Systematics of Nearctic Ants of the Genus *Dorymyrmex* (Hymenoptera: Formicidae)

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ABSTRACT. The "neotype" for "*Conomyrma insana* (Buckley)" (= *Formica insana* Buckley, 1866) and the "lectotype" for "*Conomyrma flava* McCook" (= *Dorymyrmex insanus* var. *flavus* McCook, 1879), designated by Johnson (1989), are both shown to be invalid. Appropriate neotypes are designated for both species; each is redescribed and illustrated.

Dorymyrmex pyramicus var. *smithi* Cole, 1936, is removed from the synonymy of *D. insanus* and recognized as a distinct species, of which *Dorymyrmex medeis* (Trager, 1988) is a newly recognized synonym. *Dorymyrmex bureni* (Trager, 1988), treated by Johnson (1989) as a synonym of *D. flavus*, is reinstated to species rank. *Dorymyrmex reginicula* (Trager, 1988), treated by Johnson (1989) as a synonym of *D. insanus*, is reinstated to species rank. This species is a temporary social parasite in nests of other *Dorymyrmex* species. *Dorymyrmex wheeleri* (Kusnezov, 1952), purported to be a synonym of *D. insanus* by Snelling (1973), is reinstated to species rank but remains known only from the type specimens. Two new species are described and illustrated: *D. lipan* (Texas) and *D. paiute* (Utah).

A key is given for the separation of the worker caste of the 12 described species known to occur in the United States.

INTRODUCTION

No North American ant has been cursed with such a singularly unfortunate taxonomic history as that described by Buckley (1866) as *Formica insana*. Buckley's choice for a specific name has proved to be both remarkably prophetic and apropos. The original description was inadequate, even by the standards of the time; no type specimens were designated, and none of Buckley's original material is known to have survived to the present. The identity of Buckley's species must, of necessity, rely on speculation. Much of the same is true of the ant described a few years later by McCook (1879) as *Dorymyrmex insanus* var. *flavus*.

Recently, in an effort to clarify the status of these names for two of the most common ants across the southern United States, Johnson (1989) designated a neotype for *F. insana* and a lectotype for *D. insanus* var. *flavus*. Regrettably, although the intent is commendable, neither designation is valid, as will be demonstrated below. It is my intent to critique Johnson's work and to correct his errors, both of substance and of judgment, by designating appropriate type specimens for both species.

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HISTORICAL RESUME

The original description of *Formica insana* by S.B. Buckley (1866) is regrettably brief:

> *Worker.* Length 0.14 inch—Color black or brownish-black, smooth and shining throughout; head subquadrate, the lateral margins slightly curved inwards; below oval, and rounded above; eyes large, subelliptical, and placed on the anterior portion of the head near its lateral margins; antennae long, filiform; mandibles large, curved inwards, the truncated apical ends sharply toothed; head sub-channelled beneath, with the anterior and posterior parts deeply depressed; prothorax about half the width of the head, rounded above; mesothorax somewhat depressed; metathorax has a rudimentary spine or sharp protuberance on its upper posterior surface, pedicle short, inserted near the base of the anterior part of the abdomen; scale small, wedge-shaped, and inclined forwards; abdomen broad-ovate, subacute; legs small, slender, and rather short.
>
> *Female.* Length 0.20 inch—Head small, narrower than the thorax; abdomen broad, oblong and ovate; color black-bronze, with the margins of the segments of the abdomen hyaline; thorax raised above the head; wings not seen; the remainder like the worker.

Buckley stated that this species is common in central Texas.

Edward Norton (1875) appears to have been the first to recognize that *Formica insana* belonged to the then-recently described genus *Dorymyrmex* Mayr (1866); H.C. McCook (1879) included it in

Contributions in Science, Number 454, pp. 1–14
Natural History Museum of Los Angeles County, 1995

ISSN 0459-8113

Dorymyrmex. McCook added little to the understanding of *D. insanus*, but his concept of that name was based on two of Buckley's specimens that he had examined and were then in the collections of the Academy of Natural Sciences in Philadelphia. Those specimens apparently disappeared long ago, but McCook did provide figures of *D. insanus*, although their accuracy in nearly all respects must be considered suspect.

McCook's brief discussion of *D. insanus* was followed by a description of a new variety, *D. insanus* var. *flavus:* "This variety is identical with *insanus*, except in the color, which is a uniform honey yellow, and the contour of the thorax. The apex of the abdomen and the flagellum of the antennae are tipped with a blackish hue. The variety appears to be quite permanent, the distinction holding in a number (25 or 30) of specimens examined. The cone is evidently higher than the thorax. There is no tuft under the face."

McCook stated that he had collected *D. insanus* in Texas but made no mention of having found it elsewhere. He further noted that Norton had earlier suggested that *D. insanus* might be a synonym of *D. pyramicus*, a Brazilian species described by J. Roger (1863), originally in the genus *Prenolepis*. Norton's suggestion may have been prompted by Mayr (1870), who recorded specimens from Mexico as *D. pyramicus*. Of the distribution of *D. insanus* var. *flavus*, McCook had little to say other than that it occurs in the "Southern States" of the United States.

McCook was apparently the last person to have examined any of Buckley's specimens. *Formica insana* ceased to be a recognized entity when Mayr (1886) placed it in synonymy with *D. pyramicus*, where it was to remain for almost 90 years. This has had some unfortunate consequences. Why Mayr chose to put forward this synonymy is uncertain, since it is clear that he had not seen type material of either name, nor has any myrmecologist since then. What is clear is that since Mayr's time the identity of *D. pyramicus* has been based not on Roger's type but on the characteristics of the North American ant that has been treated as its synonym and perhaps of other blackish or brownish species as well. Thus, when Forel (1913) named "*Dorymyrmex pyramicus*" as the type for his new genus *Conomyrma*, the specimens that he had before him were not Roger's Brazilian ant but specimens from North America that were assumed to be conspecific with it. A strong case could be made for the view that the true type species of *Conomyrma* should be *Formica insana* and not *Prenolepis pyramica*. That problem, however, is beyond the purview of the present study.

Creighton (1950) believed that there was a single North American species, *Dorymyrmex pyramicus*, within which he recognized three infraspecific forms: *D. pyramicus pyramicus*, *D. p. bicolor* W.M. Wheeler (1906), and *D. p. flavopectus* M. Smith (1944). The various species assigned to *Dorymyrmex* were next studied by Kusnezov (1952), who divided *Dorymyrmex* into two genera: *Dorymyrmex* and *Conomyrma*. The North American forms were all placed in the latter genus. In 1959 he again dealt with these ants, and the genus *Conomyrma* was split into two genera, with *C. pyramica* and *C. flavopecta* remaining in *Conomyrma; C. bicolor* and *C. wheeleri* Kusnezov (1952) were assigned to a new genus, *Biconomyrma*.

The status of our forms was reviewed once more by Snelling (1973). The primary purpose of that study was to affirm that *Conomyrma* is a genus apart from *Dorymyrmex* and that the North American forms all belong to *Conomyrma*. At the same time, *Biconomyrma* was synonymized with *Conomyrma*.

The most important aspect of the paper, however, was that Buckley's *Formica insana* was resurrected from the synonymy of *C. pyramica* to replace the latter name in the North American fauna; *C. pyramica* was restricted to South America and considered to be essentially unidentifiable. Three North American species of *Conomyrma* were recognized: *C. bicolor*, *C. flavopecta*, and *C. insana*. To the latter were assigned, as synonyms, *flavus* McCook, *nigra* Pergande (1895), *antillana* Forel (1911), *smithi* Cole (1936), and *wheeleri* Kusnezov, regrettably without having examined type material of nearly all these names. However, had I done so, there is no reason to believe that my conclusions would have been different, for my views on these ants have changed drastically since that time.

