *Myrmecocystus* Wesmael
   Fourth segment of maxillary palpi nearly as long as fifth 5
5. Mandibles with broad, dentate masticatory borders; (prothoracic dorsum convex) ..... *Formica* Linné
   Mandibles narrow, falcate and pointed ..... *Polyergus* Latreille

Genus LASIUS Fabricius

The genus is well represented in Utah, not only in the number of different forms but also in the prevalence of colonies. Colonies are generally rather large, and most of the nests are in the soil beneath stones. The majority of the workers attends aphids and coccids on foliage and roots of plants.

KEY TO THE SPECIES OF LASIUS IN UTAH

1. Maxillary palpi 6-segmented 2
   Maxillary palpi 3-segmented 8
2. Last three segments of maxillary palpi elongated, of nearly equal length 3
   Last three segments of maxillary palpi short, successively diminishing in length 5
3. Scapes and legs without erect hairs ..... *niger* var. *americanus* Emery
   Scapes and legs with erect hairs 4

4. Length about 4 mm.; pubescence very long and dense; ocelli small but distinct; head and gaster dark brown, thorax ferruginous .....*niger* var. *sitkaënsis* Pergande
   Length about 3 mm.; pubescence shorter and less dense, especially on the gaster; ocelli apparently absent; body dark brown to black.....*niger* var. *neoniger* Emery
5. Tips of antennal scapes scarcely surpassing posterior corners of head 6
   Tips of antennal scapes extending same distance beyond posterior corners of head.... 7
6. Color pale yellow, with whitish gaster .....*flavus nearcticus* Wheeler
   Color brownish yellow throughout .....*flavus claripennis* Wheeler
7. Color pale yellow; eyes small .....*umbratus subumbratus* Viereck
   Color brownish yellow; eyes large .....*umbratus mixtus var. aphidicola* (Walsh)
8. Petiole low, blunt above in profile .....*latipes* (Walsh)
   Petiole higher, thin and acute above in profile 9
9. Penultimate segments of distally thickened antennal funiculi somewhat broader than long; gaster with abundant long hairs.....*claviger* (Roger)
   Penultimate segments of but slightly thickened antennal funiculi not broader than long; gaster with sparse long hairs .....*interjectus* Mayr

Lasius niger var. *americanus* Emery

The workers vary considerably in color, being from very light to dark brown. They average about 3 mm. in length.

Distribution.—Fishers Pass, Duchesne, Clover (Knowlton); Snowville (Knowlton, Cole); Logan Canyon in Cache Co. (Thatcher); Millard Co. (Rees); Salt Lake Co. (Chamberlin); Salt Lake City, Butterfield Canyon in Salt Lake Co., Alta (Grundmann); Provo, Tooele (Cole).

Colonies were found in the soil beneath stones, particularly in the more open and grassy areas. Some nests were observed at an elevation of 6,500 feet.

Lasius niger var. *neoniger* Emery

Distribution.—Logan Canyon and Cowley Canyon—both in Cache Co. (Knowlton); Blacksmith Fork Canyon in Cache Co. (Thatcher); Lake Blanche trail in Big Cottonwood Canyon, S. Fork of Big Cottonwood Canyon, N. Fork of City Creek Canyon, Lake Blanche—all in Salt Lake Co., Alta (Grundmann); American Fork Canyon in Utah Co. (Whitelock); 20 Mi. N. Kanab (Cole).

It is rather prevalent in the State at the higher elevations. Colonies were found to elevations of 10,000 ft., chiefly in forested places. The nests are usually beneath stones, but occasionally one will be found in the soil beneath a log.

Lasius niger var. *sitkaënsis* Pergande

Distribution.—Big Cottonwood Canyon in Salt Lake Co. (Smith); Holliday, Gusher, Snowville (Knowlton); Salt Lake City, Mill Creek Canyon in Salt Lake Co. (Grundmann); Utah Co. (Rowe); La Sal (Rees); Kanab, Zion Natl. Park (Cole).

Numerous colonies were found nesting in the soil beneath stones.

Lasius flavus nearcticus Wheeler

Distribution.—Butterfield Canyon in Salt Lake Co. (Grundmann); Bluff (Rowe); La Sal Mts. (Rees).

Three colonies were discovered. Two of these were apparently beneath stones, and the third was under dry sheep manure.

Lasius flavus claripennis Wheeler

Distribution.—Salt Lake Co. (Chamberlin).

Apparently only a single colony has been found in Utah. The ants nest beneath stones on warm stone-covered slopes.

Lasius umbratus mixtus var. *aphidicola* (Walsh)

Distribution.—Jordon Narrows (Roskalley); Ogden Canyon near Ogden, Henefer (Knowlton); Logan Canyon in Cache Co. (R. E. Nye and Knowlton); Little Willow Creek Canyon in Salt Lake Co. (Chamberlin).

Nests are in the soil under stones in rather cool, moist, shaded areas.

Lasius umbratus subumbratus Viereck

Distribution.—Salt Lake Co. (Chamberlin, Grundmann).

It nests beneath stones, but it is apparently very uncommon.

Lasius interjectus Mayr

Distribution.—Cedar City (Chamberlin); Big Cottonwood Canyon in Salt Lake Co. (Knowlton).

Nests are beneath stones.

