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New Species of *Pheidole* from Pacific Coast Islands
(Hymenoptera: Formicidae)¹ROBERT E. GREGG²

Specimens of ants in the genus *Pheidole* have been received from Mr. Roy Snelling, of the Los Angeles County Museum, and they prove to represent two new species. I am indebted to him for the opportunity to describe these insects. One of the species was collected on the Island of San Clemente, off the coast of southern California, and the other was found on the Tres Marias Islands adjacent to Nayarit, Mexico.

Pheidole clementensis NEW SPECIES ✓

(FIGURE 1)

MAJOR.—Total length 3.62 mm; head length (excluding mandibles) 1.28 mm; head width 1.12 mm; head index 0.87; thorax length (excluding neck) 0.76 mm; petiole-postpetiole 0.46 mm; gaster length 1.12 mm. Holotype.

Head (excluding mandibles) distinctly longer than broad; cephalic sulcus deep, occipital notch profound, and occipital lobes distinct; clypeus emarginate with edges of the notch rounded; frontal lobes prominent, frontal carinae divergent; sides of head straight and subparallel, but angled toward the occipital lobes; eyes anterior to the middle of the head, composed of 40 to 45 facets. Antennae 12-segmented, club distinctly 3-segmented; scapes unflattened, wider distally than basally, and reach about one-half the distance to the occipital corners. Mandibles with two stout apical teeth and one small basal denticle. Mandibles, clypeus, and frontal area glabrous and shining; genae and frons with longitudinal and slightly divergent rugae, partly reticulate medial to the eyes; vertex partially crossed with finer rugae or striae, otherwise smooth and shining; tops of occipital lobes and their anterior faces covered with very coarse, strong, transverse rugae that are somewhat wavy, and which are reticulate where they cross the occipital sulcus; surfaces between cephalic rugae smooth and shining or only slightly subopaque in some areas; sides of occipital lobes very smooth and polished; gula smooth.

Thorax moderately convex, humeral angles distinct; meso-epinotal suture impressed, but the general contour of the thoracic dorsum straight and uninterrupted, except for the suture, not saddle-shaped. Pronotum and mesonotum smooth and shining; propleurae and mesopleurae smooth except for a few fine striae. Epinotal base and declivity subequal, and joined by a very obtuse angle; base and declivity smooth and shining, hardly any punctures visible; sides of epinotum punctate, ventral portions with a few striae. Epinotal spines narrow, pointing abruptly vertical, and with rather sharp tips; spine length $\frac{1}{3}$ their interbasal distance.

Petiole node low, its superior border broadly concave; surface of node smooth, petiolar peduncles punctate. Postpetiole broader than long, trapezoidal, with rounded lateral borders and no connules; node smooth.

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Gaster smooth and shining throughout; proportions usual for the genus.

Pilosity: hairs yellow and pointed, covering all surfaces of the body, legs, scapes, and mandibles; moderately long on the head, and longer on the thorax, pedicel, and gaster. Pubescence erect, and restricted to antennae and legs, where it appears to grade into the hairs.

Color: anterior half of head, gula, mandibles, antennae, legs, and gaster light red-rish brown; posterior part of head, thorax, petiole, and postpetiole dark brown.

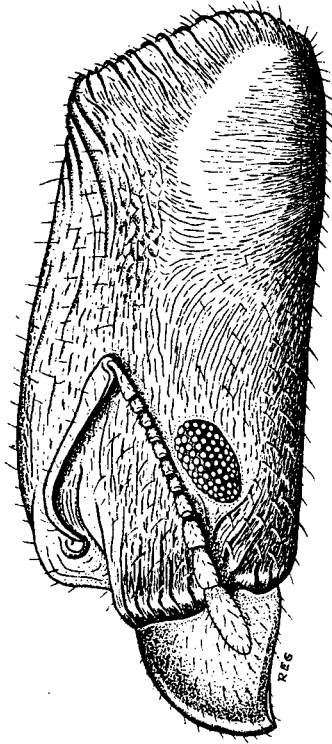


FIG. 1. *Pheidole clementensis*, new species, lateral view of head of major.

MINOR.—Total length 2.17 mm; head length (excluding mandibles) 0.56 mm; head width (excluding eyes) 0.49 mm; head index 0.875; thorax length (excluding neck) 0.59 mm; petiole-postpetiole 0.30 mm; gaster length 0.72 mm. Morphotype.