When contemplating the possibility of resuscitating Buckley's name, Creighton (1950) had commented that "this looks suspiciously like stepping out of the frying pan into the fire." These were remarkably prophetic words. It is now clear, for example, that nearly every name that I listed as a synonym of *C. insana* almost certainly represents a valid, separable species. This, however, is not the most significant problem afflicting our understanding of North American *Dorymyrmex*. At the core of all past confusion is the problem of the true identity of *D. insanus*. Despite all the changes outlined above, since W.M. Wheeler (1902), there has been a clear consensus on one point: *D. insanus* is a dark Texas species with a sharply angulate mesonotal profile. I (Snelling, 1973) echoed this in unequivocal terms when I asserted that this ant "has a mesonotum which is sharply declivitous behind." As will be shown below, this interpretation is only partly correct.

In the years following 1973 I became increasingly uncomfortable with the notion that there was only a single dark species of *Dorymyrmex* in North America. However, since the late W.F. Buren had expressed an interest in the genus, I did not pursue the matter. Following Buren's death, J.C. Trager continued Buren's study of *Dorymyrmex* and in 1988 published the results of his work on the species of Florida (placed in the then-recognized genus *Conomyrma*). The number of United States species

was increased from three to nine. In addition to the three already recognized by Snelling (1973), five new species were described; one additional species, *C. grandula*, originally described by Forel (1922) as a species of *Prenolepis*, was recognized as a valid form of *Conomyrma* in the southeastern United States.

Finally, Johnson (1989), also using the generic name *Conomyrma*, designated a neotype for *D. insanus* and a lectotype for *D. flavus* in a misguided effort to establish the identity of *D. insanus*. At the same time, he proposed that *D. medeis* Trager and *D. reginicula* Trager be treated as synonyms of *D. insanus*, and that *D. bureni* Trager be similarly regarded as a synonym of *D. flavus*. I believe that Johnson was wrong on nearly every point.

It is my hope that important areas of confusion that have existed in the past may be corrected and settled by my actions here. In particular, I wish to firmly and unequivocably establish the identities of both *D. insanus* and *D. flavus*. The problem of the identity of *D. pyramicus*, the type species of the genus, cannot now be resolved; it is possible that the types of this name no longer exist. If this proves to be the case, then a specimen matching the rather meagre original description will have to be designated as a neotype; such action is beyond the goals of the present paper and will have to be deferred until more material from Brazil is available. However, there is no evidence to support the view that a single species ranges from the southern United States to Argentina. That such confusion still exists is evidenced by the recent statement by Fowler (1993) that *D. pyramicus* "has a distribution which ranges from the southern United States of America to Buenos Aires, Argentina .... In particular, its wide distribution through the Caribbean ... suggests that this species may have spread through human commerce, and that it should be adapted to the harsh conditions of littoral systems." Fowler cited papers by Kusnezov (1952, 1959) in support of this statement, apparently unaware of the more recent works that show that "*D. pyramicus*" is a composite species (Snelling, 1973; Trager, 1988; Johnson, 1989). Since the identity of *D. pyramicus* remains unsettled, such statements must be regarded with considerable caution.

Most recently, the genus *Conomyrma* has been treated as a synonym of *Dorymyrmex* by Shattuck (1992). I believe that Shattuck's conclusions are sound and that *Conomyrma*, as a genus apart from *Dorymyrmex*, is indefensible.

MATERIALS AND METHODS

The bulk of the specimens used in this study are from the collections of the Natural History Museum of Los Angeles County (LACM). Additional material, especially important type material, was made available from the collections of the Museum of Comparative Zoology (MCZ) and the National Museum of Natural History (USNM). Important specimens were also examined from the personal collection of J.C. Trager.

The morphological terminology in the descriptions and comments below are all those conventional to ant systematics. I do not accept the popular view that the ant head should be considered prognathous. The head of ants, as well as of all other Hymenoptera, is essentially hypognathous. Therefore, the so-called "posterior border" of the head is at the summit of the head and is called the *vertex*, a long-established term recognized in nearly all insect groups. It follows that that portion of the head bearing the clypeus and the antennal sockets is the front of the head. Similarly, I abjure the terms "alitrunk," "truncus," "trunk," and "thorax," preferring instead *mesosoma*, a term recognized although rarely used by ant systematists: "thorax" is, of course, morphologically incorrect, and the other terms are simply pointless jargon for which there is no logical justification. The following acronyms are used to conserve space:

Cephalic index (CI)—The ratio of head length to head width as expressed in the formula (HW/HL) (100).

Eye length (EL)—The maximum diameter of the eye as measured in lateral view.

Head length (HL)—The maximum length of the head, from the lower (apical) clypeal margin to the summit of the vertex, not including the mandibles.

Head width (HW)—The maximum width of the head, in frontal view, *exclusive of the compound eyes.*

Interocular distance (IOD)—With the head in frontal view, the minimum distance between the compound eyes.

Interocular ratio (IOR)—The ratio of interocular distance to eye length as expressed by the formula (IOD/EL) (100).

Ocular index (OI)—The ratio of the eye length to head length as expressed by the formula (EL/HL) (100).

Oculomalar ratio (OMR)—The ratio of eye length to malar area length as expressed by the formula (OMD/EL) (100).

Oculomandibular distance (OMD)—The length of the malar area as viewed in profile, from lower eye margin to uppermost mandibular condyle.

Scape index (SI)—The ratio of scape length to head length as expressed by the formula (SL/HL) (100).

Scape index$_2$ (SI$_2$)—The ratio of scape length to head width as expressed by the formula (SL/HW) (100).

Scape length (SL)—The maximum length of the antennal scape, exclusive of the basal condyle, measured from the basal flange to the apex.

Total length (TL)—The sum of the head length + length of mesosoma + length of petiole and gaster.

SYSTEMATICS

Dorymyrmex insanus (Buckley)

Figures 1–3

Formica insana Buckley, 1866:165; ♀♀.

Dorymyrmex insanus: Norton, 1875:734. McCook, 1879:185–186.

Dorymyrmex pyramicus: Mayr, 1886:433; W.M. Wheeler, 1902:6–7; 1906:342. Creighton, 1950: 346–349.

Dorymyrmex (*Conomyrma*) *pyramicus:* Gregg, 1963:432–434 (in part).

Conomyrma insana: Snelling, 1973 (in part).

Since McCook failed to elaborate on the statement that his new variety *flavus* differed from *D. insanus* in the contour of the mesosoma, it is difficult to determine by what means Johnson was led to as-

sume that this meant that *D. insanus* had a sharply angulate mesonotal profile while in *D. flavus* the profile was non-angulate. Presumably he was following the assumptions of every myrmecologist since W.M. Wheeler (1902), who fostered this interpretation. In his original description of *D. insanus,* Buckley stated "mesothorax somewhat depressed." I do not believe that Buckley would have used "somewhat" as a qualifier had the depression been abruptly angulate, and no justification exists for the assumption that the mesonotum is sharply angulate. This belief is bolstered by the figure in McCook's treatment; in that figure the mesonotum is rather evenly rounded behind. Although the figure is clearly a crude one, it still seems unlikely that an abruptly angulate profile would be rendered as one that is evenly curved. The neotype specimen designated by Johnson is a specimen with an abruptly angulate mesonotal profile. I do not, however, wish to suggest that the mesonotal profile is evenly curved as shown in the McCook figure. Instead, the profile probably should have been rendered as being broadly angulate or obtuse.