Lasius claviger (Roger)

Distribution.—Lake Blanche in Wasatch Mts. in Salt Lake Co. (Grundmann).

Colonies were beneath stones at an elevation of 10,000 ft.

Lasius latipes (Walsh)

Distribution.—Current Creek and Blue Bench—both in Duchesne Co., Spring Canyon in Carbon Co. (Knowlton); Logan (Burrill); Salt Lake Co., Monticello (Chamberlin).

A few nests were found in the soil beneath stones. Numerous alate females were taken by Knowlton from the nests at Current Creek on August 16, 1935.

Genus FORMICA (Linné)

It is well represented in Utah. The colonies generally comprise large numbers of workers. The ants nest in the soil beneath stones and logs, or they construct domed mounds of earth or detritus. Some species which nest under stones and logs bank the sides of these objects lightly or densely with dried vegetable matter. A few species construct small craters of soil in grassy areas. The workers are rather large ants, and are generally black or brown with one or the other of these colors in combination with red.

KEY TO THE SPECIES OF FORMICA IN UTAH

1. First funicular segment about as long as the 2nd and 3rd segments together, the latter shorter or at least not longer than the penultimate segments; (frontal carinae short, subparallel, not diverging behind; small, mostly smooth, shining, dark-colored species) 2

   First funicular segment distinctly shorter than the 2nd and 3rd segments together, the latter longer than the penultimate segments 3

2. Antennal scapes with erect hairs; (body black or very dark brown, thorax sometimes reddish) ..... *neogagates lasioides* var. *vetula* Wheeler
Antennal scapes without erect hairs ..... *neogagates* Emery

3. Anterior clypeal margin notched in the middle 4
Anterior clypeal margin entire 9

4. Gaster strongly shining, with very short sparse pubescence 5
Gaster opaque or subopaque, with longer dense pubescence 6

5. Erect hairs on head, thorax and gaster long and dense; clypeal notch indistinct in small workers ..... *perpilosa* Wheeler
Erect hairs on head, thorax and gaster shorter and sparser; clypeal not distinct in small workers ..... *manni* Wheeler

6. Hairs on dorsal parts of body abundant, conspicuous, glistening white, obtuse or clavate ..... *obtusopilosa* Emery
Hairs on dorsal parts of body sparse and more slender 7

7. Hairs nearly always absent from thoracic dorsum and petiolar border ..... *sanguinea subnuda* Emery
Hairs present though sparse on thoracic dorsum and petiolar border 8

8. Posterior corners of head shining; head, thorax and appendages yellowish red, gaster brown ..... *sanguinea puberula* Emery
Posterior corners of head opaque or subopaque; thorax, petiole, appendages and lower surface of head dull, yellowish brown, vertex and occiput piceous brown, gaster deep piceous brown ..... *wheeleri* Creighton

9. Body robust; head of largest workers not or scarcely longer than broad; funicular segments 2-3 longer and more slender than segments 6-8; petiole usually with a rather sharp superior border; (body opaque; color light or dark red, with brown or black gaster) 10
Body more slender; head of largest workers usually distinctly longer than broad; funicular segments 2-3 only slightly more slender than segments 6-8; petiole usually narrow, rather thick and with blunt superior border 23

10. Female larger than largest workers, measuring 6-11 mm. 11
Female not larger and sometimes even smaller than largest workers, measuring only 4-6 mm. ..... *microgyna* var. *rasilis* Wheeler

11. Antennal scapes with erect hairs 12
Antennal scapes without erect hairs 13

12. Head and thorax bright yellowish red, legs reddish brown ..... *oreas* Wheeler
Red parts of body darker, legs dark brown ..... *oreas* var. *comptula* Wheeler

13. Frontal area opaque ..... *foreliana* Wheeler
Frontal area smooth and shining 14

14. Erect hairs absent from gula and upper surface of head and thorax 15
Erect hairs present on gula and upper surface of head and thorax 17

15. Small forms (4-6.5 mm.) ..... *criniventris* Wheeler
Larger forms (4-9 mm.) 16

16. Gaster blackish brown ..... *comata* Wheeler
Gaster reddish brown ..... *ciliata* Wheeler

17. Erect hairs on middle and hind tibiae confined to a double row of bristles along flexor surface 18
Erect hairs on middle and hind tibiae usually abundant and covering all surfaces, but at least there is a number of erect hairs besides the bristles on the flexor surface 20

18. Gaster densely clothed with short erect hairs which form a thick investiture ..... *mucescens* Wheeler
Erect hairs on gaster widely spaced, not forming a thick investiture 19

19. Dorsum of thorax without erect hairs, or with no more than six erect hairs ..... *rufa haemorrhoidalis* Emery

Dorsum of thorax with at least a dozen erect hairs, usually many more present; (clypeus and genae strongly shining) ..... *rufa laeviceps* Creighton

20. All sizes of workers extensively and deeply infuscated with piceous black; as a rule only heads of major workers are clear red and these may be tinged with black ..... *rufa melanotica* Emery
Extensive infuscation, if present, confined to smallest workers, and color brownish rather than blackish; larger workers with head and thorax clear or at most bearing blotches of brownish shading 21

21. Gaster densely pubescent, only posterior edges of segments shining, the rest opaque 22
Gaster with dilute pubescence, entire surface of each segment only a little less shining than its posterior edge ..... *rufa clivia* Creighton