Head longer than broad (excluding mandibles); occipital border weakly concave; frontal lobes well developed, frontal carinae short, straight, and indistinct; clypeus convex, not emarginate; scapes barely surpass occipital corners; mandibles with two sharp apical teeth and several denticles. Surface of head smooth and shining throughout. Eyes with 38 to 40 facets.

Thorax.—moderately convex, meso-epinotal suture distinct. Epinotal spines triangular, vertical, and sharp. Surface smooth and shining except mesopleurae which

are in part punctate. Petiolar node low and blunt, with superior border convex. Postpetiole very slightly broader than long, subquadrate. Pedicel and gaster smooth and shining.

Pilosity: similar to that of the major.

Color: head, thorax, and petiole very dark brown; mandibles yellow; legs, antennae, postpetiole, and gaster light brown.

The major of *Ph. clementensis* differs from that of its closest ally, *Ph. californica* Mayr, in the following particulars: in size it is greater (3.62 mm vs. 3.50 mm); cephalic sculpture, especially on the occiput, is much heavier; occipital rugae are extremely coarse and rise higher from the surface of the head, and on each side of the sulcus they are so prominent that in profile the head appears to have conspicuous brow ridges, with the result that the vertex immediately in front of the ridges is slightly concave; posterior occipital corners, in profile, more angular; eyes smaller (approx. 40 facets vs. approx. 55 facets). The mesonotal disc descends to the meso-epinotal suture through an even curve, whereas in *californica* there is a distinct mesonotal declivity that forms an angle with the disc; sides of the epinotum not as completely punctate; epinotal base and declivity very smooth and shining (not completely punctate and opaque); epinotal spines narrow and slender (not broad and triangular). Petiole and postpetiole smooth and shining (not punctate and subopaque). Color dark brown mostly, in contrast to orange brown.

In my key to the species of *Pheidole* (Gregg, 1958), it will be necessary to modify couplet 34, first alternative, to read as follows:

Occipital rugae of the major coarse and wavy, usually forming reticulations in the occipital sulcus. **californica**
 Occipital rugae coarse and wavy, and prominent enough to produce brow ridges on the head in profile; vertex slightly concave. . **clementensis**

The worker minor of *clementensis* differs in that the epinotal pleurae are mostly smooth and shining, the epinotal spines are slightly sharper, and the epinotal base and declivity are very shining. The color is blackish brown rather than yellowish brown.

HOLOTYPE: worker major; deposited in the Los Angeles County Museum, Los Angeles.

PARATYPES: hundreds of worker majors and minors, the bulk of them deposited in the Los Angeles County Museum; others in the author's collection, and the collections of W. S. Creighton, A. C. Cole, U. S. National Museum, American Museum, and the Museum of Comparative Zoology.

TYPE LOCALITY: Pyramid Head, San Clemente Island, San Diego County, California. Nest found under a stone by R. R. Snelling, December 7, 1963.

I include the following notes by Snelling on the biology of this new ant. "This species was one of the commonest ants on the island; it appears to be most abundant on the seaward side, and nests under stones. Workers begin foraging shortly before sundown; the ants are harvesters, bringing in seeds of *Cressa cretica* in preference to others which are available. A few grass seeds were collected, and on one occasion I observed them gathering seeds from a small legume, probably a species of *Lotus*. An interesting feature of the colonies examined was the very high percentage of majors."

Pheidole clementensis is of special interest, not only as a new species and as an addition to an already known rich fauna of North American *Pheidole*, but because of the location from which it comes. Ants from the offshore islands of southern California have in the past been described as subspecific forms and regarded as insular endemics. Wheeler seems to have been much taken by this explanation, as for example with *Monomorium minimum* subsp. *ergatogyna*, but which Creighton later (1950) showed to be a synonym of the mainland *minimum*. In the case of *clementensis* it seemed obvious from the start that we were dealing with a different population and that it might be a subspecies of the closely related mainland *Pheidole californica*. Further study revealed, however, that it is quite distinct from the latter and should be regarded as a separate species. This led to a consideration of the possible origin and the probable range of the new form. So far, it is known only from the island of San Clemente, but Creighton feels that it will eventually turn up on the mainland coast of California and perhaps on other islands in the vicinity. His reason for this (in litt.) is the fact that during much of the year the southern Californian coast is in the path of strong onshore westerly winds, and that consequently any flying insects would sooner or later be carried to the continent. It should be important, therefore, to determine whether the nuptial flights of this ant occur during the periods of these winds. While San Clemente is farther from the coast than Santa Catalina and certain other islands, it is still only about 60 miles distant, so the suppositions that Creighton makes are altogether possible. It seems strange, however, that if *clementensis* does occur on the mainland, it has not yet been found there in an area that has been repeatedly searched for ants. Although I can accept the view that this ant is probably not endemic to San Clemente, such an admission does not preclude the possibility that it may have had its origin on the island or some other island nearby. At a remote time, the mainland species from coastal stations could have been emplaced on the island during rare occasions when conditions may have been favorable for accidental transport. The rarity of these occasions would tend to favor the isolation