Johnson's proposed neotype is also at odds with the original description regarding head shape. Buckley stated that the head of the worker is "rounded above." Johnson, on the other hand, described the "occipital margin" (i.e., the vertex as seen in frontal view) as clearly to slightly concave. The obvious discrepancy was passed over without comment.

Of the queen, Buckley stated that the entire insect is "bronze-black" and the margins of the gastral terga "hyaline." The queen from the same nest as the neotype designated by Johnson is distinctly bicolored (reddish, with black gaster), and no evidence was provided to demonstrate that *D. insanus* females may be either unicolored or bicolored. There is once more a clear departure from Buckley's description.

Part of Johnson's confusion is clear from his discussion of the distribution of *D. insanus.* Throughout that discussion is the implicit assumption that *D. insanus* is the only blackish *Dorymyrmex* across the southeastern states. This is evidenced by the uncritical acceptance of all prior literature records of dark *Dorymyrmex* in these states as being based on *D. insanus;* at least some of these almost certainly refer to *D. grandulus.* Many others, however, are based on the form described by Cole (1936) as the var. *smithi,* here regarded as a distinct species with an abruptly declivitous mesonotal profile.

The same uncritical acceptance is reflected in Johnson's statement that *D. insanus* "is fortunately the only black-bodied *Conomyrma* described or reported in or near Texas, its type locality." At least two dark-bodied *Dorymyrmex* species are present in Texas: *D. insanus* and *D. smithi* (= *C. insanus, sensu* Johnson). There may well be others. Since Johnson failed to examine type material of *D. smithi,* there is no way that he could have known that this is a distinct species.

According to the International Code of Zoological Nomenclature (1985), Article 75 (d) (4), a neotype is validly designated *only* if there is "evidence that the neotype is consistent with what is known of the former name-bearing type from the original description and from other sources." Johnson's neotype material is clearly discordant with what is known of the former name-bearing type material, as described, and from the only other source (McCook) known to have examined original material; the data provided by these two sources are the only ones that cannot be ignored. Interpretations subsequent to that of McCook appear to have been based on other species or a mix of species and therefore have no bearing on resolving the identity of this species.

Finally, as a rather minor point, it should be noted that Johnson did not follow original orthography. He designated a type for "*Conomyrma insana* (Buckley)" rather than *Formica insana* Buckley. The original author's orthography should be used when labelling type material in order to avoid possible future error.

In order to stabilize the identity of *Formica insana* Buckley, 1866, I designate as neotype a worker specimen with the following data: Interstate 20, 12 mi E Big Spring, Howard Co., TEXAS, 16 April 1981, collected by W.F. Buren; neoparatype series consists of 49 workers and one female with the same data. Neotype deposited in USNM; neoparatypes in BMNH, LACM, MCZ, and USNM.

DESCRIPTION

Worker neotype, *measurements* (mm): HL 0.90; HW 0.79; SL 0.87; EL 0.26; TL 3.1. *Indices and ratios:* CI 89; SI 97; SI_2 110; OI 29; OMR 80; IOR 150.

Head (Fig. 1) broadest slightly above upper eye margin; in frontal view sides weakly convex and broadly, evenly rounded onto vertex; vertex margin mostly weakly convex from side to side, but with weak median emargination. Eye large, OMD about one-half as long as distance from upper eye margin to level of vertex margin.

Promesonotal profile (Fig. 2) weakly convex, mesonotum broadly subangulate behind, with distinct sloping posterior face. In profile, basal face of propodeum distinctly sinuate; dorsal tubercle about as high as thick at base; declivitous face nearly straight.

Mandible shiny, costate for nearly entire length. Head and body moderately shiny, distinctly tessellate, but frontal area, clypeus, and gena shinier and tessellation weak to absent.

Entire head (except clypeus, frontal area, and gena) densely pubescent, hairs fine and fully appressed, mostly separated from adjacent hairs by no more than two times their widths; mesosoma similarly pubescent, pubescence weaker on sides; gastral terga similar but hairs slightly denser, coarser, and longer. Mandible with short, suberect setae; clypeus with usual distal row of long curled setae and several long suberect to erect setae on disc;

frontal lobes each with one pair of long erect setae. Pronotal seta pair present, setae short and inconspicuous. Gaster with scattered erect setae, especially on last three segments.

Color medium brown, appendages paler; head and gaster slightly darker than mesosoma; margins of gastral terga slightly paler.

Worker neoparatypes, *measurements* (mm): HL 0.81–0.97; HW 0.68–0.87; SL 0.81–0.94; EL 0.23–0.27; TL 2.7–3.4. *Indices and ratios:* CI 84–93; SI 96–102; SI_2 108–110; OI 27–29; OMR 83–100; IOR 128–162.

Neoparatypes agree generally with above description; a few lack the pronotal setae.

Female, *measurements* (mm): HL 1.03; HW 1.01; SL 0.86; EL 0.36; TL 6.0. *Indices and ratios:* CI 99; SI 84; SI_2 85; OI 35; OMR 61; IOR 171.

Head (Fig. 3) broadest behind eyes, margins gently convex in frontal view and broadly rounded onto vertex; vertex margin weakly convex. In frontal view, outer margins of eyes coincident with head margins; distance from level of eye summit to level of vertex summit about two times OMD. Mesosoma, in dorsal view, about as wide as head.

Margins of head (in frontal view) with some short, fine, suberect to erect hairs; eyes with scattered, short erect hairs. Pilosity otherwise about as described for worker, but frontal lobes each with two erect setae and an erect seta behind each posterior ocellus.

Color medium brown, gaster slightly darker and with apical margins of gastral terga distinctly pallid.

DISCUSSION

Johnson treated the following names as synonyms of his concept of *D. insanus: D. pyramicus* var. *smithi* (Cole), *Conomyrma wheeleri* Kusnezov, *C. medeis* Trager, and *C. reginicula* Trager. None of these names is a synonym of *D. insanus* as I have defined that species, and all represent discrete species, here reinstated as such.

This species ranges from central Texas north to Kansas and westward to southern California. The distribution includes adjacent states across northern Mexico, but the southward extent is unclear, in part due to the presence of similar-appearing Mexican species such as *D. nigra* Pergande and in part due to inadequate collecting.

Dorymyrmex flavus McCook

Figures 7–9

Dorymyrmex insanus var. *flavus* McCook, 1879: 186; ♀

Dorymyrmex pyramicus: Creighton, 1950:346–349 (in part).

Dorymyrmex (*Conomyrma*) *pyramicus:* Gregg, 1963:432–434 (in part).

Conomyrma insana: Snelling, 1973 (in part).