22. Erect hairs on thorax long and rather unequal in length, cephalic hairs only a little less abundant and not much longer than those of thorax.. *rufa obscuripes* Forel
Erect hairs on thorax short and of about equal length, cephalic hairs longer and notably sparser ..... *rufa coloradensis* Wheeler

23. Thorax rather short; median segments of funiculi usually less than 1½ times as long as broad; scapes stout, distinctly curved at base; petiole flattened behind 24
Thorax long; median segments of funiculi more than 1½ times as long as broad; scapes slender, scarcely curved at base; petiole convex behind; (body opaque) ..... *mokpi* Wheeler

24. Gula with erect hairs 25
Gula without erect hairs 28

25. Body shining; head of largest workers rectangular 26
Body opaque or subopaque; head of largest workers not rectangular 27

26. Thorax brownish red or dark chestnut ..... *subpolita* Mayr
Thorax yellow or yellowish brown; (head of largest workers with more nearly parallel sides) ..... *subpolita* var. *camponoticeps* Wheeler

27. Petiole broad, seen from behind cordate, notched in the middle ..... *cinerea* var. *altipetens* Wheeler
Petiolar narrower, with blunt margin, usually entire or obtusely angular in the middle; (body dark brownish, top of head and gaster blackish) ..... *cinerea* var. *neocinerea* Wheeler

28. Gaster opaque or subopaque, densely pubescent 29
Gaster more shining, very sparsely pubescent 33

29. Thorax black or very dark brown 30
Thorax largely red 32

30. Pubescence on gaster short, not silky ..... *fusca* Linné
Pubescence on gaster longer, denser and silky 31

31. Body black; pubescence not silvery ..... *fusca* var. *subsericea* Say
Body dark brown; pubescence silvery ..... *fusca* var. *argentea* Wheeler

32. Gaster reddish brown; epinotum rounded in profile ..... *fusca* var. *neoclara* Emery
Gaster black or blackish brown, somewhat bronzy; epinotum angular in profile ..... *rufibarbis* var. *gnava* Buckley

33. Thorax entirely black ..... *fusca* var. *subaenescens* Emery
Thorax more or less red 34

34. Thorax clear yellowish red throughout ..... *fusca* var. *neorufibarbis* Emery
Thorax of large workers infuscated or black anteriorly ..... *fusca* var. *gelida* Wheeler

Formica obtusopilosa Emery

The head, thorax and antennae of the worker are red, and the gaster is black. The petiole is black but often has a reddish tinge. The grayish pubes-

cence is sparse except on the gaster where it is long and dense and conceals the shining surface.

Distribution.—Thompsons, Logan, Tremonton, Fielding, Bear River City, Lehi, Uinta, Garland, Fruitland, Duchesne, Lapoint (Knowlton); Salt Lake City (Knowlton, Titus); Blue Creek, Bonita (Knowlton and F. C. Harmston); Skull Valley in Tooele Co. (Knowlton and Bischoff); Hardup (Thomas); Cache Junction (Hagan); Dry Canyon in Salt Lake Co. (Thatcher); Stansbury Island in Great Salt Lake (Titus); Green Canyon in Cache Co. (Burrill); Gold Hill (Hammond); Ferno Valley in Juab Co. (Fautin); edge of Great Salt Lake near Timpie (Cole); Thompsons (Titus?).

Nests are in the soil of grassy areas. Some colonies construct obscure craters, while others live beneath stones. Nests along Great Salt Lake were in the soil of a salt-grass area and did not possess craters or stone covers.

Formica sanguinea puberula Emery

Distribution.—Snowville (Knowlton); Stockton (Spalding); La Sal Mts. (Creighton); Wales (Rees); Tooele (Cole).

Nests are in the soil beneath stones.

Formica sanguinea subnuda Emery

The head and thorax vary from a rich red to more brownish. The gaster is black, but in some workers each segment is reddish or brownish basally.

Distribution.—Soapstone Canyon in Uinta Mts. in Summit Co., Horsecreek in Uinta Mts. (Grundmann); Henrys Fork Basin in Wayne Co., Palisade Park in Ashley Natl. Forest (Rees); Tooele, Grantsville (Cole).

Colonies were found in the soil beneath stones and logs.

Formica wheeleri Creighton

Very closely allied to *sanguinea puberula* and difficult to separate from it.

Distribution.—Warner Ranger Sta. in La Sal Mts., *type locality*, Blue Mts. (Creighton).

Nests were found beneath stones on open hillsides surrounded by extensive aspen groves.

Formica perpilosa Wheeler

The head and thorax are yellowish red, and the gaster is black.

Distribution.—Glendale, Orderville, Santa Clara (Knowlton); St. George (Knowlton and Stains); Stansbury Island in Great Salt Lake, Salt Lake City (Grundmann); Hurricane (Grundmann, Rees); Kanab (Cole).

Nests are generally in rather sandy areas. The ants usually construct obscure craters or low domes around the roots of trees and shrubs, particularly in irrigated areas and dry river beds.

Formica manni Wheeler

The head and thorax are a rich red, and the legs are a little paler and more yellowish. The tips of the funiculi, and sometimes the top of the head of the large workers, are lightly infuscated. The gaster is deep black.

