

167  
**SOCIOBIOLOGY**  
**Vol. 36, No. 2, 2000**  
ISSN 0014-1801

**A Review of the New World Ants of the  
Subgenus *Myrafant*, (Genus *Leptothorax*)  
Hymenoptera: Formicidae**

**CONTENTS**

Abstract .....	265
Resumen .....	267
Methods and Materials .....	268
Genus <i>Leptothorax</i> .....	269
Subgenus <i>Myrafant</i> .....	270
Key to Species of <i>Leptothorax</i> ( <i>Myrafant</i> ) .....	272
Key to Species of <i>Myrafant</i> from Mexico and Guatemala (in Spanish) .....	287
Key to Species Complexes based primarily on Workers .....	298
List and Descriptions of the Complexes .....	299
Keys to Workers of the Various Complexes .....	301
List of the North American Species in the Subgenus <i>Myrafant</i> ....	309
Discussion .....	425
Acknowledgments .....	426
References .....	426
Index .....	435

Editor: David H. Kistner, Dept. of Biological Sciences, California State University, Chico, CA 95929-0515, U.S.A.

Resident Associate Editors:

Michael J. Erpino, Dept. of Biological Sciences, California State University, Chico, CA 95929-0515, U.S.A.

Alzada C. Kistner, Dept. of Biological Sciences, California State University, Chico, CA 95929-0515, U.S.A.

Associate Editors:

Murray S. Blum, Dept. of Entomology, University of Georgia, Athens, GA 30601, U.S.A.

Ralph W. Howard, USDA-ARS, U.S. Grain Marketing Research Laboratory, 1550 College Av., Manhattan, KS 66502, U.S.A.

#### ABOUT THE COVER

Distribution of species richness of the subgenus *Myrafant* in the United States. For further explanation, see p. 425

## A Review of the New World Ants of the Subgenus *Myrafant*, (Genus *Leptothorax*) (Hymenoptera: Formicidae)

by

William P. Mackay<sup>1</sup>

#### ABSTRACT

The New World species of the subgenus *Myrafant* are revised, and 3 keys are included: 1) an illustrated key to the workers based on characters, 2) a phylogenetic key, and 3) a key to the Mexican and Guatemalan species (in Spanish). The keys are followed by diagnoses, distributions, and illustrations of all of the species. There are a total of 56 species now known from the New World, including 25 new species described in this paper. Species complexes are defined, including the *andrei* complex, *andersoni* complex, *emmae* complex, *hispidus* complex, *longispinosus* complex, *nitens* complex, the *obturator* complex, *schaumii* complex, *silvestrii* complex, *striatulus* complex and the *tricarinatus* complex.

The species include: *L. adustus* new species, from Chihuahua, *L. ambiguus* Emery from northern United States and southeastern Canada, *L. andersoni* new species from Texas, *L. andrei* Emery from southwestern United States and northern México, *L. bestelmeyeri* new species from south central New Mexico, *L. bicolor* new species from Chiapas, *L. bradleyi* Wheeler from southeastern United States, *L. brevispinosus* new species from Michoacán, *L. bristoli* new species from Texas and Coahuila, *L. carinatus* Cole from western United States and northern México, *L. chandleri* new species from northern California, *L. cokendolpheri* new species from New Mexico and Texas, *L. coleenae* new species from southern New Mexico, *L. curvispinosus* Mayr (= *Stenamma gallarum* Patton) from eastern North America, *L. davisii* Wheeler new status from eastern United States, *L. emmae* new species from southwestern New Mexico, *L. furunculus* Wheeler from Wyoming and Colorado, *L. gallae* M. Smith from California, *L. hispidus* Cole from Texas, Coahuila, Nuevo León and Zacatecas, *L. josephi* new species from west central New Mexico, *L. liebi* new species from Texas, *L. lindae* new species from southern California, *L. longispinosus* Roger (= *L. longispinosus laeviceps* Buren = *L. iowensis* Buren) from northeastern United States and southeastern Canada, *L.*

<sup>1</sup>Fire Ant Laboratory, Department of Biological Sciences, The University of Texas, El Paso, TX 79968 USA

*manni* Wheeler from Nuevo León, Morelos and Hidalgo, *L. mariposa* Wheeler from western United States, *L. maryanae* new species from south central California, *L. melinus* new species from west central New Mexico, *L. mexicanus* new species from Coahuila and San Luis Potosí, *L. minutissimus* M. Smith from Washington D. C., *L. neomexicanus* Wheeler from southwestern United States, *L. nevadensis* Wheeler (= *L. eldoradensis* Wheeler new synonymy = *L. melanderi* Wheeler new synonymy = *L. nevadensis rudis* Wheeler new synonymy) from western United States, *Leptothorax nitens* Emery (= *L. nitens occidentalis* Wheeler = *L. nitens heathi* Wheeler), *L. obliquicanthus* Cole from western United States, *L. obturator* Wheeler from Texas, *L. ocellatus* new species from northern California, *L. oxynodis* new species from west central California, *L. peninsularis* Wheeler from Baja California Sur, *L. punctaticeps* new species from Nuevo León, *L. punctatissimus* new species from Nuevo León, *L. punctithorax* new species from central México, *L. rugatulus* Emery (= *L. curvispinosus rugatulus cockerelli* Wheeler = *L. curvispinosus annectens* Wheeler = *L. rugatulus mediorufus* Wheeler = *L. rugatulus dakotensis* Wheeler and Wheeler = *L. rugatulus brunnescens* Wheeler new synonymy) from western North America, *L. rugithorax* new species from Hidalgo, *L. rugosus* new species from Nuevo León, *L. rugulosus* new species from Michoacán, *L. schaumii* Roger (= *L. fortinodis* Mayr = *L. fortinodis* var. *gilvus* Wheeler = *L. fortinodis* var. *melanoticus* Wheeler) from south eastern United States, *L. schmittii* Wheeler from Colorado, *L. silvestrii* (Santschi) from Arizona, *L. smithi* Baroni Urbani (= *L. wheeleri* Smith) from southeastern United States, *L. stenotyle* Cole (= *L. angustinodus* Cole) from south eastern Arizona, *L. stollii* Forel from Guatemala, *L. striatulus* Stitz from Guerrero, *L. terrigena* Wheeler from Texas, *L. texanus* Wheeler from south central United States, *L. tricarinatus* Emery from western United States, *L. tuscaloosae* Wilson from Alabama and North Carolina, and *L. whitfordi* new species from southern New Mexico, western Texas and northern México.

Ants of this subgenus are rarely collected due to their cryptic habits, although they are common in many habitats. Most species nest in the soil or in tree branches. Nest populations are generally small, most with less than 100 workers. These ants are found in a variety of habitats, from extremely arid zones to high elevation pine and spruce forests. They are usually most common in mesic sites, although many species can be found in even the most xeric sites. Some of the species are polygynous, others have a single queen. Many of the species are enslaved by other ants. Very little is known of most of the species; some of the common species have been intensively studied. The less com-

mon species have been rarely collected, due to their small size and cryptic habitats.

## RESUMEN

Las especies del Nuevo Mundo del subgénero *Myrafant* del género *Leptothorax*, son revisadas, con 3 claves, incluyendo una clave de las especies de México y Guatemala, presentada en Español. Se incluyen diagnoses, distribuciones e ilustraciones de cada especie. Hay un total de 56 especies, incluyendo 25 especies nuevas. Once complejos de especies están descritos: complejo *andrei*, complejo *andersoni*, complejo *emmae*, complejo *hispidus*, complejo *longispinosus*, complejo *nitens*, complejo *obturator*, complejo *schaumii*, complejo *silvestrii*, complejo *striatulus*, y complejo *tricarinatus*. Las especies que se encuentran en México y Guatemala incluyen: *L. adustus* especie nueva de Chihuahua, *L. andrei* Emery de Baja California Norte, *L. bicolor* especie nueva de Chiapas, *L. brevispinosus* especie nueva de Michoacán, *L. bristoli* especie nueva de Coahuila, *L. carinatus* Cole de Chihuahua, *L. hispidus* Cole de Coahuila, Nuevo León y Zacatecas, *L. manni* Wheeler de Nuevo León, Morelos y Hidalgo, *L. mexicanus* especie nueva de Coahuila y San Luis Potosí, *L. peninsularis* Wheeler de Baja California Sur, *L. punctaticeps* especie nueva de Nuevo León, *L. punctatissimus* especie nueva de Nuevo León, *L. punctithorax* especie nueva de México, *L. rugithorax* especie nueva de Hidalgo, *L. rugosus* especie nueva de Nuevo León, *L. rugulosus* especie nueva de Michoacán, *L. stollii* Forel de Guatemala (sin localidad específica), *L. striatulus* Stitz de Guerrero, y *L. whitfordi* especie nueva de Nuevo León.

Las hormigas de este subgénero son poco colectadas debido a sus hábitos crípticos. La mayoría anidan en el suelo o en ramas de arbustos y árboles. Las poblaciones son pequeñas, con cerca de 100 obreras.

## INTRODUCTION

The subgenus *Myrafant* comprises an interesting and diverse group of small ants, which usually nest under stones in temperate forests, or in tree branches, although they are found in many other habitats in North America. Most species are rarely collected by the non-specialist as they are small and inconspicuous.

This subgenus belongs to one of the most difficult taxa of ants, the tribe Formicoxenini, whose systematics is in a state of confusion (Buschinger, 1981). The last revision of the United States species of the genus *Leptothorax* was that of Creighton (1950). Since then, the subgenus *Macromischa* has been revised by Baroni Urbani (1978), and

synonymized with *Leptothorax* by Snelling (1986), subgenus *Nesomyrmex* by Kempf (1959) and synonymized by Bolton (1982), and the genus *Formicoxenus* by Francoeur and Loisele (1985), and North American *Dichothorax* by Mackay (1993a), also synonymized by Bolton (1982). Partial keys to the subgenus *Myrafant* have been presented by Smith (1952) and Cole (1958a), which was suggested as a synonym by Brown (1973) and Bolton (1982). A number of new species have been described since 1950, and the existence of only partial keys, has made this subgenus one of the most difficult of the North American groups for species identification.

The objectives of this paper are to describe 25 new species of the subgenus from the New World, present revised, illustrated keys for the identification of the workers, and to provide illustrations of all of the species, based primarily on type material. The biology of each of the species is summarized, based on more than 30 years of collecting in the United States and more than 17 years in México. Identification of the species is difficult and two independent keys are included to facilitate identification. A third key is included for the identification of the species in Mexico. There are still many undescribed species to be expected, especially in México. If the 2 keys lead to different species, it is likely that a new species is involved.

#### METHODS AND MATERIALS

Specimens were borrowed from several institutions and curators as follows:

- AMNH American Museum of Natural History, Mark Smethurst
- CASC California Academy of Sciences, Darell Ubick, Wojciech Pulawski, Robert Zuparko
- CIDA Albertson College of Idaho Collection, Orma J. Smith Museum of Natural History, Idaho, William Clark
- CWEM William and Emma Mackay collection, University of Texas, El Paso
- FMNH Field Museum of Natural History, Philip Parillo
- EMAU Ernst-Moritz-Arndt Universität Greifswald, G. Müller-Motzfeld (Mayr Collection) Germany
- MCSN Museo Civico di Storia Naturale, Valter Raineri (Emery Collection) (Italy)
- MCZC Museum of Comparative Zoology, Harvard University, Stefan Cover
- MHNG Muséum d'Histoire naturelle, Genève, I. Löbl (Forel Collection) (Switzerland)
- UNAM Instituto de Biología, Universidad Nacional Autónoma de

México, Harry Brailovsky

USNM United States National Museum of Natural History, Smithsonian Institution, David Smith and Ted Schultz

Specimens were measured using an ocular micrometer in a dissection microscope. The following abbreviations are used (all measurements in mm):

HL Head length, anterior of median lobe of clypeus to mid point of occiput

HW Head width, posterior to eyes in all castes, maximum distance excluding eyes

EL Eye length, maximum dimension

SL Scape length, excluding basal condyle

WL Weber's length, anterior border of pronotum to posterior border of lobe of metapleural gland

PL Maximum length of petiolar node (dorsal view)

PW Maximum width of petiole (dorsal view)

PPL Maximum length of postpetiole

PPW Maximum width of postpetiole

CI Cephalic Index, HW/HL X 100

SI Scape index, SL/HL X 100 (note HL used instead of HW)

PI Petiolar index, PW/PL X 100

PPI Postpetiolar index, PPW/PPL X 100

#### Genus *Leptothorax*

*Leptothorax* Mayr, 1855:431

*Temnothorax* Mayr, 1861:68 (Forel, 1890:lxix)

*Macromischa* Roger, 1863:184 (Snelling, 1986:154)

*Dichothorax* Emery, 1895:323 (Bolton, 1982:319)

*Goniothorax* Emery, 1896:58 (Bolton, 1982:319)

*Mycothorax* Ruzsky, 1904:288 (M. Smith, 1950:29)

*Nesomyrmex* Wheeler, 1910:259 (Bolton, 1982:319; 1995:39)

*Myrafant* M. Smith, 1950:29-30 (Brown, 1973:182; Bolton, 1982:319)

Type species: *Formica acervorum* Fabricius, 1793:358 (designated by Bingham, 1903:214)

Worker: Most species are small, with an elongate head; mandibles with 4-6 teeth (usually 5); maxillary palps 5 segmented, labial palps 3 segmented; clypeus often with longitudinal depression; frontal carinae straight; antenna with 11 or 12 segments, with 3 segmented club; eyes ranging in size from small to very large; mesosoma variable in form, usually without significant depressions at the sutures and nearly always with angles or teeth on propodeum; middle and hind tibial spurs simple (not pectinate); petiolar peduncle usually short, subpetiolar process usually present, node of petiole varying in shape;

postpetiole usually nodiform, without ventral process.

Usually with few erect hairs, which are thickened, even spatulate, decumbent pubescence sparse.

Most species drab colored, ranging from yellow to brown to black, occasionally bicolored red and black. Sculpture of most species is rough, the dorsum of head may be glossy, shiny, mesosoma nearly always roughly sculptured, gaster usually polished and shiny, but may have fine sculpture.

Female: Similar to worker, except usually larger, eyes larger, ocelli present (rarely present in workers) and mesosoma modified for flight. Propodeal spines usually shorter and thicker than in worker.

Male: Similar in size to worker or smaller, ocelli well developed, compound eyes large; head usually broader than long; antennae with 12 or 13 segments; scape short, funiculus long; mesosoma modified for flight; propodeal armature usually poorly developed, sometimes being simply raised areas.

#### Subgenus *Myrafant* Resurrected Status

*Leptothorax* subgenus *Myrafant* M. Smith, 1950:29-30; D. Smith, 1979:1391-1395; Kempf, 1972:132

Type species: *Leptothorax curvispinosus* (designated by M. Smith, 1950:30)

Diagnosis: All castes similar to the descriptions above, except clypeus with at least one medial, longitudinal carina, usually with several lateral carinae. The scapes never have erect hairs and rarely have suberect hairs. Body hairs tend to be very sparse, coarse and erect. The petiolar peduncle is nearly always short.

Distribution: New World species of this subgenus are found in from southern Canada south to Guatemala. They appear to be most diverse in southwestern United States and México.

Discussion: Gregg (1953) protested the establishment of *Myrafant* as a subgenus; Brown (1973) synonymized *Myrafant* with *Leptothorax*, providing no details. Bolton (1982) followed Brown in considering *Myrafant* a synonym. Bolton (1995) later suggested caution as the Formicoxenini is currently a tangle of species, and some of them may even merit generic status. *Myrafant* is currently a group of easily distinguished ants (at least in the New World) which deserves to remain separated, at least until a thorough analysis of the Tribe is completed. Biologically the two subgenera are different, with the subgenus *Leptothorax* generally being found at higher elevations and latitudes, often found in the nests of other ant species, whereas *Myrafant* is more common at lower elevations and latitudes, rarely nesting with other

ants.

The tribe Formicoxenini is closely related to the Tetramoriini, but can be separated on the basis of several characters (Bolton, 1982). *Tetramorium* has the lateral portions of the clypeus raised into a narrow ridge or shield-like wall in front of the antennal insertions. *Leptothorax* has that part of the clypeus weakly raised or not raised into a similar wall. *Tetramorium* has maxillary palps with 4 (or rarely 3) segments, whereas *Leptothorax* has 5 segmented maxillary palps. The mandibles of *Tetramorium* usually have 7 teeth, which include 3 large teeth followed by 4 denticles. *Leptothorax* usually has 5 mandibular teeth (4-6) which decrease in size from the apex to the base. Additional characters are listed in Bolton (1982).

The subgenus *Myrafant* can be distinguished by the characters in the key. It can be characterized as having a medial clypeal carina and a relatively short petiolar peduncle.

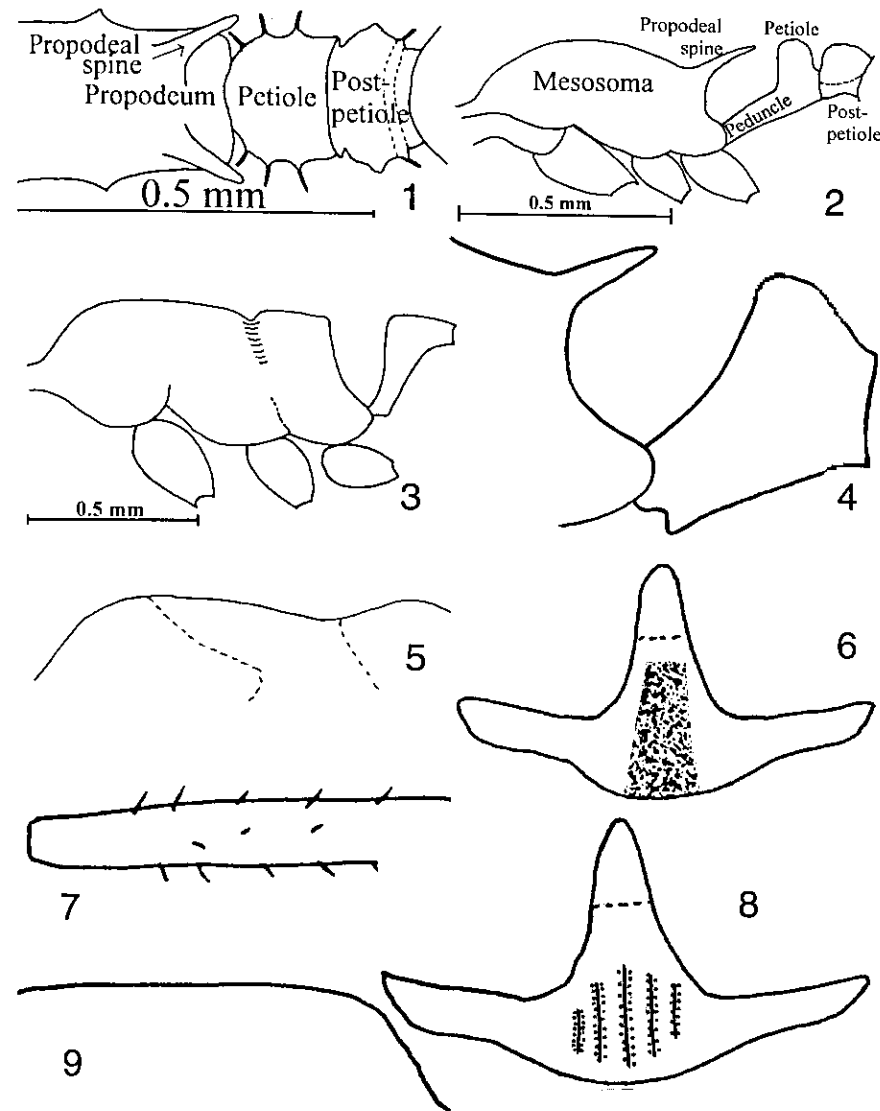
The shape of the petiolar node appears to be one of the best characters in the subgenus. The shape ranges from a sharp apex to a rounded apex and finally to a truncate apex. The number of antennal segments appears to be of little importance in the phylogeny of this group. Species with 11 segments appear to have independently evolved at least 3 times.

European species are similar to the species in North America, and are apparently closely related. Some species appear to be members of North American species complexes. European members of *Myrafant* include *L. angustulus* (Nylander), *L. fuentei* Santschi, *L. gredosi* Espadaler and Collingwood, *L. growellei* Bondroit, *L. interruptus* (Schenck), *L. kraussei* Emery, *L. lichensteini* Bondroit, *L. nadigi* Kutter, *L. niger* Forel, *L. nigriceps* Mayr, *L. nylanderi* (Foerster), *L. parvulus* (Schenck), *L. rabaudi* Bondroit, *L. racovitzai* Bondroit, *L. rottenbergii* (Emery), *L. sordidulus* Müller, *L. specularis* Emery, *L. tubum* (Fabricius), and *L. unifaciatus* (Latreille).

Biology: Nests are found in the soil, under rocks, and in plant cavities, such as tree and shrub branches and insect galls. A given species is found either always in the soil or always in plant cavities. Nest populations are small, usually fewer than 100 workers. Most species are timid or docile, some species can be surprisingly aggressive, and attack when the nest is disturbed. They are often common, at least in the southwestern United States and México. Little is known of their feeding habits, but limited observations suggest they collect dead arthropods and may even feed on seeds.

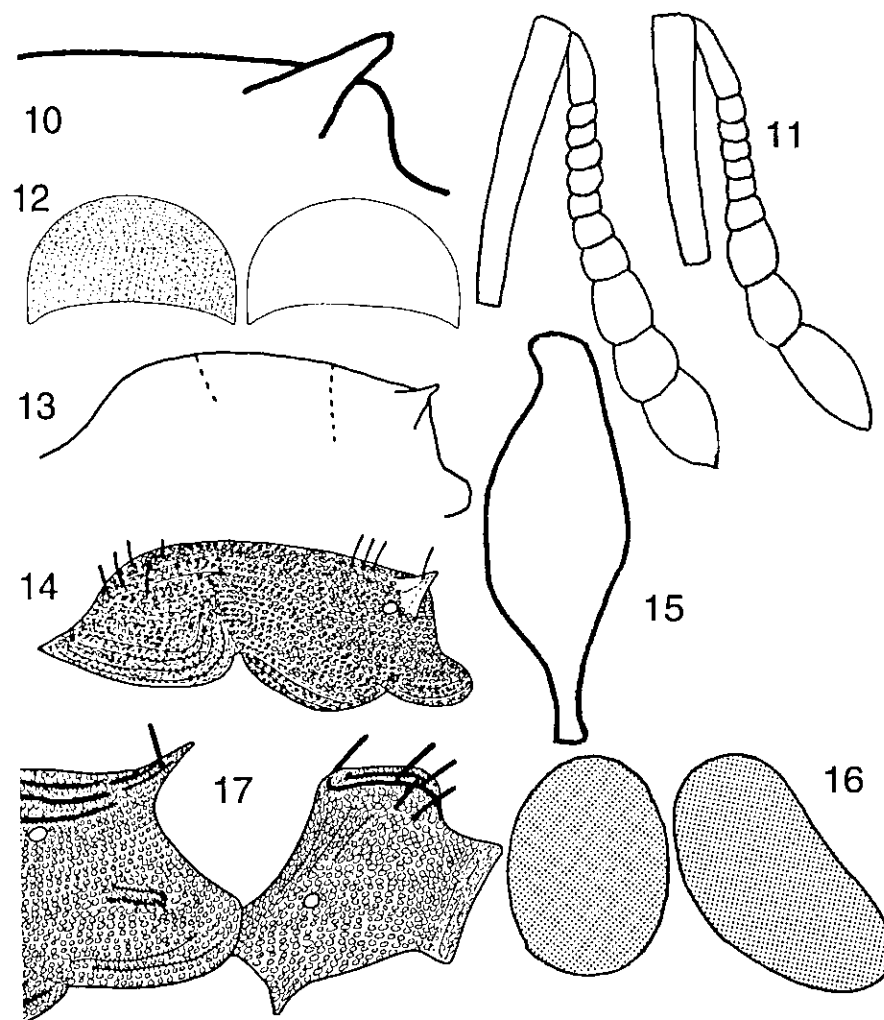
KEY TO THE SPECIES OF *LEPTOTHORAX* SUBGENUS *MYRAFANT*  
IN THE NEW WORLD, BASED PRIMARILY ON WORKERS

1. Petiole and postpetiole armed with spine-like protuberances (Fig. 1) ..... Subgenus *Nesomyrmex*  
(see Kempf, 1959 for key to species)
  - Petiole and Postpetiole without spine-like processes (Fig. 2) ..... 2
- 2(1). Petiole with elongate peduncle (Fig. 2); mesosoma either strongly arched (Fig. 2) or mesopropodeal suture deeply impressed (Fig. 3) ..... 3
  - Petiole without an elongate peduncle (Fig. 4), or dorsum of promesonotum flat (Fig. 9) or feebly convex in profile; mesopropodeal suture at most feebly impressed (except for *L. hispidus*, see Fig. 5) ..... 4
- 3(2). Dorsum of mesosoma strongly arched (Fig. 2) .....  
Subgenus *Macromischa* (see Baroni Urbani 1978 for key to species)
  - Dorsum of promesonotum not strongly convex in profile (Fig. 3); mesopropodeal suture deeply impressed (Fig. 3) .....  
..... Subgenus *Dichothorax*, *L. pergandei* (see Mackay, 1993a)
- 4(2). Clypeus without carinae on medial surface (Fig. 6), but usually with carinae present anterior to frontal carinae, middle of clypeus usually concave with longitudinal depression (Fig. 6); antennal scapes often with erect or suberect hairs (Fig. 7) .....  
... Subgenus *Leptothorax* (see Creighton, 1950:257-258 for key to species) and genus *Formicoxenus* (see Francoeur and Loiselle, 1985 for assistance with species identifications).
  - Clypeus with medial, longitudinal carina (Fig. 8), in addition to several lateral carinae; scape usually without erect hairs ..... 5 (Subgenus *Myrafant*)
- 5(4). Posterior corner of propodeum completely rounded, without evidence of angles or spines (Fig. 9); México ..... *striatulus* Stitz
  - Posterior corner of propodeum with angles or spines (Fig. 10); widely distributed in North America, including México ..... 6
- 6(5). Antennae with 12 segments (Fig. 11, left) (usually easier to count with funiculus held at an oblique angle) ..... 7
  - Antennae with 11 segments (Fig. 11, right) ..... 49
- 7(6). Disc (at least basal 1/3) of first tergum of gaster predominantly reticulopunctate (Fig. 12, left), (sculpture may be very weak and difficult to see); Nevada to Colorado, Arizona to west Texas south to northern México ..... 8
  - Entire disc (except possibly region immediately posterior to connection of postpetiole) of first tergum of gaster completely smooth, polished and shining (Fig. 12, right); widely distributed in North



Figs. 1-9. 1, Dorsal view of propodeum, petiole, and postpetiole of a paratype worker of *Leptothorax wilka*; 2, Mesosoma, petiole and postpetiole of a worker of *Leptothorax subditivus*; 3, Mesosoma and petiole of a worker of *L. pergandei*; 4, Propodeum and petiole of a worker of *L. rugatulus*, showing a relatively short petiolar peduncle; 5, Outline of mesosoma of a worker of *L. hispidus*; 6, Clypeus of a member of the subgenus *Leptothorax*, with depressed area indicated by stippling; 7, Scape of a worker with erect hairs; 8, Clypeus of a member of the subgenus *Myrafant* showing the longitudinal carinae on the clypeus; 9, Outline of propodeum without propodeal spines.