The situation with respect to *D. flavus*, as treated by Johnson, is a more difficult and disturbing matter. The original description was uninformative. Other than color and contour of the mesosoma, *D. flavus* was said to be identical to Buckley's species. The range was merely given as "Southern States." While McCook may have meant that the shape of the mesosoma, *including the mesoscutum*, was different between *D. flavus* and *D. insanus* in that one was angulate and one was not, this is probably not true. Note, for example, McCook's enigmatic statement that "the cone is evidently higher than the thorax." Possibly he meant that the propodeal tubercle, the "cone," is relatively high when compared to that of *D. insanus*, and it is quite possible that this is the true meaning of the differing "contour of the thorax." Bearing in mind that *D. flavus* was described as a mere variety, he may equally well have meant simply that the mesonotum was less conspicuously angled than in the Buckley specimens of *D. insanus*. Clearly, however, there is no justification for the assumption that the mesonotum is straight in profile. Similarly, the statement by Johnson that McCook "considered his *flavus* and Buckley's *insana* as non-angular and angular in mesonotal profile respectively" cannot be supported by any of McCook's statements. In fact, the authentic McCook-determined specimens of *D. flavus* from Larissa, Texas, do have a broadly angulate mesonotal profile, despite Johnson's claim to the contrary.

In selecting a lectotype specimen, Johnson had available to him a few specimens from Larissa, Cherokee County, Texas, a community that no longer exists. These specimens were labelled as "*Dorymyrmex insanus* var. *flavus* McC." in McCook's handwriting. Johnson assumed, perhaps correctly, that these were some of the original material examined by McCook. However, this is not absolutely certain, and it is entirely possible that these were specimens collected and identified at a later date. The note that the ants were "destroying cotton worms" would seem to suggest that they may, indeed, be original material. While McCook cited the distribution to be "Southern States," he did not specifically mention any one state. Nor is there any reason to assume that McCook ever understood that there are other yellow species of *Dorymyrmex* in the southern states. Rather, it seems likely that with material from several states (implied by his statement on the distribution of *D. flavus*), McCook almost certainly had a mixed series.

As in the case of the neotype designation for *D. insanus*, Johnson did not use original orthography when designating his "lectotype": the specimen is labelled "*Conomyrma flava* (McCook)," rather than *Dorymyrmex insanus* var. *flavus*. I have examined with great care the few Larissa specimens that comprise the putative type series. There are a total of six specimens mounted on a single card on which were cut eight points; two specimens obviously now are lost, as indicated by the glue remnants on the two empty points.

The condition of these specimens is discouraging. When originally mounted, all were crushed against their respective points; gasters were uniformly flat-

tened. Legs were "scrunched" up against and over the body, and the specimens are more or less covered by the adhesive material. In most specimens the heads are crushed and distorted. Finally, the specimens are dirty, with particles of sand and other attached debris; the mouthparts cannot be studied because they are occluded by sand particles and, in most specimens, glue as well. It is possible, however, to determine that the integument of the head and mesosoma is distinctly tessellate and moderately shiny.

These difficulties are true of all the Larissa specimens *except* the putative lectotype. In that specimen the head and body are not crushed; the gastral distortion is minor and limited to that resulting from normal drying of internal tissues. The specimen is not crushed flat against the point. The legs and antennae are fully visible, and no significant portions of the body are obscured by adhesive, dirt, or other debris; there is not a sand particle to be seen anywhere on this specimen, including the mouthparts.

The "lectotype" differs radically from the other specimens on the card in one crucial character: in all the other individuals the mesonotal profile (Fig. 8) is obtusely angulate. Originally this feature was concealed, but I moved or removed legs so that the mesonotum was visible in all specimens. In the "lectotype" the mesonotum is nearly straight, exactly as in *D. bureni* (Fig. 11).

Johnson's "lectotype" differs from the remaining specimens on the card in other features as well. The integument of the head and mesosoma is less sharply tessellate, hence shinier. Although difficult to determine in the other five specimens, the head of the "lectotype" is apparently both longer and relatively narrower; the antennal scape is proportionately longer. The psammophore is slightly nearer the oral cavity than the occipital foramen in the "lectotype" but slightly nearer the foramen in the others.

In short, in terms of preparation technique, physical condition, and morphological characteristics, the putative "lectotype" differs sharply from the other specimens with which it is now associated. In my opinion, it is conspecific with *D. bureni* and not with the other specimens on the card, all of which can be safely referred to *D. flavus* as that name has usually been interpreted. I can only conclude that Johnson's "lectotype" is, in fact, a specimen of *D. bureni* added to the card at a date later than the other specimens. As such, it is invalid and must be set aside.

At the same time, I do not believe it advisable to select a true lectotype from among the five authentic Larissa specimens, none of which is in sufficiently good condition that the important morphological characteristics are readily visible. Furthermore, while it is possible, even likely, that McCook had these specimens available when he described this ant, there is no way to prove that this is so.

The only obvious solution is to set aside all the Larissa specimens and to assume that no provable type material exists. It is then possible to designate a neotype that is consistent with McCook's original description and conforms to the visible morphological characteristics of the Larissa specimens. I have, therefore, selected as neotype a worker specimen collected 21 mi W Monahans, Ward Co., TEXAS, 6 June 1979, by O.F. Francke, J.V. Moody, and F.W. Merickel; neotype is deposited in USNM; neoparatypes (8 females, 91 workers, 3 males) in BMNH, LACM, MCZ, and USNM.

DESCRIPTION

Worker neotype, *measurements* (mm): HL 0.87; HW 0.74; SL 0.85; EL 0.27; TL 2.94. *Indices and ratios:* CI 85; SI 97; SI_2 114; OI 31; OMR 140; IOR 130.

Head (Fig. 7) broadest at level of eyes; in frontal view, sides gently and evenly convex, above broadly rounded onto vertex; vertex slightly convex in frontal view. Eye large, OMD about one-half as long as distance from eye summit to level of vertex margin.

Promesonotal profile (Fig. 8) gently convex, mesonotum obtusely angulate behind. In profile, basal face of propodeum weakly sinuate; posterior tubercle erect and sharp, about as high as long; posterior declivity nearly straight.

Mandible shiny, costate for nearly entire length. Clypeus and lower face shiny, head distinctly shagreened and less shiny dorsally; mesosoma and gaster similar to upper one-half of head.

Front of head, above level of lower eye margins, with dense appressed pubescence; mesosoma (sparser on sides) and gaster similar. Erect setae as described for *D. insanus*, except pronotum without discal seta pair.

Color yellowish, head slightly reddish, and last three gastral segments medium brown; appendages yellowish, last flagellar segment brownish.

Neoparatype workers, *measurements* (mm): HL 0.83–0.91; HW 0.69–0.79; SL 0.83–0.90; EL 0.24–0.27; TL 2.83–3.08. *Indices and ratios:* CI 83–87; SI 98–100; SI_2 112–114; OI 29–30; OMR 79–81; IOR 130–138.

Neoparatypes agree generally with above description but largest workers with vertex margin nearly flat in frontal view; of the 91 paralectotype workers, 27 have at least one (most often two) erect submedian setae on the disc of the pronotum.

Female, *measurements* (mm): HL 1.05–1.09; HW 1.05–1.08; SL 0.95–0.97; EL 0.37–0.40; TL 5.74–6.13. *Indices and ratios:* CI 98–101; SI 87–92; SI_2 89–91; OI 35–36; OMR 171–200; IOR 161–172.

Head (Fig. 9) broadest above eyes, margins weakly convex in frontal view, dorsally broadly rounded onto vertex; vertex margin nearly flat to weakly convex. Eye margins, in frontal view, coincident with or slightly exceeding head margin; distance from eye summit to level of vertex about two times OMD.

Mesosoma, in dorsal view, about as wide as head.

Pilosity about as described for *D. insanus* but head margins in frontal view with few suberect or erect hairs.