of the population and bolster the speciation process. Some specimens would presumably be blown back to the mainland, but those that remained could have continued their divergence. After full evolutionary separation was achieved, the new species would, of course, be subject to periodic and fortuitous transport back to the mainland. Thus, the allopatric origin of this ant is at least a feasible explanation, and may be offered tentatively until more information is at hand. It will be interesting and critical to see whether this insect does in fact show up later as a member of the mainland fauna.

***Pheidole dwyeri* NEW SPECIES** ✓

(FIGURE 2)

MAJOR.—Total length 6.19 mm; head length (excluding mandibles) 2.32 mm; head width 2.24 mm; head index 0.97; thorax length (excluding neck) 1.29 mm; petiole-postpetiole 0.86 mm; gaster length 1.72 mm. Holotype.

Head (excluding mandibles) only slightly longer than broad; cephalic sulcus deep, occipital notch profound, and occipital lobes pronounced but well rounded in full-face view; in profile the lobes show a distinct dorsal flattening which extends forward to about the middle of the head; anterior margin of clypeus sinuate; frontal carinae strongly divergent, and about one-half as long as the scapes in repose; sides of head straight, but converging toward the mandibular insertions. Eyes lateral, placed anterior to the middle of the head; approximately 100 facets. Antennae 12-segmented; club slender, indistinctly 3-4 segmented; funicular joints 2 to 7 short and only gradually increasing in length, merging into the club; scape short, curved, but unflattened, extending about one-half the distance to the occipital corners. Mandibles with two stout apical teeth, incisor border entire, one faint denticle near the basal border. Frons, vertex, and genae with longitudinal and somewhat divergent rugae that are partly reticulate, especially medial to the eyes; rugae fade out on the occipital lobes. Interrugal spaces and occipital lobes heavily punctate, the surfaces opaque; hair foveolae noticeable on the lobes; a small but distinct pit is located at the anterior end of the cephalic sulcus in the approximate position of a median ocellus; sulcus cross-striate; tops of the occipital lobes finely striate and faintly shining; gula smooth. Mandibles mostly glabrous and shining, except for hair punctures and several strong rugae on the lateral borders. Frontal area triangular, smooth and shining.

Thorax moderately convex, humeral angles distinct; posterior part of mesonotum concave and forming a small saddle in front of the epinotum; meso-epinotal suture distinctly impressed. Epinotal base shorter than the declivity, and connected by an obtuse angle; epinotal spines long and sharp, spine length almost $\frac{1}{2}$ their interbasal distance; epinotal spiracles round and prominent. Pronotum and mesonotum transversely rugose (neck smooth); interrugal spaces punctate, opaque. Epinotal base and declivity transversely striated and weakly shining. Entire thoracic pleurae, including epinotum, punctate and opaque, partly rugose. Petiolar node moderate in size, merging gradually with the anterior peduncle, its superior border truncate and faintly concave. Postpetiole very broad and lenticular in shape, twice as wide as the petiole; lateral connules fairly sharp. Both segments of the pedicel punctate and opaque, the postpetiole also with foveolae.

Gaster shagreened throughout its dorsal surface, and subopaque to slightly shining; sides and venter shining.

Pilosity: entire body, including scapes, funiculi, mandibles, and legs covered with abundant, yellow, pointed hairs which vary greatly in length. Pubescence absent except on the funiculi where it grades into the hairs.

Color: head, thorax, and pedicel for the most part reddish brown, the head notably lighter and redder in tone; clypeus, anterior border of head, mandibles, postpetiole, and gaster blackish brown; legs and antennae light reddish brown.