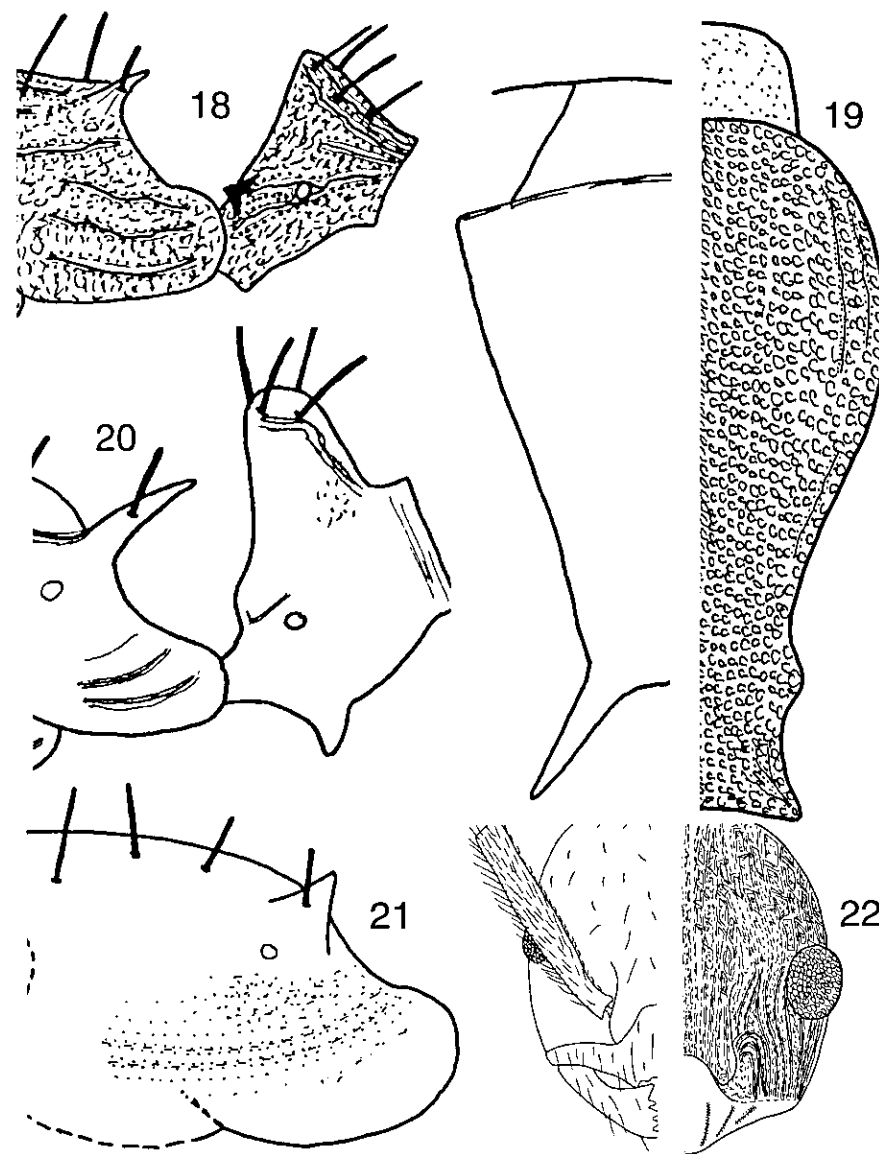
- America (including México and Guatemala) ..... 12
- 8(7). Propodeal angles dentiform or bump-like (Fig. 13); mesosomal outline varies, often impressed (Fig. 5) ..... 9
- Propodeal spines well formed (Fig. 10), often half as long as, or even longer than, the distance between their bases (Fig. 17); mesosoma not impressed at the mesopropodeal suture (Fig. 14) ..... 10
- 9(8). Mesosoma somewhat impressed at mesopropodeal suture (Fig. 5); head mostly rugose with few punctures ..... *hispidus* Cole
- Mesosoma not depressed at mesopropodeal suture (Fig. 14); head heavily and densely punctate ..... *andersoni* new species
- 10(8). Eye oval in shape (Fig. 16, left); dorsum of mesosoma with coarse, longitudinal rugae; shape of petiolar node varies; hind femur greatly thickened (Fig. 15); Arizona and Nuevo León ..... 11
- Eye elongate, kidney shaped (Fig. 16, right); dorsum of mesosoma finely punctate with no evidence of rugae; petiolar node in profile with relatively sharp apex (Fig. 18); hind femora not greatly thickened; NV, CO, NM, TX ..... *obliquicanthus* Cole
- 11(10). Petiolar node in profile nearly as broad apically as basally (Fig. 17); propodeal spines nearly as long as distance between them; Arizona ..... *silvestrii* (Santschi)
- Petiolar node with sharp apex (Fig. 18); propodeal spines short, less than  $\frac{1}{2}$  distance between bases; México (Nuevo León) ..... *rugosus* new species
- 12(7). Dorsum of mesosoma very smooth and shiny (Fig. 19, left), entirely devoid of sculpture except for small and widely spaced piligerous punctures ..... 13
- Dorsum of mesosoma sculptured (Fig. 19, right), or at least never entirely smooth and shining, if mostly smooth and shining, at least dorsum of propodeum sculptured ..... 14
- 13(12). Propodeal spines long (Fig. 20), (longer than broader at their bases); Colorado ..... *schmittii* Wheeler
- Propodeal spines short (Fig. 21) (shorter than distance between bases); widely distributed in western North America ..... *nitens* Emery
- 14(12). Eyes tiny (Fig. 22, left), maximum length about  $\frac{1}{2}$  distance between base of mandible and anterior edge of eye; California ..... *ocellatus* new species
- Eyes larger (Fig. 22, right), maximum diameter ranging from  $\frac{1}{2}$  length between base of mandible and anterior edge of eye, to about as long as this distance; widely distributed ..... 15
- 15(14). Dorsum of head at least in part smooth and shining (Fig. 22, left); if head is partly sculptured, at least central area smooth and



Figs. 10-17. 10, Propodeum of a worker with well developed propodeal spines; 11, Antennae with 12 segments (left) and 11 segments (right); 12, Reticulo-punctate sculpture on first gastral tergite (left) and smooth gastral tergite (right); 13, Propodeum with dentiform propodeal angles; 14, Mesosoma of a worker of *L. andersoni*; 15, Hind femur of a worker of *L. silvestrii*; 16, Oval (left-*L. liebi*) and kidney shaped (right-*L. obliquicanthus*) eyes of workers; 17, Propodeum and petiole of a worker of *L. silvestrii*.

- shining and petiolar node is angulate in profile, with relatively sharp apex (Fig. 18) ..... 16
- Head largely or entirely sculptured (Fig. 22, right), surface feebly shining only between sculpture, or completely opaque; if head is partially smooth and shining, then petiolar node is rounded and

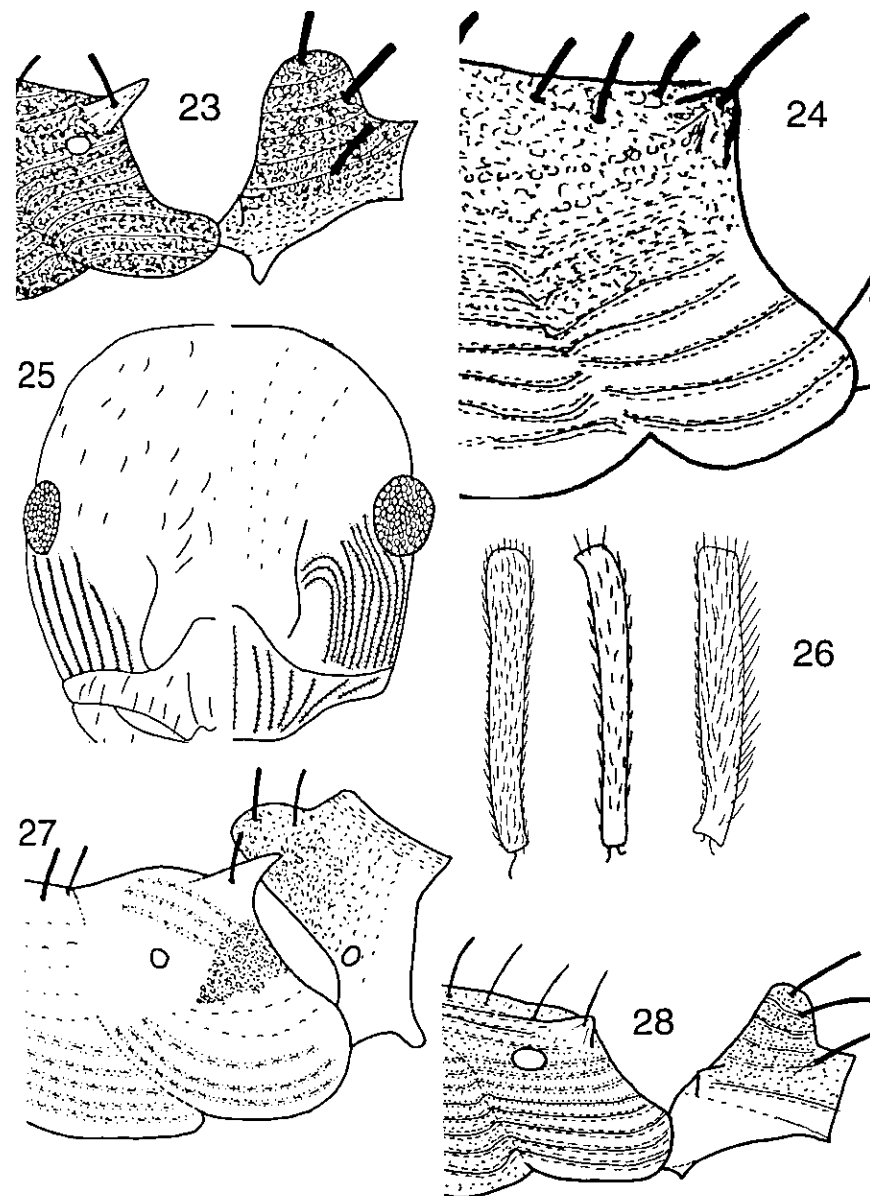
- blunt or obliquely truncate in profile (Fig. 17), and/or propodeal spines are about  $\frac{1}{2}$  as long as the distance between their bases .. 29
- 16(15). Dorsum of head entirely smooth and polished (Fig. 25), striae or rugae present on sides of head (Fig. 25); southern Texas, México and Guatemala ..... 17
- Dorsum of head partially to mostly smooth and shining (Fig. 22, left), area adjacent to broad, central, shining strip with sculpture, often very fine; widely distributed in USA and México ..... 21
- 17(16). Propodeal spines well developed (Fig. 23), nearly half as long as distance between bases; semicircular striae posterior to insertions of antennae present (Fig. 22 right) or absent (Fig. 25, left) ..... 18
- Propodeal armature consisting of only small angles or tiny spines (Fig. 24); semicircular striae present posterior to insertions of antennae (Fig. 25, right) ..... 19
- 18(17). Semicircular striae absent posterior to insertion of antennae (Fig. 25, left) ..... *stollii* Forel
- Semicircular striae present posterior to insertion of antennae (Fig. 25, right) ..... **bicolor** new species
- 19(17). Hairs on scape decumbent (Fig. 26, left, middle); hairs on dorsum of head very fine and dispersed; widely distributed in Texas and México ..... 20
- Hairs on scape suberect to nearly erect (Fig. 26 right); hairs on dorsum of head coarse and abundant; Michoacán ..... **brevispinosus** new species
- 20(19). Mesopleuron and sides of propodeum with rugae (Fig. 27); side of pronotum predominantly smooth and glossy; Hidalgo, Morelos and Nuevo León ..... *manni* Wheeler
- Mesopleuron and sides of propodeum punctate (Fig. 28); side of pronotum with fine striae; western Texas and Coahuila ..... **bristoli** new species
- 21(16). Petiolar node blunt in profile (Fig. 27); nearly entire head smooth and shining (Fig. 25, left), area adjacent to polished central strip with very fine sculpture ..... 22
- Petiolar node in profile with angulate apex (Fig. 29); entire dorsum of head often smooth and shining, at least posterior half of head in part smooth and shining, with broad, central strip which is free of sculpture (Fig. 25, right), extending posteriorly to vertex ..... 24
- 22(21). Entire dorsum of head with fine striae (Fig. 30, left); dorsal surface of postpetiole smooth and shining; nests under stones ..... **mexicanus** new species
- Central region of dorsum of head mostly free of sculpture (Fig. 30,



Figs. 18-22. 18, Propodeum and petiole of a worker of *L. rugosus*; 19, Top of the mesosoma of workers of *L. schmittii* (left) and *L. ocellatus* (right); 20, Propodeal spines and petiole of a worker of *L. schmittii*; 21, Propodeum of the holotype worker of *L. nitens*; 22, Head of workers, in which *L. stollii* (left) is smooth and shiny, and *L. rugithorax* (right) is sculptured.

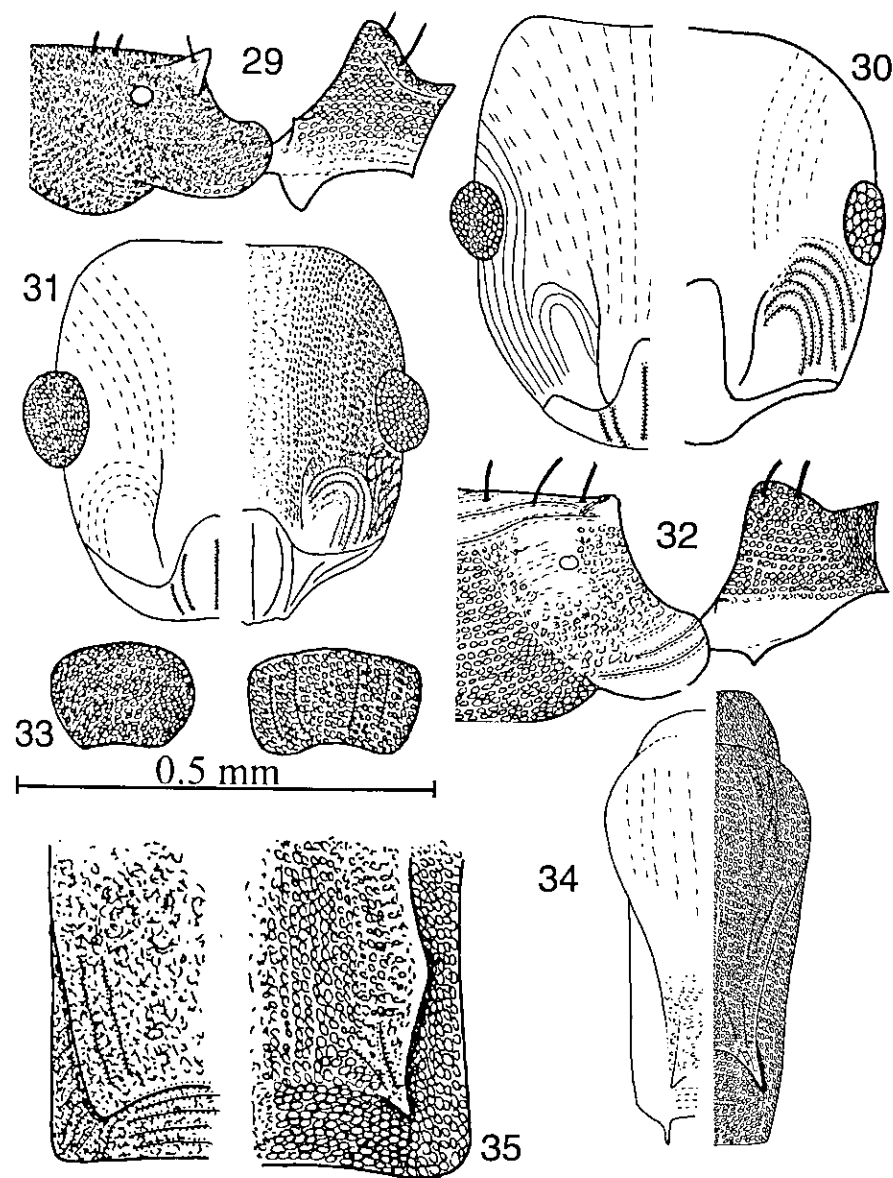


- right), region adjacent to central strip with fine punctures or costulae; dorsal surface of postpetiole densely punctate (Fig. 33, left) ..... 23
- 23(22). Eyes small, distance from insertion of mandible to anterior border of eye about 1.2 X maximum diameter of eye (Fig. 30, right); New Mexico and southern Texas ..... **cokendolpheri** new species
- Eyes larger, distance from insertion of mandible to anterior border of eye about equal to maximum eye diameter (Fig. 31, left); central México (state of México) ..... **punctithorax** new species
- 24(21). Much of the dorsum of head smooth and shining (Fig. 30, right); petiolar node in profile with very sharp apex (Fig. 29) ..... 25
- Head usually with only a central strip free of sculpture (Fig. 31, right); petiolar node in profile with a relatively sharp apex (Fig. 32) ..... 26
- 25(24). Posterior surface of petiolar node with punctures (Fig. 33, left); New Mexico ..... **melinus** new species
- Posterior surface of petiolar node with fine rugulae (Fig. 33, right); Oregon, California and Arizona ..... **mariposa** Wheeler
- 26(24). Dorsum of pronotum mostly glossy with a few longitudinal fine striae, but with little or no evidence of punctures (Fig. 34, left); region between propodeal spines finely punctate, nearly smooth ..... **nitens** Emery
- Dorsum of pronotum punctate with little evidence of striae (Fig. 34 right); region between spines sculptured with fine rugae, or punctate ..... 27
- 27(26). Propodeal spines well developed (Fig. 34, right), at least  $\frac{1}{2}$  length of distance between bases of spines, often as long as distance ..... **maryanae** new species
- Propodeal spines small to tiny, total length less than  $\frac{1}{2}$  distance between bases (Fig 35) ..... 28
- 28(27). Dark brown; propodeal armature consisting of blunt angles (Fig. 35, left), region between propodeal angles with fine transverse rugae; known only from the state of Chihuahua, México, nesting under bark of cottonwood trees ..... **adustus** new species
- Light yellow brown; propodeal spines small, but acute (Fig. 35 right), region between propodeal spines punctate; California (in litter) ... **chandleri** new species
- 29(15). Head densely and evenly punctate, never with central strip free of sculpture (Fig. 36, left), without striae or rugae, or rarely with punctures in rows that may form weak striae; pale yellow to light brown with black eyes ..... 30
- Head usually with striae or rugae as well as punctures (Fig. 36,



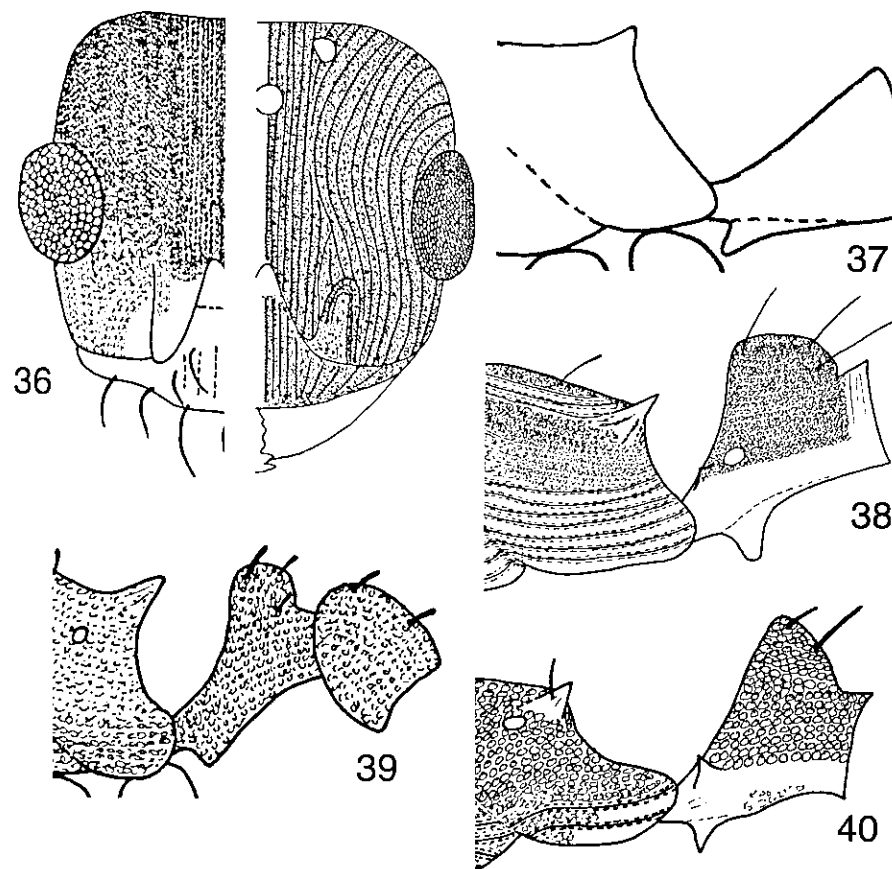
Figs. 23-28. 23, Propodeum and petiole of a worker of *L. bicolor*; 24, Propodeal armature of a worker of *L. brevispinosus*; 25, Head of a cotype worker of *L. stollii* (left) and the holotype worker of *L. bicolor* (right); 26, Scapes of workers of *L. mexicanus* (left), *L. bestelmeyeri* (middle), and *L. stollii* (right); 27, Mesopleuron, propodeum and petiole of a cotype worker of *L. manni*; 28, Mesopleuron, propodeum and petiole of the holotype worker of *L. bristoli*.

- right), the entire dorsal surface usually feebly shining, often central strip is without sculpture; color yellow, yellow brown to dark brown ..... 35
- 30(29). In profile, node of petiole relatively sharp (Fig. 37) ..... *coleenae* new species
- In profile, node of petiole truncate or rounded (Fig. 38) ..... 31
- 31(30). Relatively large species, total length greater than 3mm; petiolar node broadly rounded in profile (Fig. 38) ..... *punctaticeps* new species
- Smaller species, total length less than 3mm; petiolar node more or less truncate or acute in profile (Figs. 39, 40) ..... 32
- 32(31). Propodeal spines small, but developed; hairs on petiole blunt and thickened (Fig. 39); Texas ..... 33
- Propodeal spines poorly developed, consisting simply of angles; hairs on petiole fine with relatively sharp tips (Fig. 40); México (Nuevo León) ..... *punctatissimus* new species
- 33(32). Eyes relatively small (maximum diameter < 0.15mm), maximum diameter less than distance of anterior edge to base of mandible (Fig. 41, left); recorded only from near Austin and from the Chisos Mountains of western Texas ..... *terrigena* Wheeler
- Eyes relatively large (maximum diameter > 0.20mm), maximum diameter about equal to distance from insertion of mandible (Fig. 41, right); found in deserts in west Texas ..... 34
- 34(33). Color nearly white; dorsum of pronotum with poorly developed rugulae; petiolar node truncate (Fig. 42, left) .... *liebi* new species
- Color pale brown; dorsum of pronotum with distinct rugae; node of petiole rounded (Fig. 42, right) ..... *bestelmeyeri* new species
- 35(29). Propodeal spines joined at bases by distinct transverse ridge or welt (Fig. 43) which lies at angle between dorsal and posterior faces of propodeum; east central Texas ..... *obturator* Wheeler
- Propodeal spines not joined at base by transverse welt; widely distributed ..... 36
- 36(35). Head with rugae as well as punctures (Fig. 36, right); petiolar peduncle elongate and petiole with square node as seen in profile (Fig. 44); Baja California ..... *peninsularis* Wheeler
- Head mostly or entirely punctate, or with striae or rugae (Fig. 41, left); petiolar peduncle short (and node may be square in profile) or if somewhat elongate, petiolar node rounded (Fig. 47); widely distributed ..... 37
- 37(36). Postpetiole less than 1.5 times as wide as total width of petiole, as seen from top (Fig. 45) ..... 38
- Total width of postpetiole at least 1.5 times as wide as total width of



Figs. 29-35. 29, Propodeum and petiole of a worker of *L. melinus*; 30, Heads of workers of *L. mexicanus* (left) and *L. cokendolphi* (right), showing sculpture; 31, Heads of workers of *L. punctithorax* (left) and *L. adustus* (right), showing sculpture; 32, Propodeum and petiole of a worker of *L. adustus*; 33, Nodes of the postpetioles of a paratype worker of *L. melinus* (left) and of a cotype worker of *L. mariposa* (right); 34, Mesosomae of the holotype worker of *L. nitens* (left) and the holotype worker of *L. maryanae* (right), showing the sculpture; 35, Propodia of a paratype worker of *L. adustus* (left) and the holotype worker of *L. chandleri* (right).

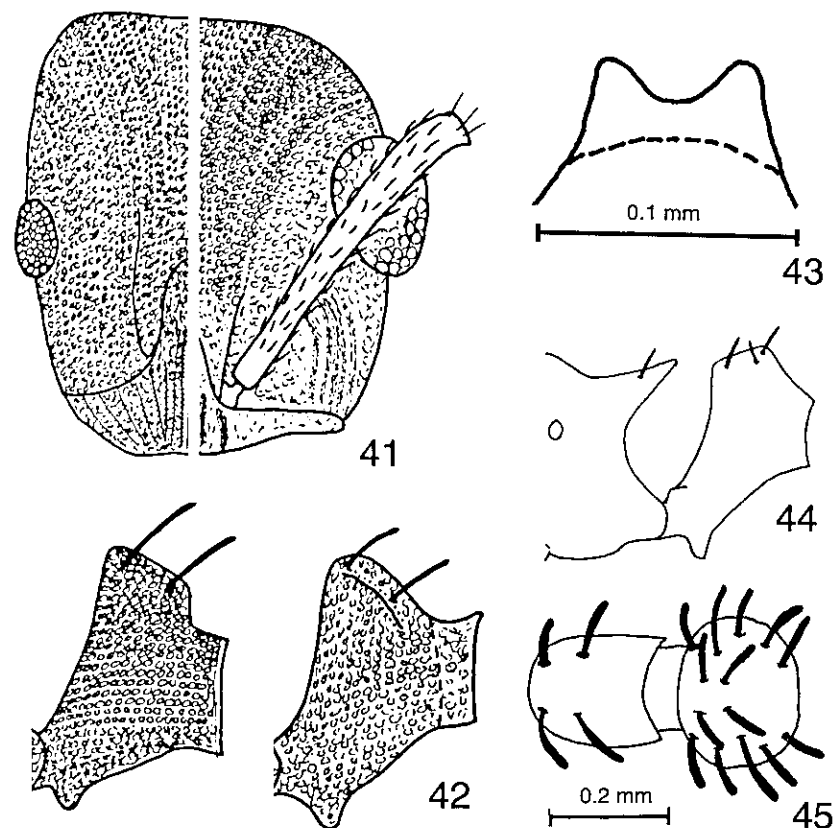
- petiole (Fig. 46), occasionally twice as wide ..... 43
- 38(37). Petiole and postpetiole with coarse, long, thick, clavate hairs (Fig. 45), about 4-10 on petiole and 12-20 on postpetiole; dorsum of head with rugae, with intrarugal spaces shining; dorsum and especially sides of mesosoma with well defined rugae; node of petiole truncate (Fig. 47); southeastern Arizona (Cochise Co.) ..... *stenotyle* Cole
- Without all of above characteristics; hairs on petiole and postpetiole slightly spatulate, or only blunt tipped; dorsum of head strongly striate, mixed with punctures or with fine rugulae ..... 39
- 39(38). Propodeal spines at least  $\frac{1}{2}$  as long as distance between bases (Fig. 48 & 49); dark brown in color ..... 40
- Length of propodeal spines usually less than  $\frac{1}{2}$  distance between bases, usually consisting of tiny spines or simply angles (Fig. 40) (if longer, apex of petiole sharp as seen in profile); pale yellow or light yellowish brown, head and part of gaster may be light-brown .. 42
- 40(39). Propodeal spines longer than the distance between their bases (Fig. 49, left); petiole with moderately sharp apex (Fig. 48), which is "pinched" as seen from above (Fig. 50, left); postpetiolar node one and one fourth times broader than long, sides subparallel; usually nests in cynipid galls in canyon live oak (*Quercus chrysolepis* Liebm.) in California ..... *gallae* M. Smith
- Propodeal spines about  $\frac{1}{2}$  to as long as distance between bases (Fig. 49, right); petiolar node rounded or truncate in profile (Fig. 51), apex not "pinched" as above (Fig. 50, right); nests under rocks and duff, or simply in soil, and is common and widely distributed in western U.S.A. .... 41
- 41(40). Dorsum of pronotum with longitudinal rugae (Fig. 49, right); intrarugal spaces on head of female smooth and shining ..... *nevadensis* Wheeler
- Dorsum of pronotum predominantly punctate (Fig. 52, left), with a few striae; intrarugal spaces on head of female punctate ..... *lindae* new species
- 42(39). Petiole in profile with sharp apex (Fig. 54); propodeal spines nearly  $\frac{1}{2}$  length of distance between bases; mesosoma with evidence of striae, especially on sides; Colorado, Wyoming ..... *furunculus* Wheeler
- Petiole in profile with rounded or somewhat truncated apex (Fig. 56); propodeal spines shorter than  $\frac{1}{2}$  distance between bases (Fig. 55); mesosoma completely punctate with no evidence of striae (Fig. 55); western North America (CA, NV, AZ, NM, Baja California Norte) ...



Figs. 36-40. 36, Heads of the holotype worker of *L. liebi* (left) showing dense punctures, and of a cotype female of *L. peninsularis* (right), showing rugae or striae; 37, Propodeum and petiole of the holotype worker of *L. coleenae*; 38, Propodeum and petiole of the holotype worker of *L. punctaticeps*; 39, Propodeum, petiole and postpetiole of a cotype worker of *L. terrigena*; 40, Propodeum and petiole of a worker of *L. punctatissimus*.