Color light yellowish brown, with variable slightly duskier blotches on head and mesosoma; gaster more brownish, terga more yellowish basad and with broad pallid apical margins.

DISCUSSION

The several males in this series are not described because of their poor condition and because specific character states in males are poorly defined.

Johnson included within his concept of *D. flavus*, as a synonym, the Floridian species *D. bureni* Trager. Since Johnson's lectotype designation for *D. flavus* is invalid and *D. flavus* as established here is a different species, it follows that *D. bureni* must be reinstated as a valid taxon.

This species has been recently collected in a park near Blythe, Riverside County, California. Since *D. flavus* appears to be absent over most of New Mexico and all of Arizona, it seems likely that this California record represents an accidental introduction. The county park near Blythe is on the banks of the Colorado River and is heavily used by travellers from other states. The ant is now abundant in that park but has not been collected elsewhere in California.

Dorymyrmex bureni (Trager)
REVISED STATUS
Figures 10–12

Conomyrma edeni Tryon, 1986:340 (*nomen nudum*); Barton, 1986:496 (*nomen nudum*).
Conomyrma bureni Trager, 1988:19–21; ♀♀.
Conomyrma flava: Johnson, 1989:187–191; ♀♀ (in part, misidentification, including "lectotype" of "*Conomyrma flava*.")

As shown above, Johnson's "lectotype" of *D. flavus* is not part of the original series and not conspecific with authentic specimens identified as *D. flavus* by McCook but is conspecific with Trager's recently described *D. bureni;* Johnson's contention that *D. bureni* is a synonym of *D. flavus* is here rejected.

Trager (1988) gives the range of *D. bureni* as extending from Maryland and Virginia south to Florida and west to Mississippi. I have seen samples from several localities in Louisiana and workers collected at Columbus, Colorado County, Texas.

Dorymyrmex reginicula (Trager)
REVISED STATUS
Figure 15

Conomyrma reginicula Trager, 1988:27–28; ♀♀.
Conomyrma insana: Johnson, 1989:185–187; ♀♀ (in part).

Although Johnson considered *D. reginicula* to be a synonym of *D. smithi* (misidentified as *C. insana*), I cannot agree and here reinstate *D. reginicula*. In my opinion this social parasite differs from *D. smithi* in the features originally cited by Trager, and I see no evidence of hybridization between the two.

In both workers and females of *D. reginicula*, the front of the head is shinier because of the much finer and shorter appressed pubescence. The female of *D. reginicula* is distinctly smaller than that of *D. smithi* (HW 0.98–1.03 versus 1.23–1.32 mm, respectively). In females of *D. reginicula*, the scapal pubescence is closely appressed to the shaft, but in *D. smithi* the hairs are distinctly decumbent to subdecumbent. Although the scapal pubescence is similar in workers of the two species, the scapes of *D. smithi* workers usually have at least some subdecumbent to decumbent pubescence along the shaft. Trager also noted the proportionately longer scape in workers of *D. reginicula* (SI over 101 in 80% of individuals) when compared to those of *D. smithi* (SI less than 101 in 80% of individuals).

Trager established that *D. reginicula* is a social parasite in nests of *D. bureni* and possibly *D. bossuta* and is apparently not known to occur outside of Florida. The absence of *reginicula*-like specimens from other areas further suggests the specific distinctness of the two forms.

Dorymyrmex smithi Cole
REVISED STATUS
Figures 4–6

Dorymyrmex pyramicus var. *smithi* Cole, 1936: 120; ♀
Dorymyrmex pyramicus: G.C. Wheeler and Wheeler, 1963:155–159 (misidentification).
Dorymyrmex (*Conomyrma*) *pyramicus:* Gregg, 1963:432–434 (in part, misidentification).
Conomyrma insana: Snelling, 1973 (in part, misidentification). Johnson, 1989:185–187 (in part, misidentification).
Conomyrma medeis Trager, 1988:25–26; ♀♀. NEW SYNONYMY.

I have now no doubt that my decision to declare Cole's *D. pyramicus* var. *smithi* a synonym of *D. insanus* was in error. Both workers and females of *D. smithi* differ from those of *D. insanus* in the distinctly broader head and the concave, rather than flat to weakly convex, vertex margin.

I have compared paratype workers of *D. smithi* with those of *C. medeis* and conclude that they are conspecific. In both series the worker head (Fig. 4) is broad, and the vertex margin is distinctly to weakly concave in frontal view, rarely flat. In both series the mesonotal profile (Fig. 5), anterior to its posterior declivity, is flat or nearly so. The propodeal tubercle is both higher and sharper in workers of *D. smithi* than in those of *C. medeis*, but these differences are well within the range of variation noted in workers of other species.

Although females of *D. smithi* were not available to Cole at the time of the description, those that I have seen from Nebraska and adjacent states are essentially inseparable from female paratypes of *C. medeis*.

In both workers and females from Nebraska, the front of the head is a little duller than in samples from Florida. Johnson's "neotype" of "*Conomyrma insana*" and the associated alate female (also labelled "neotype"!) are like the Florida population described by Trager as *C. medeis*. Other workers and females from more northern and western localities in Texas resemble more closely the specimens from Nebraska.

The range of *D. smithi* extends from North Dakota to eastern Colorado and New Mexico, east through Texas to North Carolina and Florida. The westward extent of the range is uncertain.

Dorymyrmex wheeleri (Kusnezov) REVISED STATUS

Figures 13, 18

Conomyrma (? *Biconomyrma*) *wheeleri* Kusnezov, 1952:438–439; ♀.
Conomyrma insana: Snelling, 1973 (in part).

This species was described from two workers collected by P. Klingenberg at "College P. A.," Tucson, Arizona, on 22 March 1933; a specific holotype was not designated. A female specimen in the MCZ collection, perhaps conspecific with the two workers, has a similar label, with identical data, and a label written by W.M. Wheeler; "*Dorymyrmex pyramicus* n. subsp."

The locality data as cited by Kusnezov are incorrect: the first line of the label reads "College P. K." on both samples. According to F.G. Werner (personal communication), P. Klingenberg collected specimens in Arizona and sent them to W.M. Wheeler. Apparently, when the specimens were mounted and the labels written, the notation "coll. P. K." (= collector P. Klingenberg) became "College P. K.," misquoted by Kusnezov as "College P. A." A further distortion is that of Shattuck (1994), who translated the citation to read "College Park, Tucson."

Of the two syntypes, the larger is here designated lectotype; the second specimen is the paralectotype. *Measurements* (mm) lectotype (paralectotype): HL 0.73 (0.62); HW 0.60 (0.51); SL 0.71 (0.59); EL 0.19 (0.17); TL 2.5 (2.2). *Indices and ratios:* CI 82 (83); SI 97 (96); SI_2 117 (115); OI 26 (27); OMR 93 (85); IOR 153 (146).

When I placed this species in synonymy with *D. insanus* in 1973, I did so on the basis of Kusnezov's original description; nothing in that description suggested that *D. wheeleri* could be separated from *D. insanus*. Kusnezov failed to note a characteristic that will separate *D. wheeleri* from all previously described North American *Dorymyrmex:* the sparsely pubescent frons, the hairs of which are separated from adjacent hairs by several times their own widths (in the paralectotype many of the hairs are separated by their own lengths or more). In the paralectotype the entire frons is smooth and shiny, but in the lectotype most of the frons is distinctly shagreened.

