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*Three New Genera of Inquiline Ants
from Utah and Colorado.*

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Article I. — THREE NEW GENERA OF INQUILINE
ANTS FROM UTAH AND COLORADO.

By WILLIAM MORTON WHEELER.

PLATES I AND II.

The three genera of ants described in this paper are, for the following reasons, of more than usual interest to the myrmecologist: First, because they live with other ants; second, because in one of the genera, *Symmyrmica*, the males are of the ergatoid type, *i. e.*, wingless and like the worker in the structure of the thorax; while in the two other genera, *Sympheidole* and *Epipheidole*, the worker caste has disappeared, so that these species are no longer trimorphic. Hitherto only a single American ant (*Ponera ergatandria*)¹ has been found to have worker-like males, though these are known to occur in four European species: *Formicoxenus nitidulus*, *Anergates atratulus* (both inquilines), *Ponera punctatissima*, and *Cardiocondyla stambuloffii*. And only two genera, *Anergates* of Europe and *Epæcus* of the United States, have been described as lacking the worker caste. Third, the three new genera present some interesting taxonomic difficulties. *Symmyrmica* is obviously allied to the European *Formicoxenus*, but differs in the character of its males, which are not nearly so ergatoid,

¹ This species, originally described by Forel from the island of St. Vincent, W. I., occurs also in the Southern States. I have taken it at the sources of the Comal River, near New Braunfels, Texas. In the very same locality occur two other tropical ants, not hitherto included in the North American fauna, namely, *Cyphomyrmex rimosus* and *Strumigenys margaritæ*. The latter was also originally described from St. Vincent by Forel.

but seem to have been arrested in a less degenerâte condition. In other words, the antennæ, head, and thorax of the male *Symmyrmica* are much more like those of the typical winged Myrmicine male and less like those of the worker than are these structures in the ergatoid male of *Formicoxenus*. Moreover, in all three phases, the sculpture and pilosity of the head, thorax, and pedicel, and the absence of a spine on the ventral surface of the postpetiole, give the American form a distinctive habitus.¹ The determination of the systematic position of *Epipheidole* and *Sympheidole* is even more difficult, owing to the absence of the workers, on which generic and specific distinctions among ants are chiefly based. Although these ants are certainly very closely related to *Pheidole*, at least so far as the males are concerned, they cannot properly be assigned to this huge genus, if, as I believe, the worker caste is really absent. Nor can we properly place in a single genus two such different ants as the females of *Sympheidole* and *Epipheidole*. Fourth, the occurrence of a genus like *Symmyrmica* in North America is interesting from the standpoint of geographical distribution, since this genus is related both in its structure and instincts to the European *Formicoxenus*. This relationship still further emphasizes the homogeneous character of the circumpolar ant-fauna. Fifth, it is interesting to note that dealated females of *Epipheidole* and *Sympheidole* have been known for some time, but have been regarded as peculiar dwarf females (microgynes) of the species of *Pheidole* with which they live. Referring to some specimens of *Pheidole pilifera* from Nebraska, Emery² says (p. 290): "Mit diesen Soldaten und einigen Arbeitern sandte mir Herr Pergande ein flügelloses, aber geflügelt gewesenes Zwergweibchen von kaum 3½ mm., mit wenig entwickeltem Thorax und dicken, stumpfen, beulenartigen Metanotumdornen." There can be little doubt that this insect was a female of the *Epiphei-*

¹ Although three European species of *Formicoxenus* have been described (*F. nitidulus* Nyl., *corsicus* Emery and *ravouxi* André) the two latter are known only from single female specimens. And it is not even certain that these should be placed in the genus *Formicoxenus*, since they have no prominent spine on the ventral surface of the postpetiole. When their workers are discovered it may, perhaps, be necessary to redefine the genus and to reduce *Symmyrmica* to the rank of a subgenus.

² Beiträge zur Kenntnis der nordamerikanischen Ameisenfauna. Zool. Jahrb., Abth. f. Syst., Bd. VIII, 1894, pp. 257-360, Taf. VIII.

dole inquilina described below as occurring with *Pheidole pilifera* var. *coloradensis*. Among a number of carded soldiers and workers of *Pheidole ceres* sp. nov. sent me from Boulder, Colo., by Father J. Schmitt, O.S.B., a few years ago, there is a single small dealated female which agrees perfectly with one I took with a number of small males in a nest of the same species of *Pheidole* in the Ute Pass during the past summer. Before I had found this colony and while I still believed Emery's interpretation to be correct, I requested a former pupil, Miss Margaret Holliday, to describe and figure the small female received from Father Schmitt and described below under the name *Sympheidole elecebra*, as a peculiar microgyne of *Pheidole ceres*. It is certainly true that in many respects the female *Sympheidole* closely resembles the female of *Ph. ceres*, just as the female of *Epipheidole* resembles the same sex of *Ph. pilifera*, but I believe, nevertheless, that we are compelled to regard the two small females as belonging to distinct species and even genera, since the corresponding diminutive males have been discovered. We need not be disconcerted by the resemblances in form and sculpture between the inquiline ants and their hosts. Such resemblances are well known in other cases,¹ and are probably due to mimicry; *i. e.*, they serve to facilitate symbiosis by deceiving the tactile sense of the host ant. This kind of mimicry reaches its most remarkable development in certain myrmecophilous beetles that live with ants of the genera *Dorylus* and *Eciton*.²

Symmyrmica gen. nov.

Allied to *Formicoxenus*. Male, female, and worker all of about the same size. Body long and slender, opaque, with the exception of the gaster and legs, and abundantly pilose. Hairs robust, frayed at their ends into several acute microscopic processes. There is no spine on the ventral surface of the postpetiole.