- ..... *andrei* Emery
- 43(37). Dorsum of postpetiole coarsely, and predominantly transversely, reticulo-rugose (Fig. 57, left); node of petiole truncate in profile ..... *texasus* Wheeler
- Dorsum of postpetiole punctate or granulose (Fig. 57, right), rarely reticulo-rugose, rugae often present on sides of node, node of petiole in profile occasionally with sharp apex (Fig. 54) ..... 44
- 44(43). Postpetiole very large, at least 1.6 X as wide as petiole and half

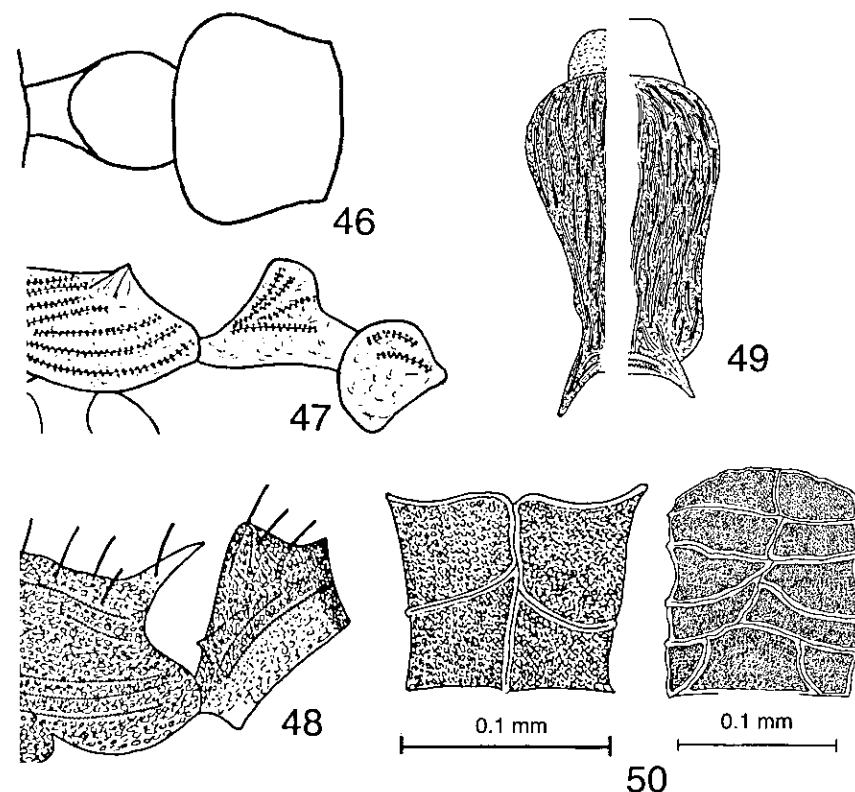
- as wide as gaster (Fig. 57, right); New York south to Florida .....  
 ..... *davisi* Wheeler  
 — Postpetiole usually less than 1.6 X as wide as petiole and less than  
 half as wide as gaster; middle and western USA south into western  
 México ..... 45  
 45(44). Sculpture on dorsum of head consisting primarily of striae or  
 very fine rugulae (or finely punctate) (Fig. 58, left); side of petiole  
 without rugae or rarely with rugulae (Fig. 60); often concolorous pale  
 yellowish-brown (rarely dark brown), gaster often slightly darker.  
 ..... 46  
 — Sculpture on head consisting of fine rugae (Fig. 58, right); side of  
 petiole with rugae which are not obscured by punctures (Fig. 59);  
 concolorous dark brown; middle and western USA .....  
 ..... *tricarinatus* Emery  
 46(45). Side of pronotum weakly shining with well-defined parallel  
 striae (Fig. 60); México (Michoacán and Hidalgo) ..... 47  
 — Side of pronotum dull and granulate or punctate, or with poorly  
 defined parallel striae (Fig. 59); southwestern USA and NW México  
 ..... 48  
 47(46). Propodeal spines poorly developed (Fig. 60), but present;  
 rugulae on pronotum well defined and extending posteriorly onto  
 mesonotum ..... *rugulosus* new species  
 — Propodeal spines consisting of tiny angles; fine rugae on pronotum  
 poorly defined, dorsum of mesonotum punctate .....  
 ..... *rugithorax* new species  
 48(46). Propodeal armature consisting of simple angles (Fig. 61); light  
 brown ..... *carinatus* Cole  
 — Propodeal spines well developed (Fig. 62), length at least  $\frac{1}{3}$  the  
 distance between bases of the spines; petiole obliquely truncate (Fig.  
 62); dark brown ..... *neomexicanus* Wheeler  
 49(6). Propodeal spines short or dentiform (Fig. 63), length less than  $\frac{1}{2}$   
 distance between bases; often concolorous dark brown ..... 50  
 — Propodeal spines longer than  $\frac{1}{2}$  distance between bases (Fig. 64);  
 ranging from yellowish-brown to concolorous dark-brown or bicol-  
 ored ..... 53  
 50(49). Dorsum of head densely punctate, mixed with striae (Fig. 65,  
 left); distributed over much of the United States ..... 51  
 — Dorsum of head partially smooth and shining (Fig. 65, right); New  
 Mexico and México ..... 52  
 51(50). Node of petiole broadly rounded (Fig. 66); eastern half of USA  
 (west to Kansas, Oklahoma & Texas) ..... *schaumii* Roger  
 — Node of petiole with sharp apex (Fig. 63); known only from California



Figs. 41-45. 41, Head of a cotype worker of *L. terrigena* (left) and the holotype worker of *L. bestelmeyeri* (right); 42, Petiole of workers of *L. liebi* (left) and *L. bestelmeyeri* (right); 43, Propodeal spines of a worker of *L. obturator*; 44, Propodeum and petiole of a cotype female of *L. peninsularis*; 45, Top view of the petiole and postpetiole of a worker of *L. stenotyle*, as seen from the top.

- ..... *oxynodis* new species  
 52(50). Dorsum of pronotum with rugae (Fig. 67, left); bicolored (head  
 and gaster black, mesosoma, legs, petiole & postpetiole orange) ..  
 ..... *emmae* new species  
 — Dorsum of pronotum ranging from smooth to punctate (Fig. 67,  
 right); concolorous dark brown ..... *whitfordi* new species  
 53(49). Dorsum of head nearly smooth, shining (Fig. 72, left); pro-  
 podeal spines often nearly as long as distance between tips (Fig. 68)  
 ..... 54  
 — Entire dorsum of head covered with sculpture (Fig. 72, right);  
 propodeal spines often shorter than distance between tips (Fig. 69)  
 ..... 55

- 54(53). Propodeal spines form an angle of nearly  $180^\circ$  with dorsum of propodeum when viewed in profile (Fig. 70); common and widely distributed in eastern United States ..... *longispinosus* Roger
- Propodeal spines form an angle of about  $150^\circ$  with dorsum of propodeum when viewed in profile (Fig. 71); known only from Alabama and North Carolina ..... *tuscaloosae* Wilson
- 55(53). Head with very delicate longitudinal rugae, not much coarser than intrarugal sculpture and often forming reticulations with it; eastern United States ..... 56
- Head with coarse longitudinal rugae which are notably heavier than the intrarugal sculpture and do not form reticulations with it (Fig. 72, right); mostly western United States ..... 58
- 56(55). Propodeal spines set close together at bases, spines about twice as long as distance between bases (Fig. 73, top); postpetiole, from above, sub-quadrate, slightly broader than long .....  
..... *curvispinosus* Mayr
- Propodeal spines well-separated at bases, about as long as the distance between bases (Fig. 73, bottom); postpetiole, from above, notably broader than long ..... 57
- 57(56). Propodeal spines of worker and female tapered toward apex, with sharp tip (Fig. 74); female with large, oblong eye (greatest diameter about 0.25mm, see Fig. 76, left); common and widely distributed in eastern half of USA ..... *ambiguus* Emery
- Propodeal spines of female blunt tipped (Fig. 75) and of approximately the same diameter (Fig. 75) along entire length (worker unknown); female with small, round eye (maximum diameter about 0.12mm, see Fig. 77); known only from Washington DC, may be workerless parasite of *L. curvispinosus* ..... *minutissimus* M. Smith
- 58(55). Intrarugal punctures of head very dense and coarse, areas where they occur dull (Fig. 78, left); southeastern United States ..  
..... 59
- Intrarugal punctures of head fine and somewhat separated, areas where they occur feebly shining (Fig. 78, right); western United States ..... 60
- 59(58). Dorsum of postpetiole lightly punctate, not completely opaque; dorsum of mesonotum with longitudinal rugae largely replaced by punctures (Fig. 79, left); propodeal spines about half as long as distance between tips ..... *bradleyi* Wheeler
- Dorsum of postpetiole heavily punctured and completely opaque; dorsum of mesonotum with longitudinal rugae not replaced by punctures (Fig. 79, right); propodeal spines more than half as long as distance which separates tips ..... *smithi* Baroni Urbani



Figs. 46-50. 46, Petiole and postpetiole of holotype worker of *Leptothorax neomexicanus*; 47, Propodeum, petiole and postpetiole of *L. stenotyle*, as seen in profile; 48, Propodeum and petiole of a worker of *L. gallae*, as seen in profile; 49, Mesosoma of a cotype worker of *L. gallae* (left) and of a worker of *L. nevadensis* (right), as seen from above; 50, Dorsum of the petiole of a cotype worker of *L. gallae* (left) and of the petiole of a worker of *L. nevadensis* (right).

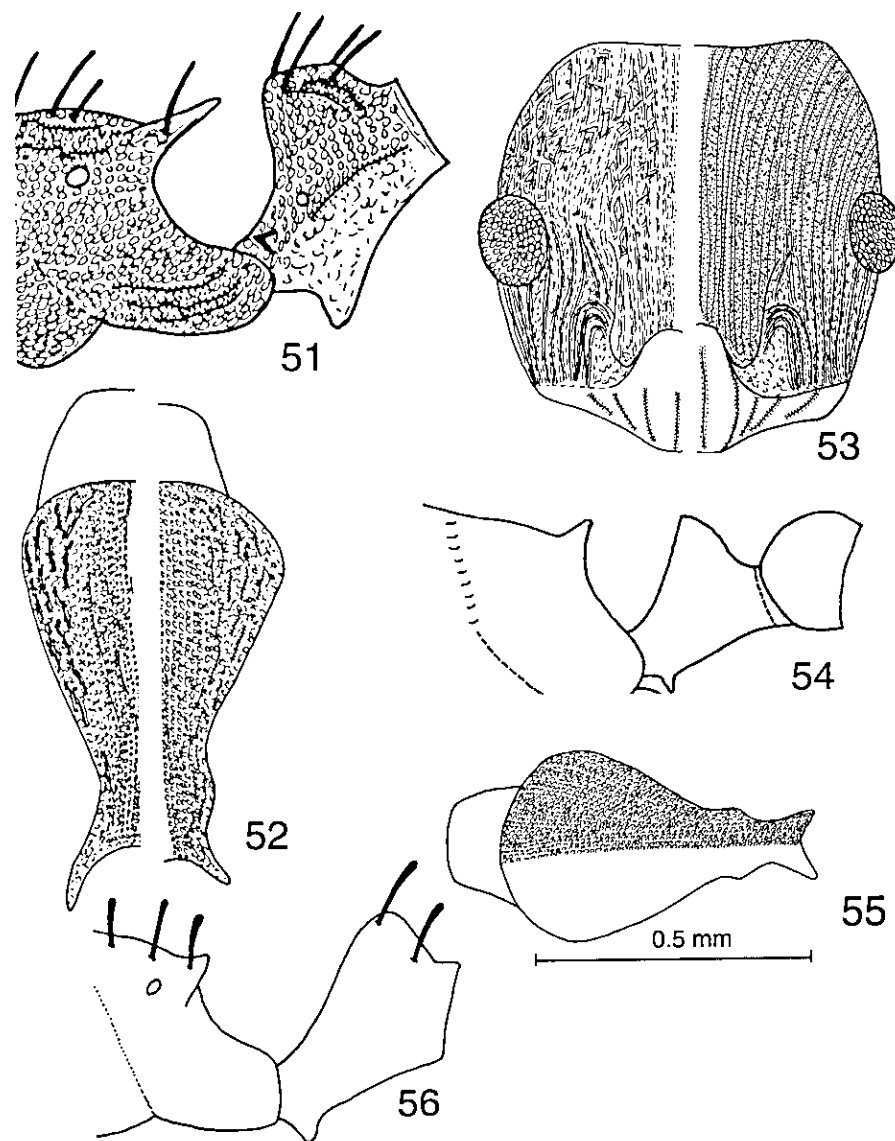
- 60(58). Relatively small, total worker length approximately 2.5mm, yellowish-brown with dorsum of head slightly darker, rarely bicolored; nests under rocks ..... *rugatulus* Emery
- Large ants, total worker length over 3mm; bicolored, head and gaster black, mesosoma dark reddish brown; nests in branches of oak trees ..... *josephi* new species

CLAVE PARA LA IDENTIFICACIÓN DE OBRERAS DE LAS  
ESPECIES DE MYRAFANT EN MÉXICO Y GUATEMALA  
(\*SIGNIFICA QUE NO HA SIDO COLECTADA EN MÉXICO, PERO  
OCURRE CERCA DEL BORDE)

Nota: Sin duda alguna, hay muchas especies desconocidas en

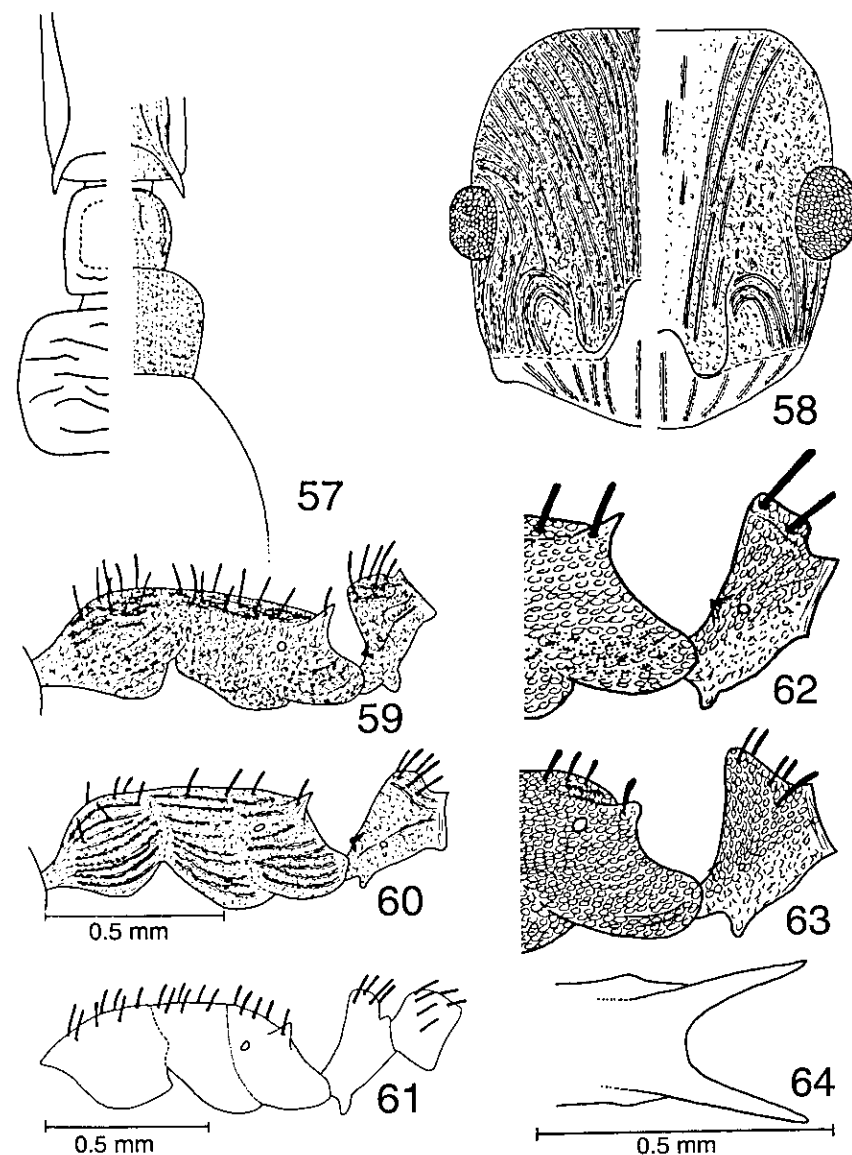
México. Si tiene problemas con la identificación de algunos especímenes, posiblemente representan una nueva especie.

1. Peciolo y postpeciolo armados con espinas (Fig. 1) ..... subgénero *Nesomyrmex*
- Peciolo y postpeciolo sin espinas (Fig. 2) ..... 2
- 2(1). Peciolo con el pedúnculo muy alargado (Fig. 2); mesosoma muy arcado o sutura mesopropodeal muy profunda (Fig. 3) ..... 3
- Peciolo sin un pedúnculo alargado (Fig. 4); mesosoma plano o apenas convexo en perfil (Fig. 9); la sutura mesopropodeal poco profunda o no marcada (excepción: *L. hispidus*, vea Fig. 5) ..... 4
- 3(2). El dorso del mesosoma muy encorvado (Fig. 2) ..... subgénero *Macromischa*
- El dorso del mesosoma casi plano en perfil, la sutura mesopropodeal muy profunda (Fig. 3) ..... subgénero *Dichothorax* (*L. pergandei*)\*
- 4(2). Clípeo sin carina en la superficie medial (Fig. 6), pero usualmente con carinas presentes anterior a la carina frontal, clípeo con la parte medial deprimida, con una depresión longitudinal (Fig. 6); escapos antenales a veces con pelitos rectos o semirectos (Fig. 7) ..... Subgénero *Leptothorax*\*
- Clípeo con una carina medial, además de algunas carinas laterales (Fig. 8); escapo usualmente sin pelos rectos ..... 5 (subgénero *Myrafant*)
- 5(4). Esquina del propodeo completamente redonda, sin evidencia de ángulos o espinas (Fig. 9); Guerrero ..... *striatulus* Stütz
- Propodeo con ángulos o espinas (Fig. 10) ..... 6
- 6(5). Antena con 12 artejos (Fig. 11, izquierda) ..... 7
- Antena con 11 artejos (Fig. 11, derecha) ..... 35
- 7(6). La sección basal del gáster con puntitos (Fig. 12, izquierda), que pueden ser muy finos; en el norte de México ..... 8
- Casi todo el gáster liso y brillante (Fig. 12, derecha); completamente distribuida en México y Guatemala ..... 11
- 8(7). Espinas propodeales pequeñas (Fig. 13); mesosoma frecuentemente deprimida (Fig. 5) ..... 9
- Espinas propodeales bien formadas (Fig. 10), usualmente tan largas o mas largas que la distancia entre las bases; mesosoma sin impresión en el área de la sutura mesopropodeal (Fig. 13) ..... 10
- 9(8). Mesosoma parcialmente imprimido en el área de la sutura mesopropodeal (Fig. 5); cabeza con arrugas y pocos puntitos; Coahuila, Zacatecas, Nuevo León ..... *hispidus* Cole
- El dorso del mesosoma plano o aplanado (Fig. 13); cabeza con puntitos; no ha sido colectada en México ..... 10



Figs. 51-56. 51, Propodeum and petiole of a worker of *L. lindae*, as seen in profile; 52, Mesosoma of a paratype worker of *L. lindae* (left) and a cotype worker of *L. furunculus* (right) showing the sculpture; 53, Head of the holotype worker of *L. rugithorax* (left) and of a cotype worker of *L. furunculus* (right), showing sculpture; 54, Propodeum and petiole of a worker of *L. furunculus*, as seen from the side; 55, Top of the mesosoma of a worker of *L. andrei*; 56, Propodeum and petiole of a worker of *L. andrei*.

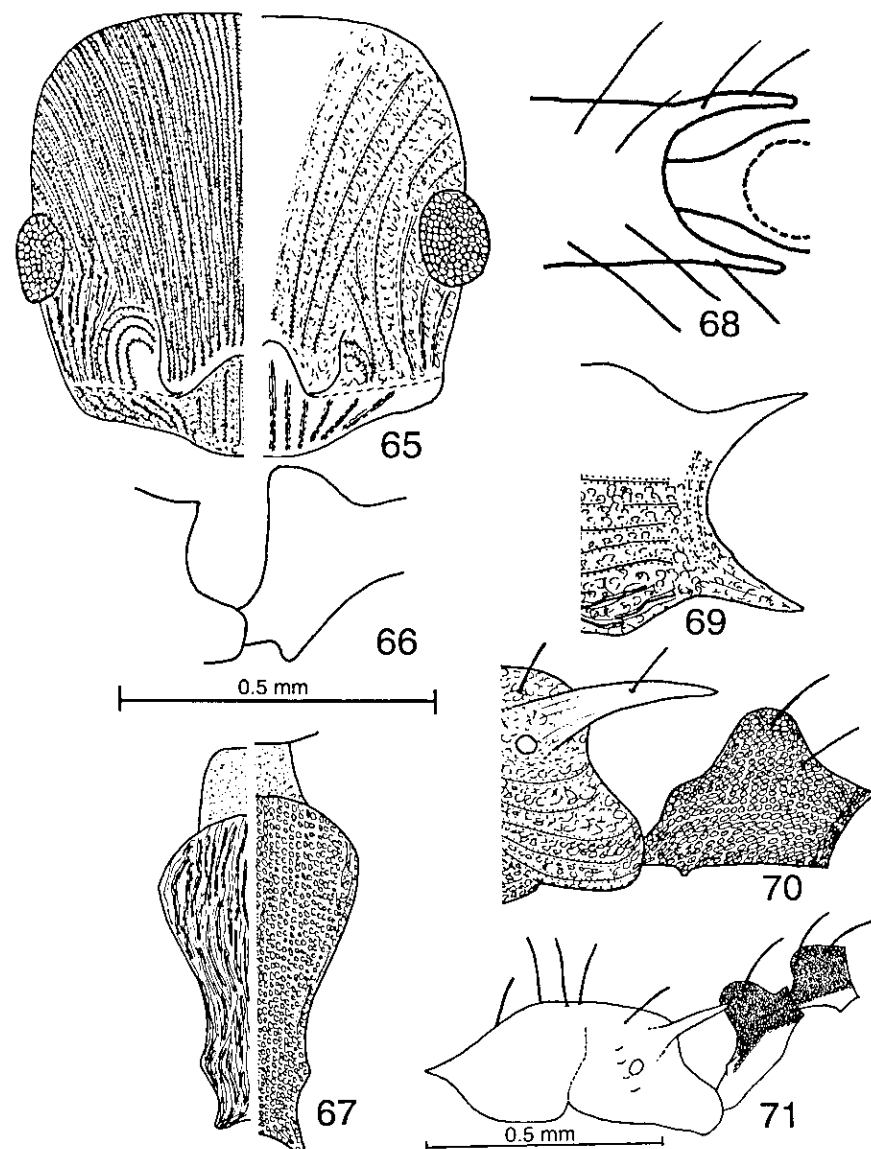
- ..... **andersoni** especie nueva\*
- 10(8). Ojo en forma oval (Fig. 16, izquierda); el dorso del mesosoma con arrugas longitudinales y fuertes; femur posterior grueso; Nuevo León ..... **rugosus** especie nueva
- Ojo elongado y en forma de riñon (Fig. 16, derecha); el dorso de la mesosoma con puntitos finos, sin arrugas; femur posterior no grueso ..... **obliquicanthus** Cole\*
- 11(7). El dorso de la cabeza es parcial o totalmente lisa y brillante (Fig. 22, izquierda), si parte es esculturada, por lo menos una área central es lisa y brillante y el nodo del peciolo es angulado y puntiagudo en el ápice (Fig. 18 ) ..... 12
- La cabeza es casi totalmente (o totalmente) esculturada (Fig. 22, derecha), la superficie es poco lisa o totalmente opaca, si la cabeza es parcialmente lisa y poco brillante, el nodo es redondeado en perfil (Fig. 23), y/o las espinas propodeales son aproximadamente la mitad de la distancia entre las bases ..... 21
- 12(11). El dorso de la cabeza totalmente lisa y brillante (Fig. 25), estrias o arrugas presentes solamente en los lados de la cabeza (Fig. 25) ..... 13
- El dorso de la cabeza parcialmente lisa y brillante, área cercana a la parte central con escultura fina ..... 17
- 13(12). Espinas propodeales bien desarrolladas, casi tan largas como la mitad de la distancia entre si (Fig. 19, izquierda); estrias semicirculares posterior de las inserciones de las antenas presentes (Fig. 22, derecha) o ausentes (Fig. 25, izquierda) ..... 14
- Espinas propodeales consisten solamente de ángulos pequeños (Fig. 24) o espinitas; estrias semicirculares presentes posterior a las inserciones de las antenas (Fig. 25, derecha) ..... 15
- 14(13). Estrias semicirculares ausentes posterior a las inserciones de las antenas (Fig. 25, izquierda); Guatemala ..... **stolli** Forel\*
- Estrias semicirculares presentes posterior a las inserciones de las antenas (Fig. 25, derecha); Chiapas ..... **bicolor** especie nueva
- 15(13). Pelitos en el escapo apresados (Fig. 26, izquierda); pelos en el dorso de la cabeza muy finos y escasos; de varias partes de México ..... 16
- Pelitos en el escapo semirectos (Fig. 26 derecha); pelos en el dorso de la cabeza fuertes y abundantes; Michoacán ..... **brevispinosus** especie nueva
- 16(14). Mesopleurón y el lado del propodeo con arrugas fuertes (Fig. 27); Hidalgo, Morelos y Nuevo León ..... **manni** Wheeler
- Mesopleurón y lados del propodeo punteados (Fig. 28); suroeste Texas y Coahuila ..... **bristoli** especie nueva



Figs. 57-64. 57, Dorsum of the pronotum, petiole and postpetiole of a cotype worker of *L. texanus* (left) and a worker of *L. davisi* (right); 58, Head of the holotype worker of *L. rugulosus* (left) and of a worker of *L. tricarinatus* (right), showing the sculpture; 59, Mesosoma and petiole of a worker of *L. tricarinatus* (UT), as seen from the side; 60, Lateral view of mesosoma and petiole of *L. rugulosus*; 61, Mesosoma, petiole and postpetiole of *Leptothorax carinatus*; 62, Propodeum and petiole of a worker of *L. neomexicanus* as seen from the side; 63, Propodeum and petiole of the holotype worker of *L. oxynodis*, as seen from side; 64, Propodeal spines of a worker of *L. longispinosus* as seen from above.