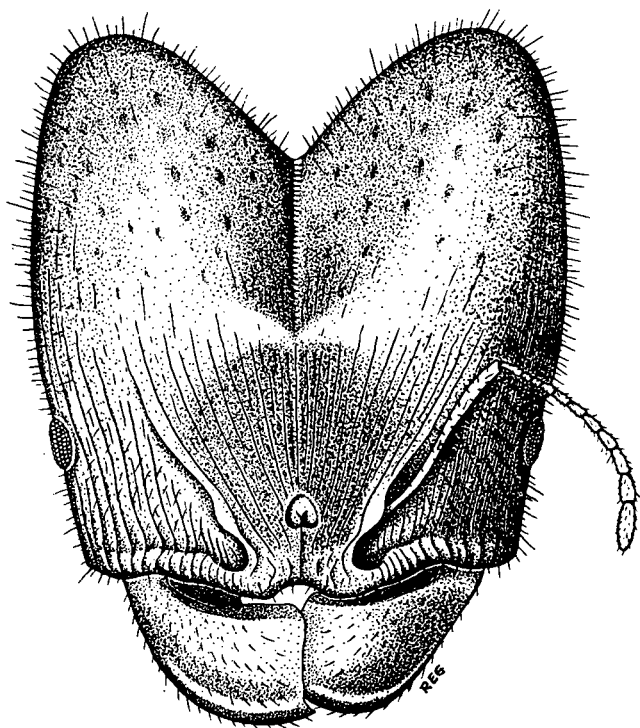


FIG. 2. *Pheidole dwoyeri*, new species, anterior view of head of major.

MINOR.—Total length 2.68 mm; head length (excluding mandibles) 0.73 mm; head width (excluding eyes) 0.66 mm; head index 0.904; thorax length (excluding neck) 0.83 mm; petiole-postpetiole 0.36 mm; gaster length 0.76 mm. Morphotype.

Head longer than broad; occipital border flat; clypeal border convex; frontal carinae short and parallel; frontal area distinctly impressed, and continuous with a fine median sulcus which ends in a minute pit; compound eyes lateral, about midway between anterior and posterior borders of the head, comprised of about 40 facets; mandibles with sharply denticular masticatory border; antennal scapes long, extending a little over one-fourth their length beyond the occipital corners; antennal club of 3 to 4 segments that seems more distinct than in the major worker.

Thorax moderately convex; meso-epinotal suture distinct and impressed, but not saddle-shaped; epinotal base longer than declivity; spines long, almost vertical, pointed. Petiolar node low, dorsal border flat, about as long as the peduncle. Postpetiolar node very low, slightly wider than long, not quite twice the width of the petiolar node. Entire body of insect shagreened to punctate and granular; subopaque, except occipital border, pronotum, and sides and venter of gaster which are somewhat shining.

Pilosity: hairs as in the major, except sparser and shorter in length.

Color: dark brown, except funiculi, mandibles, and tarsi which are paler.

In the two most recent tables to the species of North American *Pheidole* (Creighton, 1950; Gregg, 1958), this ant would run either to *Pheidole pilifera coloradensis*, or to *Pheidole titanis*, depending upon how one chooses to interpret the couplets, or stretch the meanings of the couplets. It does not fit comfortably in either of the above species, and as a matter of fact, it is completely impossible to identify the ant by means of these keys. This is not surprising considering the little-known and very inadequately studied region from which the specimens have come (vide infra). Direct comparison with the above two species shows them to be quite unrelated.

The peculiar cephalic flattening in the major of *Pheidole dwyeri*, together with its overall appearance seems to indicate that it may be closely allied to *Pheidole xerophila*, but if so, the latter then is a diminutive relative. *Dwyeri* may be said to differ from *xerophila* in the following particulars: in size much larger (approx. 6.2 mm vs. not more than 4.3 mm); head heavily sculptured with longitudinal rugae and densely punctured interspaces and verteces, the surface opaque in contrast to lighter sculpture confined to the anterior half of the head with vertices and occipital lobes smooth and shining; cephalic hairs arising from narrow punctures rather than punctures much wider than the hairs in *xerophila*; eyes with a much greater number of facets; epinotal spines proportionally longer and sharper and reclining posteriorly; gaster strongly shagreened; the entire insect noticeably more opaque. *Pheidole dwyeri* differs from *macclendoni* in the soldier caste by its larger size, (the latter 6.0 mm); by the cephalic flattening; complete cephalic sculpturing (posterior half of head in *macclendoni* smooth and shining); sharper and more reclining epinotal spines; broader, more lenticular postpetiole with sharper connules; and shagreened gaster. The major of *dwyeri* differs from that of *militicida* by its slightly larger size (the latter about 6.1 mm); cephalic flattening more definite, but occipital lobes more rounded in profile; complete head sculpturing (posterior half of head in *militicida* smooth and shining); pronotum transversely rugose and subopaque (smooth and shining in *militicida*); promesonotum lower and less strongly arched; epinotal spines slightly sharper; petiole lower and more blunt (superior border sharper and concave in *militicida*);