Worker. — Head longer than broad, subopaque, slightly wider in front than behind, anterior and posterior corners rounded, occipital

¹ Confer *e. g.* the resemblances between the following inquiline ants and their hosts: *Tomognathus* and *Leptothorax*; *Leptothorax emersoni* and *Myrmica brevimodis*; *Strongylognathus* and *Tetramorium*; *Symmyrmica* and *Myrmica mutica*; *Polyergus* and *Formica*, etc.

² See *e. g.* E. Wasmann: *Neue Dorylinengäste aus dem neotropischen und dem äthiopischen Faunengebiet*. Zool. Jahrb., Abth. f. Syst., Bd. 14, Heft 3, 1900, pp. 1-75, Taf. I, II.

border straight, sides subparallel. Eyes moderate, flattened, in the middle of the lateral surface. Small ocelli often present. Mandibles 6-toothed, two apical teeth longest, four basal teeth conical, distinct. Clypeus large, convex, but longitudinally impressed in the middle, anterior border broadly rounded, entire; posterior portion somewhat retuse, extending back between the antennal insertions as far as their posterior edges. Frontal area indistinct, impressed. Antennal foveæ large. Frontal carinæ prominent, decidedly longer than in *Formicoxenus*, subparallel, separated by somewhat over a third the breadth of the head. Maxillary palpi 5-jointed (instead of 4-jointed as in *Formicoxenus*); labial palpi 3-jointed. Antennæ like those of *Formicoxenus*, 11-jointed; scape, rather short, nearly as long as the first nine joints of the funiculus; first funicular joint as long as joints 2-4 together; joints 2-6 distinctly broader than long; three terminal joints robust, forming a distinct club; last joint as long as the two preceding together. Thorax long and slender, narrower than the head, broadest through the pronotal region, humeri rounded; in profile the dorsoventral diameter is nearly the same through the pro- and epinotal regions. Promesonotal surface broadly convex, promesonotal suture faint; mesoëpinotal constriction broad and pronounced. Epinotum armed with short spines, its basal surface convex, its declivity shorter, concave. Petiole and postpetiole as in some species of *Leptoithorax*, the former not pedunculate, produced ventrally into a blunt, flattened tooth, the latter quite unarmed below. Gaster large, about twice as broad as the thorax, elongate elliptical, compressed dorso-ventrally, with sloping anterior angles. Sting slender but well developed. Legs robust, femora fusiform, middle and hind tibiæ spurless.

Female. — Resembling the worker except for the usual female Myrmicine characters. Eyes and ocelli but little larger than in the worker, thorax higher and somewhat broader, with the various sclerites distinctly marked. The type is dealated so that the nature of the wing venation cannot be ascertained.

Male. — Ergatoid, wingless. Head, excluding the eyes, but little longer than broad, rounded in front and behind, cheeks very short. Eyes and ocelli very large and prominent. Mandibles small, far from meeting each other, their blades with a single median, acute tooth. Clypeus short and very convex, anterior border nearly straight, somewhat retuse, posterior border ending in front of the antennal insertions. Frontal area large, triangular, impressed. Frontal carinæ very short. Maxillary palpi 5-, labial palpi 3-jointed. Antennæ long and slender, 12-jointed, all the joints much longer than broad; scape shorter than in the worker, about as long as joints 1-4 of the funiculus; joints 1-7 of the latter subequal, four terminal joints longer, not forming a club as in *Formicoxenus*; last joint somewhat shorter than the two preceding taken together. Thorax resembling that of the worker but

broader, higher and less constricted in the mesoepinotal region. Mesonotum, paraptera, scutellum, and metanotum all distinct, but small. There are even traces of the Mayrian furrows on the mesonotum. Epinotal spines of worker replaced by rather obtuse swellings. Petiole, postpetiole and gaster like the corresponding parts of the worker, except that the petiolar node is lower and rounder and the gaster has five instead of four visible segments. External genital valves exerted, rounded at their tips, concealing the well-developed median and internal appendages and penis; cerci small and slender. Legs longer and more slender, femora less swollen in the middle than in the worker.

Symmyrmica chamberlini sp. nov.

Worker (Figs. 3, 4, 5, and 7). — Length 3–3.25 mm.

Antennal scape reaching to half-way between the eye and the posterior corner of the head. Epinotal spines short and acute, hardly longer than broad at their bases, shorter than the distance which separates them, directed upward and backward. Petiole from above oblong, with subparallel sides, about $1\frac{1}{2}$ times as long as broad; node in profile rather conical, transverse, but not very high, both its anterior and posterior slopes concave, the former somewhat longer than the latter; lower surface with a median keel ending anteriorly in a blunt tooth. Postpetiole half as broad again as the petiole, distinctly broader than long, with rounded anterior angles, constricted behind at its juncture with the gaster; in profile evenly convex on the dorsal, somewhat flattened on the ventral surface.

Mandibles, head, thorax, petiole, and postpetiole opaque. Clypeus, frontal area, gaster, and legs shining. Mandibles coarsely punctate. Clypeus longitudinally rugose except in the middle; this and the interrugal spaces with shallow punctures. Head rather coarsely and densely, longitudinally reticulate-rugose, with punctate-rugose interrugal spaces. Thorax reticulate-rugose, very finely and irregularly on the pro- and mesonotum, much more coarsely on the pleurae and epinotum. As in the head, the coarser rugae enclose minor reticulations. Petiole and postpetiole uniformly rugose-punctate. Antennae and legs covered with coarse, piligerous punctures.

Excepting the lower surfaces of the thorax and pedicel, the body as well as the legs and antennae are covered with abundant, coarse, suberect, yellow hairs, which are longest on the body, especially on the pedicel and gaster, and shorter and somewhat more reclinate on the appendages. There is no pubescence.

Rich ferruginous red throughout, gaster and legs somewhat paler than the head, thorax, and pedicel.