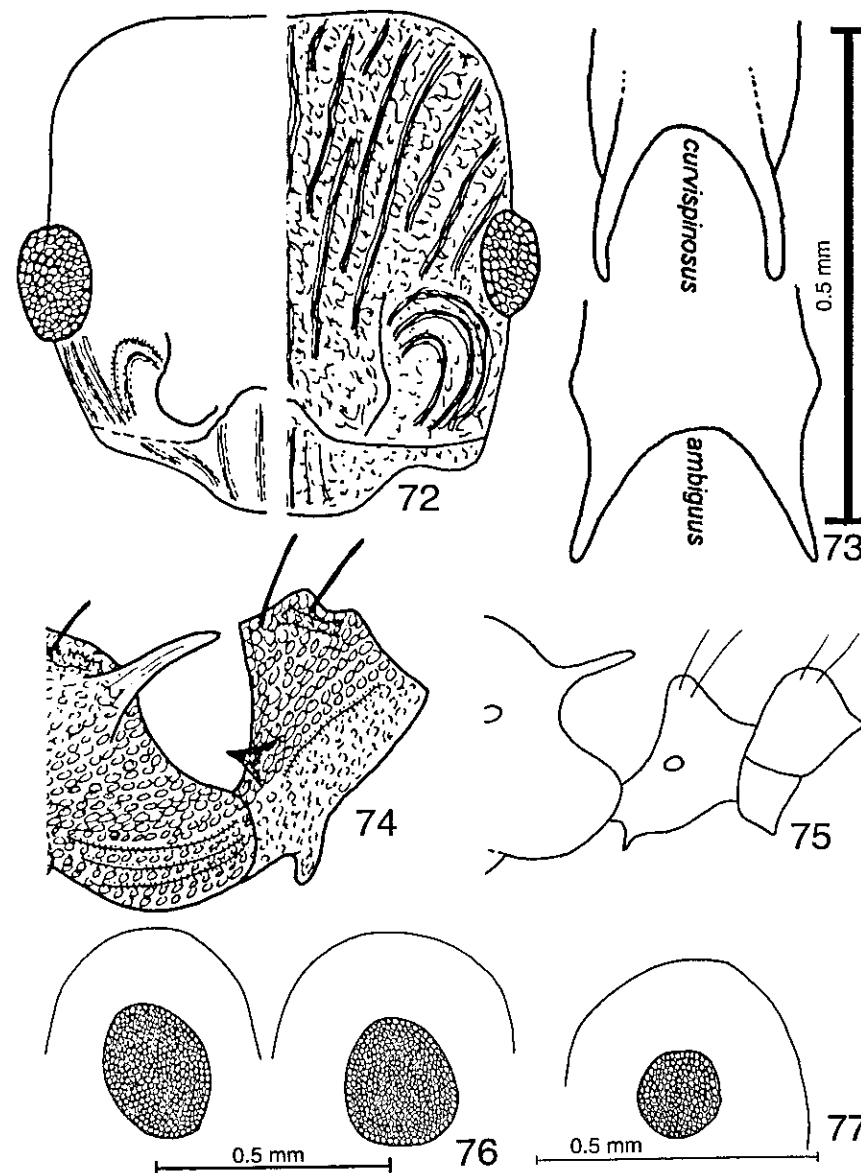
- 17(12). Nodo del peciolo redondeado en perfil (Fig. 28); casi la totalidad de la cabeza lisa y brillante, área al lado de una franja central con escultura fina (Fig. 30) ..... 18
- Nodo del peciolo agudo en perfil (Fig. 29); usualmente toda la cabeza lisa y brillante (Fig. 25) ..... 20
- 18(17). El dorso de la cabeza con estrias finas (Fig. 30, izquierda); superficie dorsal del pospeciolo liso y brillante; anida debajo de piedras; Coahuila y San Luis Potosí..... **mexicanus** especie nueva
- Región central de la cabeza sin estrias finas, los lados de esta franja puntuados o con costulas (Fig. 30, derecha); superficie dorsal del pospeciolo puntuado densamente ..... 19
- 19(18). Ojo pequeño (Fig. 30, derecha), la distancia entre la inserción de la mandíbula y el borde anterior del ojo aproximadamente 1.2 veces el diámetro máximo del ojo, Nuevo México y Texas ..... **cokendolpheri** especie nueva\*
- Ojo mas grande (Fig. 31, izquierda), la distancia entre la inserción de la mandíbula y el borde anterior del ojo es equal como el máximo diámetro del ojo; México ..... **punctithorax** especie nueva
- 20(17). Mucha de la cabeza lisa y brillante (Fig. 31, izquierda); nodo del peciolo muy agudo en perfil (Fig. 29); Arizona . **mariposa** Wheeler\*
- Usualmente la cabeza tiene una franja central sin escultura (Fig. 31, derecha); nodo del peciolo no tan agudo (Fig. 32); café oscuro; región entre las espinas propodeales con arrugas finas y transversales, la superficie baja de la cara posterior del propodeo lisa y brillante, anidan en la corteza de alamos; Chihuahua ..... **adustus** especie nueva
- 21(11). Cabeza densamente punteada (Fig. 36, izquierda), nunca con una franja sin escultura, sin estrias ni arrugas, ni con puntitos en filas que formen estrias debiles; amarillas hasta café claro con ojos negros ..... 22
- Cabeza con estrias o arrugas (Fig. 36, derecha), además de puntitos (si es casi totalmente punteado, hay una franja central sin escultura), el dorso de la cabeza parcialmente liso, la franja central a veces sin escultura; amarillo, café amarilloso hasta café oscuro ..... 26
- 22(21). El nodo del peciolo en perfil es truncado o redondeado (Fig. 38); Texas y Nuevo León ..... 23
- El nodo del peciolo es agudo (Fig. 37); Nuevo Mexico ..... **coleenae** especie nueva\*
- 23(22). Especie grande, el largo total mas de 3mm; nodo del peciolo redondeado (Fig. 38); Nuevo León .... **punctaticeps** especie nueva
- Especie mas pequeña, el largo total menos de 3mm; nodo del peciolo truncado en perfil (Fig. 39) ..... 24



Figs. 65-71. 65, The head of a worker of *L. schaumii* (left) and of a paratype worker of *L. whitfordi* (right), showing the sculpture; 66, Propodeum and petiole of a worker of *L. schaumii* as seen from the side; 67, Mesosoma of a paratype worker of *L. emmae* (left) and a paratype worker of *L. whitfordi* (right); 68, Dorsum of propodeum of holotype worker of *Leptothorax tuscaloosae*; 69, Propodeal spines of the cotype worker of *L. bradleyi*; 70, Propodeum and petiole of a worker of *L. longispinosus* as seen from side; 71, Mesosoma, petiole and postpetiole of the holotype worker of *L. tuscaloosae*.

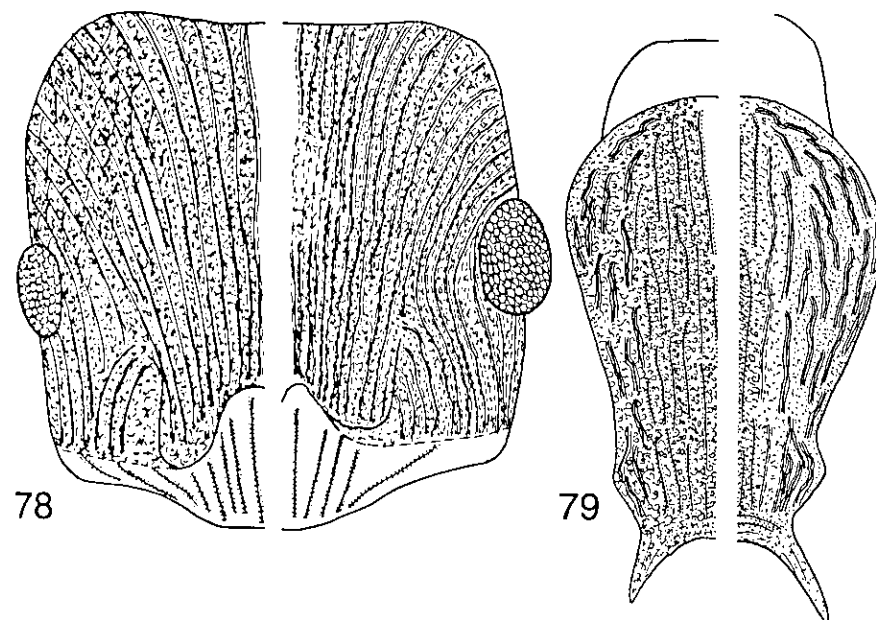


- 24(23). Espinas propodeales pequeñas, pero desarrolladas; pelos del peciolo no puntiagudos (Fig. 39); Texas ..... 25\*
- Espinas propodeales poco desarrolladas, consisten sencillamente de ángulos; pelos en el peciolo puntiagudos (Fig. 40); Nuevo León ..... *punctatissimus* especie nueva
- 25(24). Ojos relativamente pequeños (diámetro máximo < 0.15mm), diámetro máximo menos que la distancia entre la inserción de la mandíbula y el borde anterior del ojo (Fig. 41, izquierda) ..... *terrigena* Wheeler\*
- Ojos relativamente grandes (diámetro máximo > 0.20mm), diámetro máximo aproximadamente igual a la distancia entre la inserción de la mandíbula y el borde anterior del ojo (Fig. 41, derecha) ..... *liebi* especie nueva\*
- 26(21). Espinas propodeales conectadas a las bases por una carina (Fig. 43); Texas ..... *obturator* Wheeler\*
- Espinas propodeales no conectadas por una carina; México .... 27
- 27(26). Cabeza con arrugas y puntitos (Fig. 36, derecha); pedúnculo del peciolo elongado y el nodo del peciolo cuadrado en perfil (Fig. 44); Baja California ..... *peninsularis* Wheeler
- La mayoría de la cabeza con puntitos, o con estrias o arrugas poco definidas (Fig. 36, izquierda); pedúnculo del peciolo corto (nodo del peciolo puede ser cuadrado) o si el pedúnculo es elongado, el nodo es redondeado ..... 28
- 28(27). Pospeciolo es 1.5 veces o menos ancho que la anchura total del peciolo (Fig. 45) ..... 29
- Pospeciolo es 1.5 veces o mas ancho que la anchura total del peciolo (Fig. 46), ocasionalmente 2 veces mas ancha ..... 31
- 29(28). Peciolo y pospeciolo con pelos gruesos, largos y clavados fuertemente (Fig. 45), como 10 en el peciolo, 20 en el pospeciolo; el dorso de la cabeza con arrugas, con espacios brillantes entre las arrugas; el dorso y los lados del mesosoma con arrugas bien definidas; el nodo del peciolo truncado (Fig. 47); Arizona ..... *stenotyle* Cole\*
- Sin todas las características anteriores, pelos en el peciolo y pospeciolo un poco espatulados, dorso de la cabeza con estrias, mezcladas con puntitos o con arrugas finas ..... 30
- 30(29). Amarillo o café palido; cabeza y parte del gáster pueden ser café palido; el dorso de la cabeza está cubierto con costulas mezcladas con puntitos; Baja California Norte ..... *andrei* Emery
- Café oscuro; dorso de la cabeza está cubierto con arrugas finas (Fig. 53, izquierda); Hidalgo ..... *rugithorax* especie nueva
- 31(28). El dorso del pospeciolo con arrugas muy marcadas (Fig. 57,



Figs. 72-77. 72, Heads of the holotype worker of *L. tuscaloosae* (left) and of a worker of *L. rugatulus* (right), showing the sculpture; 73, Propodeal spines of workers of *L. curvispinosus* (MS) and *L. ambiguus* (NY) as seen from above; 74, Propodeal spines and petiole of a worker of *L. ambiguus*; 75, Propodeal spines and petiole of a cotype female *L. minutissimus*; 76, Eye of females of *Leptothorax ambiguus* (left) and *L. curvispinosus* (right); 77, Eye of a cotype female of *L. minutissimus*.

- izquierda); nodo del peciolo truncado, vista en perfil; EEUU, incluyendo Arizona, Nuevo México y Texas ..... *texanus* Wheeler\*
- El dorso del pospeciolo punteado o granulado (Fig. 57, derecha), raramente con arrugas, el lado usualmente con arrugas; nodo del pospeciolo a veces punteado (Fig. 54) ..... 32
- 32(31). Café amarillo pálido (raramente café oscuro), gáster a veces un poquito más oscuro; escultura en el dorso de la cabeza consiste de arrugas finas (o con puntitos finos); clipeo comúnmente impreso en forma de una franja de poca profundidad, aunque la carina central y varias carinas laterales pueden ser desarrolladas; los lados del peciolo y pospeciolo sin arrugas o con arrugas poco desarrolladas ..... 33
- Café oscuro; escultura de la cabeza consiste de arrugas; carina medial del clipeo bien desarrollada; lados del peciolo y pospeciolo con arrugas que no están bloqueadas por puntitos ..... 34
- 33(32). Lado del pronoto no liso, granulado o punteado, con estrias poco definidas (Fig. 97); lados del peciolo y pospeciolo punteado sin evidencia de arrugas (Fig. 97); Chihuahua ..... *carinatus* Cole
- Lado del pronoto liso y con estrias paralelas bien definidas (Fig. 60); lados y dorso del peciolo con arrugas finas; Michoacán ..... *rugulosus* especie nueva
- 34(32). Dorso de la cabeza opaco o semiopaco, puntitos frontales ausentes o poco desarrollados (Fig. 58, derecha); dorso del mesosoma con arrugas finas longitudinales; Chihuahua ..... *tricarinatus* Emery
- Dorso de la cabeza casi totalmente liso y brillante; puntitos frontales grandes y distintos; dorso del mesosoma finamente granulado o punteado, a veces liso y brillante; Arizona, Nuevo México y Texas ..... *neomexicanus* Wheeler\*
- 35(6). Espinas propodiales cortas y dentiformes (Fig. 63), largura menos de la mitad de la distancia entre las bases; usualmente café oscuro ..... 36
- Espinas propodiales más largas que la mitad de la distancia entre las bases (Fig. 64); de café amarillo hasta café oscuro o dos colores .. ..... 37\*
- 36(35). Dorso de la cabeza densamente punteada, mezclada con estrias (Fig. 65, izquierda); EEUU y probablemente en el norte de Coahuila ..... *schaumii* Roger\*
- Dorso de la cabeza casi totalmente liso y brillante (Fig. 65, derecha); Nuevo México, Nuevo León, y San Luis Potosí ..... *whitfordi* especie nueva
- 37(35). Obreras relativamente pequeñas, el largo total aproximada-



Figs. 78-79. 78, Head of a cotype worker of *L. bradleyi* (left) and of a paratype worker of *L. josephi* (right); 79, Dorsum of mesosoma, of the cotype worker of *L. bradleyi* (left) and of a cotype of *L. smithi* (right), showing the sculpture.

- mente 2.5mm; café amarillo con el dorso de la cabeza un poco más oscuro; anidan debajo de piedras; oeste de EEUU, incluyendo California, Arizona, Nuevo México y Texas ..... *rugatulus* Emery\*
- Obreras relativamente más grandes, largura más de 3mm; cabeza y gáster negros, mesosoma rojo oscuro; anidan en árboles de encinos; sur de Nuevo México ..... *josephi* especie nueva\*

#### SPECIES COMPLEXES

An attempt is made to separate the species in this subgenus into species complexes, although these complexes are difficult to define, and in some cases, probably do not represent monophyletic groups. For example, *L. oxynodis* is considered a member of the *nitens* species complex, although it has an 11-segmented antennae, and all the other members have a 12-segmented antenna. It may be a member of a complex with an 11-segmented antenna, but does not seem to belong to any of these groups. The *nitens* complex may be a polyphyletic group, as they are united primarily on the shape of the node of the petiole. The *andrei* group is probably also polyphyletic, as it is also based primarily on the shape of the petiole. Other species complexes appear to be well defined, such as the *emmae* complex, *hispidus*

complex, *silvestrii* complex (although the 2 members have 11 and 12 segmented antennae), and even the large *tricarinatus* group, which is based on the form of the clypeal carinae. Some complexes contain a single species, but seem to be so distinct that they should be in a separate group. These include the *striatulus* complex and the *obturator* complex.

*Leptothorax* is a difficult genus of ants to identify to species. Hopefully this additional key will make identification of more of the species possible. It may be easier to use that the key based on morphological characters, or will at least make accurate identifications more certain. Many species remain to be discovered, especially in México. If the two keys lead to different identifications, it is possible that you are dealing with an undescribed species.

#### KEY TO THE SPECIES COMPLEXES, BASED PRIMARILY ON WORKERS

1. Large ants (total length of worker over 3mm); petiole with long peduncle (Fig. 114) ..... *hispidus* species complex
- Smaller (total length less than 3mm); petiole with short peduncle (Fig. 51) ..... 2
- 2(1). Propodeum without spines or angles (Fig. 9); México ..... *striatulus* species complex
- Propodeum with spines or at least angles (Fig. 4); widely distributed ..... 3
- 3(2). Propodeal spines united by a carina (Fig. 43); Texas ..... *obturator* species complex
- Propodeal spines not united by a carina; widely distributed ..... 4
- 4(3). Clypeus with 3 well defined carina, 1 medial and two lateral, in addition to several finer carinae (Fig. 111), lateral carinae converging anteriorly ..... *tricarinatus* species complex
- Clypeus with medial carina and several lateral carinae that are all more or less equally well defined, and are nearly parallel (Fig. 86) ..... 5
- 5(4). Petiolar node sharp as seen in profile (Fig. 29) ..... *nitens* species complex
- Petiolar node blunt (rounded or truncate) in profile (Fig. 4) ..... 6
- 6(5). Petiolar node truncate in profile (Fig. 17) ..... 7
- Petiolar node round in profile (Fig. 28) ..... 8
- 7(6). Node of petiole nearly square as seen in profile (Fig. 17); concolorous light brown; antenna with 11 or 12 segments ..... *silvestrii* species complex
- Node of petiole not square as seen in profile (Fig. 70); dark brown or

- bicolored black with red mesosoma; antenna with 11 segments .. *longispinosus* species complex
- 8(6). Anterior and posterior faces of petiolar node nearly parallel (Fig. 39) ..... *andrei* species complex
- Anterior and posterior faces of petiolar node converging dorsally (Fig. 40) ..... 9
- 9(8). Antenna with 11 segments (Fig. 11, right) ..... 10
- Antenna with 12 segments (Fig. 11, left) *andersoni* species complex
- 10(9). Suprapeduncular process well developed, curved upwards (Fig. 107); dorsum of head at least partly smooth and shining ..... *emmae* species complex
- Suprapeduncular process poorly developed; dorsum of head nearly completely covered with fine striae (Fig. 65, left) ..... *schaumii* species complex

#### LIST AND DESCRIPTIONS OF THE COMPLEXES

##### *andersoni* species complex

Members of this species complex can be recognized by the 12-segmented antenna and by the often broadly rounded petiolar node. The postpetiole is occasionally widened, as compared to the petiole. The clypeus has several carinae, with the medial carina being only slightly more prominent than the others. The region next to the medial carina has smaller carinae, and is usually not smooth and shiny. Members include *L. andersoni*, *L. bestelmeyeri*, *L. bicolor*, *L. liebi*, *L. lindae*, *L. ocellatus*, and *L. punctatissimus*. This complex is closely related to the *tricarinatus* species complex, which has 3 major carinae on the clypeus, including a sharp, well-defined medial carina and two lateral carinae, which converge anteriorly. Some of the members of the *tricarinatus* complex could be confused with this complex, and are included in the following key (*L. carinatus*, *L. cokendolpheri*, *L. gallae* and *L. rugulosus*).

#### KEY TO THE WORKERS OF THE SPECIES OF THE ANDERSONI COMPLEX

1. Dark brown or bicolored; propodeal spines moderately well developed, or very well developed (Fig. 2) ..... 2
- Pale yellow or light brown; propodeal armature consisting of small angles or spines (Fig. 13) ..... 4
- 2(1). Entire dorsal surface of head with striae (Fig. 22, right); California ..... 3
- Dorsum of head mostly smooth and shining (Fig. 22, left); southern

- México (Chiapas) ..... **bicolor** new species  
 3(2). Node of petiole rounded (Fig. 123); nests in soil .....  
 ..... **lindae** new species  
 — Node of petiole relatively sharp (Fig. 112); nests in plant cavities .  
 ..... **gallae** Smith\*  
 4(1). Eyes large, greatest diameter longer than length from base of  
 mandible to anterior border of eye (Fig. 88) ..... 5  
 — Eyes smaller, greatest diameter less than or equal to length from  
 base of mandible to anterior border of eye (Fig. 145) ..... 6  
 5(4). Nearly white in color; dorsum of pronotum with fine rugulae ...  
 ..... **liebi** new species  
 — Light brown; dorsum of pronotum with distinct rugae .....  
 ..... **bestelmeyeri** new species  
 6(4). Eye tiny, maximum diameter  $\frac{1}{2}$  length of distance between base  
 of mandible and anterior edge of eye (Fig. 145); head at least partially  
 smooth and shining ..... **ocellatus** new species  
 — Eye larger, maximum diameter nearly as long as distance between  
 base of mandible and anterior border of eye, if eyes smaller, dorsum  
 of head densely punctate ..... 7  
 7(6). Dorsum of base of first gastral tergite finely punctate (Fig. 12, left)  
 ..... **andersoni** new species  
 — Dorsum of first gastral tergite completely smooth and polished (Fig.  
 12, right ) ..... 8  
 8(7). Entire dorsum of head densely and evenly punctate (Fig. 36, left)  
 ..... **punctatissimus** new species  
 — Part of head smooth and shining (central region, Fig. 31), or at least  
 head not densely and evenly punctate (Fig 30) ..... 9  
 9(8). Head with fine rugae (Fig. 162); Michoacán .....  
 ..... **rugulosus** new species\*  
 — ..... Head with striae, moderately smooth and polished (Fig. 101);  
 western United States and northern México (Chihuahua) ..... 10  
 10(9). Eyes with 7-8 ommatidia in maximum diameter; dorsum of head  
 mostly smooth and glossy, but with very fine costulae (Fig 101) ..  
 ..... **cokendolpheri** new species\*  
 — Eyes with 8-9 ommatidia in maximum diameter; dorsum of head  
 with costulae, little of dorsum smooth and shining **carinatus** Cole\*  
 \* member of *tricarinatus* species complex

#### *andrei* species complex

Members of this species complex can be recognized as the medial clypeal carina is poorly developed, the lateral carinae are well developed or several are present. The surface of the clypeus is convex. The

antennae has 12 segments. The anterior and posterior faces of the petiole are nearly parallel (Fig. 39), and the top of the node is usually rounded or truncate. The subpeduncular process is nearly always small and poorly developed. The propodeal spines are small and usually consist of only feeble angles (Fig. 24) or small spines (Fig. 27). Members of the species complex include *L. andrei*, *L. bristoli*, *L. manni*, and *L. terrigena*. Some of the members of the *tricarinatus* complex may be confused with members of the *andrei* complex (*L. bestelmeyeri*, *L. brevispinosus*, *L. furunculus*, *L. mexicanus*, *L. neomexicanus*, and *L. punctithorax*) and are included in the key. These are indicated with asterisks.

#### KEY TO THE WORKERS OF THE SPECIES OF THE *ANDREI* COMPLEX

1. Dorsum of head nearly completely smooth and shining, if sculpture is present, it is usually fine (Fig. 22, left) ..... 2
- ..... Dorsum of head nearly completely sculptured (Fig. 22, right), sculpture usually consisting of punctures, if striate present, surface usually dull, central region may be smooth and shining ..... 6
- 2(1). Dorsum of pronotum mostly smooth and shining (Fig. 34, left) ..... 3
- Dorsum of pronotum with rugae or striate (Fig. 49) or punctae (Fig. 34, right) ..... 4
- 3(2). Propodeal armature of worker represented only as bumps (Fig. 95); propodeal spines of female with blunt tips; node of petiole of male low and weakly concave posteriorly .....  
 ..... **brevispinosus** new species\*  
 — Propodeal armature of worker poorly developed angles; propodeal spines of female with acute tips; node of petiole of male higher and somewhat concave posteriorly ..... **mexicanus** new species\*
- 4(2). Side of pronotum punctate, and only weakly shining (Fig 151) .....  
 ..... **punctithorax** new species\*  
 — Side of pronotum partly smooth (Fig. 126) and strongly shining 5
- 5(4). Mesopleuron with rugae (Fig 126) ..... **manni** Wheeler  
 — Mesopleuron predominantly punctate (Fig. 96) .....  
 ..... **bristoli** new species
- 6(1). Dark brown in color ..... **neomexicanus** Wheeler\*  
 — Pale brown or yellow ..... 7
- 7(6). Eyes large (Fig. 88), maximum diameter much greater than distance between anterior border of eye and insertion of mandibles .....  
 ..... **bestelmeyeri** new species\*  
 — Eyes relatively small (Fig. 111), maximum diameter less than (or

- equal to) distance to insertions of mandible ..... 8  
 8(7). Entire dorsum of head covered with dense punctures (Fig. 179),  
 entire surface dull ..... *terrigena* Wheeler  
 — Dorsum of head with fine striae (Fig. 86), weakly shining ..... 9  
 9(8). Clypeus with 4 to 6 well differentiated carinae on each side of  
 medial carina, with the medial carina being most developed (Fig.  
 111); known only from Colorado and Wyoming .....  
 ..... *furunculus* Wheeler\*  
 — Clypeus with many poorly defined carinae (Fig. 86), impossible to  
 count, medial carina not more developed than others; widely distrib-  
 uted in southwestern USA and northern México; not reported from  
 Colorado ..... *andrei* Emery  
 \* member of *andersoni* species complex

#### *emmae* species complex

Members of this species complex can be recognized by an 11-segmented antenna, a thickened, blunt, rounded petiolar node, and that the dorsum of the head is partially smooth and shining with fine striae. The suprapeduncular process is well developed (Fig. 107), with a curved dorsal surface. These characters, in addition to the 11-segmented antenna, will easily separate this complex from the *andersoni* complex in which the shape of the node is similar. Members include *L. emmae* new species and *L. whitfordi* new species.

#### KEY TO THE WORKERS OF THE SPECIES OF THE *EMMAE* COMPLEX

1. Bicolored (head and gaster dark, mesosoma, petiole, and postpetiole red); dorsum of mesosoma with longitudinal striae (Fig. 67, left) ..  
 ..... *emmae* new species
- Concolorous dark brown (mesosoma rarely lighter in color); meso-  
 soma without prominent longitudinal striae (Fig. 67, right) .....  
 ..... *whitfordi* new species

#### *hispidus* species complex

Members of this species complex are large (over 3mm total length), and can be recognized by the pedunculate petiole (Fig. 114). The node of petiole is broadly rounded or truncate, and thickened as seen in profile (Fig. 114). The propodeal spines are small. The eyes are small, the minimum diameter is about  $\frac{1}{2}$  to  $\frac{2}{3}$  the distance between the anterior border of the eye and the base of mandible. The head and mesosoma are coarsely sculptured with rugae or coarse striae, the intrarugal spaces are densely and coarsely punctate. The *hispidus*

complex is a Mexican group, with a single species (*L. hispidus*) which barely enters the southern United States. This complex includes *L. hispidus*, *L. peninsularis* and *L. punctaticeps*.

#### KEY TO THE WORKERS OF THE SPECIES OF THE *HISPIDUS* COMPLEX

1. Hairs on scape completely decumbent (Fig. 26, left); Baja California  
 ..... *peninsularis* Wheeler
- Hairs on scapes suberect (Fig. 26, right); southern United States  
 and eastern México ..... 2
- 2(1). Mesopropodeal suture deeply impressed (Fig. 5); dorsum of head  
 with coarse rugae; dorsum of first gastral tergum finely punctate or  
 finely striate (Fig. 12, left) ..... *hispidus* Cole
- Mesopropodeal suture not deeply impressed, outline of mesosoma  
 in the same plane and broadly rounded (Fig. 149); dorsum of head  
 densely and finely punctate, with striae; first gastral tergite smooth  
 and glossy (Fig. 12, right) ..... *punctaticeps* new species

#### *longispinosus* species complex

Members of this species complex can be recognized by the 11 segmented antenna, the petiolar node is obliquely truncate and sloping posteriorly, the mesosoma is roughly sculptured in most species, and the head is roughly sculptured in some of the species, smooth and shining in others. The clypeus has a single medial carina and 2 prominent lateral carinae, as well as additional carinae. It could be confused with the *tricarinatus* species complex, but differs in having a 11-segmented antenna. Members include *L. josephi*, *L. longispinosus*, *L. rugatulus*, and *L. tuscaloosae*.

#### KEY TO THE WORKERS OF THE SPECIES OF THE *LONGISPINOSUS* COMPLEX

1. Head mostly smooth and shining (Fig. 72, left) ..... 2
- Head covered with coarse rugae or striae (Fig. 72, right) ..... 3
- 2(1). Mesosoma coarsely sculptured, with mixture of rugae and punc-  
 tures (Fig. 70) ..... *longispinosus* Roger
- Mesosoma finely sculptured, nearly smooth (Fig. 71) .....  
 ..... *tuscaloosae* Wilson
- 3(1). Larger species, total length over 3mm; bicolored (head and gaster  
 dark, mesosoma lighter); New Mexico ..... *josephi* new species
- Smaller species, total length less than 3mm; rarely bicolored; widely  
 distributed ..... *rugatulus* Emery

*nitens* species complex

Members of this species complex can be recognized by the sharp apex of the petiolar node and that the propodeal spines are usually poorly developed. The medial clypeal carina is poorly developed and not more prominent than the numerous lateral carinae. Most species have a 12-segmented antenna. This complex includes *L. maryanae*, *L. mariposa*, *L. melinus*, *L. nitens*, *L. oxynodis*, *L. rugosus* and *L. stoll*. Three species in the *tricarinatus* complex, *L. adustus*, *L. chandleri*, and *L. coleenae*, are included in the key as the sharp node of the petiole may cause them to be confused with members of this species complex. They are indicated by asterisks.

KEY TO THE WORKERS OF THE SPECIES OF THE *NITENS* COMPLEX

1. Dorsum of head predominantly smooth and shining (Fig. 22, left) ..... 2
- Dorsum of head predominantly sculptured (Fig. 22, right), occasionally central strip free of sculpture ..... 5
- 2(1). Scapes extending to occipital corners (Fig. 22, left); anterior medial border of clypeus strongly concave (Fig. 173), crenulated with teeth that terminate carinae on clypeus; Guatemala ..... *stoll* Forel
- Scapes not reaching occipital corners; anterior medial border of clypeus weakly concave and not crenulated ..... 3
- 3(2). Dorsum of mesosoma usually smooth and shining (Fig. 34, left) ..... *nitens* Emery
- Dorsum of mesosoma coarsely punctured (at least propodeum) (Fig. 34, right) ..... 4
- 4(3). Posterior face of petiole with fine rugulae (Fig. 33, right); common and widely distributed in western North America ..... *mariposa* Wheeler
- Posterior face of petiole punctate (Fig. 33, left); New Mexico ..... *melinus* new species
- 5(1). Antenna with 11 segments (Fig. 11, right) ..... *oxynodis* new species
- Antenna with 12 segments (Fig. 11, left) ..... 6
- 6(5). Propodeal spines developed (Fig. 34, right); California and northeastern México ..... 7
- Propodeal armature consisting of simple angles (Fig. 35, left); western North America ..... 8
- 7(6). Side of pronotum punctate (Fig. 129) (top with rugae-Fig. 130); California ..... *maryanae* new species

- Side of pronotum with rugae (Fig. 160); northeastern México ..... *rugosus* new species
- 8(6). Concolorous dark brown ..... *adustus* new species\*
- Concolorous pale brown or yellow ..... 9
- 9(8). California ..... *chandleri* new species\*
- New Mexico ..... *coleenae* new species\*

*obturator* species complex

The only species in this complex, *L. obturator* Wheeler, can be recognized as the propodeal spines are united by a carina (Fig. 43). In addition, the propodeum is depressed when compared to the remainder of the mesosoma (Fig. 142).