anterior border of postpetiole less convex, connules not as sharp; gaster shagreened and subopaque (not smooth and shining); color dark reddish brown in contrast to the golden to reddish golden color of *militicida*; antennal club indistinctly 3 to 4 segmented (clearly 3-segmented in *militicida*). The minor of *dwyeri* differs from that of *militicida* in that the epinotum is flat (not convex), spines are long and distinct (not short and triangular); petiole and postpetiole are shorter; body surface of all tagmata shagreened and subopaque (not smooth and shining); long diameter of eye only $\frac{2}{3}$ that of *militicida*; antennal club like that of the major.

My key to *Pheidole* could handle the placement of this new species if couplet 30, first alternative, were modified to read as follows:

Front and vertex of the major with coarse, piligerous foveolae, longitudinal rugae, and interrugal granulations; feebly shining; occipital sulcus shallow, lobes moderate; head small (1.5 mm long)
 ***pilifera* subsp. *coloradensis***
 Front and vertex granular, piligerous foveolae indistinct, longitudinal rugae confined to the anterior portion of the head; occipital sulcus deep, lobes pronounced; head large (2.4 mm) ***dwyeri***

Although this treatment will separate *dwyeri* from other North American species of *Pheidole* so far known, the key is an artificial one and makes no claim to show relationship between *dwyeri* and the forms of *pilifera*.

Holotype: worker major; deposited in the Los Angeles County Museum, Los Angeles.

Paratypes: hundreds of worker majors and minors, most of them deposited in the Los Angeles County Museum; others in the author's collection, and the collections of W. S. Creighton, A. C. Cole, U. S. National Museum, American Museum, and the Museum of Comparative Zoology.

Type locality: Maria Cleofas, Islas Tres Marias, Nayarit, Mexico. Two colonies of this ant were collected by R. R. Snelling, one on March 30, 1964 (#36430-C), and another on March 31, 1964, both on Maria Cleofas. The holotype specimen was selected from the colony taken on the latter date. This insect is named for Mr. Richard F. Dwyer, who supported the work of Mr. Snelling and made it possible for him to visit the Tres Marias Islands.

Pheidole dwyeri on first examination appeared to be related to *Pheidole* (*Ceratopheidole*) *granulata* Pergande, because the antennal club seems to be 4-segmented, and thus to represent another new form in this small subgenus. But *Ceratopheidole* as a taxonomic entity has been questioned (in litt.) by Creighton and by Snelling. The latter has studied the two original specimens of *granulata* in the United States National Museum, and has

discovered that the type locality of Pergande's specimens is San Jose del Cabo, Lower California, not Tepic, Mexico, as cited by Pergande. This appears to indicate why the species has not been found subsequently on the main part of Mexico. Snelling has also compared the *granulata* types to *grallipes*, and considers the two species closely related. In size, color, pilosity, and sculpturation the two are much alike, and the main difference, he states, is the longer eighth flagellar segment of *granulata*, together with minor differences in cephalic and thoracic sculpturing. Both ants are similar in the general form of the antennal club, with the last segment elongated and narrowed. The club is said to be poorly defined. Specimens of *grallipes* in my collection all show the antennal club to be unequivocally 3-segmented. The foregoing shows that the distinction heretofore made between the subgenera *Pheidole* and *Ceratopheidole* may be suspect and that the latter name may have to be abandoned. The indefinite nature of the club in *Ph. davyeri*, making it intermediate between the 3-jointed club of typical *Pheidole* and the supposed 4-jointed club of *Ceratopheidole*, shows that it would be inadvisable to assign *davyeri* to the second subgenus until the status of *Ceratopheidole* can be clarified. I therefore place the new species in the subgenus *Pheidole*, *sen. st.*

ACKNOWLEDGMENTS

I wish to thank Mr. Roy R. Snelling for generously permitting me to study and describe these new ants, and for making certain critical comparisons with species of *Pheidole* in the collections of the United States National Museum. Dr. W. S. Creighton has assisted with the evaluation of the status of these ants and several others in the genus *Pheidole*, and has carefully reviewed the manuscript for this article.

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