The head shape (Fig. 13) is about as in *D. insanus:* lateral margins weakly convex, vertex margin so weakly convex that it is nearly flat. The profile of the mesonotum (Fig. 18) is flat and with a distinctly sloping posterior face. The mostly convex basal face of the propodeum is abruptly depressed behind, to form a distinct transverse crease in front of the short, acute tubercle.

These two workers appear to be nanitic, and I have seen no specimens like them in any of the numerous collections of *Dorymyrmex* available from the Tucson area. The female specimen cited above is probably not conspecific with the worker types of *D. wheeleri*. It is similar to a number of females sent to me by D.E. Wheeler; several of these are foundresses with nanitic workers that do not resemble the *D. wheeleri* types. They may represent an undescribed species.

Dorymyrmex lipan, new species

Figures 16, 17

DIAGNOSIS

Worker head nearly devoid of appressed pubescence, entirely smooth and shiny.

DESCRIPTION

Worker holotype, *measurements* (mm): HL 0.81; HW 0.71; SL 0.79; EL 0.22; TL 2.7. *Indices and ratios:* CI 88; SI 98; SI_2 113; OI 27; OMR 94; IOR 159.

Head (Fig. 16) broadest slightly above upper eye margin; in frontal view, sides nearly straight below and weakly curved above eyes, broadly and evenly rounded onto vertex, vertex nearly flat. Eye large, OMD about 0.60 times distance from upper eye margin to level of vertex margin.

Promesonotal profile nearly flat, obtusely angulate behind (Fig. 17). In profile, basal face of propodeum weakly sinuate, posterior cone erect and sharp; posterior declivity nearly straight.

Mandible shiny, costate for nearly entire length. Head and body shiny, integument weakly tessellate to smooth.

Entire head and body sparsely pubescent, appressed hairs nowhere obscuring surface and not imparting sheen across surface. Erect hairs as described for *D. insanus*.

Color medium reddish brown, gaster darkest; antennae and legs yellowish.

Paratype, *measurements* (mm): HL 0.79–0.86; HW 0.71–0.77; SL 0.78–0.83; EL 0.19–0.24; TL 2.7–2.9. *Indices and ratios:* CI 86–92; SI 92–100; SI_2 107–114; OI 24–28; OMR 93–94; IOR 143–157.

TYPE MATERIAL

Holotype and 14 paratype workers: TEXAS, Brewster Co.: Basin Road, 4800 ft. elev., Chisos Mts., Big Bend National Park, 6 Sept. 1969 (G.C. & J. Wheeler, no. TEX-258). Holotype in LACM; paratypes in BMNH, LACM, MCZ, USNM.

ETYMOLOGY

Named for the Lipan Apache of western Texas; the name is a noun in apposition.

Dorymyrmex paiute, new species

Figures 14, 23

DIAGNOSIS

Unicolorous brownish species with greatest EL distinctly shorter than OMD.

DESCRIPTION

Worker (holotype), *measurements* (mm): HL 0.90; HW 0.81; SL 0.84; EL 0.21; TL 3.0. *Indices and ratios:* CI 89; SI 97; SI_2 110; OI 23; OMR 114; IOR 200.

Head (Fig. 14) broadest at eye level; in frontal view, margins weakly convex and broadly rounded onto vertex, vertex weakly concave. Eye small, EL 0.90 times OMD, OMD about 0.64 times distance from upper eye margin to level of vertex margin.

Mesonotal profile (Fig. 23) flat or slightly concave; base of propodeum long, distinctly sinuate, posterior tubercle broad at base, sharp.

Sculpture and pilosity as described for *D. insanus* but pronotum without erect hairs (several specimens have one pair of setae that are distinctly shorter than minimum scape thickness).

Color light reddish brown, head more reddish and gaster more brownish; antennae and legs paler.

Paratypes, *measurements* (mm): HL 0.81–0.92; HW 0.71–0.84; SL 0.77–0.87; EL 0.19–0.23; TL 2.9–3.4. *Indices and ratios:* CI 88–96; SI 93–100; SI_2 100–114; OI 22–26; OMR 108–129; IOR 171–200.

TYPE MATERIAL

Holotype and 35 paratype workers: UTAH, Washington Co.: Zion National Park, 22 July 1932 (W.S. Creighton). Holotype in LACM; paratypes in BMNH, LACM, MCZ, USNM.

ETYMOLOGY

Named for the Paiute people who formerly occupied the Great Basin region; the name is a noun in apposition.

DISCUSSION

The small eyes and lack of pronotal hairs serve to separate this species from all others previously described from North America. Three specimens do possess pronotal hairs, but these hairs are distinctly shorter than the minimum thickness of the antennal scape. In all other species with pronotal hairs, the hairs are as long as, or longer than, the maximum width of the antennal scape.

This species is presently known only from the type series.

KEY TO WORKERS OF UNITED STATES SPECIES OF *DORYMYRMEX*

1 Mesonotal profile, in all or nearly all individuals from same nest, evenly convex (Figs. 11, 20) or flat to weakly concave (Fig. 22) 2

– Mesonotal profile, in all or nearly all individuals from same nest, with distinct dorsal and declivitous faces that meet in more or less well-defined angle (Figs. 18, 19) ... 4

2(1) Promesonotal profile convex, base of propodeum angled 145° or less to plane of posterior portion of mesonotum (Figs. 11, 20); scape surpassing vertex by no more than 0.33 times its length (Fig. 10); color various 3

– Promesonotal profile flat, base of propodeum angled 165° or more to plane of mesonotum (Fig. 22); scape surpassing vertex by nearly 0.5 times its length; color uniformly clear yellow (gastral apex sometimes darkened) (Florida) ..... *elegans* (Trager)

3(2) Head (Fig. 10) broad, CI over 87 (less in some minor workers); scape relatively short (SI less than 112); propodeal tubercle blunt, posterior face straight or slightly convex (Fig. 11); color largely yellow or reddish yellow, but if head and gaster infuscated, then mesosoma also infuscated (Maryland to Florida, west to eastern Texas) ..... *bureni* (Trager)

– Head narrower, CI less than 87; scape relatively longer, (SI at least 112 in 95% of individuals); propodeal tubercle sharper, posterior face slightly concave (Fig. 20); head and gaster brown, mesosoma clear yellowish (Florida) ..... *flavopectus* (M. Smith)

4(1) Front of head and discs of gastral terga 1–3 shiny, with only obscure sparse to scattered appressed pubescence 5

– Front of head and discs of gastral terga 1–3 only moderately shiny, with abundant appressed pubescence that partially obscures surface and imparts silky sheen to surface in oblique view 7