*schaumii* species complex

This species complex can be recognized by the 11-segmented antennae, the node of the petiole is convex (occasionally concave) anteriorly and posteriorly (as seen in profile). The node is not broadly rounded as in the *emmae* complex and the dorsum of the head is nearly completely covered with fine striae. Members include *L. ambiguus* Emery, *L. bradleyi*, *L. curvispinosus* Mayr, *L. minutissimus* and *L. schaumii* Roger.

KEY TO THE WORKERS OF THE SPECIES OF THE *SCHAUMII* COMPLEX

1. Propodeal armature consisting of tiny spines or angles (Fig. 66) ..... *schaumii* Roger
- Propodeal armature well developed with long, acute spines (Fig. 69) ..... 2
- 2(1). Worker unknown; eye of female small, round (Fig. 77) diameter about equal in length to length from base of mandible to anterior edge of eye; propodeal spines long (length 0.15mm), diameter about equal along entire length (Fig. 75); Washington, D. C. .... *minutissimus* Smith
- Eye of female large, oblong (Fig. 76), diameter greater than length between base of mandible and anterior edge of eye; propodeal spines thick at bases, narrowed towards tip (Fig. 74); distributed throughout eastern United States ..... 3
- 3(2). Head with rugae or coarse striae, intrarugal spaces punctate (Fig. 78, left) ..... *bradleyi* Wheeler
- Head with fine striae, surface between striae finely sculptured, and forming reticulations with striae ..... 4
- 4(3). Propodeal spines elongate, length greater than twice distance

- between bases (Fig. 73) ..... *curvispinosus* Mayr  
 — Propodeal spines shorter, length about equal to distance between bases (Fig. 73) ..... *ambiguus* Emery

#### *silvestrii* species complex

The *silvestrii* species complex appears to be the most plesiomorphic in the subgenus, and possesses a number of characteristics that link this subgenus to the Tetramoriini. These characters include a raised area on the lateral surfaces of the clypeus, directly anterior to the insertions of the antennae. It is not as developed as it is in *Tetramorium*, but it is more developed than in other members of the subgenus *Myrafant*. The maxillary palps have 5 segments, the labial palps have 3 segments, as other members of *Leptothorax*, which clearly demonstrates the proper placement of *L. silvestrii* in *Leptothorax*. Additionally, the mandible has 5 teeth, as in most other *Leptothorax*. The propodeal spines are long and well developed, whereas they are usually short in the remainder of the subgenus. The node of the petiole is quadrate or subquadrate as in *Tetramorium*, not rounded or with a sharp apex in most of the species of *Myrafant*. These ants are larger than is typical for *Myrafant* and are coarsely sculptured with rugae, characters it shares with *Tetramorium*. Although *L. silvestrii* was once considered a member of *Tetramorium*, it is clearly a *Leptothorax*, especially when one considers the closely related *L. smithi*. This complex includes *L. silvestrii* and *L. smithi*, which can be easily separated as *L. silvestrii* is from Arizona, has a 12-segmented antenna, and has roughened sculpture on the dorsum of the gaster whereas *L. smithi* is found in eastern US, has a 11-segmented antenna, and has a smooth and glossy gastral surface. *Leptothorax rugosus*, a member of the *nitens* complex, may be related as it also has the incrassate femur with a weakly sculptured gaster. It can be separated from the other two by the sharp petiolar apex (Fig. 160).

#### *striatulus* species complex

*Leptothorax striatulus* Stitz, the only species in this complex, can be recognized as it lacks spines or even angles on the propodeum (Fig. 9).

#### *tricarinatus* species complex

This species complex can be recognized by the 3 prominent carinae (Fig. 111) on the clypeus (1 medial and 2 lateral). The lateral carinae on the clypeus somewhat converge anteriorly. The area between the medial carina and the lateral carinae is usually smooth and glossy. There are usually additional finer carinae on the clypeus (Fig. 111).

Many species often have a widened postpetiole, as compared to width of petiole. In addition, the 12-segmented antenna has a relatively short scape, which fails to reach the occipital corner by at least one diameter, and the mesosoma is without a mesopropodeal constriction. This complex includes *L. adustus*, *L. brevispinosus*, *L. carinatus*, *L. chandleri*, *L. cokendolpheri*, *L. coleenae*, *L. davis*, *L. furunculus*, *L. gallae*, *L. mexicanus*, *L. neomexicanus*, *L. nevadensis*, *L. obliquicanthus*, *L. punctithorax*, *L. rugithorax*, *L. rugulosus*, *L. schmittii*, *L. stenotyle*, *L. texanus*, and *L. tricarinatus*. This complex is closely related to the *andersoni* complex, but can be separated by the 3 prominent carinae on the clypeus. Specimens with weakly developed carinae, or which do not key well in the following key, will probably be members of the *andersoni* species complex.

#### KEY TO THE WORKERS OF THE SPECIES OF THE *TRICARINATUS* COMPLEX

1. Top of pronotum smooth and glossy (Fig. 19, left); dorsum of head smooth and glossy (Fig. 22, left) ..... 2
- Top of pronotum partially or completely sculptured (Fig. 19, right); dorsum of head usually sculptured (Fig. 22, right) ..... 4
- 2(1). .... Carina present on pronotum, which forms transverse ridge across anterior border (Fig. 19, left) ..... *schmittii* Wheeler
- Carina not forming transverse ridge across pronotum (Fig. 19, right) ..... 3
- 3(2). Propodeal armature of worker represented only as bumps (Fig. 24); propodeal spines of female with blunt tips; node of petiole of male low and weakly concave posteriorly ..... *brevispinosus* new species
- Propodeal armature of worker poorly developed angles (Fig. 133); propodeal spines of female with acute tips; node of petiole of male higher and somewhat concave posteriorly ..... *mexicanus* new species
- 4(1). Propodeal armature consisting of small angles which are less than 1/3 distance between bases (Fig. 19, right) ..... 5
- Propodeal armature consisting of definite spines, that are usually at least 1/3 as long as distance between bases (Fig. 19, left) ..... 16
- 5(4). Eyes relatively small, greatest length less than distance from anterior border of eye to base of mandible (Fig. 102); dorsum of head with rugae, or densely punctate (Fig. 41) ..... 6
- Eyes larger, maximum diameter nearly equal to distance between eye and insertion of antenna (Fig. 41, right); dorsum of head with fine striae, or partly smooth and polished (Fig. 31, left) ..... 9



- 6(5). Head densely and evenly punctate (Fig. 41, left) ..... *coleenae* new species  
 — Head with rugae ..... 7
- 7(6). Postpetiole widened (Fig. 46), about 1.5 X or more width of petiole ..... 8  
 — Postpetiole not noticeably widened as seen from above, about 1.25 X width of petiole (Fig. 45) ..... *stenotyle* Cole
- 8(7). Rugae on dorsum of head coarse (Fig. 58, right); propodeal spines small, but developed (Fig. 59); distributed in much of USA south into northern México ..... *tricarinatus* Emery  
 — Sculpture of head fine, consisting of rugulae (Fig. 53, left); propodeal armature consisting of small angles; Hidalgo .....  
 ..... *rugithorax* new species
- 9(5). Much of dorsum of head, especially posterior half, smooth and glossy (Fig. 31, left) ..... 10  
 — Entire head, except for central area, covered with fine striae (Fig 31, right) ..... 12
- 10(9). Propodeal armature consisting of blunt angles (Fig. 32); pale brown or yellow, or dark brown; New Mexico, Texas, and Chihuahua ..... 11  
 — Propodeal spines small, but developed and acute (Fig. 151); dark brown; central México ..... *punctithorax* new species
- 11(10). Pale brown or yellow; subpetiolar process large (Fig. 100) ....  
 ..... *cokendolpheri* new species  
 — Dark brown; subpetiolar process small (Fig. 80) .....  
 ..... *adustus* new species
- 12(9). Hairs on scape raised above surface, may be semierect (Fig. 26, right) ..... 13  
 — Hairs on scape appressed (Fig. 26, left) ..... 15
- 13(12). Node of petiole with relatively sharp apex (Fig. 99); California .....  
 ..... *chandleri* new species  
 — Node of petiole blunt and rounded as seen in profile (Fig. 61); southwestern United States and México ..... 14
- 14(13). Node of petiole relatively high, height above posterior peduncle nearly equal to thickness of petiole at same point (Fig. 61); southwestern US and northern México (Chihuahua) ..... *carinatus* Cole  
 — Node of petiole lower, height above posterior peduncle about half thickness of petiole at same point (Fig. 60); Michoacán .....  
 ..... *rugulosus* new species
- 15(12). Pale brown or yellow; subpeduncular process well developed (Fig. 109); central Colorado and Wyoming ..... *furunculus* Wheeler  
 — Dark brown; subpeduncular process consisting of small bump (Fig.

- 136); southeastern Arizona, southern New Mexico, western Texas ..... *neomexicanus* Wheeler
- 16(4). Eye elongate, kidney-shaped (Fig. 16, right); first gastral tergum finely punctate (Fig. 12, left) .....  
 ..... *obliquicanthus* Cole
- Eye not kidney shaped (Fig. 16, left); first gastral tergum smooth and shining (Fig. 12, right) ..... 17
- 17(16). Dorsum of postpetiole covered with coarse rugae (Fig. 57, left) .....  
 ..... *texasus* Wheeler
- Dorsum of postpetiole covered with punctures (Fig. 57, right), if any rugae are present, they are fine and form reticulations with punctures ..... 18
- 18(17). Postpetiole wide, at least half width of gaster (Fig. 57, right); eastern USA ..... *davisi* Wheeler
- Postpetiole not greatly widened, much narrower than half width of gaster (Fig. 57, left); western USA ..... 19
- 19(18). At least part of head smooth and shining (Fig. 25, right) .....  
 ..... *neomexicanus* Wheeler
- Entire head punctate or striolate (Fig. 36, left), very weakly shining ..... 20
- 20(19). Propodeal spines straight; nests in soil (Fig. 51) .....  
 ..... *nevadensis* Wheeler
- Propodeal spines slightly bend downwards (Fig. 48); nests in plant cavities ..... *gallae* Smith

#### LIST OF THE NORTH AMERICAN SPECIES IN THE SUBGENUS MYRAFANT

##### *Leptothorax (Myrafant) adustus* new species

Figs. 31, 32, 35, 80, & 81; Map 1

Species complex: *nitens*

Diagnosis: This is a small, dark species with very tiny propodeal spines (Fig. 80), the node of the petiole has a relatively sharp apex and the ventral surface of the peduncle has a small tooth or at least a bump. The antenna has 12 segments. The head is usually partially smooth and shining, although this lack of sculpture may be restricted to only a slender strip.

Distribution: México: Chihuahua, and northern New Mexico (Map 1).

##### Description

Worker measurement (mm): HL 0.64-0.70, HW 0.54-0.65, SL 0.49-



0.53, EL 0.17-0.18, PW 0.16-0.19, PL 0.19-0.20, PPW 0.22-0.23, PPL 0.17-0.18. Indices: CI 84-93, SI 76-77, PI 84-95, PPI 74-82.

Mandibles with 5 or 6 teeth, apical and preapical well defined, remainder poorly developed; anterior border of clypeus varies, concave to weakly convex; clypeus with a number of well developed carinae, including medial carina; sides of head weakly convex; vertex broadly concave; eyes small, but extending past lateral border of head; scape not reaching occipital corners; maxillary and labial palps short, not extending past buccal cavity; mesosoma nearly straight dorsally, sutures scarcely impressed; propodeum with dorsal face and posterior face nearly equal in length, propodeal angles small and poorly formed; petiole with relatively sharp apex, anterior petiolar face broadly concave, posterior face convex, bottom of peduncle with small tooth or at least bump; postpetiole not noticeably broadened.

Fig. 80. Mesosoma and petiole of the holotype worker of *Leptothorax adustus*.

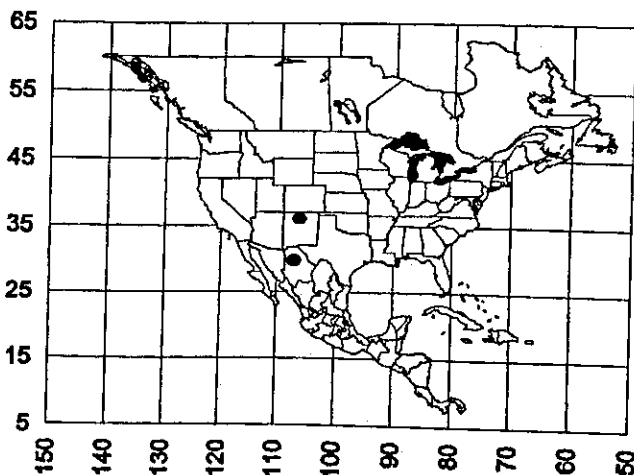
Erect hairs thickened and scattered on all surfaces except legs and scapes; decumbent pubescence scattered on all surfaces, especially obvious on legs and scapes.

Sculpture for the most part fine, consisting of fine striae on sides of head and fine punctures on mesosoma, petiole and postpetiole, central part of head, much of dorsum of mesosoma (especially pronotum) and

dorsum of gaster smooth and polished. Top of pronotum mostly punctate, but one specimen is relatively smooth and glossy and also smooth between propodeal spines.

**C o l o r :** concolorous dark brown.

**Female measurements (mm):** HL 0.76-0.79, HW 0.74-0.75, SL 0.58-0.59,



Map 1. Distribution of *Leptothorax adustus*.

EL 0.22-0.23, WL 1.26-1.28, PW 0.23-0.26, PL 0.22-0.25, PPW 0.31-0.32, PPL 0.18-0.19. Indices: CI 94-99, SI 73-78, PI 104-105, PPI 168-172.

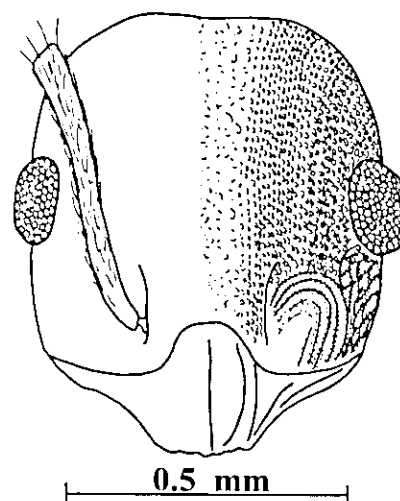


Fig. 81. Head of the holotype worker of *Leptothorax adustus*. The sculpture is shown only on the right side of the figure.

Similar to worker in most aspects, except for presence of ocelli, larger eyes and mesosoma modified for flight; striae on head cover nearly all the dorsum, background between striae smooth and shining; dorsum of mesosoma with longitudinal striae, sides of pronotum striate, sides of propodeum rugose, mesopleuron smooth and polished; propodeal angles somewhat more developed than in worker, but still consisting of only angles; petiole with sharp apex, anterior surface only very weakly concave, posterior face nearly straight, bump on venter of peduncle only weakly developed.

Erect hairs and decumbent pubescence, and color as in worker.

**Male measurement (mm):** HL 0.47-0.53, HW 0.46-0.55, SL 0.12-0.14, EL 0.20-0.22, WL 0.91-1.00, PW 0.13-0.16, PL 0.19-0.20, PPW 0.18-0.19, PPL 0.16-0.17. Indices: CI 87-117, SI 23-30, PI 68-80, PPI 106-119.

Mandible with well defined apical and subapical teeth; median anterior border of clypeus convex, clypeus with transverse fine rugae; eyes large; ocelli well developed; scape short; palps short; propodeal angles nearly absent; petiole with straight anterior petiolar face, slightly convex posterior face, petiolar node rounded, not angulate as in worker and female.

Erect hairs sparse and covering nearly all surfaces, including legs; decumbent pubescence very sparse.

Sculpture consisting of dense punctures on head, rugae anterior to eyes, transverse rugae on anterior 1/3 to 1/2 of clypeus, dorsum of mesosoma mostly shining, as are sides of mesosoma, side of petiole lightly punctate.

Concolorous dark brown.

**Type series:** Three series from same locality, consisting of holotype worker (MCZC #5873), 14 paratype workers, 4 paratype females and 15 paratype males (CASC, CIDA, CWEM, LACM, MCZC, USNM, UNAM),

MEXICO, Chihuahua: Municipio. Janos, 7KS San Lorenzo, 18 May 1982, W & E. Mackay.

Material examined: Type series, collection numbers 5872, 5873 and 5874, and New Mexico, Taos Co., Ojo Caliente, 28-vi-1986, W&E Mackay # 7962 (10 workers CWEM).

Etymology: From Latin, *adustus* for brown, as all castes of this species are concolorous brown.

Discussion: This species is a member of the *nitens* species complex, and can be easily distinguished by characters in the key and in the diagnosis. The sculpturing on the head nearly completely covers the dorsum of the head, which may result in this species being misidentified as *L. rugithorax*. It can be distinguished on the basis of the distribution (*L. rugithorax* is from the state of Hidalgo) and that the apex of the petiole is sharp (blunt and rounded in *L. rugithorax*).

Biology: All three series were collected under and in the bark of a single branch of a live cottonwood tree (*Populus fremontii*), at a height of about 3 meters from the ground; the specimens are likely all from the same nest. The specimens were collected in parts of the tree damaged by other insects, although the tree was very healthy. The habitat was riparian on the side of the Santa María River. The additional specimens from near Taos were collected loose on a large cottonwood tree, in a riparian area at a flat area near the road.

*Leptothorax (Myrafant) ambiguus* Emery  
Figs. 73, 74, 76 & 82; Map 2

*Leptothorax curvispinosus ambiguus* Emery, 1895:320, worker, Hill City, South Dakota (designated by Creighton, 1950:262); Wheeler, 1903a:241, Plate 12, Fig. 11; *Leptothorax ambiguus*: Wesson & Wesson, 1940:97, female, male; Buren, 1944:287; Wheeler and Wheeler, 1955:22 larvae; *Leptothorax (Myrafant) ambiguus*: Smith, 1979:1392

Species complex: *schaumii*

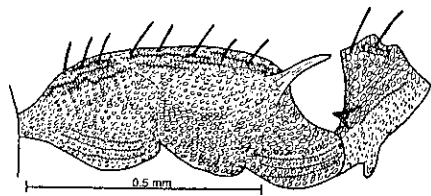


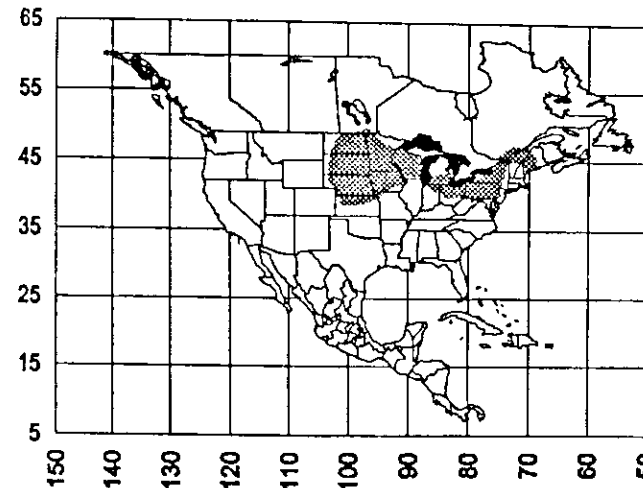
Fig. 82. Mesosoma and petiole of a worker of *Leptothorax ambiguus* (NY).

Diagnosis: Members of this species are usually light yellow or orange, roughly sculptured ants with an 11-segmented antenna. The head is covered with striae, leaving only a narrow, medial region free of sculpture and shining. The propodeal spines are nearly straight, with a length of about the distance

between the bases. The petiole is obliquely truncate as seen in profile (Fig. 82).

Distribution: USA: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Wisconsin, Michigan, Ohio, Pennsylvania, New York; Canada: Manitoba, Quebec (Map 2).

Type series: AMNH, MCZC, USNM, MCSN [seen].



Map 2. Distribution of *Leptothorax ambiguus*.

Discussion: This species is not likely to be confused with any of the others. It generally has long propodeal spines as in some of the other species, but can be separated from *L. longispinosus* by the roughly sculptured head and from *L. curvispinosus* as the propodeal spines are widely separated at the base, and shorter than those of *L.*

*curvispinosus* (Fig. 73). Wesson and Wesson (1940) provide more details for separating these 2 species, including characters for the sexuals. There are three subspecies (*ambiguus ambiguus* Emery, *ambiguus foveatus* M. Smith and *ambiguus pinetorum* Wesson and Wesson), that can be separated with difficulty using characters listed in Creighton (1950). They will probably be considered synonyms when more material becomes available.

Biology: Wesson and Wesson (1940), Gregg (1944) and Talbot (1965) discuss the biology of this species. It nests in soil, in dead stems in clumps of grasses and herbs, in galls, in hollow twigs, etc. in many habitats, including slightly exposed sites or in low wet fields, floodplain forests and meadows (Wesson and Wesson, 1940; Wheeler and Wheeler, 1963; DuBois, 1985). It also occurs in woodlands (Wheeler, 1903a; Talbot, 1934; Wheeler and Wheeler, 1963), but never nests in logs (Gregg, 1944), although it may be found in wood partially buried in the soil (Wheeler and Wheeler, 1963). It occurs as far north as Manitoba (Wheeler, et. al., 1989). The nest population size is moderate with 6-106 workers and up to 14 alates per nest. This species is

polygynous and polydomous (Alloway et al., 1982; Stuart, 1991). One to six queens may be present in a nest (Talbot, 1965), but it is not known if all lay eggs. Brood is present in the nests throughout the year (Talbot, 1965). Reproductives are present from June to Sept., with possible flights occurring at noon in July to August (Kannowski, 1959; Talbot, 1965). Females start nests between leaves, often cementing them together with salivary secretions (Kannowski, 1959). This species is aggressive and is able to recognize nestmates (Stuart, 1991). Social organization was discussed by Herbers (1983).

It is the host of the social parasite *Protomognathus americanus* (Emery) (Alloway et al., 1982; Alloway and Del Rio Pesado, 1983) and *Leptothorax (Leptothorax) duloticus* (Talbot, 1957). Foraging involves tandem running (Moeglich, 1979). Foraging is lowest during summer in Vermont (Herbers, 1989).

### *Leptothorax (Myrafant) andersoni* new species

Figs. 14 & 83; Map 3

Species complex: *andersoni*

Diagnosis: This is a small, concolorous yellow brown species with a 12-segmented antenna. The entire head and mesosoma are coarsely and densely punctate. The propodeal spines are well developed, but small (Fig. 83). The petiolar node is blunt in profile. The gaster has punctures on the basal third of first gastral tergum.

Distribution: Known only from Big Bend National Park in southwestern Texas (Map 3).

### Description

Worker measurement (mm): HL 0.55-0.64, HW 0.46-0.52, SL 0.43-0.47, EL 0.13-0.14, WL 0.64-0.68, PW 0.14-0.16, PL 0.18-0.19, PPW 0.22-0.23, PPL 0.16-0.17. Indices: CI 81-84, SI 73-78, PI 78-84, PPI 130-135.

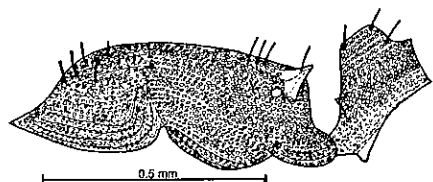


Fig. 83. Mesosoma and petiole of the holotype worker of *Leptothorax andersoni*.

12 segments; mesosoma without any sutures breaking surface; propodeal spines small, but well developed and acute (Fig. 51); petiole with well developed subpeduncular tooth, acute and with flange which

Mandibles with 5 teeth, only apical 3 well defined; anterior border of clypeus convex, clypeus with well formed median carina plus several lateral carinae; sides of head broadly and weakly convex; vertex weakly concave; eyes small, 8 or 9 facets in greatest diameter; antennae with

extends posteriorly at least half length of petiole, anterior petiolar face concave, posterior face convex, petiolar node blunt in profile.

Erect hairs on all surfaces, except legs and antennae, up to 0.8mm in length; decumbent pubescence sparse, present on legs and antennae.

Sculpture consisting of closely set, dense punctures on all surfaces of head (except middle of underside of head), mesosoma, petiole and postpetiole, and gaster with punctures over basal third of first gastral tergum (Fig. 5).

Color: light yellowish brown.

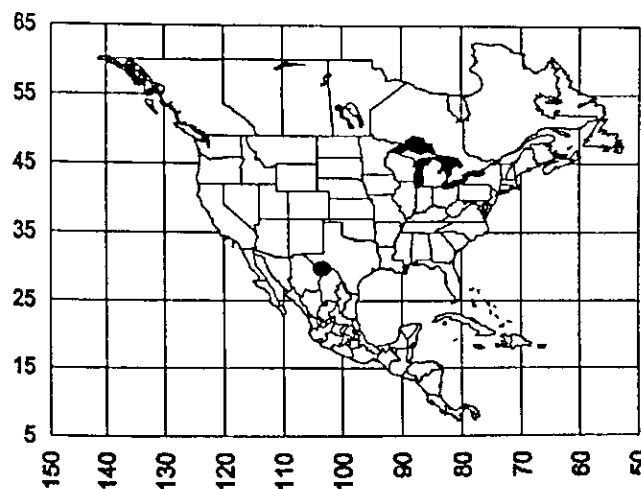
Type series: Holotype worker (MCZC) and two paratype workers (CWEM, USNM), USA, Texas, Brewster Co., Big Bend National Park, Cattail Falls, 6-ix-1988, R. Anderson.

Material examined: Four workers, including type series and a worker collected from Texas, Brewster Co., Big Bend National Park, Pine Canyon, 6-ix-1988, R. Anderson (CWEM).

**Etymology:** Named in honor of the collector, Robert Anderson, who has provided me with abundant material collected from litter.

**Discussion:** This species is easily recognized by the punctures on the first gastral tergum. It can be separated from other species

with a sculptured gaster, such as *L. obliquicanthus*, *L. silvestrii* and *L. rugosus*, by the small propodeal spines. *Leptothorax rugosus* and *L. silvestrii* have coarse rugae on the dorsum of the mesosoma, *L. andersoni* is densely punctate in this region, without any evidence of rugae. *Leptothorax obliquicanthus* has kidney shaped eyes, *L. andersoni* has round eyes. There is no chance of confusing this species with *L. hispidus*, as the outline of the mesosoma is continuous, without the depressed mesopropodeal suture found in *L. hispidus*. If the sculpture on the dorsum of the gaster is too fine to be noticed, *L. andersoni* would



Map 3. Distribution of *Leptothorax andersoni*.

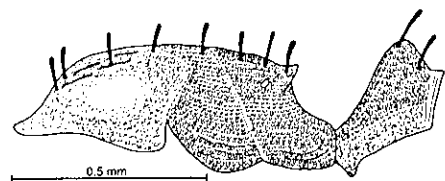


Fig. 84. Mesosoma and petiole of a worker of *Leptothorax andrei* (AZ).

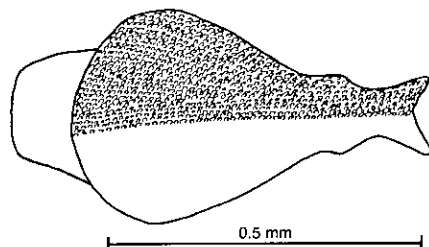


Fig. 85. Mesosoma of a cotype worker of *Leptothorax andrei* as seen from the top. Sculpture is shown on only the right half.

*Leptothorax* (Myrafant) *andrei* Emery  
Figs. 55, 56, 84, 85, & 86; Map 4

*Leptothorax andrei* Emery, 1895:322, Plate 8, Fig. 15, worker, California (without specific locality); Wheeler, 1903a:256, Plate 12, Fig. 22, worker; Cole, 1958a:537-538, female, male; *Leptothorax* (Myrafant) *andrei*: Smith, 1979:1392

Species complex: *andrei*

Diagnosis: This is a small, light yellow or brown species with a 12 segmented antenna; striae are on head, except for a narrow central strip which is smooth and shining, entire mesosoma, petiole and postpetiole are punctate. The clypeus has a number of poorly defined carinae, the medial carina is poorly developed. The subduncular tooth is well developed,

key with difficulty to *L. terrigena*. It could be separated from the latter species as the node of the petiole is obliquely truncate (Fig. 84), whereas the node of the petiole of *L. terrigena* is broadly rounded (Fig. 180). Additionally, close inspection of the gaster should reveal the fine sculpture.

This species could be confused with other pale species found in the Chihuahuan Desert, including *L. bestelmeyeri*, *L. cokendolphi*, *L. coleenae*, and *L. liebi*. See the discussion of *L. coleenae* for hints on how to separate these species.

Biology: All four workers were collected in mixed hardwood leaf litter.