Female (dealtated). — Length 3.25 mm.

Differing from the worker in the sculpture of the thorax: the meso-

notum, paraptera, and scutellum being subopaque and rather finely, longitudinally rugose, the mesonotum smooth in the parapsidal and midanterior regions, which are also of a paler color than the remainder of the thorax. Prothorax, pleuræ, and epinotum very coarsely reticulate-rugose. Epinotal spines of about the same size and shape as in the worker.

Male. (Figs. 1, 2, and 6.)—Length 3–3.25 mm.

Epinotal spines reduced to two obtuse swellings. Petiole nearly twice as long as broad, the anterior portion, seen from above, somewhat more slender than in the worker, without a ventral tooth, and with the node rounder and lower.

Sculpture, pilosity, and color like those of the worker, with the following exceptions: Scutellum and parapsidal regions of mesonotum smooth and shining; bottom of mesoepinotal constriction with several prominent longitudinal rugæ; upper surface of postpetiole smoother, and upper surface of epinotum finely reticulate-rugose like the pedicel. Legs with somewhat sparser hairs. Head darker than the remainder of the body; ocellar region black. The cephalic rugæ are denser and sharper around the ocelli, from which they tend to radiate.

Described from twenty-one workers, five males, and a single female taken Aug. 20, 1902, near Salt Lake City, Utah, in a flourishing colony of *Myrmica mutica* Emery by Mr. C. V. Chamberlin. In thirteen of the workers minute ocelli are present, although sometimes only the anterior median ocellus is represented. As there were many fine males and virgin females of the *Myrmica* in the nest, it is probable that the habits of *Symmyrmica chamberlini* are similar to those of the European *Formicoxenus nitidulus* and the American *Leptothorax emersoni*. The *Symmyrmica* probably have their own independent nest in the midst of the *Myrmica* formicary, but consort freely with the host ants. Confirmation of this view is contained in the following notes kindly sent me by Mr. Chamberlin: "Nests of *Myrmica mutica* are common in some localities near Salt Lake City over the flood-plains of the Jordan River. The soil where they occur oftenest is pre-vaillingly argillaceous and sometimes contains much 'alkali.' I have not found them in stony or gravelly ground. All the nests observed opened free from any cover, and not a few were seen in the middle of foot-paths, although they prefer loose soil. In several parts of a ten-acre field where the soil is of

the usual character I found nests of this *Myrmica* containing the symbiotic species. Three of these compound colonies were preserved, two now being in a collection stored at my home in Utah, the other being the one you have examined. I never succeeded in finding one of the compound nests elsewhere than in this particular field. My attention was drawn to the first compound nest by seeing two individuals of *Symmyrmica* disappear into a burrow immediately following a *Myrmica* worker. Upon excavating I found others of the symbiotic form, mostly collected in a chamber about eight inches below the surface of the ground. The nest seemed to be above the average in size."

About Colorado Springs, Colo., the nests of *Myrmica mutica* are of common, though sporadic occurrence. I have found them only in the loose silt and fine gravel of creek bottoms, especially along Monument Creek, Cheyenne Creek, and the tributaries of the Fontaine qui Bouille. Though I dug up many of the nests I was not fortunate enough to find the *Symmyrmica* in any of these localities.

Sympheidole gen. nov.

Small species allied to *Pheidole*. Workers apparently nonexistent; male and female about the same size, both winged.

Female. — Head, excluding mandibles, as broad as long, as broad in front as behind; anterior and posterior angles rounded, posterior border straight, sides rather convex. Eyes rather large, protruding, distinctly in front of the middle of the head, cheeks short. Ocelli of moderate size, rather far apart. Mandibles convex, with two strong apical teeth, of which the terminal is the longer; remainder of blade sharp, toothless. Clypeus moderate, convex behind, extending back between the antennal insertions; anterior border retuse, distinctly impressed in the middle. Frontal area distinct, subelliptical, concave. Antennæ 12-jointed; scape rather long, funiculus with long and robust first joint; three terminal joints forming a distinct club. Frontal carinæ short, rather far apart, diverging behind. Thorax of the typical Myrmicine type, but rather small, resembling that of *Pheidole*; mesonotum convex in front, flattened behind, not as broad as the head through the eyes. Epinotum armed with short spines. Petiole with a short peduncle and shaped like that of *Pheidole*, but with a much lower and rounder node, without a tooth on the anterior ventral surface. Postpetiole very broad and short, with prominent posterior

angles; nearly as broad as the first gastric segment, which has a very straight anterior border and rather prominent anterior angles. This first segment forms nearly $\frac{3}{4}$ of the gaster, which is elliptical and dorsoventrally flattened, but not more convex on the ventral than on the dorsal side. Legs rather slender, femora fusiform, somewhat incrassated in the middle, tibiae somewhat enlarged towards their distal ends. Strigil well developed, middle and hind tibiae spurless. Wings absent in the types. Body, legs and antennae covered with coarse hairs, which are microscopically frayed at their ends.

Male. — Very similar to the male of *Pheidole*. Head, excluding the eyes, as broad as long, cheeks extremely short, postocular borders long, converging behind, occipital border straight. Eyes and ocelli very large, protruding. Mandibles slender, with very acute tips and rounded edentulous borders. Maxillary palpi 3-, labial palpi 2-jointed. Clypeus convex, broadly rounded in front, anterior margin entire. Antennae long and filiform, 13-jointed; scape short, first funicular joint large and globose, remaining joints long and cylindrical. Thorax robust, broad through the alar insertions; mesonotum without Mayrian furrows; epinotum rounded, unarmed. Petiole like that of the female; postpetiole broad, with a prominent spine-like process on either side. Gaster as in *Pheidole*; genitalia prominent, tips of outer valvules broadly rounded, mesial surfaces concave; median and inner valvules robust, unciform, the latter with more acute, the former with more broadly rounded tips. Legs very long and slender, femora and tibiae not incrassated; last tarsal joint of all the legs somewhat dilated. Wings like those of *Pheidole*, with complete discal and two cubital cells. The second cubital cell is small and triangular. In some specimens the recurrent vein is obsolescent, so that the discal cell may be open. Apterostigma large. Hairs on the body and legs tapering, not microscopically frayed at their ends.