Distribution.—Stansbury Island in Great Salt Lake (Knowlton); Hardup (Thomas); Willard (Knowlton and Thatcher); Lampe (Knowlton and F. C. Harmston);

Logan (Burrill); Leeds (Vasquez); Tule Springs in Millard Co. (Fautin); Jordan Narrows (Roskalley).

Colonies were found beneath stones in dry areas.

Formica comata Wheeler

The head and thorax are yellowish red, and the gaster is blackish brown except for a large reddish or yellowish spot at the base of the anal region. The pronotum and mesonotum each has a fuscous spot which is particularly evident in the smaller workers. The smaller workers have brown or black spots on the head and epinotum, and the coxae are more or less infuscated.

Distribution.—Mill Creek Canyon in Salt Lake Co. (Grundmann).

The colony cited was beneath a cluster of stones. The ants frequently nest under logs and stumps, and the nesting site is generally banked or covered with detritus.

Formica ciliata Mayr

The head, thorax and petiole of the largest workers are a rich yellowish red. The gaster is brown, but the dense pubescence gives it a gray appearance. The antennae are reddish yellow, and their tips are infuscated. The coxae, femora, and sometimes the tibiae, are dark brown. The smallest workers have the top of the head, the thoracic dorsum and the petiolar border infuscated. In some of the smallest workers the entire body, except the anterior portion of the head, is deeply infuscated.

Distribution.—between Blanding and Vedura (Woodbury).

Nests are in the soil under clusters of stones or beneath logs and stumps.

Formica criniventris Wheeler

The head and thorax are yellowish red, and the gaster is dark reddish brown, except for the yellow anal area and a yellowish spot at the base of the first segment. The tips of the funiculi and the median portions of the femora and tibiae are reddish or brownish. The smallest workers have the pronotum and mesonotum somewhat infuscated.

Distribution.—Boulton (Knowlton).

Colonies nest in the soil beneath clusters of stones which they bank with detritus.

Formica oreas Wheeler

The head and thorax are bright yellowish red, and the mandibles and antennal scapes are darker. The funiculi and legs are reddish brown. The gaster is black, with its anal segment, a large spot at the base of the first segment and often a spot on each of the sternites, yellow or red. Some of the smallest workers have the vertex, pronotum and mesonotum infuscated.

Distribution.—Logan (Knowlton, Titus); Blacksmith Fork in Cache Co. (Smith and Rowe); Box Ellder Co. (Rees); Duck Creek in Cedar Mts. (Woodbury).

Colonies are founded in open sunny areas and beneath stones which the workers bank with detritus.

Formica oreas var. *comptula* Wheeler

The head and thorax are much darker than in the typical species, being reddish brown. The legs are dark brown or nearly black.

Distribution.—St. George (Knowlton); Cove (Knowlton and Stains); Cornish (Knowlton and Rowe, Smith); Wolf Creek in Summit Co. (Rees).

The habitat and nests are like those of the typical species.

Formica foreliana Wheeler

The head and thorax are brownish red; the frons, dorsal surface of the thorax, the petiole and the femora are infuscated; the gaster is black. The entire body is opaque.

Distribution.—Uinta Mts. in Summit Co. (Grundmann).

Colonies apparently nest beneath stones.

Formica rufa clivia Creighton

Distribution.—Logan (Thatcher).

Nests are begun under logs or stones in areas of sparse to moderate cover.

Formica rufa laeviceps Creighton

Distribution.—Warner Ranger Sta. in La Sal Mts., *type locality* (Creighton).

Nests are in the soil beneath stones and logs; a little detritus is often scattered about the covering object. Colonies are in areas of moderate to sparse cover.

Formica rufa muscescens Wheeler

Distribution.—Bryce Canyon (Creighton).

Habitat and nest are like those of the preceding subspecies.

Formica rufa obscuripes Forel

Distribution.—Holliday, Farmington, Fountain Green, Harrisville, Providence, Morgan, Ogden, Hooper, Midvale, Promontory, Bear River City, Amalga (Knowlton); Honeyville (Knowlton, Titus); Brigham, Harrisburg, Layton (Knowlton and Smith); Slaterville (Knowlton and Thatcher); foot of Mt. Logan near Logan (Knowlton and R. E. Nye); Logan (Knowlton, Anthon, Cole); Trout Creek in Juab Co., Logan Canyon in Cache Co. (Thatcher); Huntsville (Knowlton and Hardy); Smithfield, Stansbury Island in Great Salt Lake (Titus); Lehi (Knowlton, Hooker); Salt Lake Valley near Murray, Parleys Canyon in Salt Lake Co. (Grundmann); Garland (Knowlton and Stains); Swasey Springs in Millard Co., Green Canyon in Daggett Co., Wales (Rees); Provo (Cole); Collinston, Bear River Canyon in Box Elder Co., Providence (collectors unknown).

The ants construct domed mounds of detritus in open areas. These thatched mounds are generally started around the base of some shrub, frequently sagebrush. Colonies are usually very populous, and the workers actively repel animals disturbing the nests. This is one of the most common ants in the State, and its colonies abound at the lower elevations.

Formica rufa melanotica Emery

Distribution.—mountains of Utah (Creighton).

Nests are reported in aspen groves. The ants build mounds of detritus in areas of moderate to dense cover. Colonies are generally populous.