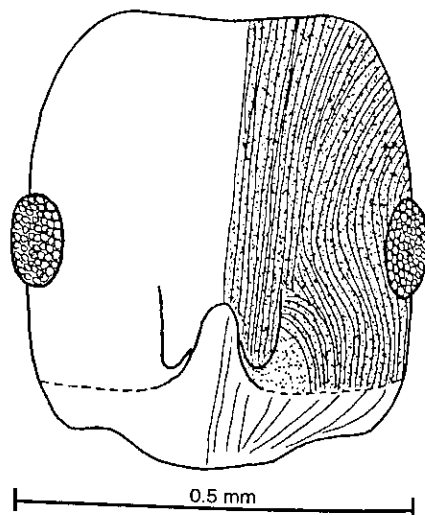
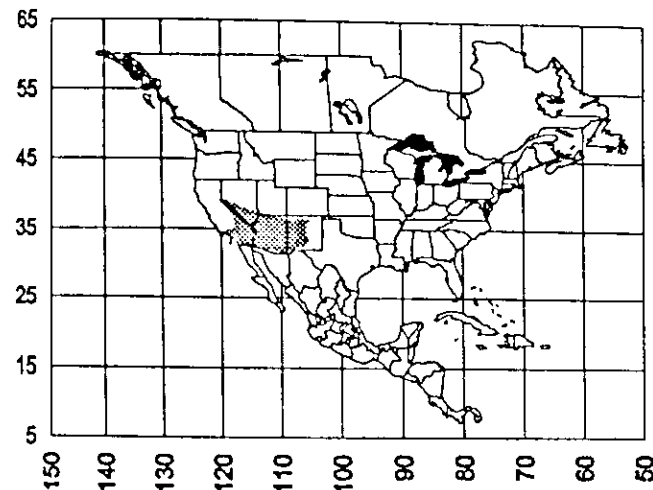


Fig. 86. Head of a cotype worker of *Leptothorax andrei*.



Map 4. Distribution of *Leptothorax andrei*.

the petiolar node is blunt and rounded in profile (Fig. 14), gaster entirely smooth and shining. The propodeal spines consist of small angles (Fig. 84). The postpetiole is not broadened. The hairs on the petiole and postpetiole are somewhat clavate (Fig. 84).

Distribution:  
USA: California, Nevada, Arizona, New Mexico; Mexico: Baja California Norte (Map 4).

Type series: Holotype worker (MCSN) [seen].

Discussion: The characteristics listed in the diagnosis should separate this species from others in the genus. It could be confused with members of the *andersoni* species complex, but differs in that the node of the petiole is not broadly rounded. It would be easily separated from *L. bestelmeyeri* by the smaller eyes, from *L. terrigena* in that the head has striae (not punctate) and from *L. furunculus* by the very different sculpture of the clypeus (numerous, poorly developed carinae, instead of a single medial carina and 2 prominent lateral carinae). Specimens from Arizona (Cochise Co.) are roughly sculptured, having poorly defined rugae on head, mesosoma and top of petiole and may represent an undescribed species.

Note that Wheeler (1903a) stated that this species was closely related to *L. nevadensis*. This is incorrect, see discussion of *L. nevadensis* for details.

Biology: This species occurs in relatively dry coniferous forests (Cole, 1958a; Wheeler and Wheeler, 1986; Mackay, pers. obs.), oak woodland (Mackay, pers. obs.), laurel forest (Anderson, pers. comm.), pinyon-juniper (Cole, 1966; Allred and Cole, 1971; Wheeler and Wheeler, 1973, 1986; Mackay et al., 1987), or even cool deserts (Wheeler and Wheeler, 1986). Nests may be located under stones (Wheeler and Wheeler, 1973, 1986; Mackay, pers. obs.) with 32-109 workers in the nest (Cole, 1958a). Sexu- als were present in nests in June and July. This species occasionally lives in nests of *Camponotus*

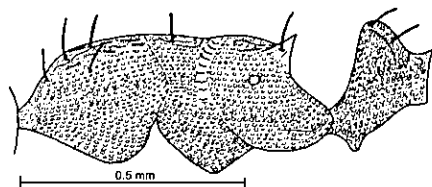
*yogi* as well as with other *Camponotus* and *Formica* (Creighton and Snelling, 1966), including *Formica occidua* (Mann 1911) and the thatched nests of *Formica ravid* (= *Formica haemorrhoidalis*) (Mackay and Mackay, 1984).

***Leptothorax (Myrafant) bestelmeyeri* new species**

Figs. 26, 41, 42, 87, 88, & 89; Map 5

Species complex: *andrei*

Diagnosis: This is a small, pale yellow species with large, black eyes and a 12-segmented antenna. The dorsum of the head is covered with



striae formed by closely placed punctures that are in rows. The carinae on the clypeus are poorly formed, the middle carina is lacking, but the entire surface of the clypeus is convex. The top of the

mesosoma is covered with fine rugae. The petiolar node is moderately sharp in profile, with the edge

formed by a ruga. The subpeduncular process is well developed. The postpetiole is more than 1.5 X the width of the petiole.

Distribution: Known only from the type locality in south central New Mexico (Map 5).

**Description**

Worker measurement (mm): HL 0.67, HW 0.54, SL 0.49, EL 0.22, WL 0.79, PW 0.19, PL 0.16, PPW 0.29, PPL 0.20. Indices: CI 81, SI 73, PI 113, PPI 145.

Mandibles with 4 teeth plus poorly defined denticles; anterior border of clypeus convex, clypeus without medial carina and poorly defined lateral carinae; eye large, anterior edge to anterior edge of cheek (0.16mm) less than maximum diameter of eye; vertex straight; mesosoma with none of the sutures breaking the sculpture; propodeal spines small (0.06mm in length), but well developed; petiole with well developed, blunt subpetiolar tooth, anterior petiolar

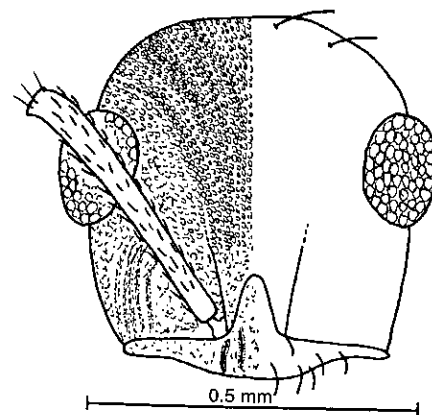


Fig. 88. Head of the holotype worker of *Leptothorax bestelmeyeri*. The sculpture is shown only on the left side of the figure.

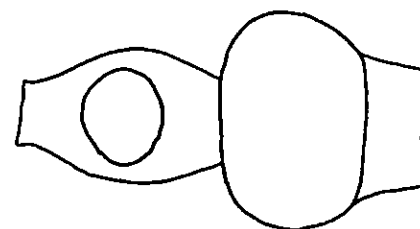


Fig. 89. Petiole and postpetiole of the holotype worker of *Leptothorax bestelmeyeri*, as seen from above.

face straight, posterior face convex, petiolar node moderately sharp in profile (Fig. 87).

Erect, blunt hairs scattered on most surfaces, up to 0.12mm in length, legs and scapes with finer hairs, which are nearly decumbent.

Dorsum of head punctate with punctures forming costulae, dorsum of mesosoma with fine rugulae, sides similar to sculpture on head,

gaster smooth and polished, mesosoma, petiole and postpetiole (sides and dorsum) mostly punctured and rough, dorsum of gaster smooth and shining.

Concolorous pale yellow with black eyes.

Female and male: Unknown.

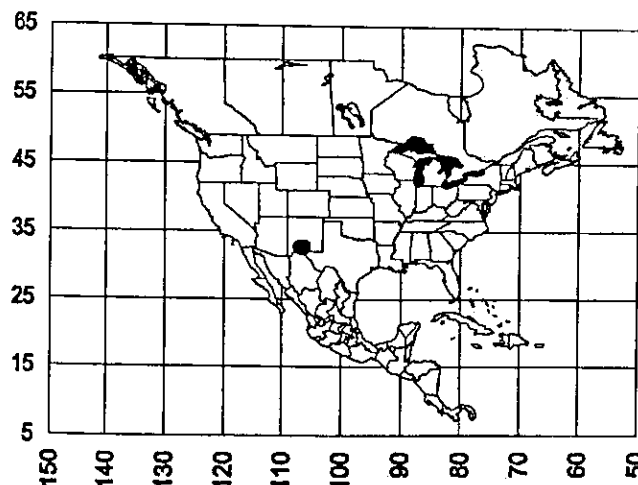
Type series: Holotype worker (MCZC), USA: New Mexico, Doña Ana Co. 37 k N Las Cruces, Jornada Experimental Range, 26 or 29-vii-1996, B. Bestelmeyer.

Material examined: One worker.

**Etymology:** Named in honor of Brandon Bestelmeyer, who collected the holotype, as well as other interesting *Leptothorax* specimens.

**Discussion:** This pale yellow ant with large, black eyes would be confused with few other species, except for *L. andersoni*, *L. cokendolpheri*, *L. liebi* and *L. coleenae* from the Chihuahuan Desert. See the discussion of *L. coleenae* for characteristics to separate these species. The large eyes would also separate it from *L. terrigena*, *L. furunculus*, and *L. andrei*.

**Biology:** The single worker was collected in a pitfall trap in a desert grassland.



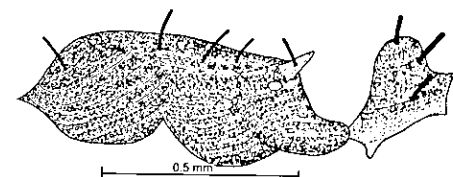
Map 5. Distribution of *Leptothorax bestelmeyeri*.

***Leptothorax (Myrafant) bicolor* new species**

Figs. 23, 25, 90, &amp; 91; Map 6

Species complex: *andersoni*

Diagnosis: This is a bicolored species (dark brown head and gaster, reddish brown mesosoma) with a 12-segmented antenna. The dorsum of the head is smooth and shining, the mesosoma, petiole and postpetiole are heavily sculptured. The medial clypeal carina is poorly developed, as are the lateral carinae. The surface of the clypeus is weakly convex. The propodeal

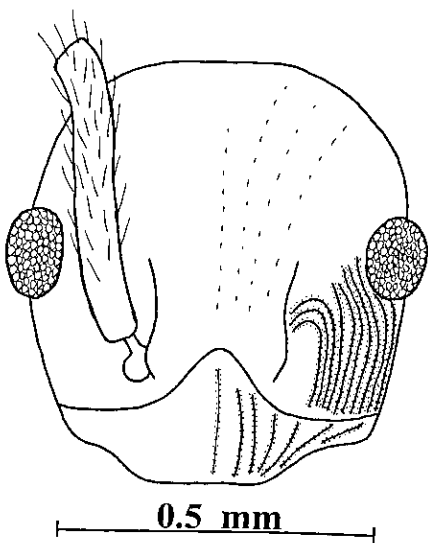
Fig. 90. Mesosoma and petiole of the holotype worker of *Leptothorax bicolor*.

spines are long and well developed (Fig. 90). The petiole is broadly rounded.

Distribution: Known only from the type locality, México, Chiapas (Map 6).

**Description**

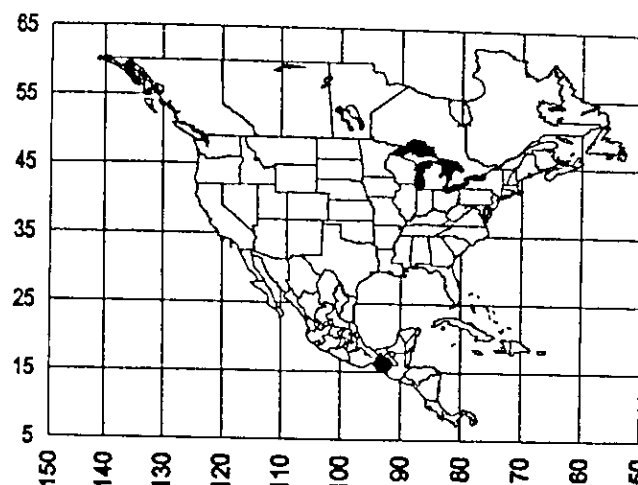
Worker measurement (mm): HL 0.66, HW 0.56, SL 0.52, EL 0.18, WL 0.77, PW 0.19, PL 0.25, PPW 0.28, PPL 0.20. Indices: CI 85, SI 79, PI 76, PPI 140.

Fig. 91. Head of the holotype worker of *Leptothorax bicolor*.

Mandibles with 5 teeth; anterior border of clypeus nearly straight, clypeus with poorly defined medial carina and 4 lateral carinae on each side; vertex straight; mesosoma with none of the sutures breaking the sculpture; propodeal spines small (0.06mm in length), but well developed; petiole with well developed, blunt subpetiolar tooth, anterior petiolar face concave, posterior face convex, petiolar node blunt and rounded in profile.

Erect, blunt hairs scattered on most surfaces, up to 0.05mm in length, legs and scapes with finer hairs, which are nearly decumbent.

Dorsum of head and gaster smooth and polished, mesosoma,

Map 6. Distribution of *Leptothorax bicolor*.

NW Highway 190 on Highway 199, 1-vi-1988, 2400 meters, W. Mackay #10700.

Material examined: One worker.

Etymology: Based on the color of the worker.

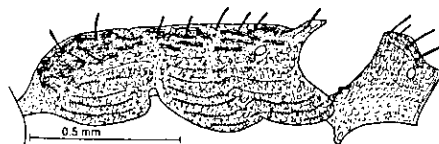
Discussion: The long, well-developed propodeal spines of this species will separate it from most similar species. It could be most likely to confuse this species with *L. stollit*, from which it can be separated by the presence of the semicircular striae posterior to the insertion of the antenna.

Biology: The single worker was collected in a soil surface trap baited with Vienna sausage. The vegetation consisted of pine forest mixed with hardwoods, and had been recently burned. The soils were a pale red clay with some litter on the ground.

***Leptothorax (Myrafant) bradleyi* Wheeler**

Figs. 69, 78, 79, 92, 93, &amp; 94; Map 7

*Leptothorax bradleyi* Wheeler, 1913:113-114, worker; Georgia, Charlton Co., Okefenokee Swamp, Billy's Island; Wilson, 1952:68-71, worker, female, male; *Leptothorax (Myrafant) bradleyi*: Smith, 1979:1392

Fig. 92. Mesosoma and petiole of the holotype worker of *Leptothorax bradleyi*.

Species complex: *schaumii*

Diagnosis: This species has an 11-segmented antenna, the scape

petiole and postpetiole mostly punctured and rough, poorly defined rugae on sides of mesosoma.

Head and gaster very dark brown, mesosoma reddish brown.

Female and male: Unknown.

Type series: Holotype worker (MCZC), MEXICO, Chiapas: 20 KE San Cristóbal de las Casas (3 miles

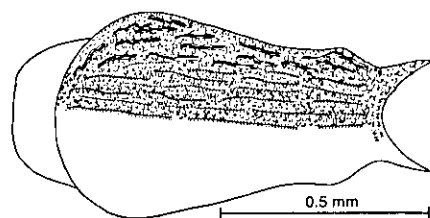


Fig. 93. Mesosoma of the holotype worker of *Leptothorax bradleyi* as seen from above. Sculpture is shown only on the right half.

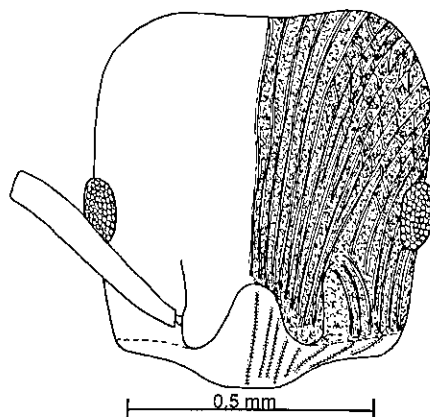
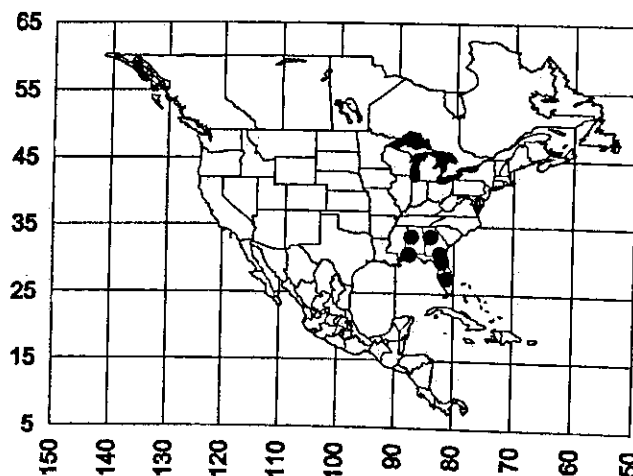


Fig. 94. Head of the holotype worker of *Leptothorax bradleyi*. Sculpture is shown only on the right half of the figure.



Map 7. Distribution of *Leptothorax bradleyi*.

of which reaches half way between the eyes and the occipital corners. The mesosoma has no evidence of a mesopropodeal constriction. The propodeal spines are stout and as long as the distance between their bases. The femora are incrassate. The head is longitudinally rugose, the intrarugal spaces are reticulo-punctate. The mesosoma, petiole and postpetiole are densely punctate, the mesosoma is also reticulate and longitudinally rugose on the top and sides.

Distribution: USA: Georgia (Charlton Co., Jackson Co.), Alabama (Baldwin Co., Tuscaloosa Co.), Florida (Alachua Co., Highlands Co.) (Map 7).

Type series: Holotype worker (AMNH) [seen].

Discussion: Wheeler (1913) and Wilson (1952) carefully characterized this species and compared it to *L. schaumii* and *L. smithi* (= *L. wheeleri*). It is similar to *L. schaumii*,

except it is more coarsely rugose, the propodeal spines are much larger. It is smaller than *L. smithi*, with a Weber's length of 0.83-0.93mm, compared to 0.90-1.13 in *L. smithi*; the head length of *L. bradleyi* ranges from 0.70-0.80, whereas it ranges from 0.83-1.02 in *L. smithi*. The mesosoma of *L. bradleyi* is mostly

punctate, but with interspersed rugae, whereas the mesosoma of *L. smithi* is coarsely rugo-reticulate. Both species are a rich, ferruginous red.

Biology: Nests are found under bark of living pine trees. They occupy flat, well-defined galleries about 1 meter above the ground. A complete colony contained 1 dealate female, 42 workers, 2 males and brood (Wilson, 1952).

### *Leptothorax (Myrafant) brevispinosus* new species

Figs. 24 & 95; Map 8

Species complex: *tricarinatus*

Diagnosis: This is a small, brown species with a 12-segmented antenna. The propodeal spines are poorly developed, consisting of small, blunt bumps. The head is nearly completely smooth and shiny, as is much of the dorsum of the mesosoma (except propodeum, which has well defined rugae intermixed with punctures) and the side of the pronotum. The petiolar node has a relatively sharp apex, with coarse rugae covering the upper surface.

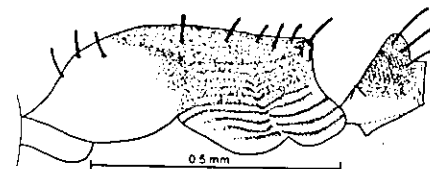


Fig. 95. Mesosoma and petiole of the holotype worker of *Leptothorax brevispinosus*.

surface.

Distribution: Known only from type locality, México, Michoacán (Map 8).

### Description

Worker measurement (mm): HL 0.65-0.67, HW 0.52-0.53, SL 0.51-0.52, EL 0.13-0.14, WL 0.68-0.70, PW 0.14-0.16, PL 0.13-0.14, PPW 0.20-0.22, PPL 0.16-0.18. Indices: CI 79-80, SI 78, PI 108-114, PPI 122-125.

Mandibles with 5 teeth; anterior border of clypeus straight and crenulated, clypeus with well developed medial carina and several lateral carinae; vertex nearly straight; sides of head broadly convex; eyes extending past sides of head; antenna with 12 segments; scape nearly reaching occipital corners; mesosoma with dorsum nearly flat, sutures not marked on dorsum; propodeum with dorsal face and posterior face equal in length, propodeal spines consisting of simple angles; petiole with anterior petiolar face nearly straight, posterior face also nearly straight, meeting at the top of the petiolar node at an angle (Fig. 95), subpeduncular process consisting of a simple tooth; post-petiole not remarkable.



Erect hairs mostly blunt tipped, scattered over head, including clypeus, short (up to 0.05mm), scapes with abundant hairs, few nearly erect, most suberect to decumbent, mesosoma with several hairs, mostly on dorsum, short (up to 0.08mm), some nearly clavate, legs with several hairs, many erect, many hairs on petiole and postpetiole, similar to those on mesosoma, gaster with many hairs, some nearly sharp pointed; decumbent pubescence sparse, few hairs on head and gaster.

Sculpture mostly smooth, dorsum of head smooth and glossy, area posterior to insertion of antennae with concentric whorls of rugae, sides of head, especially near base of mandible, with rugae and a few scattered punctures, side and dorsum of pronotum smooth and shining, except for very fine costulae on lower lateral border, mesopleural region and side of propodeum with moderately well defined rugae, intermixed with punctures, top of mesosoma predominantly smooth and shining, dorsum of propodeum similar to side, posterior face with transverse striations, side of petiole with poorly defined rugae and punctures, top of petiole with coarse rugae, side of postpetiole mostly punctate, top smooth on anterior half, posterior half punctate, gaster completely smooth and shining.

Color medium brown.

Female measurements (mm): HL 0.77, HW 0.67, SL 0.61, EL 0.22, WL 1.30, PW 0.22, PL 0.16, PPW 0.32, PPL 23. Indices: CI 87, SI 79, PI 138, PPI 139.

Mandible with 5 or 6 teeth (some poorly defined); clypeus as in worker; eyes large, extending well beyond sides of head; ocelli well developed; scape reaching occipital corner; vertex slightly concave; propodeal spines consisting of simple angles; petiole and postpetiole as in worker, except that anterior half of postpetiole rising above surface as swollen area.

Erect hairs on head and mesosoma similar to those of worker, those on petiole, postpetiole and gaster longer (up to 0.18mm) and mostly with sharp points; decumbent pubescence as in worker; sculpture more coarse, specifically rugae on head extend to area between eye and frontal carina, pronotum with striae on sides, mesopleuron mostly smooth and shining, propodeum with coarse rugae with intrarugal spaces partially to mostly shining, petiole, postpetiole and gaster as in worker.

Color medium brown.

Male measurement (mm): HL 0.46-0.47, HW 0.52-0.53, SL 0.14-0.15, EL 0.22-0.25, WL 1.00-1.01, PW 0.14-0.15, PL 0.11-0.13, PPW 0.20-0.21, PPL 0.11-0.12. Indices: CI 113, SI 30-32, PI 115-127, PPI

175-182.

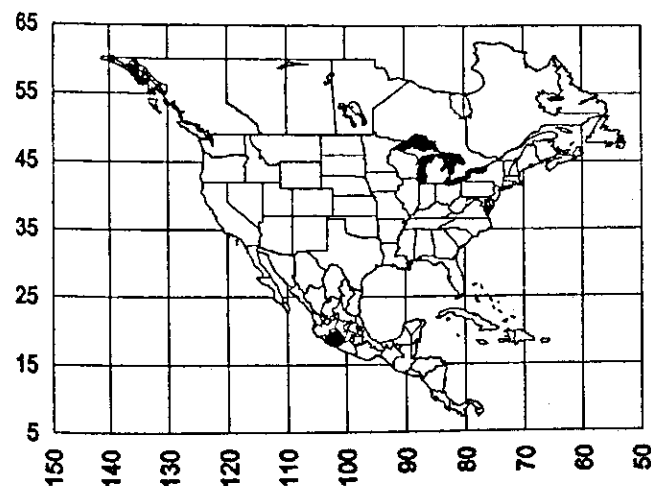
Mandible with 3-5 teeth, most except apical poorly defined; median anterior border of clypeus convex, clypeus convex; eyes large, extending well past sides of head; ocelli large; scape short, approximately length of first 3 funicular segments; vertex weakly concave; propodeal armature nearly absent, area where spines normally occur simply bulging from surface and connected across propodeum to other bulge by carina; petiole as in worker, but lower and less acute.

Erect hairs sparse, those on head very short (less than 0.04mm), those on mesosoma slightly longer (up to 0.07mm), those on petiole long (0.12mm), gastral hairs slightly shorter (0.10mm); decumbent pubescence very sparse, few hairs only on head.

Sculpture very different than that of worker and female, dorsum and ventral surface of head completely punctate, rugae present near mandibles and near frontal carinae, clypeus with coarse rugae, a major ruga extending transversely across middle of clypeus, a smaller medial ruga extending from anterior margin of clypeus to this ruga, other rugae smaller, pronotum glossy with fine costulae on lower surface, scutum moderately shining, surface covered with costulae, mesopleural area mostly shining, side of propodeum with costulae, top with fine rugae, posterior face coriaceous, petiole and postpetiole with fine punctures and costulae, gaster smooth and shining.

Color medium brown.

Type series: Holotype worker (MCZC), 33 paratype workers (CWEM, MCZC, MHNG, UNAM, USNM), 1 paratype female (MCZC) and 3



Map 8. Distribution of *Leptothorax brevispinosus*.

paratype males (CWEM, MCZC, USNM); MEXICO, Michoacán, Parque Nacional Cerro Gárnica, 2700 meters, 25 May 1988, W. Mackay #10357, nest in soil. The site is one mile E of park entrance, 3.2 miles road distance from Pino Gordo, using odometer.

Material examined: Type series.



**Etymology:** Name based on the small propodeal spines in all three castes.

**Discussion:** This new species is nearly identical to *L. mexicanus*. It differs in the sculpturing of the workers, females and males. The head of the worker is more coarsely sculptured than that of *L. mexicanus*, specifically the striae between the eye and insertion of the antenna are very coarse and well developed, consisting of parallel, semicircular lines with the insertion of the antennae at the center. The side of the pronotum is mostly smooth and glossy, whereas the side of the pronotum of *L. mexicanus* is covered with striae. The females are less sculptured than those of *L. mexicanus*, the dorsum of the head is nearly smooth and shining, but the semicircular striae are present between the eye and the insertions of the antennae, as in *L. mexicanus*. The degree of sculpturing of the workers and females is reversed from the situation in *L. mexicanus*: the workers of *L. brevispinosus* are more sculptured than those of *L. mexicanus*, the females of *L. brevispinosus* are less sculptured than those of *L. mexicanus*. The propodeal spines of *L. brevispinosus* are very poorly developed, much less than *L. mexicanus*. The clypeus of the male of *L. brevispinosus* is nearly completely covered with reticulated rugae, much more than simply a transverse ruga at the anterior of the clypeus, as appears in *L. mexicanus* and *L. adustus*. Thus, although these three species are closely related, there are these major structural differences between them. It could be confused with *L. manni*. It differs in that the scapes have at least suberect hairs (appressed in *L. manni*). Additionally, the propodeal armature consists of poorly developed angles, whereas the angles of *L. manni* are nearly developed into spines.

**Biology:** Type series was collected in rocky soil in amongst rocks, in pine-oak forest, along road in a somewhat open area. The ants moved slowly and only attempted to rescue brood.

***Leptothorax (Myrafant) bristoli* new species**

Figs. 28 & 96; Map 9

**Species complex:** *andrei*

**Diagnosis:** This is a small, black species in which the dorsum of the head is completely shining, and the top of the mesosoma is mostly smooth and shining, but with poorly defined, very weak rugulae, the side of the pronotum is mostly smooth and shining (with weak striae), but the side of the mesosoma is densely punctate, the propodeal spines are very small and the petiolar node is blunt and rounded. The antenna has 12 segments.

**Distribution:** Southwestern Texas and southern Coahuila (Map 9).

**Description**

Worker measurements (mm) (holotype in parentheses): HL (0.55)-0.61, HW (0.41)-0.51, SL (0.43)-0.44, EL (0.13)-0.13, WL (0.55)-0.64, PW (0.11)-0.16, PL (0.16)-0.19, PPW (0.19)-0.25, PPL (0.14)-0.15. Indices: CI 75-84, SI 72-78, PI 69-84, PPI 136-167.

Mandible with 5 teeth; anterior border of clypeus convex, clypeus with poorly defined medial carina and 2 or 3 lateral carinae on each side, most of surface smooth and polished; sides of head nearly straight and parallel; vertex very slightly concave; mesosoma without sutures which break sculpture; propodeal angles very tiny and poorly developed; peduncle of petiole with very tiny ventral tooth, anterior petiolar face straight, posterior face convex and rounded, petiolar node blunt in profile.

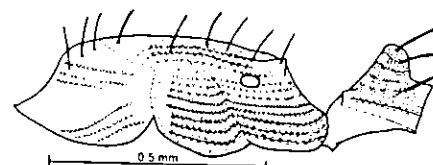


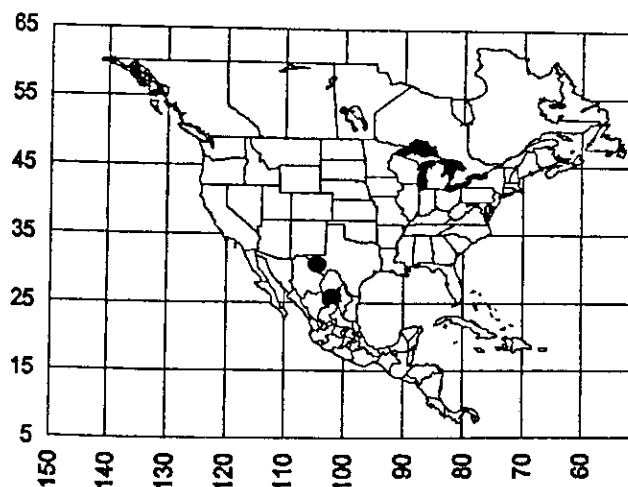
Fig. 96. Mesosoma and petiole of the holotype worker of *Leptothorax bristoli*.