Symphheidole elecebra sp. nov.

Female (deälated).—(Fig. 8.) Length 2.75–3 mm.

Antennal scape reaching to the posterior corner of the head; first funicular joint nearly as long as the four succeeding joints taken together; joints 2–6 subequal, the second joint as long as broad; joints 3–6 broader than long; seventh joint nearly twice as long as wide, broader than the preceding joints; terminal joint of club tapering, as long as the two preceding, subequal joints together. Epinotal spines small and acute, as long as broad at their bases, directed backward and outward and somewhat upward, farther apart than broad at their bases. Petiole from above $1\frac{1}{2}$ times as long as broad, decidedly broader behind than in front, node transverse, rounded, rather low, in profile, with long, rather straight anterior, and abrupt, rounded posterior slope. Postpetiole three times as broad as the petiole,

about $\frac{1}{4}$ as long as broad, its anterior border straight in the middle with convex sides, its posterior border with concave sides, so that the segment presents two pointed, somewhat backwardly directed, posterior angles.

Smooth and shining. Mandibles subopaque, coarsely and sparsely punctate towards their tips, striated at their bases. Head with scattered piligerous punctures and a few longitudinal rugæ on the cheeks and between the frontal carinæ on either side of the frontal area. Pro- and mesonotum and scutellum with scattered piligerous punctures; epinotum subopaque, finely punctate-rugose. Petiole and postpetiole punctate and subopaque on the sides and below, smooth and shining above. Gaster with scattered piligerous punctures.

Whole insect, including mandibles, antennæ, and legs, covered with abundant and rather long, reclinate, yellowish hairs, which under a low magnification appear obtuse, but are microscopically frayed at their ends into several short, acute processes.

Rich reddish brown, the head darker, in one of the specimens black; the paraptera, legs, and funiculi more yellowish.

Male. (Figs. 9, 10, and 11.)—Length 2.5–2.75 mm.

Antennal scape as long as the first and second joints of the funiculus taken together; first funicular joint hardly longer than broad; joints 2–11 subequal, slightly increasing in length to the terminal joint, which is twice as long as the one preceding. Petiole about twice as long as broad, narrower than in the female and less widened behind, with a lower, more rounded node. Postpetiole three times as broad as long, shaped somewhat like the postpetiole of the female, except that the acute lateral angles are at, instead of behind, its median transverse diameter.

Head opaque, somewhat more shining behind, its surface uneven, densely punctate. Thorax, pedicel, and gaster shining, indistinctly and sparsely punctate.

Covered with rather long, sparse, and reclinate, yellowish hairs, which taper at their ends.

Head black; thorax, pedicel, and gaster piceous brown, darker on the dorsal surface. Mouth parts, antennæ, venter, genitalia, and legs, sordid yellow, coxæ, femora, and tibiæ infuscated except at the articulations, which are paler. Wings grayish hyaline with sordid yellow veins and distinct brown apterostigma.

Described from two females and eighteen males. Father J. Schmitt, O.S.B., sent me one of the former together with numerous soldiers and workers of *Pheidole ceres* sp. nov., collected near Boulder, Colo. The other female and the males were taken in the Ute Pass, near Manitou, Colo., by myself,

Aug. 17, 1903, also in a *Pheidole ceres* nest. This nest was completely excavated and carefully examined, but was found to contain only soldiers and workers of the *Pheidole* and, besides the adult forms, several pupæ of *Sympheidole* males. No workers belonging to the latter species could be detected, though from what we know of other ants, they should certainly have been present, if they exist at all, in the nest at the time of maturity of the males. When the nest, which was under a large stone, was disturbed, the *Pheidole* workers hurriedly seized the inquilines and their pupæ and carried them into the galleries. There could be no doubt concerning the fact that the two species formed a mixed colony and were living on perfectly amicable terms with each other. The absence of any *Pheidole ceres* queens, of which there are normally from one to five in a colony, would seem to indicate that, like the European *Anergates*, the American *Sympheidole* does not permit the sexual forms of its host to mature.

As the host ant of this interesting inquiline is still unknown to science, I here insert a description of all four of its phases:

***Pheidole ceres* sp. nov.**

Soldier. — Length 3–3.25 mm.

Head large, excluding the mandibles but little longer than broad, sides subparallel, posterior corners prominent, rounded, occipital border rather deeply excised and with a pronounced median, vertical groove growing much shallower in front of the crown, which is convex. The head is thickest dorsoventrally through its anterior portion. Eyes distinctly in front of the middle of the sides, of moderate size, flattened. Mandibles convex, toothless, with rounded tips and somewhat sinuous inner borders. Clypeus small and short, somewhat impressed, its anterior border faintly notched in the middle. Frontal area triangular, concave, about as long as wide, its sides rounded, traversed its entire length by a prominent median carinula. Frontal carinæ rather short, diverging posteriorly. Antennal scape short, somewhat enlarged towards the tip, which does not reach to half the distance between the eye and the posterior corner of the head. All the joints of the funiculus distinctly longer than broad, first joint as long as the three succeeding together, club about as long as the remainder of the funiculus, its two basal joints subequal, together as long as the terminal joint. Humeri rounded, pronotum convex, mesonotum angular above

and behind, basal surface of epinotum flattened, forming an obtuse angle with the sloping declivity. Epinotal spines prominent, longer than broad at their bases, blunt at their tips, directed upward, and parallel with each other; somewhat further apart at their bases than long. Each spine is continued forward as a ridge to the anterior border of the epinotum. Region between the spines concave. Petiole laterally compressed, nearly twice as long as broad; node transverse, its summit concave in the middle when seen from behind; in profile both its anterior and posterior slope concave, the former much longer than the latter. Postpetiole broader than long and broader in front than behind, trapezoidal, its anterior angles small but distinct; in profile its dorsal surface is rounded. Gaster of the usual shape, smaller than the head. Legs moderate.