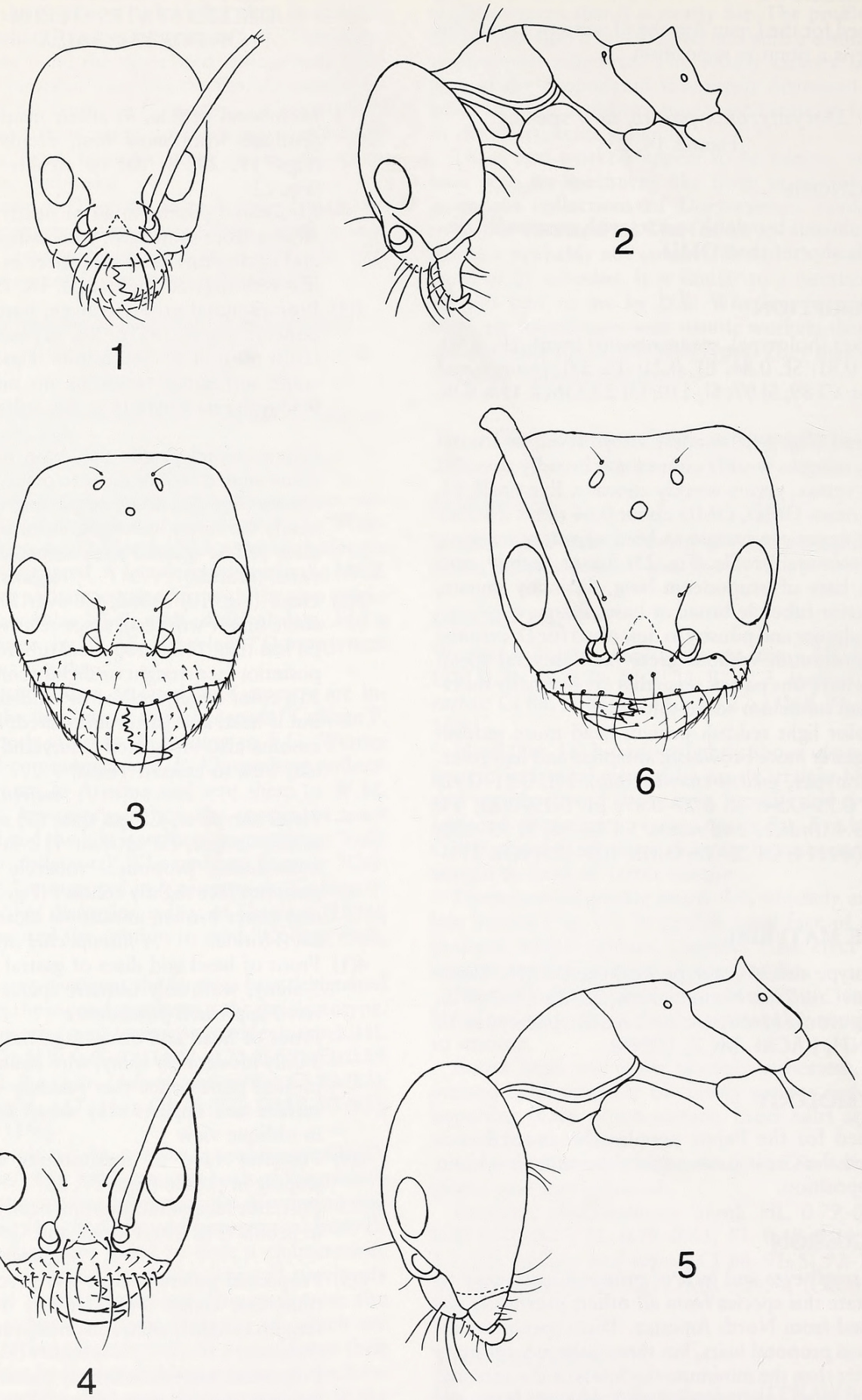
5(4) Posterior face of mesonotum distinctly sloping in profile (Figs. 17, 18) 6

– Posterior face of mesonotum nearly vertical in profile (Fig. 19) (Florida and Georgia) .. .. *bossutus* (Trager)

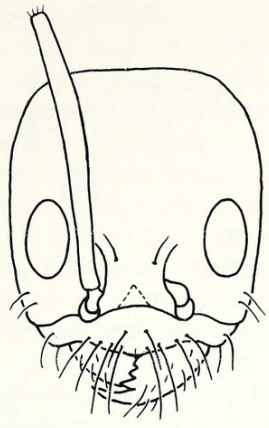
6(5) Propodeal tubercle short and preceded by transverse crease (Fig. 18); disc of gastral tergum 1 slightly shiny, distinctly roughened (Arizona) ..... *wheeleri* (Kusnezov)

– Propodeal tubercle relatively higher and not preceded by transverse crease (Fig. 17); disc of gastral tergum 1 smooth and shiny (Texas) ..... *lipan,* new species

7(4) Head relatively narrow, CI usually less than 88, rarely as much as 90; vertex margin



Figures 1–6. Worker head (frontal view), worker head and mesosoma (profile), and female head (frontal view), respectively, of *Dorymyrmex insanus* (**1–3**) and *D. smithi* (**4–6**). Figures 1, 2, and 4–6 by Tina Ross.



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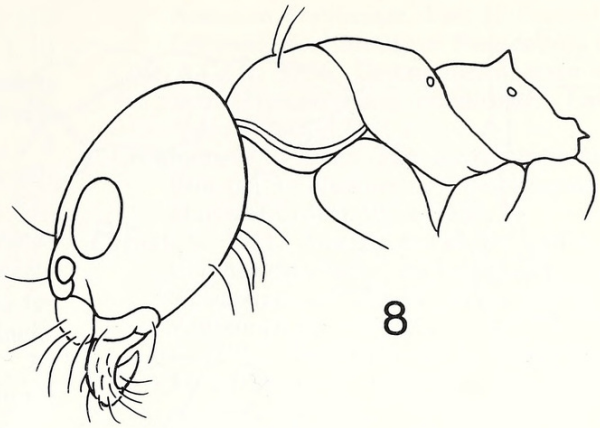

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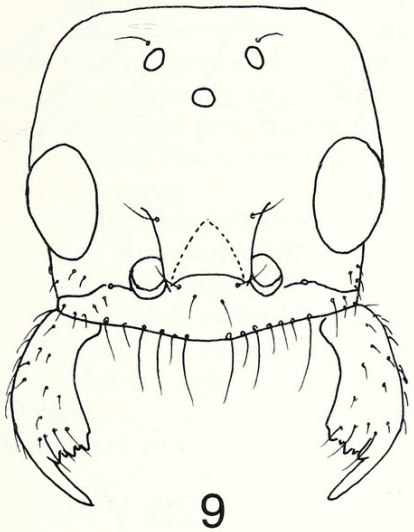

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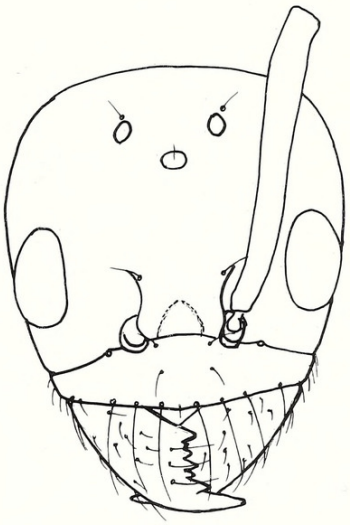

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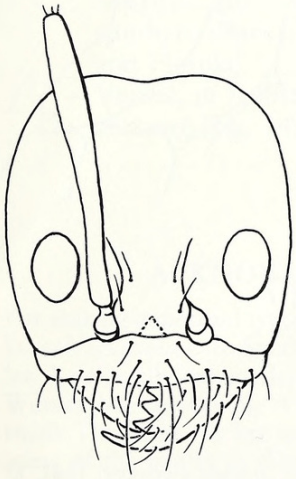