Formica rufa coloradensis Wheeler

Distribution.—Hooper, Daniels Canyon in Wasatch Co. (Knowlton); Slaterville (Knowlton and Thatcher); Providence Lake in Ogden Canyon (R. E. Nye); Swasey Springs in Millard Co. (Rees); Duck Creek Ranger Sta. in Kane Co. (Creighton).

Nests are in the soil beneath logs and stumps in areas of moderate to heavy cover. There is a thatching of detritus constructed over the object covering the nest, and the mounds are frequently dome-shaped.

Formica rufa haemorrhoidalis Emery

Distribution.—Juab Co., Hyde Park (Knowlton); Kaysville (Knowlton and Smith); Bryce Canyon (Rowe).

Colonies are in the soil under logs and stones in areas of moderate to sparse cover. There is often a scattering of detritus over the nest periphery.

Formica microgyna var. *rasilis* Wheeler

The head, thorax and petiole are deep yellowish red, the mandibles and clypeus are somewhat darker and the ocellar region is often fuscous. In small workers the frons, vertex, thoracic dorsum and petiole are infuscated. The antennae are red, and the funiculi are more or less infuscated at their tips; the gaster is black. The entire body is opaque.

Distribution.—Salt Lake Co. (Chamebrlin); La Sal Mts. (Creighton).

Nests are under stones which are frequently banked with detritus.

Formica fusca Linné

Distribution.—Uinta Mts. in Summit Co. (Grundmann); Kanab Canyon, La Sal Creek in La Sal Mts. (Rees); Ferron (Rowe).

The ants nest beneath stones or logs, or they construct crude craters or small earthen mounds. Colonies are in the mountains at rather high elevations.

Fig. 4. Mound of the thatching ant (*Formica rufa obscuripes* Forel) in a sagebrush area.

Formica fusca var. *subsericea* Say

Distribution.—Clover, Current Creek, Fishers Pass, Snowville, Right Fork of Logan Canyon in Cache Co. (Knowlton); Logan Canyon (Thatcher); Salt Lake City, Ogden, Brigham, Grantsville, Tooele (Cole).

The ants nest under stones, or they may construct low flat "earthen beds" or mounds.

Formica fusca var. *subaenescens* Emery

Distribution.—Big Cottonwood Canyon in Salt Lake Co., Oak Creek in Millard Co., Clover, Richfield, Snowville (Knowlton); Green Canyon in Cache Co. (Knowlton and R. E. Nye, Thatcher); Logan (Knowlton, Thatcher, Anthon, Burrill); Diamond Canyon in Juab Co. (Knowlton and Thornley); Woodruff Park in Rich Co. (Knowlton and Smith); Mill Creek Canyon, Little Willow Canyon, S. Fork of Big Cottonwood Canyon, Parleys Canyon—all in Salt Lake Co. (Grundmann); Salt Lake Co. (Chamberlin, Rowe, Rees, Grundmann; Henry Fork Basin in Summit Co., Green Lake in Daggett Co. (Rees); 30 Mi. N. of Kanab (Cole); Providence (Hammond).

Nests are under stones in cold shady woods and forests, and they are generally found only at the higher elevations.

Formica fusca var. *gelida* Wheeler

The head and thorax are reddish brown, the upper half of the head is black and the thoracic dorsum is infuscated. The gaster is dark reddish brown or black.

Distribution.—Thatcher, Ouray, Iosepa, Orr's Ranch in Tooele Co., Riverdale, Orem, Brigham, Salina Co. Snowville, Hardup, Kaysville, Tremonton, Fishers Pass, Grantsville, Garland, Riverside, Willard, Wanship, Corinne, Lewiston, Amalga, St. Johns Sta., Gusher, Curlew, Park Valley and Promontory Ridge—both in Box Elder Co., Salina (Knowlton); Logan (Thatcher and Armstrong); Mill Creek Canyon, Little Cottonwood Canyon, Butterfield Canyon—all in Salt Lake Co. (Grundmann); Salt Lake City (Knowlton, Whitelock); Murray (Hawley).

The ants nest beneath stones or in rotting logs in woods and shady canyons.

Formica fusca var. *neorufibarbis* Emery

The head is black; the thorax, petiole, scapes and base of the funiculi are yellowish red, and the legs are a little paler; the gaster is dark reddish brown or black. There is a slight infuscation of the thoracic dorsum only in the smallest workers.

Distribution.—Roy, Sharon, Orem, Parowan, Cedar City, Holden, Summit, Leamington, Snowville, Richmond, Petersboro, Lehi, Brigham, Fielding, Collinston, Tremonton, Bear River City, Murray, Smithfield, Paradise, Hunter, Ogden, Trenton, Sardine Canyon in Cache Co., Laketown Canyon in Rich Co. (Knowlton); Amalga (Knowlton and Stains); Bear River City, Hooper (Knowlton and Smith); Newton (Knowlton and Rowe); Hobble Creek (Knowlton and Sorenson); Salt Lake City (Knowlton, Grundmann); Hyde Park (Smith); Logan Canyon in Cache Co. (Thatcher); Wellsville. Woods Cross, 20 Mi. E of Camas in Uinta Mts., 3 Mi. above Suicide Rock in Parleys Canyon in Salt Lake Co., Soapstone Canyon in Uinta Mts. (Grundmann); Salt Lake Co. (Rees, Grundmann); Logan (Burrill, Meacham, Titus); Provo, Snowville (Cole); Ephram, Parleys Canyon in Salt Lake Co. (Rees).