Mandibles smooth and shining, coarsely and sparsely punctate, striate at their bases. Clypeus and frontal area shining, the former longitudinally rugose except in the middle, which is smooth. Anterior two thirds of head opaque, coarsely longitudinally rugose, posterior third shining and sparsely foveolate. Bottom of occipital furrow transversely ridged. Pronotum smooth and shining, remainder of thorax opaque, reticulate, and punctate-rugose, irregularly on the mesonotum and mesopleuræ, more regularly and densely on the neck and epinotum, where even the spines are rugose. Petiole and postpetiole finely reticulate-rugose, the summits of the nodes smoother and more shining. Gaster and legs glabrous.

Hairs yellowish gray, rather long and suberect on the trunk, short and more appressed on the legs and antennæ, upper surfaces of the femora almost nude.

Black; disks of mandibles, clypeus, anterior fourth of head, except the anterior border, inferior occipital region, mesoëpinotal constriction, peduncle of petiole, and legs, with the exception of the middle portions of the femora and tibiæ, red.

Worker. — Length 1.75–2 mm.

Mandibles acute, with a sharp apical and four shorter, equidistant, basal teeth. Clypeus convex, with nearly straight anterior border. Head as broad as long, posterior margin slightly excised, posterior angles rounded. Eyes in middle of sides of head, rather prominent. Frontal area and antennæ like those of the soldier, the scape of the latter reaching beyond the posterior angle of the head only to a distance equal to the transverse diameter of the scape. Thorax, petiole and postpetiole as in the soldier, except that the mesonotum is not angular above and behind, and the postpetiole is narrower, scarcely broader, in fact, than the petiole, about as long as broad, subspherical, without prominent angles; and the node of the petiole is not impressed in the middle.

Smooth and shining. Mandibles punctate towards their tips, striate at the base. Cheeks and front of head longitudinally striated,

outer borders of antennal foveæ concentrically rugose. Mesopleuræ, epinotum, and sides, and lower surfaces of petiole and postpetiole evenly reticulate-rugose.

Hairs whitish, rather sparse; long on the trunk, shorter on the legs and antennæ. On the thorax, pedicel, and gaster the hairs are obtuse, elsewhere tapering.

Black; mandibles yellow, sides of thorax, gaster, ventral portions of pedicel and basal half of antennal funiculi, tarsi and articulations of legs, red.

Female. — Length 5–5.5 mm.

Mandibles with two acute apical and several smaller and more irregular basal teeth. Head somewhat broader than long, broadest through the posterior angles, occipital border straight, without vertical groove. Eyes just in front of the middle of the sides of the head. Antennal scapes just reaching to the posterior corners. Thorax broad, dorsally very flat; epinotal spines robust, like those of the soldier in shape. Petiole $1\frac{1}{2}$ times as long as broad, widest behind the middle and through the node, which is transverse but thick and evenly rounded when seen from behind. In profile its anterior slope is long and concave, the summit somewhat truncated and the posterior slope abrupt. Postpetiole nearly twice as broad as the petiole, and nearly twice as broad as long, widest in front of the middle, produced on either side into a prominent, rather acute tooth, which has a convex anterior and a concave posterior border. Gaster and legs of the usual shape.

Mandibles subopaque, coarsely punctate, striated towards the base. Clypeus finely and longitudinally rugose. Head opaque throughout, coarsely longitudinally rugose, the rugæ diverging on the occiput. There is a smooth, shining spot in front of the anterior ocellus and another lateral to either posterior ocellus. Thorax smooth and shining except for the following regions: Pronotum coarsely, longitudinally rugose. Outer borders of mesonotum and of scutellum coarsely punctate, the former also finely and longitudinally striated on either side of the middle. Epinotum concentrically rugose, opaque, except the region between the spines, which is shining. Petiole and postpetiole opaque, finely reticulate-punctate throughout. Gaster and legs smooth and shining, the latter as well as the antennal scapes, which are subopaque, covered with rather coarse, piligerous punctures.

Hairs pale yellow, abundant on the head, thorax, pedicel, and gaster; on the last, reclinate, covering the entire first and the posterior half of each of the remaining segments. On the legs and antennæ the hairs are shorter.

Black; mandibles red with black teeth; cheeks, frontal carinæ, funiculi and tips of scapes, tarsi, ventral half of petiole and the wing-insertions; red. Wings smoky hyaline, with sordid yellow veins and conspicuous blackish stigma.

Male. — Length 3.75–4 mm.

Mandibles small, 3-toothed, meeting with their tips. Head, excluding eyes, a little longer than broad, cheeks extremely short, postocular region long, vertex convex, eyes and ocelli large and protruding. Clypeus short, moderately convex, its anterior and posterior borders entire, broadly rounded. Antennæ long, filiform, scape not longer than two first joints of the funiculus; first funicular joint globose, remaining joints cylindrical, growing longer towards the distal end. Thorax robust, broad through the alar insertions. Epinotum with two prominent swellings instead of spines. Petiole twice as long as broad, about as broad behind as in front, node lower and more rounded than in the soldier and female. Postpetiole half again as broad as the petiole, nearly square when seen from above, its anterior angles small and acute, its sides subparallel; in profile its dorsal surface is somewhat flattened. Gaster broad, flattened dorso-ventrally. Legs long and slender.