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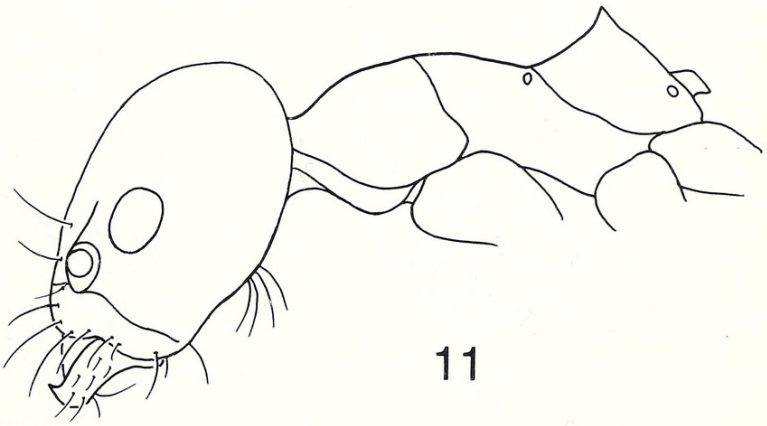

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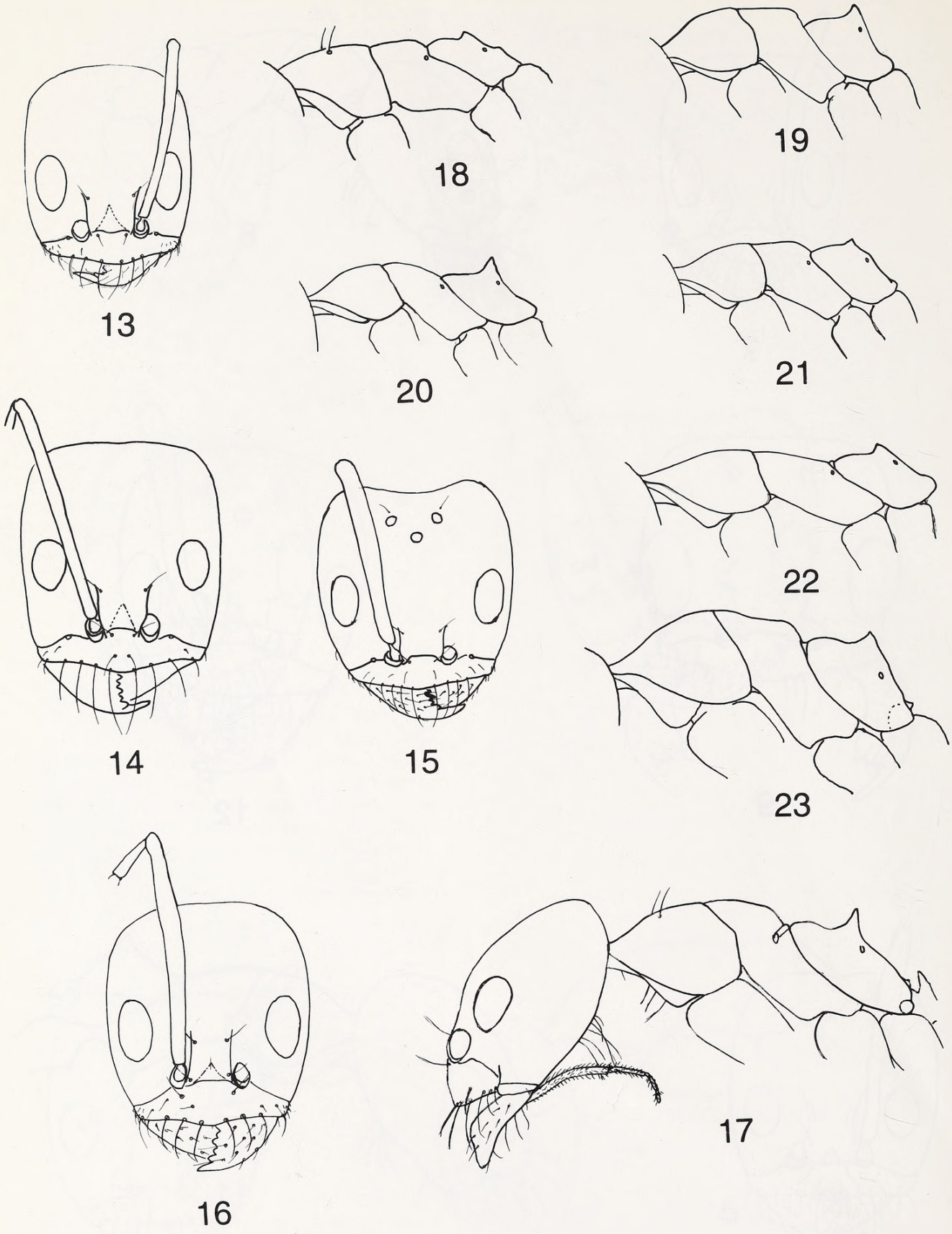
Figures 7–12. Worker head (frontal view), worker head and mesosoma (profile), and female head (frontal view), respectively, of *Dorymyrmex flavus* (7–9) and *D. bureni* (10–12). Figures 7, 8, 10, and 11 by Tina Ross.



Figures 13–23. **13–16.** Head (frontal view) of *Dorymyrmex wheeleri* (worker) (**13**), *D. paiute* (worker) (**14**), *D. reginicula* (female) (**15**), and *D. lipan* (worker) (**16**). **17.** Head and mesosoma (profile) of worker *D. lipan*. **18–23.** Worker mesosoma (profile) of *D. wheeleri* (**18**), *D. bossutus* (**19**), *D. flavopectus* (**20**), *D. grandulus* (**21**), *D. elegans* (**22**), and *D. paiute* (**23**).

straight or slightly convex (Figs. 4, 7); eye relatively large, IOD usually less than 1.50 (never over 1.70) times EL and EL equal to or exceeding OMD; female unicolorous yellowish or brownish 8

- Head relatively broad, CI over 90; eye relatively small, IOD at least 1.75 times EL, OMD at least equal to, and usually greater than, EL; vertex margin usually distinctly concave in frontal view, rarely straight; female head and mesosoma red, gaster blackish 10

8(7) Propodeal tubercle relatively prominent; pronotum usually with discal seta pair, or, if absent, color distinctly yellowish (west of Mississippi River) 9

- Propodeal tubercle short (Fig. 21); pronotal disc without erect setae (Illinois?, Michigan?, New Jersey, south to Florida and Alabama) ..... *grandulus* (Forel)

9(8) Color light to dark brownish, head and gaster commonly darker than mesosoma; pronotal seta pair usually present (Kansas to central Texas, west to southern California) ..... *insanus* (Buckley)

- Color clear yellowish to reddish yellow, often with vertex, mesosomal dorsum, and apex of gaster infuscated; pronotal seta pair commonly absent (Kansas and eastern Colorado to southern Texas, eastern New Mexico, and western Louisiana) ..... *flavus* (McCook)

10(7) Head and mesosoma black or dark brown 11

- Head and mesosoma red (western Texas to southern Nevada and California) ..... *bicolor* Wheeler

11(10) Vertex, in frontal view, distinctly concave (Fig. 4) (North Dakota south to eastern New Mexico and western Texas, east across southern states to North Carolina, Georgia, and Florida) ..... *smithi* Cole

- Vertex, in frontal view, straight or weakly concave (Fig. 14) (Utah) ..... *paiute,* new species

ACKNOWLEDGMENTS

For making important types and other material available, I thank S. Cover, D.R. Smith, J.C. Trager, and D.E. Wheeler. I especially acknowledge my indebtedness to F.G. Werner for unravelling "College P. A." I also wish to thank Tina Ross for her assistance in the preparation of some of the figures in this paper. For important review comments I am indebted to S. Cover and J. Trager.

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Received 25 May 1994; accepted 10 January 1995.

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