This common variety nests in the soil beneath stones. Colonies occur generally at lower elevations than those of *gelida*, and the nests are usually in drier areas.

Formica fusca var. *argentea* Wheeler

The body is dark reddish brown or brownish black, and the legs and antennae are generally light red or yellow. The dense pubescence gives the entire body a silvery luster.

Distribution.—Snowville, Delle (Knowlton); East Mill Creek in Little Willow Canyon in Salt Lake Co., Monticello (Chamberlin); Logan Canyon and Blacksmith Fork Canyon—both in Cache Co. (Thatcher); Salt Lake Co. (Grundmann); Box Elder Co., American, Sheep Creek in Ashley Natl. Forest in Daggett Co. (Rees).

Nests are beneath stones and logs in cold forests at the higher elevations.

Formica fusca var. *neoclara* Emery

The body and appendages are pale red with the vertex, funiculi and dorsum of the gaster infuscated.

Distribution.—Logan, Smithfield, Lewiston, Brigham, Wellsville (Knowlton); Salt Lake City (Grundmann).

The ants build "beds" of soil, with numerous entrances in crude, flat, confluent craters.

Formica rufibarbis var. *gnava* Buckley

The head, thorax, petiole and legs vary from light to dark brownish red or brown. The top of the head, and often also the pronotum and mesonotum, are infuscated; the tips of the funiculi are not infuscated. The head and thorax of the smaller workers are frequently dark brown.

Distribution.—Morgan, Ogden Canyon near Ogden (Knowlton); Lehi (Hooker).

These ants, which inhabit shady canyons, either nest in the soil beneath stones or they construct nests without craters in unprotected ground.

Formica cinerea var. *neocinerea* Wheeler

The body is dark brown, and the top of the head, the gaster and sometimes even the thoracic dorsum, are darker and more blackish.

Distribution.—17 Mi. S.W. of Jensen, Snowville (Knowlton); Wasatch (Knowlton and F. C. Harmston); Wellsville (Grundmann); Kanab (Cole).

The ants nest in rather open areas where they construct flat earthen mounds or nest beneath stones. Colonies are generally rather populous.

Formica cinerea var. *altipetens* Wheeler

The workers are blackish brown. The genae, anterior border of the clypeus, antennae (except the tips of the funiculi), petiole and legs are dark red or brownish red.

Distribution.—Warner Ranger Station in La Sal Mts. (Creighton); Henrys Fork Basin in Summit Co. (Rees).

The habits are the same as those of the preceding variety.

Formica subpolita Mayr

The body varies from brownish red to dark chestnut brown; the legs are paler, and the gaster and top of the head are black. The tips of the antennal

funiculi are infuscated, and sometimes the pronotum and mesonotum are also infuscated.

Distribution.—Orr's Ranch and Fishers Pass—both in Tooele Co., Iosepa, Trenton, Blanding, Nephi, Showell, Locomotive Springs in Box Elder Co., Rosebud, Grantsville, Kosmo, Blue Creek, Delta, Park Valley, Penrose, Bear River City (Knowlton); Diamond Canyon in Juab Co. (Knowlton and Thornley); St. George (Knowlton and Smith); Willard (Knowlton and Thatcher); West Point (Knowlton and M. J. Janes); Hurricane, Salt Lake Co. (Grundmann); Stansbury Island in Great Salt Lake (Titus); Swasey Springs in Millard Co. (Rees); Logan (Greene); Logan Canyon in Cache Co. (Thatcher); Provo, Ogden (Cole); Delta (collector unknown).

This common species nests in the soil beneath stones in grassy places. The colonies are rather small.

Formica subpolita var. *camponoticeps* Wheeler

Distribution.—Rosette, Clover, Orr's Ranch in Tooele Co., Snowville, Hardup, Kelton, Flux (Knowlton); Stansbury Island in Great Salt Lake, Ft. Douglass Reservation in Salt Lake Co. (Grundmann); Logan (Titus); Swasey Springs in Millard Co. (Rees); Moab (Chamberlin); Provo, Snowville (Cole).

The habits are like those of the typical species.

Formica neogagates Emery

Distribution.—Sevier, Lake Point (Knowlton); Logan (Knowlton, Burrill); Salt Lake City, Alta (Groundmann); Logan Canyon in Cache Co. (Thatcher); S. Fork of Cottonwood Canyon in Salt Lake Co. (Grundmann and Fox); White Valley in Millard Co., Tule Springs (Fautin); Promontory Point (Wetmore); Gunnison, Greenriver (Rowe); Salt Lake City (Parks).

The small colonies nest under stones in open areas, although some construct small craters.

Formica neogagates lasioides var. *vetula* Wheeler

Distribution.—Salt Lake Co. (Grundmann); Ferron Reservoir in Emery Co. (Rees); Warner Ranger Sta. in La Sal Mts. (Creighton).

The habits are the same as those of the typical species.

Fig. 5. Portion of the sagebrush plains, the habitat of *Formica subpolita* Mayr, *F. rufa obscuripes* Forel and *Pogonomyrmex occidentalis* (Cresson).

Formica moki Wheeler

The body is a dusky reddish yellow; the gaster, top of the head, tips of the funiculi, apical border of the petiolar scale, the coxae and the femora are dark brown or fuscous; the pronotum and mesonotum are infuscated.