Smooth and shining; mandibles, head, epinotum, petiole and postpetiole, except the upper surface of the last, opaque. Head reticulate and punctate-rugose, epinotum, petiole, and postpetiole densely and uniformly punctate.

Body and legs covered with delicate, more or less appressed, grayish hairs, longest on the head, thorax, and gaster.

Black; antennæ, venter, genitalia, tarsi and articulations of the legs more piceous. Wings like those of the female.

Like *Ph. pilifera*, *instabilis*, etc., *Ph. ceres* is a harvesting ant which subsists on various seeds stored up in the chambers of its nests. These nests are most commonly found under stones in sunny places, and, so far as my observations go, occur only in the mountains, most abundantly in Colorado at an altitude of from 7000–9000 feet. I have found them in many localities in the Ute Pass, and in the more open cañons of Cheyenne Mt. near Colorado Springs. Other specimens have been received from Boulder, Colo. (Father J. Schmitt, O.S.B.), and from the following localities in New Mexico: San Geronimo and Manzanares (Miss Mary Cooper); San Ignacio (T.D.A. and W. P. Cockerell); Arroyo five miles southeast of Las Vegas (T. D. A. Cockerell). In Colorado the males and females of *Ph. ceres* were found in numbers in the nests during the last week in July. Hence they mature earlier than the males and females of the *Sympheidole*.

Epipheidole gen. nov.

Small species allied to *Pheidole*. Workers apparently absent; male and female of about the same size, both winged.

Female. — Head, excluding eyes, nearly as broad as long, quadrangular, with prominent posterior and anterior angles, concave posterior border and subparallel sides. Eyes large, projecting, a little in front of the middle of the head; ocelli of moderate size, rather far apart. Mandibles large and convex, with two larger apical and two smaller basal teeth, the latter at the posterior angle of the blade, the intermediate portion of the blade with two indistinct teeth. Labial palpi 2-, maxillary palpi 3-jointed. Clypeus convex, broadly rounded and entire in front, extending back between the antennal insertions behind. Frontal area distinct, triangular, longitudinally carinulate in the middle. Frontal carinae prominent, subparallel, extending back to near the middle of the head. Antennae slender, 12-jointed; scape reaching beyond the posterior corner of the head; first funicular joint long, three last joints forming a distinct club. Thorax like that of *Pheidole*, about as broad as the head. Humeral angles prominent; mesonotum convex in front, much flattened dorsally; epinotum armed with two very large, blunt spines. Petiole and postpetiole like those of *Pheidole*, the former pedunculate, without an antero-median ventral spine, postpetiole rather narrow. Gaster large, broadly elliptical, but little flattened dorsoventrally, as convex on its dorsal as on the ventral side. Legs rather slender, the femora somewhat fusiform, the tibiae stouter towards their distal ends. Strigil well developed, middle and hind tibiae spurless. Wings with large apterostigma and two cubital cells, the second of which is small and triangular. The discal cell is usually absent or open, owing to the disappearance of the recurrent vein. Hairs on the head, thorax and pedicel stout, microscopically frayed at their tips.

Male. — Closely resembling the male of *Pheidole*. Head, excluding the eyes, as broad as long. Eyes and ocelli very large and protruding. Cheeks short, postocular region long, but passing over into the posterior corner of the head with less of an angle than in the male of *Sympheidole*. Mandibles small and slender, with two, or sometimes three, distinct teeth. Clypeus convex, broadly rounded in front. Maxillary palpi 3-, labial palpi 2-jointed. Antennae slender, filiform, 13-jointed; scape very short, first funicular joint globose, remaining joints long and cylindrical. Thorax robust, without Mayrian furrows on the mesonotum. Epinotum armed with two broad and prominent spines. Petiole, postpetiole, gaster, and genitalia as in *Pheidole*. Legs very long and slender, last tarsal joint on each leg somewhat dilated. Wings like those of the female. Hairs on the body tapering, not frayed at their tips.

Epipheidole inquilina sp. nov.

Female. (Figs. 12, 13 and 14.)—Length 3–3.3 mm.

Antennal scape projecting about a fourth its length beyond the posterior corner of the head, distinctly thickened towards the apex; all the funicular joints longer than broad, first joint as long as the three succeeding joints taken together, eighth joint not conspicuously broader though longer than the preceding; terminal joint of club as long as the two preceding, subequal joints together. Epinotal spines very large, blunt, laterally compressed, a little longer than broad at their bases, directed upward, outward, and backward, the distance between their bases about as great as their length. Petiole somewhat more than $1\frac{1}{2}$ times as long as broad, as broad in front as behind, sides rather concave in the middle, node high and transverse, its anterior slope in profile long and concave, its posterior slope more abruptly concave. Seen from behind the summit of the node is slightly impressed in the middle. Postpetiole distinctly broader than long, widest in the middle, where it is produced on either side to form a rather sharp angle. Gaster more rounded in front than in the female of *Sympheidole*.

Mandibles and clypeus shining, the former with a few large and scattered, piligerous punctures, the latter with a few longitudinal rugæ on the sides. Head subopaque, coarsely reticulate-rugose, the rugæ being especially prominent and longitudinal on the front and crown. Prothorax opaque, finely and evenly reticulate-rugose; mesonotum, paraptera, and scutellum shining, the first rather delicately and irregularly rugose, the paraptera coarsely rugose in the middle and with a few piligerous foveolæ on either side; scutellum smooth and shining in the middle, with a series of piligerous foveolæ on either side near its edge. Epinotum, including the spines, subopaque, covered with fine reticulation. Pleuræ coarsely reticulate-rugose. Petiole and postpetiole sculptured like the epinotum, but with the upper surface of the nodes smooth. Gaster glabrous, shining.