Erect hairs on most surfaces except legs and antennae, those on petiole and postpetiole especially coarse, with blunt tips (Fig. 96); decumbent pubescence on antennae and legs.

**Sculpture** smooth and polished on dorsum of head, including most of clypeus, dorsum of mesosoma mostly smooth and shining, but with fine striolae, sides of pronotum with fine rugae, most of remainder of side of mesosoma with fine punctures, sides

and tops of petiole and postpetiole with fine punctures, apex of node of petiole with poorly defined rugae, gaster smooth and polished.

Color dark brown.



Map 9. Distribution of *Leptothorax bristoli*.

Female and male: Unknown.

Type series: Holotype worker (MCZC), TEXAS, Hudspeth Co., 25 KSW Van Horn, Indio Mountain Research Station, 7-vii-1991, W. Mackay #14518.

Material examined: Two workers, including holotype and a second worker, MEXICO, Coahuila: 30.5 KE Dr. Arroyo, 10-vi-1988, W. Mackay #10977-14 (CWEM).

Etymology: Named in honor of Dr. John ("Jack") Bristol, professor emeritus of Biology and former Dean of the College of Sciences at the University of Texas at El Paso, who has been the major driving force in the development of the Indio Mountain Research Station of the University of Texas, El Paso.

Discussion: This species is most similar to *L. manni*, differing in that the side of the mesosoma is densely punctate, not rugose as in *L. manni*. It is one of the few species found in the United States in which the dorsum of the head is smooth and polished. It is unlikely to be confused with any other species. It can be easily distinguished from the similar *L. punctithorax* by the nearly smooth pronotum (side is roughly sculptured in *L. punctithorax*).

Biology: The holotype worker was collected in a pitfall trap in typical Chihuahuan Desert scrub. The second worker was collected in a surface trap baited with Vienna sausage, in an arid pine/juniper forest.

*Leptothorax (Myrafant) carinatus* Cole

Figs. 61, 97, & 98; Map 10

*Leptothorax (Leptothorax) carinatus* Cole, 1957:213-215 worker, female, Texas, Jeff Davis Co., Davis Mountains, Limpia Canyon; Wheeler and Wheeler, 1973b:70 larva; *Leptothorax (Myrafant) carinatus*: Smith, 1979:1392

Species complex: *tricarinatus*

Diagnosis: This is a yellow brown species with a 12-segmented antenna. The dorsum of the head is usually finely striolate, but is still moderately shining. The top and side of the mesosoma are mostly punctate, although there may be fine rugulae along the lower border of the pronotum. The propodeal armature consists of small angles. The petiolar node is blunt and both the petiole and postpetiole are punctate, without any sign of rugulae or costulae. The subpetiolar process is well developed. The postpetiole is at least 1.5 X as wide as the greatest width of the petiole (Fig. 98). The gaster is completely smooth and shining.

Distribution: USA: Wyoming (Albany Co., Converse Co., Goshen Co.,

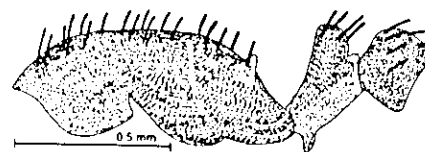


Fig. 97. Mesosoma, petiole and postpetiole of a

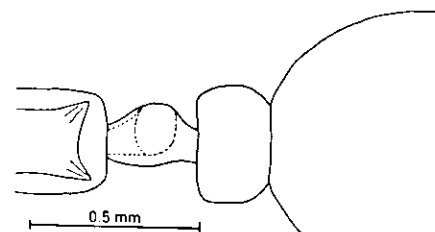


Fig. 98. Dorsum of propodeum, petiole, postpetiole and gaster of a paratype worker of *Leptothorax carinatus*.

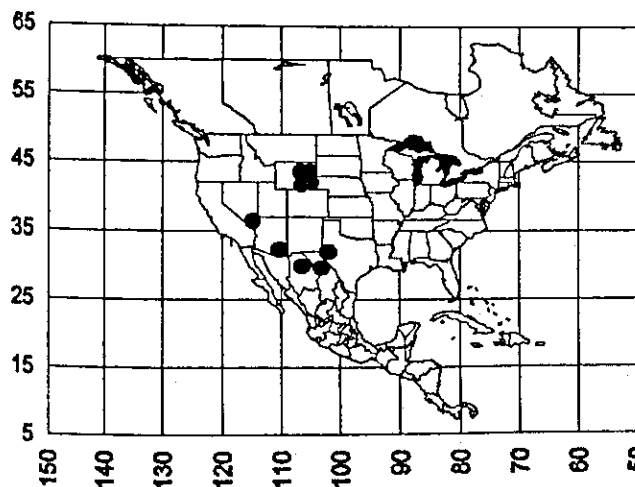
Laramie Co., Platte Co.), Nevada, southeastern Arizona (Chiricahua Mountains); western Texas (Davis Mountains, Chisos Mountains); Mexico: Chihuahua, (Mpio. Madera, 23 k N of Madera) (Map 10).

Type series: Holotype in Cole's collection (University of Tennessee), paratypes in Creighton collection, Gregg collection (University of Colorado), AMNH, MCZC, USNM. Cole (1957) did not specify the exact type locality. We have intensively sampled Limpia Canyon from where it crosses the road (Highway 118), to Fort Davis, and have not been able to find this species again in the Davis Mountains. He did state the type locality was at about 5,400 ft,

which would place it near the McIves Ranch.

Discussion: This species superficially resembles *L. andrei*, but can be easily distinguished by a number of characters (Cole, 1958a). The postpetiole is 1.5-1.65 X the width of the petiole, whereas in *L. andrei* it is about 1.2 times the width of the petiole. In addition the node of the

petiole in profile has anterior and posterior faces which are almost parallel (Fig. 97), whereas the faces of the node of *L. andrei* converge towards the apex. This species is a member of the *tricarinatus* species complex and could be confused with *L. tricarinatus* or *L. neomexicanus*, but differs most obviously in being lighter in color. The sides of



Map 10. Distribution of *Leptothorax carinatus*

the petiole and postpetiole are punctate (rugose or rugulose in *L. tricarinatus* and *L. neomexicanus*). It is much lighter in color than either of these 2 species and the propodeal spines are poorly developed, as compared to the latter 2 species. It can be separated from *L. rugulosus* as the hairs on the scape are nearly all closely placed on the surface, those of *L. rugulosus* are partially raised, nearly suberect. The dorsum of the mesosoma is mostly punctate, whereas the sculpture of the top of the mesosoma of *L. rugulosus* has fine rugulae. It is similar to *L. neomexicanus*, but differs in being yellow or orange (*L. neomexicanus* is dark or black), the propodeal spines are usually poorly developed, consisting of tiny angles (small, but well developed spines in *L. neomexicanus*) and the subpeduncular process consists of an elongate lobe (tiny tooth in *L. neomexicanus*). *Leptothorax carinatus* has fine striolae on the dorsum of the head, and has a well-developed subpeduncular tooth, and seems to occur in more mesic sites. *Leptothorax neomexicanus* has at least part of the dorsum of the head finely punctate, the subpeduncular process is poorly developed, and is generally found in more arid sites.

**Biology:** This species nests beneath stones, with populations ranging between 29-182 workers (Cole, 1958b). Nests are monogynous (Frumhoff and Ward, 1992). All of the nests we have found have been beneath stones. Nests occur in habitats ranging from desert grasslands, to juniper forests with cholla to desert riparian sites up to pine forests. This species is common in the Chisos Mountains, TX (Van Pelt, 1983), and in Wyoming (Wheeler and Wheeler, 1988). Sexu- als were in nests from June to August.

***Leptothorax (Myrafant) chandleri* new species**

Figs. 35 & 99; Map 11

Species complex: *nitens*

**Diagnosis:** This is a small, light brown species with a 12-segmented antenna, in which the apex of the petiolar node is very sharp. The dorsum of the head is punctate and striate, except for a central strip, which is smooth and shining. The mesosoma, petiole and postpetiole are completely punctate, with a few rugulae on the dorsum of the mesosoma (Fig. 35).

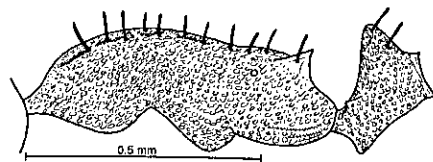


Fig. 99. Mesosoma and petiole of the holotype worker of *Leptothorax chandleri*.

**Distribution:** Known only from type locality in northern California (Map 11).

**Description**

Worker measurement (mm): HL 0.67-0.70, HW 0.53-0.62, SL 0.52-0.53, EL 0.16-0.17, WL 0.68-0.72, PW 0.16-0.18, PL 0.13-0.14, PPW 0.21-0.23, PPL 0.14-0.16. Indices: CI 79-89, SI 76-78, PI 114-138, PPI 144-150.

Mandibles with apparently 5 teeth (mandibles closed), 3 apical most teeth well formed, 2 basal most teeth poorly developed; anterior border of clypeus convex, clypeus with several carinae, including medial carina; vertex concave; eyes extending past sides of head; scape failing to reach occipital corners by about first 2 funicular segments; mesosoma without impressions at sutures; propodeum with pair of well developed teeth; petiole with very sharp apex (Fig. 99), anterior petiolar face slightly concave, posterior face slightly convex.

Erect hairs sparse, most with blunt tips, some nearly spatulate,

especially on mesosoma; decumbent pubescence sparse.

Sculpture of dorsum of head consisting of punctures mixed with longitudinal striae, only central strip free of sculpture, concentric whorls posterior to insertions of antennae, mesosoma mostly punctate, dorsum with a few rugulae,

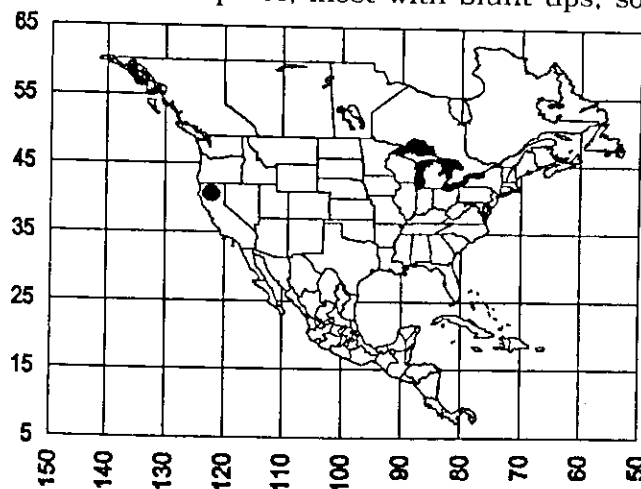
dorsal face of propodeum punctate, posterior face with transverse striae, sides and tops of petiole and postpetiole punctate, gaster glossy and shining.

Color: light yellow brown.

Female and male: Unknown.

Type series: Holotype worker (MCZC) and 2 paratype workers (University of New Hampshire, CWEM), USA: California, Tehama Co., Red Bluff, Samson Slough, 29-iv, 9-v-1984, D. S. Chandler.

Discussion: This species is closely related to *L. mariposa*, differing in that most of the head is sculptured, whereas the head of *L. mariposa* is nearly entirely smooth and shining.



Map 11. Distribution of *Leptothorax chandleri*.

**Etymology:** Named in honor of my friend, Dr. Donald Chandler, who collected the type series, as well as many other interesting ants.

**Biology:** The type series was collected in leaf litter and oak litter on the margin of a slough.

***Leptothorax (Myrafant) cokendolpheri* new species**

Fig. 30, 100, & 101; Map 12

Species complex: *tricarinatus*

**Diagnosis:** This species has a 12-segmented antenna and is a small,

light brown or pale yellow species in which the dorsum of the head is nearly smooth and shining. The medial carina of the clypeus is well developed, as are several lateral carinae, which converge anteriorly. The sides of the head have fine striae, which pass to the dorsum, where they are weak. The eyes are small, with about 7 ommatidia in the maxi-

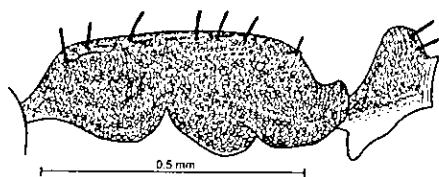


Fig. 100. Mesosoma and petiole of the holotype worker of *Leptothorax cokendolpheri*.

mum diameter, which is equal to or less than the minimum distance from the anterior border of the eye to the insertion of the mandibles. The mesosoma is punctate, with the sides of the pronotum having striae. The propodeal armature consists of simply small angles, which are poorly developed. The petiole and postpetiole are punctate, and the postpetiole is usually about 1.5 X the maximum diameter of the petiole, although there is a lot of variation. The dorsum of the gaster is polished and shining.

**Distribution:** USA: New Mexico, known from type locality in Eddy Co., and Texas: Brewster Co., Big Bend National Park (Map 12).

**Description**

**Worker measurement (mm):** HL 0.60-0.63, HW 0.47-0.48, SL 0.46-0.48, EL 0.12-0.13, WL 0.64-0.66, PW 0.16-0.17, PL 0.13-0.14, PPW 0.24-0.25, PPL 0.15-0.16. Indices: CI 76-78, SI 76-77, PI 114-131, PPI 156-160.

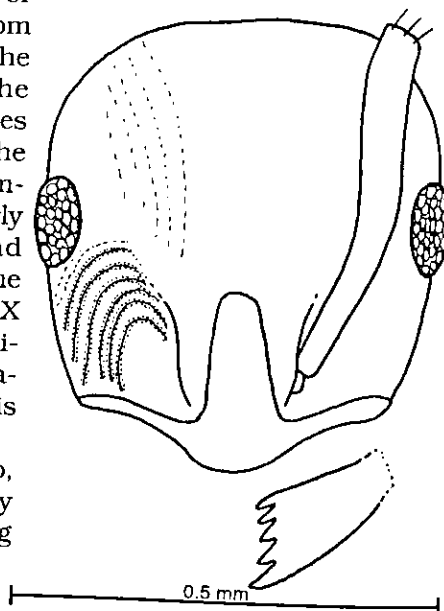


Fig. 101. Head of the holotype worker of *Leptothorax cokendolpheri*. The inset is the mandible as seen from the top.

0.48, EL 0.12-0.13, WL 0.64-0.66, PW 0.16-0.17, PL 0.13-0.14, PPW 0.24-0.25, PPL 0.15-0.16. Indices: CI 76-78, SI 76-77, PI 114-131, PPI 156-160.

Mandibles with 5 teeth; anterior border of clypeus convex, clypeal surface convex, with carinae (including middle carina) poorly defined; vertex concave; eyes small, with 7 or 8 ommatidia in greatest diameter, maximum diameter usually less than shortest distance to insertion of mandible; scape barely reaching occipital corner; mesosoma without sutures depressed below surrounding area; propodeal spines consisting of tiny angles; petiole with blunt node as seen in profile (Fig. 100), anterior petiolar face slightly concave, posterior face convex, subpeduncular process well formed, with blunt, rounded tip.

Erect hairs sparse, but present on most surfaces, short (most < 0.05); decumbent pubescence obvious only on head, and consisting of few scattered hairs.

Sculpture of head fine, dorsum nearly completely smooth and shining, but with a few fine striae on sides, striae well defined anterior to eyes and near frontal carinae, mesosoma, petiole and postpetiole punctate, side of pronotum with striae, gaster smooth and shining.

**Color:** light yellow brown.

**Female measurements (mm):** HL 0.74, HW 0.64, SL 0.56, EL 0.22, WL 1.13, PW 0.23, PL 0.16, PPW 0.38, PPL 0.19. Indices: CI 86, SI 76, PI 144, PPI 200.

Similar to worker in most aspects, differing in that the eye is larger, diameter about 0.7 times minimum distance to insertion of mandibles; ocelli well developed; scape reaching occipital corner; vertex concave; mesosoma large; propodeal spines well developed, length about 0.8mm; subpeduncular process well developed, rounded tip; petiole similar to that of worker, except node narrower.

Hairs as in worker, blunt tipped, some weakly spatulate, those on gaster up to 0.10mm in length; decumbent pubescence nearly absent, few hairs on head and gaster.

Sculpture slightly more coarse than in worker, dorsum of head completely striate, surfaces lateral to and anterior to eye nearly rugose, scutum and scutellum finely striate, side of pronotum and mesopleuron finely striate, propodeum rugose and punctate in intrarugal spaces, petiole and postpetiole punctate, with rugae on anterior face of petiole, transversely across top of node, on side and across posterior half of postpetiole, gaster smooth and shining.

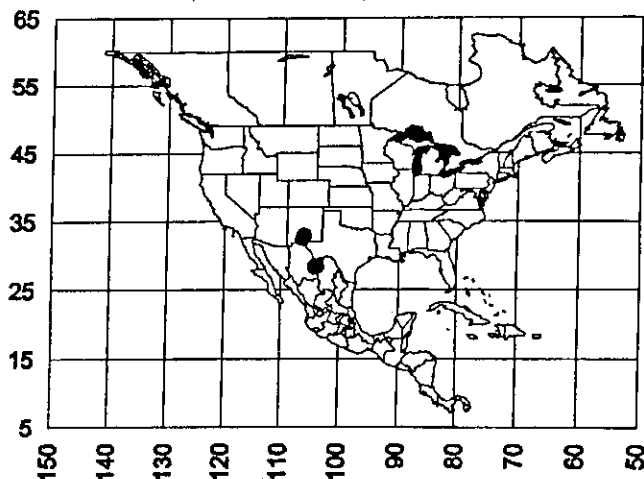
**Color:** yellow brown, slightly darker than workers.

**Male:** Unknown.

**Type series:** Holotype worker (MCZC), 21 paratype workers (AMNH,

CASC, CWEM, FMNH, EMAU, LACM, MCSN, MCZC, MHNG, USNM), 1 paratype female (MCZC), USA: New Mexico, Eddy Co., Hidden Cave, 25-x-1992, J. Cokendolpher, #631.

Material examined: Twenty-two workers of the type series, 1 paratype female, and New Mexico, Eddy Co., and Texas: Brewster Co., Big Bend National Park, Cattail Falls, 6-ix-1988, R. Anderson, (1 worker MCZC).



Map 12. Distribution of *Leptothorax cokendolpheri*.

**Etymology:** Named in honor of my close friend, James Cokendolpher, who has sent me hundreds of interesting ants over the years, including the type series of this new species.

**Discussion:** *Leptothorax cokendolpheri* is similar to *L. punctithorax*, and differs in that the postpetiole is noticeably

broadened, the propodeal spines are smaller and the eyes are smaller. It is pale yellow in color whereas *L. punctithorax* is dark brown. The propodeal armature consists of simple angles, whereas the spines of *L. punctithorax* are small, but developed and acute. It appears to be closely related to *L. carinatus*, but can be separated as the eyes are smaller (7-8 ommatidia in maximum diameter vs. 8-9 in *L. carinatus*), the distance from the anterior margin to the insertion of the mandibles is equal to or greater than the maximum diameter of the eye (equal to or less than in *L. carinatus*) and the dorsum of the head is mostly smooth and shining (mostly striate or lightly punctate in *L. carinatus*). The females of *L. cokendolpheri* and *L. carinatus* are similar, but can be easily separated as the katepisternum is completely striate (at least partially smooth in *L. carinatus*) and the propodeal spines are well developed (less developed in *L. carinatus*). The width of the postpetiole ranges from 1.41 to 1.67 times as wide as the petiole in the type series workers, a single worker from Big Bend National Park appears to be identical to this species, but has a ratio of 1.36. It could be confused with *L. mexicanus*, but can be easily separated by the pale yellow color (*L. mexicanus* is dark brown), and the top of the postpetiole is

completely punctate (top of postpetiole smooth and shining, but posterior surface punctate in *L. mexicanus*). Specimens with the dorsum of the head very smooth would key to *L. bristoli*. These specimens can be easily separated as the top of the pronotum is densely punctate, whereas the top of the pronotum of *L. bristoli* is mostly smooth and shining.

This species could be confused with other light colored species in the Chihuahuan Desert, including *L. andersoni*, *L. bestelmeyeri*, *L. coleenae*, and *L. liebi*. See the discussion of *L. coleenae* for hints as to how these species could be separated.

**Biology:** The type series was collected in a cave, the specimen from Big Bend National Park was collected mixed hardwood leaf litter by Robert Anderson.

### *Leptothorax (Myrafant) coleenae* new species

Figs. 37 & 102; Map 13

Species complex: *tricarinatus*

**Diagnosis:** This is an easily recognized, small, light yellow species with strongly contrasting black eyes and a 12-segmented antenna. Only a few species have this combination of colors and occur in the Chihuahuan Desert, see discussion for suggestions on how to separate them.

**Distribution:** Known only from type locality in south central New Mexico (Map 13).

### Description

Worker measurement (mm): HL 0.66, HW 0.55, SL 0.48, EL 0.21, EW 0.14, WL 0.81, PW 0.16, PPW 0.29. Indices: CI 83, SI 73.

Mandible with well formed apical tooth somewhat longer and darker than others, subapical tooth also well formed, about 1/3 as long as apical tooth, followed by 3 poorly formed teeth; clypeus with well defined median carina and 2 less well defined lateral carinae on each

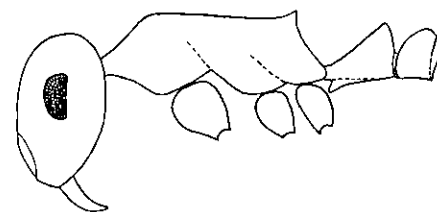


Fig. 102. Head, mesosoma, petiole and postpetiole of the holotype of *Leptothorax coleenae*.

side; antenna with 12 segments (left antenna of holotype missing); dorsum of head almost completely punctate, with small, moderately shiny area posterior to frontal area; striae present on malar area; eye relatively large, occupying about 1/3 length of head, with about 115 facets; propodeal spines shorter than 1/2 distance between bases,

flattened laterally, very wide at base; petiole in profile with relatively sharp apex (Fig. 102), section between upper base and apex straight, region posterior to apex rounded; anterior peduncle with well defined ventral flange which terminates anteriorly in blunt tooth.

Hairs numerous on body, 12 on submentum, 30 on dorsum of head (maximum length 0.07mm), 20 on dorsum of mesosoma (maximum length 0.10mm), petiole with 6 hairs on posterior of node pointing backwards and upwards (maximum length 0.11mm), 8 on posterior of postpetiole (maximum length 0.09mm).

Head punctate, dorsum of mesosoma with fine reticulated rugae, obscured in large part by punctures; side of mesosoma completely punctate with little evidence of rugae; basal face of propodeum with longitudinal striae, posterior face punctate; surfaces of petiole and post-petiole heavily punctate; dorsal surface of gaster strongly shining.

Color: pale yellow, eyes black, strongly contrasting with rest of specimen, mandibular teeth dark brown.

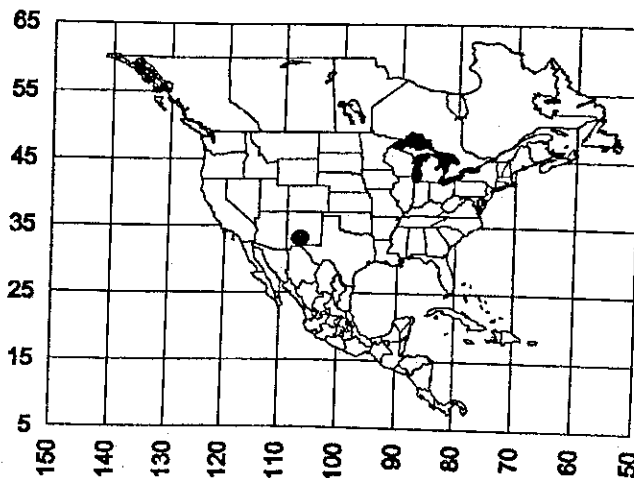
Female and male: Unknown.

Type series: Holotype worker (MCZC) collected in New Mexico, Doña Ana Co., 45k NE of Las Cruces on the Long Term Ecological Site.

Material examined: Holotype worker.

Etymology: This species is dedicated to the memory of Colleen "Coco" Adelia Whitford, daughter of our closest friends, Walter and Linda Whitford. Coco was born on Nov. 6, 1973 and died on Jan. 29, 1981 from Reyes Syndrome.

Discussion: This species is clearly distinct from all other *Leptothorax* species. Although a small region posterior to the frontal area is somewhat smooth and shining, the head is almost completely punctated which would preclude any confusion with species such as *L. carinatus*, *L. mariposa*, *L. nitens* or *L. adustus*, which usu-



Map 13. Distribution of *Leptothorax coleenae*.

ally have a large portion of the dorsum of the head smooth and shining and always have at least some striae on both sides of this shiny region. Also these 4 species are much darker than *L. coleenae*. There are no striae on the head of *L. colleenae*, except on the malar area, which would eliminate confusion with any of species such as *L. carinatus* or *L. furunculus*. It is also much lighter in color than these species. The well-developed ventral flange on the anterior peduncle of the petiole also separates it from most of the other similar *Leptothorax*. This species can be easily distinguished from the light colored *L. bestelmeyeri* and *L. cokendolpheri*, which have heads with fine striolae, and which are partially smooth and shining. The eye of *L. bestelmeyeri* is much larger than the eye of *L. coleenae* (compare Figs. 88 & 102). It could be confused with *L. liebi* and *L. andersoni*, in which the heads are also punctate. Both of these species have blunt petiolar nodes, which would allow separation of these species from *L. coleenae*.

Biology: The holotype was collected in a pitfall trap on 6 July 1984. The habitat was a creosotebush (*Larrea tridentata*) desert bajada. The specimen was collected along the Long Term Ecological Site Control Transect, a few meters west of the diagonal dirt road which crosses the transect in the creosotebush zone. Despite extensive pitfall trapping in the area and numerous collecting trips made in all seasons and during both day and night, by numerous individuals, over several years, only the single specimen was collected. This is one of the 7 species which occur in typical Chihuahuan Desert vegetation (the others are *L. andersoni*, *L. bestelmeyeri*, *L. cokendolpheri*, *L. neomexicanus*, *L. liebi*, *L. bristoli*). It may be nocturnal as it is light colored and has large black eyes as other nocturnal desert ants.

*Leptothorax (Myrafant) curvispinosus* Mayr

Figs. 73, 76, 103, & 104; Map 14

*Leptothorax curvispinosus* Mayr, 1866:508-509, Fig. 13 worker, North America (without specific locality); Mayr, 1886:453 female; Wheeler, 1903a:239-241, Plate 12, Fig. 10; *Leptothorax (Myrafant) curvispinosus*: Smith, 1950:30

*Stenamma gallarum* Patten 1879:126-127 (Mayr, 1886:453)

Species complex: *schaumii*

Diagnosis: This is a small yellow ant with an 11-segmented antenna, which is very common in eastern USA. The very long, inwardly curved, closely spaced propodeal spines make this species immediately recognizable. The top and side of the mesosoma are covered with coarse rugae. The head is completely and coarsely punctate.

Distribution: USA: Arizona (Smith, 1979), North Dakota, South

Dakota, Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, Louisiana, Michigan, Wisconsin, Illinois, Indiana, Kentucky, Tennessee, Alabama, Ohio, Pennsylvania, New Jersey, New York, New Hampshire, Connecticut, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida (Map 14).

### Description

Male (undescribed) measurements (mm): HL 0.52-0.53, HW 0.47-0.50, SL 0.17-0.20, EL 0.25-0.26, WL 0.97-1.02, PW 0.10-0.14, PL 0.08-0.23, PPW 0.18-0.19, PPL 0.22. Indices: CI 90-94, SI 33-38, PI 61-125, PPI 82.

Mandible with apical and 1 or 2 subapical teeth well defined, others present as denticles; median anterior border of clypeus weakly convex, clypeus with well defined central, longitudinal carina and a few other, poorly defined lateral carinae; eyes very large, occupying most of side of head; ocelli well developed, diameters of all three greater than distance between them; scape short, extending about half distance to occipital corner; propodeal spines or angles absent, only indication is a poorly defined carina; petiole with

low node, which is not much higher than peduncle.

Hairs erect and scattered on most surfaces, suberect on antennae and legs; decumbent pubescence sparse.

Sculpture consisting of rough, longitudinal striae on most of head, area posterior to eyes with concentric whorls, clypeus with central carina and poorly defined lateral carinae, sides of mesosoma mostly smooth and shining, but with a few rugae, propodeum mostly smooth, but finally striate, petiole striate.

Color: pale yellow with black eyes.

Type series: One cotype worker in MCSN [seen], specimens could not be located in Roger's collection (Museum für Naturkunde Zentralinstitut der Humboldt-Universität zu Berlin).