Distribution.—Milford (Bradley); Blanding (Woodbury); Bluff (Chamberlin); Parleys Canyon in Salt Lake Co. (Grundmann).

The ants nest in the soil under stones in dry open areas.

Genus POLYERGUS Latreille

Members of this genus are "slave-makers" and are often known as the "amazon ants." The workers pillage nests of *Formica* whose brood they seize and carry to the *Polyergus* colonies. When the raiders are attacked by the occupants of the nest they raid, they apparently pierce the heads or thoraxes of the inmates with their long, sharp, powerful mandibles.

Polyergus rufescens breviceps Emery

The body is subopaque, rather densely pubescent and entirely yellowish brown, except that the tip of the gaster is lightly infuscated. There is a very sudden and strong enlargement near the distal end of each antennal scape.

Distribution.—Green Canyon in Cache Co. (Knowlton and R. E. Nye); Salt Lake Co. (Knowlton); Logan Canyon in Cache Co. (Burrill); Logan (Burrill, Titus); Richfield (Rowe); Chester (Rees).

The ants nest beneath large stones with their slaves which are workers of *Formica fusca* var. *argentea, F. fusca* var. *subsericea, F. fusca* var. *neorufibarbis* or *F. cinerea* var. *neocinerea*. The mixed colonies are generally large.

Genus MYRMECOCYSTUS Wesmael

All members of this genus are called "honey ants." Colonies vary considerably in size, but all are occupants of arid lands.

KEY TO THE SPECIES OF MYRMECOCYSTUS IN UTAH

1. Mandibles 9-toothed; head and thorax, and usually also the gaster, yellow 2
   Mandibles 7-toothed; color always darker, head and thorax red or more or less infuscated 3
2. Large forms, averaging more than 5 mm.; erect hairs on all surfaces of antennal scapes; (head, thorax and gaster yellow).....*mexicanus* var. *horti-deorum* McCook
   Small forms, averaging less than 5 mm.; erect hairs only on anterior surfaces of antennal scapes; (head narrow).....*mexicanus navajo* Wheeler
3. Workers polymorphic; erect hairs long, especially on posterior gastric segments; pubescence on gaster long and dense, completely obscuring the shining surface and gives the gaster a silky appearance .....*melliger mendax* Wheeler
   Workers monomorphic; erect hairs short over entire body; gastric pubescence very dilute or absent, so that the gaster is distinctly shining .....*melliger semirufus* Emery

Myrmecocystus melliger mendax Wheeler

The workers average more than 4 mm. in length, and the stature is extremely variable. The body is dull yellowish red, with the thorax infuscated and the gaster blackish with a silvery gray pubescence.

Distribution.—Wellsville (Grundmann); Swasey Springs in Millard Co. (Rees).
Nests are made in the unprotected soil of dry open areas.

Myrmecocystus melliger semirufus Emery

The workers average less than 4 mm. in length, and the stature is more constant than that of the preceding subspecies. The entire body is shining. The head, thorax, legs and antennae are light yellowish red, the petiole is brownish and the gaster is black or piceous.

Distribution.—Lucin, Moab (Knowlton and M. J. Janes).

The ants construct nests with rather regular craters, about 6 inches in diameter, in sandy soil of dry open areas.

Myrmecocystus mexicanus var. *horti-deorum* McCook

Distribution.—Thompsons (Titus?); Bluff (Grundmann, Stafford, Woodbury); between Bluff and Blanding (Chamberlin); Gunnison Butte in Sanpete Co., Greenriver (Rowe).

Nests are constructed generally in the rocky soil of hills and ridges with sparse cover, and they have rather irregular craters made of large pellets of soil. The single nest entrance is spacious and irregular. Certain specialized workers, known as "repletes," occur in the nest chambers. These individuals contain "honey" which is stored in their crops. The crop becomes so greatly distended with the sweet liquid that the gaster gets very turgid and markedly larger than that of the normal worker. The honey-like material is obtained by the normal workers, during their foraging activities, from the exudations of aphids and coccids. This substances is then fed to the repletes.

There seems to be a concentration of colonies around Bluff.

Myrmecocystus mexicanus navajo Wheeler

The workers average much smaller in size than those of the preceding variety. The entire body is of a pale whitish yellow color, except the gaster which is more or less fuscous. The eyes are distinctly larger than those of *horti-deorum*.

Distribution.—White Valley in Millard Co. (Fautin).

The inconspicuous nests are constructed in warm dry soil of open country. The tiny entrance is surrounded by a scattering of small earthen pellets.

Genus CAMPONOTUS Mayr

This genus contains some of the largest known North American ants. It is well represented in Utah. The genus may be divided into those forms which nest in the soil beneath stones and logs and those which colonize chiefly dead wood or live in plant galls. The smaller species belong to the Caryae Group of which only a single member *(C. nearcticus* var. *decipiens)* is apparently known from the State.