Hairs yellowish, rather scattered and not very conspicuous, reclinate; on the head, thorax, and pedicel stout, frayed at their tips; on the gaster, mandibles, antennæ, and legs the hairs are simple.

Body reddish yellow; legs paler; mandibular teeth, crown of head, mesonotum, scutellum, epinotal spines, upper surface of petiole, postpetiole, and the gaster, excepting its tip and the base of the first segment, dark brown or black. Wings hyaline, veins pale yellowish, apterostigma somewhat deeper in color but not very conspicuous.

Male. (Figs. 15, 16, and 17.)—Length 3–3.5 mm.

Antennal scape as long as the first two funicular joints; first funicular joint distinctly longer than broad; remaining joints cylindrical, very gradually increasing in length to the terminal joint, which is

nearly as long as the two preceding joints taken together. Epinotal spines prominent, broader at their bases than long, rather acute, directed upward and backward, about as far apart as the breadth of their bases. Petiole and postpetiole resembling the corresponding segments of the female, except that the node of the former is acute and its posterior slope longer and less concave, and the anterolateral angles of the postpetiole are less prominent.

Mandibles and clypeus shining, the former sparsely punctate, the latter irregularly rugose. Head opaque, finely and longitudinally rugose-punctate. Pronotum and pleuræ subopaque, shagreened; mesonotum smooth and shining, with sparse, shallow, piligerous punctures, except behind, where it is finely longitudinally rugose. Paraptera coarsely and irregularly rugose; scutellum like that of the female, smooth in the middle with lateral foveolæ. Epinotum, including the spines, petiole, and postpetiole, opaque, finely and densely punctate-rugose, the upper surface of the postpetiole, like the gaster, smooth and shining.

Hairs covering the body yellowish, sparse, more or less reclinate slender, and tapering; on the antennæ and legs short and inconspicuous.

Mandibles and antennæ pale yellow; clypeus brown; head black. Thorax yellowish brown, posterior portions of mesonotum and the scutellum dark brown, epinotum black. Petiole black, postpetiole black below, brown above. Gaster dark brown above, tip and genitalia yellow. Legs yellow, femora and tibiæ more or less infuscated. Wings like those of the female.

Described from numerous males and females taken from three colonies of *Pheidole pilijera* Roger var. *coloradensis* Emery, found under stones in different localities about Colorado Springs, Colo. The first colony, in Red Rock Cañon, near the Garden of the Gods (July 28), contained many *Epipheidole* males and three *Pheidole* males, besides numerous soldiers and workers of the latter species. The second colony was found at Austin's Bluffs Aug. 10. It contained only a single virgin female of the *Epipheidole*, together with a few *Pheidole* soldiers and workers. The third colony, taken at Broadmoor, Aug. 11, was examined with great care. It contained one deãlated female *Epipheidole*, with a distorted gaster, evidently the mother queen of the colony, numerous virgin females, a few males, and a peculiar gynandromorph, which I have described and figured in a former paper.¹ In

¹ Some New Gynandromorphous Ants, with a Review of the Previously Recorded Cases. Bull. Am. Mus. Nat. Hist., Vol. XIX, 1903, pp. 653-683. 11 figs.

this nest there were many *Pheidole* soldiers and workers, all living amicably with the *Epipheidole*, but no worker forms that could by any possibility be referred to the latter species were to be found either in this or the other nests. Nor was I able to find queens of the *Pheidole* in any of the colonies, so that it is probable that *Epipheidole*, like *Anergates* and *Symphheidole*, does not permit the females of its host species to mature. Unfortunately all of these colonies were found on occasions when I was not prepared to capture them alive and keep them under observation in artificial nests.

As in the case of the preceding species, the males and females of *Ph. coloradensis* mature earlier in the year than the corresponding sexes of the inquiline. The three males of the former species taken July 28 were belated individuals since the majority of *coloradensis* colonies near Colorado Springs gave off their males and females early in July.

[January, 1904.]

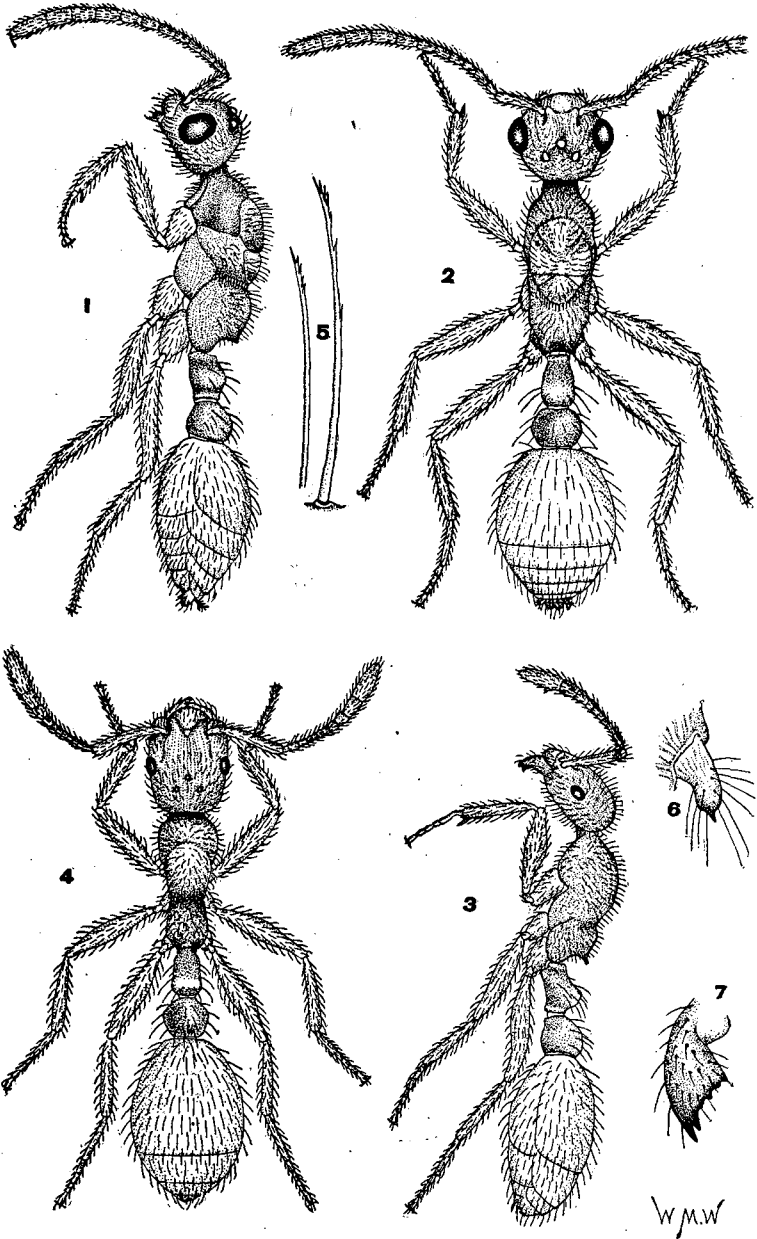


Fig. 1. Male of *Symmyrmica chamberlini* gen. nov. et sp. nov. Lateral view.
Fig. 2. Dorsal view of the same.
Fig. 3. Worker of *Symmyrmica chamberlini*. Lateral view.

Fig. 4. Worker of *Symmyrmica chamberlini*. Dorsal view.
Fig. 5. Hairs from gaster of worker *Symmyrmica*, highly magnified.
Fig. 6. Mandible of male *Symmyrmica*.
Fig. 7. Mandible of worker *Symmyrmica*.

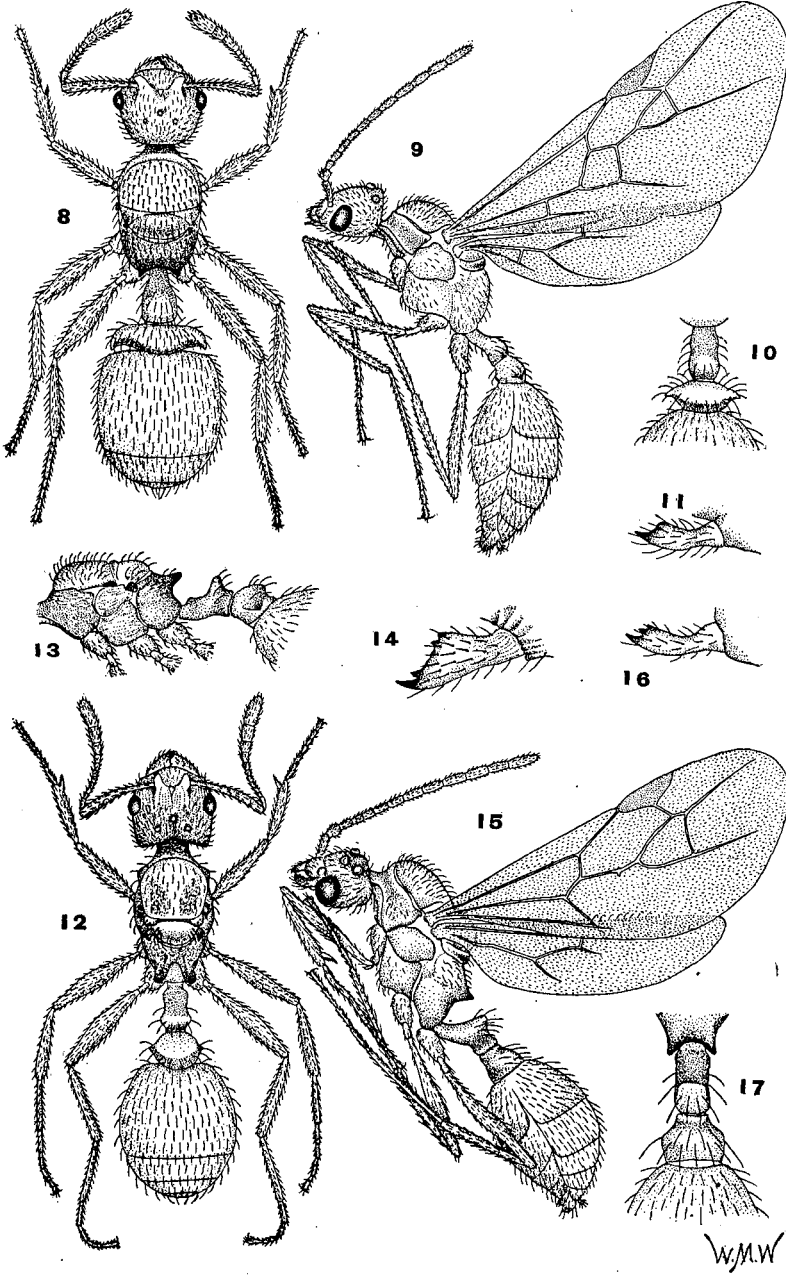


Fig. 8. Female *Symphheidole eleebra* gen. nov. et sp. nov. (deälated). Dorsal view.

Fig. 9. Male of same. Lateral view.

Fig. 10. Pedicel of male *Symphheidole*. Dorsal view.

Fig. 11. Mandible of same.

Fig. 12. Female *Epipheidole inquilina* gen. nov. et sp. nov. (deälated). Dorsal view.

Fig. 13. Thorax and pedicel of same. Lateral view.

Fig. 14. Mandible of same.

Fig. 15. Male *Epipheidole inquilina*. Lateral view.

Fig. 16. Mandible of same.

Fig. 17. Pedicel of male *Epipheidole*. Dorsal view.