KEY TO THE SPECIES OF CAMPONOTUS IN UTAH

1. Anterior clypeal border with a distinct but narrow notch; body 6-8 mm. in length; (head and thorax reddish brown, gaster black throughout) ..... *nearcticus* var. *decipiens* Emery
   Anterior clypeal margin entire, or at most feebly and broadly excised in the middle; body 6-13 mm. in length 2
2. Middle and hind tibiae with a row of graduated bristles on flexor surface 3
   Middle and hind tibiae without such bristles 7
3. Surface of gaster opaque 4
   Surface of gaster shining 5
4. Posterior corners of head with yellow spots, thorax yellowish red ..... *sansabeanus vicinus* var. *luteangulus* Wheeler
   Posterior corners of head without yellow spots, thorax brownish red or chestnut, gaster often red at base ..... *sansabeanus vicinus* Mayr
5. Thorax red, gaster often red at base ..... *sansabeanus vicinus* var. *nitidiventris* Emery
   Thorax brownish yellow 6
6. Apical half of gaster infuscated ..... *sansabeanus* (Buckley)
   Entire gaster yellow; (head black) ..... *sansabeanus* var. *torrefactus* Wheeler
7. Antennal scapes with short erect hairs; (body shining, black) ..... *laevigatus* (F. Smith)
   Antennal scapes without erect hairs 8
8. Gaster opaque or subopaque 9
   Gaster shining; (thorax red, head and gaster black) ..... *herculeanus ligniperda* var. *noveboracensis* (Fitch)
9. Posterior portion of thorax red ..... *herculeanus* var. *whymperi* Forel
   Entire thorax black ..... *herculeanus* var. *modoc* Wheeler

Camponotus sansabeanus (Buckley)

Distribution.—Butterfield Canyon in Salt Lake Co., Parowan (Grundmann).

Nests are beneath stones in dry woods.

Camponotus sansabeanus vicinus Mayr

Distribution.—Vernon, Chester (Knowlton); Big Cottonwood Canyon, Butterfield Canyon—both in Salt Lake Co. (Grundmann); Salt Lake City (English); White Valley in Millard Co. (Fautin); Trout Creek (Gardner); Tintic (H. R. Harmston); Cache Junction, Logan Canyon in Cache Co. (Titus); Moab (Chamberlin); American Fork (Rees and Moffett); Ferron (Rowe); Swasey Springs in Millard Co., La Sal Creek in La Sal Mts. (Rees).

The ants nest in the soil beneath large stones in rather dry open places.

Camponotus sansabeanus vicinus var. *nitidiventris* Emery

Distribution.—Willard, Granite, Gransville, Logan Canyon in Cache Co., Clover, Orr's Ranch and Willow Springs—both in Tooele Co. (Knowlton); Ogden (Knowlton, Cole); Blanding (Stafford); Trenton (Hammond); Benmore (Bischoff); Dolphin Island in Great Salt Lake (Marshall); Salt Lake City (Titus); Logan (Knowlton, Anthon, Davidson, Meacham); Roosevelt (Knowlton, Cutler); Farmington, Springville (Anthon); Jordon Narrows (Roskally); Providence Canyon in Cache Co. (Thatcher); Diamond Canyon in Juab Co. (Knowlton and Thornley).

Colonies are in the soil beneath stones in dry sunny areas at the higher elevations.

Camponotus sansabeanus vicinus var. *luteangulus* Wheeler

Distribution.—Moab (Stafford).

The ants nest in the soil beneath stones in rather open areas.

Camponotus sansabeanus var. *torrefactus* Wheeler

Distribution.—East Mill Creek Canyon in Salt Lake Co., Oris (Chamberlin); Ft. Douglass Reservation in Salt Lake Co. (Grundmann); Big Cottonwood Canyon in Salt Lake Co. (Knowlton); Salt Lake City (Rowe).

Nests are under stones in dry woods.

Camponotus laevigatus (F. Smith)

Distribution.—Beaver Canyon in Beaver Co. (Schaeffer); Aspen Grove (Stafford); Logan (Knowlton, Meacham); Logan Canyon in Cache Co. (Thatcher).

The colonies are very populous and nest in dry decayed logs and stumps chiefly in open woods.

Camponotus herculeanus var. *whymperi* Forel

Distribution.—Lake Blanche in Salt Lake Co., Horsecreek in Uinta Mts. (Grundmann); Henrys Fork in Summit Co. (Rees).

The ants nest in partially decayed logs and stumps, especially those of conifers. They are found at high elevations, those at Lake Blanche being at 10,000 ft.

Camponotus herculeanus var. *modoc* Wheeler

Distribution.—Little Willow Canyon in Salt Lake Co. (Chamberlin); S. Fork of Big Cottonwood Canyon in Salt Lake Co. (Grundmann and Fox); Logan (Greene); Logan Canyon in Cache Co. (R. E. Nye, Thatcher); Woodburn, Taylorsville (Knowlton); Strawberry Valley in Wasatch Co. (Anthon); Ferron Reservoir in Emery Co., Palisade Forest in Daggett Co. (Rees).

The nesting sites are like those of *whymperi*.

Camponotus herculeanus ligniperdus var. *noveboracensis* (Fitch)

Distribution.—Salt Lake Co. (Grundmann); Muellers Park in Davis Co. (Duncan); Roosevelt (Cutler).

Nests are in the soil beneath stones and logs in rather moist cool areas. Colonies are generally large.

Camponotus nearcticus var. *decipiens* Emery

Distribution.—East Mill Creek Canyon in Salt Lake Co. (Chamberlin).

The ants nest in dry dead wood, such as that of standing trees.