Discussion: This species is easily recognized as the bases of the propodeal spines are closely set and the spines are usually very long

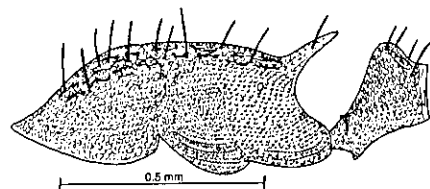


Fig. 103. Mesosoma and petiole of a worker of *Leptothorax curvispinosus* (MS).

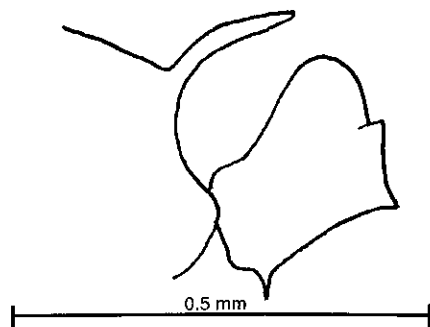
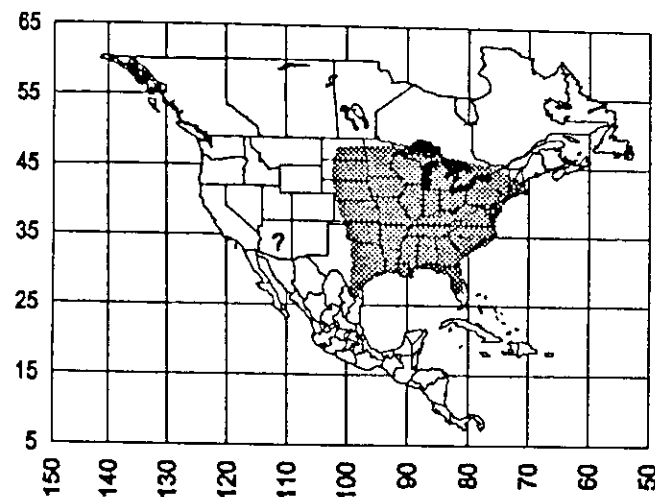


Fig. 104. Typical Propodeal spines of *L. curvispinosus*.



Map 14. Distribution of *Leptothorax curvispinosus*.

and curved inward, although Wesson and Wesson (1940) mention that the propodeal spines may be as short as the distance between their bases. Note that the specimens reported by Wesson and Wesson (1940) differ in other aspects and may be a valid species. The propodeal spines are often narrow and about the same diameter throughout (Fig. 104). The head is strongly punctured with delicate, longitudinal rugae. The long spines could result in it being confused with *L. longispinosus*. It can be easily separated from this black species by the nearly smooth and shining upper surface of the head of *L. longispinosus*.

The workers of some series (MS, Carroll Co., TN, Lincoln Co., in CWEM) have thickened propodeal spines (Fig. 41) and could be considered a separate species, but comparison of workers, females and males reveal no other significant differences and thus the thickness of the propodeal spines is probably of no significance.

Biology: The habits of this species are well known (Wheeler, 1916, 1917; Smith, 1924; Dennis, 1938; Cole, 1940; Wesson and Wesson, 1940; Headley, 1943; Buren, 1944; Gregg, 1944; Talbot, 1934, 1957, 1965; DuBois, 1985). Nests are found in plant cavities including hollow stems, under bark of living trees, in reeds, twigs, logs, acorns, nut shells, insect galls, puffballs, pine cones (Williams, 1989) and under rocks or in soil in forested areas (Wheeler, 1903a, 1905; Cole, 1940; DuBois, 1985). It is found at lower elevations in the southern Blue Ridge of Virginia (Van Pelt, 1963). Nest populations are about 80-100 workers with several queens (Wilson, 1974a), up to 113 workers in acorn nests (Talbot, 1957); average populations in Ohio were 235 (all castes), with the largest population of workers being 369 (total members 727), and nest densities of 0.6 nests per square meter (Headley, 1943). Alates are present from June-Aug. (Kannowski, 1959; Talbot, 1957; DuBois, 1985); flights occur in early July (Wesson and Wesson,



1940). Workers reproduce in queenright colonies (Frumhoff and Ward, 1992). Larvae are found within nests throughout the year (Headley, 1943; Talbot, 1957). Nests are polygynous (Alloway et al., 1982) and polydomous (Stuart, 1985, 1987a). The nest site may change after slight disturbances (Moeglich, 1978). The species is widely distributed in many different habitats, and is especially common in Tennessee (Dennis, 1938), Ohio (Wesson and Wesson, 1940), near Chicago (Gregg, 1944) and Mississippi (Smith, 1924). Herbers (1983) discussed the social organization and Wilson and Fagen (1974) estimated the total behavioral repertoires. Stuart (1987a, 1987b) reported on transient nestmate recognition. Wilson (1974b) studied the behavior of workers in laboratory colonies. It eats honeydew on leaves of trees and plants (Smith, 1924), but apparently does not tend aphids (Dennis, 1938), and carries seeds (Heithaus, 1981) and presumably eats at least part of them. They also feed at the axillary nectaries of bracken fern (Douglas, 1983), and on dead insects (Fellers and Fellers, 1982). Foraging involves tandem running (Moeglich, 1979). Seasonally, foraging rate is highest in the spring and early summer, dropping off in the fall and being absent in the winter (Fellers, 1989). It is most active during the daylight hours (Fellers, 1989).

It is the host of *Leptothorax (Leptothorax) duloticus* Wesson (Talbot, 1957), *Protomognathus americanus* (Emery) (Emery, 1895; Alloway et al., 1982; Alloway and del Rio Pesado, 1979, 1983; pers. obs.), possibly *L. minutissimus* (Smith, 1942) and *Limulodes parki* (Coleoptera-Seever and Dybas, 1943).

### *Leptothorax (Myrafant) davisi* Wheeler, new status

Figs. 57, 105, & 106; Map 15

*Leptothorax texanus davisi* Wheeler, 1905:385, worker, female, USA, New Jersey, Lakehurst; *Leptothorax (Myrafant) texanus davisi*: Smith, M., 1952:104-106; Smith, D., 1979:1395

Species complex: *tricarinatus*

Diagnosis: This species is easily recognized as the postpetiole is more than half as wide as the gaster. The dorsum of the postpetiole is covered with poorly defined punctures and the antenna has 12-segments. The head is punctate, the central portion has numerous striae, the top and side of the mesosoma are also punctate with a few wavy rugae. The propodeal

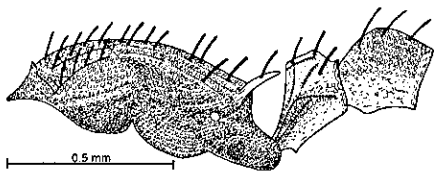


Fig. 105. Mesosoma of a cotype worker of *Leptothorax davisi*.

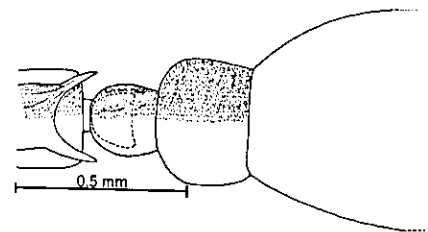


Fig. 106. Top of propodeum, petiole, postpetiole and gaster of a cotype worker of *Leptothorax davisi*.

spines are about half the length of the distance between their tips. The top of the node of the petiole is truncate in profile, and as seen from above, the node is surrounded by a carina on all sides.

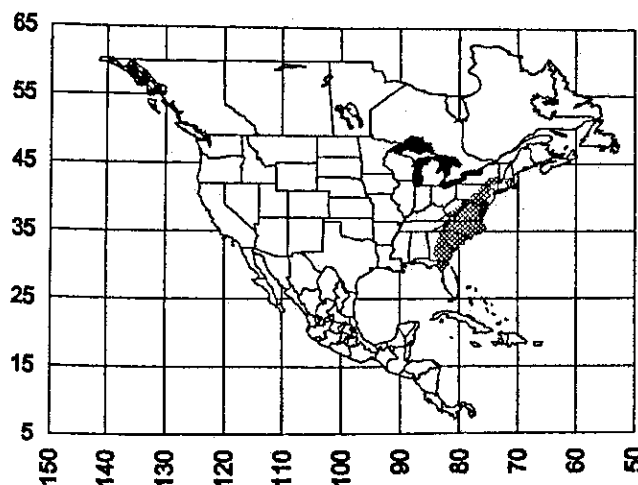
Distribution: USA: Massachusetts, New York, New Jersey, Virginia, North Carolina, South Carolina, Georgia and Florida (Putnam Co. Welake Exp. Stn., 5 mi. SE

Melrose) (Map 15).

Type series: AMNH, MCZC, USNM [seen].

Discussion: *Leptothorax davisi* differs in a number of characteristics from *L. texanus* and should be regarded as a separate species. The postpetiole is wider than it is in *L. texanus*. The head is punctate, with the central region covered with longitudinal striae, not nearly smooth and shining as in *L. texanus*. The node of the petiole is definitely truncate as seen in profile, and is not really truncate in *L. texanus*. This species is found in eastern USA (Map 15), whereas *L. texanus* is from the Midwest to the west of the United States (Map 53).

Biology: This species was found in oak-rosemary xeric hummocks (J. Trager pers. comm.) and has been swept from turkey oak scrub (Chandler and Reeves, pers. comm.). It often nests in the driest habitats in an area (Cole, 1952; Van Pelt, 1958; Carter, 1962). The type



Map 15. Distribution of *Leptothorax davisi*.

series was collected from an area with pure, white sand, forming galleries a few centimeters in length (Wheeler, 1905), and is found most commonly in sandy soils. It slowly forages on the surface in search of small insects. The largest nest reported by Cole (1952) had 18 workers and a single queen. This



species is monogynous (Frumhoff and Ward, 1992).

***Leptothorax (Myrafant) emmae* new species**

Figs. 67, 107, & 108; Map 16

Species complex: *emmae*

Distribution: Southwestern New Mexico (Map 16).

**Description**

Worker measurement (mm): HL 0.60-0.62, HW 0.53-0.54, SL 0.39-0.41, EL 0.14, WL 0.66-0.70, PW 0.16-0.18, PL 0.18-0.19, PPW 0.20-0.23, PPL 0.16-0.17. Indices CI 87-94, SI 65-68, PI 87-97, PPI 131-135.

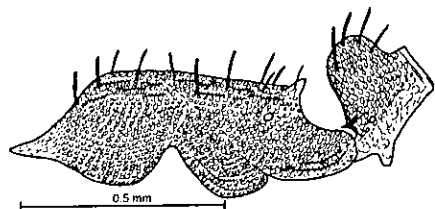


Fig. 107. Mesosoma of the holotype worker of *Leptothorax emmae*.

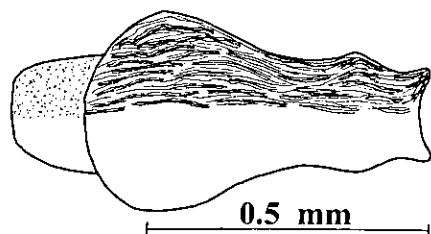


Fig. 108. Mesosoma of a paratype worker of *Leptothorax emmae*. The sculpture is shown only on the right side.

Mandible with 5 teeth; anterior border of clypeus slightly concave, crenulated by carinae, surface of clypeus with well developed medial carina and several lateral carinae; head nearly quadrate, almost as wide as long, vertex slightly concave; eyes reaching side of head; scape failing to reach occipital corner by about first three funicular segments; mesosoma without depression at site of sutures; propodeal spines consisting of small angles; petiolar node rounded (profile), subpeduncular tooth well formed, broad.

Erect hairs sparse, short (0.06mm), bristly, several on dorsal surface and ventral surface of head,

mesosoma, petiole, postpetiole, and gaster. Decumbent hairs nearly absent.

Dorsal surface of head mostly smooth and polished, semi-circular carinae present posterior to insertion of antenna, longitudinal carinae on each side along frontal carinae, side of mesosoma densely sculptured, consisting of punctae and striae, dorsum of mesosoma similar except striae more developed, posterior face of propodeum with transverse carinae, side of petiole punctate, dorsum with fine rugae, top of postpetiole with fine rugulae, dorsum of gaster smooth and polished.

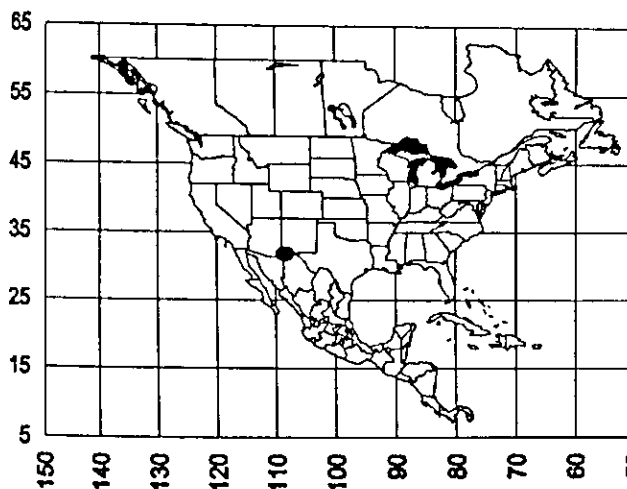
Color dark brown, mesosoma, petiole and postpetiole yellow-red.

Female measurements (mm): HL 0.68, HW 0.62, SL 0.47, EL 0.22, WL 1.18, PW 0.27, PL 0.20, PPW 0.31, PPL 0.22. Indices CI 91, SI 68, PI 132, PPI 144.

Mandible with 5 teeth; anterior border of clypeus convex, medial carina well formed, several lateral carinae present; head narrowed slightly anteriorly; vertex convex; eyes extending well past sides of head; scape failing to reach occipital corner by first 2 funicular segments; propodeum without spines, but with lateral swellings; petiole thickened in profile with rounded node, subpetiolar peduncle moderately developed.

Erect hairs abundant on head, mesosoma, petiole, postpetiole and gaster; decumbent hairs scarce, few present on head and gaster.

Sculpture on dorsum of head consisting of fine striae or rugulae, most surfaces moderately to strongly shining, dorsum of mesosoma with parallel striae,



Map 16. Distribution of *Leptothorax emmae*.

sides of petiole and postpetiole very finely punctate with scattered rugae, dorsum of petiole with transverse striae, dorsum of postpetiole nearly smooth, with the few lateral striae, dorsum of gaster smooth and shining.

Dorsum of head dark brown, lower surfaces lighter, mesosoma, petiole and postpetiole yellow-brown, gaster dark brown.

Male: Unknown.

Type series: Holotype worker (MCZC), 115 paratype workers (AMNH, CASC, CWEM, FMNH, LACM, EMAU, MCSN, MCZC, MHNG, MZSP, USNM, UNAM), 1 paratype female (MCZC), New Mexico, Hidalgo Co., Peloncillo Mts., Coronado National Forest, 31°30'58"N 109°00'04"W, 21-iii-1998, Mackay family #17975; 54 paratype workers, same area, Cloverdale Creek, 31°26'25"N 108°58'29"W, 1491 m 19-iii-1998, Mackay family #17925.

Material examined: One hundred sixty nine workers, and 1 female

of type series, one additional worker found in the same area, Clayton Draw, 31°31'00" 108°58'56", 20-iii-1998, Mackay family (CWEM).

Distribution: Known only from southwestern New Mexico.

Discussion: The 11-segmented antenna, well developed medial clypeal carina, with two prominent lateral carinae, the thick, blunt petiole and the well-developed suprapeduncular process would separate *L. emmae* from all of the other species in the subgenus, except *L. whitfordi*. It could be separated from this latter species as the mesosoma has longitudinal striae (punctate or partially smooth and shining in the latter species). Additionally, it is bicolored, whereas the other species is dark brown.

Biology: This species nests in 3cm diameter dead branches of Emory oak (*Quercus emoryi* Torr.). The ants attempt to escape when the nest is opened. The trees were located in the bottom of a draw, in a flat area of oak-juniper grassland. The soils are a light brown, sandy loam, where the moisture level was high. The complete nest population of nest # 17975 was collected, and consisted of a single female and 116 workers.

*Leptothorax (Myrafant) furunculus* Wheeler  
Figs. 52, 53, 54, 109, 110, & 111; Map 17

*Leptothorax furunculus* Wheeler, 1909:82 worker, Colorado, Williams Canyon near Manitou, 7,500'; *Leptothorax (Myrafant) furunculus*: Smith, 1979:1393

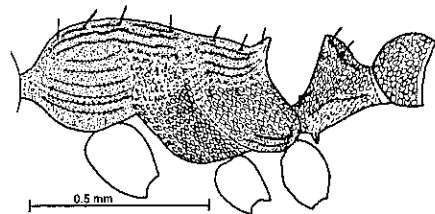


Fig. 109. Mesosoma, petiole and postpetiole of a

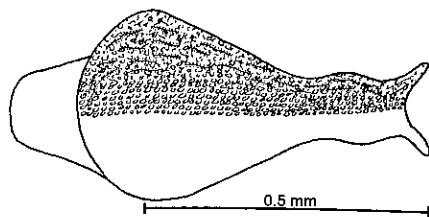


Fig. 110. Top of the mesosoma of a cotype worker of *Leptothorax furunculus*. The sculpture is shown only on the right side.

Species complex: *tricarinatus*  
Diagnosis: The workers of this species are yellow brown with a 12-segmented antenna. The clypeus has a single median carina, 2 prominent lateral carinae and a few others, which are poorly defined. The head has wavy rugae, forming concentric semicircles around the insertion of the antennae, the striae posterior to the eyes are directed posteriorly to the occipital lobes, the central area of the head has poorly defined striae and is partially smooth and shining. The top of the mesosoma is covered with punctures and fine rugae, the sides near the top have somewhat coarse

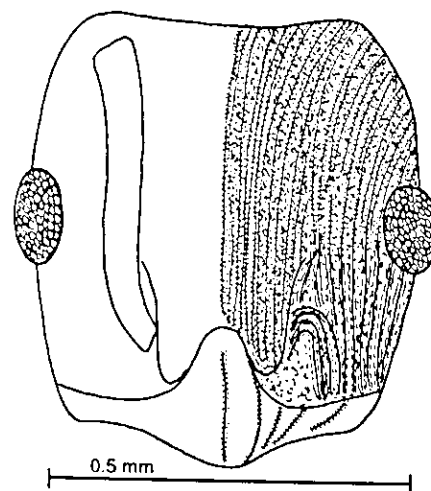


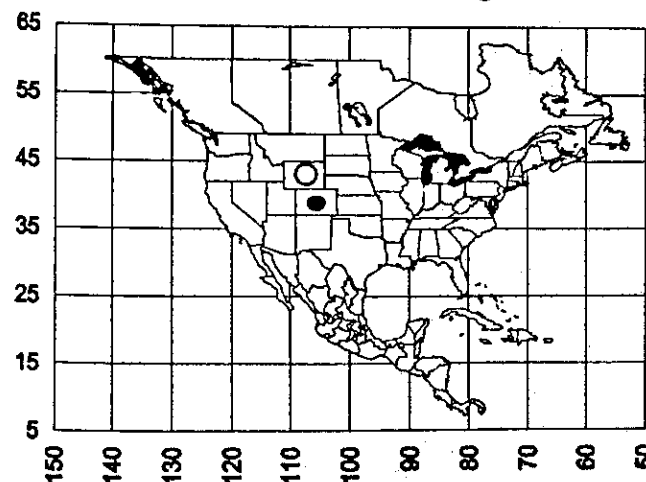
Fig. 111. Head of a cotype worker of *Leptothorax furunculus*. The sculpture is shown only on the right side of the figure.

rugae. The pronotum has striae, the mesopleuron and side of the propodeum are covered with punctures. The propodeal spines are small, but well formed. The petiolar node is moderately sharp, as seen in profile. The subpeduncular process is large and well developed (Fig. 109). The surface of the petiole and postpetiole are covered with punctures. The dorsum of the gaster is smooth and polished.

Distribution: USA, Wyoming (no locality listed, see Lavigne and Tepedino, 1976), Colorado: El Paso Co., near Manitou Springs, Co., Williams Canyon (Map 17).

Type series: AMNH, MCZC [seen].

Discussion: This species could be confused with *L. nevadensis* or *L. andrei*. It differs from these species in that the petiolar node is moderately sharp at the apex (Fig. 109) (rounded in *L. nevadensis* and *L. andrei*, see Figs. 137 & 84) and the hairs on the petiole and postpetiole are only very slightly spatulate, or simply truncate. It is similar in color to *L. andrei*, but has propodeal spines, which are about 1/2 the length of the distance between their



Map 17. Distribution of *Leptothorax furunculus*. The open circle represents the unknown locality in Wyoming.

bases, not simply angles as in *L. andrei*. The clypeus is completely different from that of *L. andrei* possessing a single medial carina and two prominent lateral carinae, not a series of poorly defined carinae as in *L. andrei*. It could be confused with *L. rugithorax*, but differs in the node of the petiole having a sharp apex (trun-

cate and square shaped in *L. rugithorax*). It can be separated from *L. neomexicanus*, but is lighter in color and has a much more developed subpeduncular process. Wheeler (1909) states that *L. furunculus* has distinct mesopropodeal impression, which is correct, although the impression is poorly developed and not much more notable than in most of the other species in the subgenus.

Biology: Nests under stones in pinyon-cedar woodlands (Wheeler, 1909; Gregg, 1963). Wheeler (1909) mentions the type series has a peculiar oily appearance not seen in any of the other species in the genus.

*Leptothorax (Myrafant) gallae* M. Smith  
Figs. 48, 49, 50, 112, & 113; Map 18

*Leptothorax (Leptothorax) gallae* Smith, 1949:112-115, worker, California, Pasadena, Devil's Gate Dam; *Leptothorax (Myrafant) gallae*: Smith, 1979:1393

Species complex: *tricarinatus*

Diagnosis: The entire dorsum of the head of this species is usually sculptured, with fine costulae mixed with the background punctures and the antenna has 12 segments. The propodeal spines are well developed, longer than the distance between the bases (shorter in smaller workers). The sides of the pronotum are rugose, as well as the top of the mesosoma (can be seen most easily by looking obliquely from the side), but the rugae on the sides of the pronotum are poorly defined

and mixed with the background punctuation, and not shiny in the intrarugal surfaces. The rugae are somewhat mixed with the background punctures. The node of the petiole is somewhat sharp in profile, the top of the node is coarsely reticulo-rugose, and looks "pinched" or constricted laterally as seen from top (Fig. 50), the subpeduncular tooth is well developed. The erect hairs are all blunt and short (about 0.05mm).

Distribution: USA, California, Los Angeles Co., Pasadena, Devil's Gate Dam; Riverside Co.; Napa Co.; Orange Co. (Silverado Canyon), Butte Co.; Santa Barbara Co. (Mt.

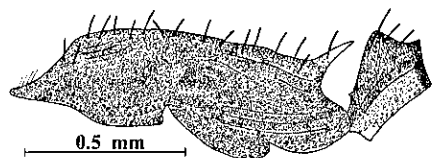


Fig. 112. Mesosoma of cotype worker of *Leptothorax gallae*.

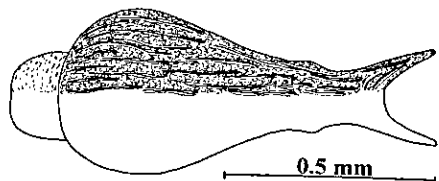
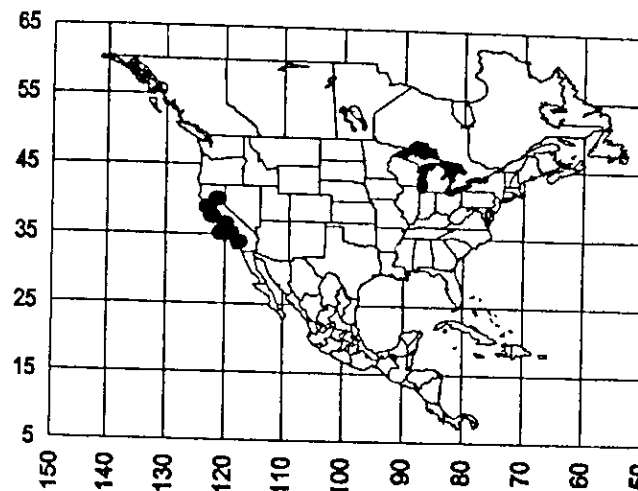


Fig. 113. Mesosoma of a cotype worker of *Leptothorax gallae*. The sculpture is shown only on the right side.



Map 18. Distribution of *Leptothorax gallae*.

Figuerroa), Santa Clara Co. (Los Gatos), Marin Co. (Mill Valley, Inverness), San Mateo Co. (Campus Exp. Area) (Map 18).

Type series: USNM, CASC [seen].

Discussion: This species is similar to *L. chandleri* (see discussion of *L. chandleri* for details). It is easy to

confuse with *L. mariposa*, due to the shape of the petiole (also sharp in profile, but can be separated by the roughly sculptured head, which is predominantly smooth and shining in *L. mariposa*, and by the longer propodeal spines, much longer than space between bases, spines of *L. mariposa* are about half the length of the distance between the spines). This species could also be confused with *L. nevadensis*. It differs in that the propodeal spines are long (nearly twice length of distance between bases), and are slightly incurved at the tips. The petiole has an appearance that it has been pinched from the sides, resulting in the sides of the node being slightly concave in the middle. In comparison, the propodeal spines of *L. nevadensis* are about the length of the distance between their bases (or less), but are also slightly incurved. The petiole is usually rounded or somewhat truncate in profile, but is not "pinched" from the sides and the top of the node is convex. This latter species is usually light brown in color. *Leptothorax gallae* is usually dark brown in color. This species superficially resembles *Leptothorax (Leptothorax) muscorum*, but has a well-defined medial carina on the clypeus.

Biology: Nests in cynipid galls on the canyon live oak (*Quercus chrysolepis* Liebm.) and galls of *Andricus spectabilis*.

*Leptothorax (Myrafant) hispidus* Cole  
Figs. 5 & 114; Map 19

*Leptothorax (Leptothorax) hispidus* Cole, 1957:42-45, Fig. 1, worker, female, USA, TX, Jeff Davis Co., Davis Mountains, Limpia Canyon,

5,400'; Wheeler and Wheeler, 1973:71 larva; *Leptothorax* (*Myrafant*) *hispidus*: Smith, 1979:1393

Species complex: *hispidus*

Diagnosis: This is a large species (3-4mm total length) with a 12-segmented antenna, dark brown, with the mesosoma depressed at the area of the mesopropodeal suture, although the sculpture is not broken in the region. The top and side of the mesosoma are covered by coarse, reticulated rugae. The propodeal armature is represented by bumps. The node of the petiole is low and truncate. The petiole and postpetiole are covered with reticulated rugae.

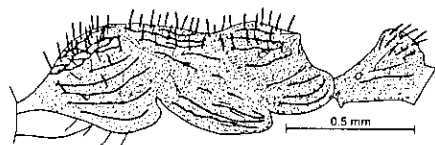
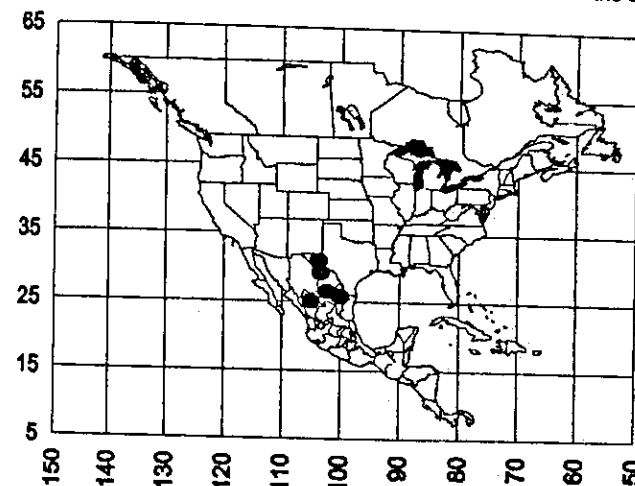


Fig. 114. Side of the mesosoma and petiole of a paratype worker of *L. hispidus*.

Distribution: USA, Texas: Jeff Davis Co. (Davis Mountains, Limpia Canyon); Brewster Co. (Chisos Mountains [Van Pelt, 1983]). México, Coahuila (Diamante Pass, Arteaga [Cole, 1957]), Nuevo León, (Monterrey, Parque Chipinque), Zacatecas (30 mi. E Sombrerete [Cole, 1957]) (Map 19).

Type series: Holotype worker in Cole collection, paratypes in Cole collection (University of Tennessee), Kennedy collection (Ohio State University), Creighton collection, Gregg collection (Colorado State University), Talbot collection (Lindenwood College), AMNH, MCZC, USNM [seen].

Discussion: The strongly reticulo-punctate disc of the first gastral tergite, the depressed mesosoma, and the large size will separate this species from all other species in the subgenus, including the other species in the *hispidus* complex (*L. peninsularis*, *L. punctaticeps*). Cole (1957) stated that this species is most closely related to *L. silvestrii*. I can not agree as the only important characteristic they have in common is that the disc of the gastral tergum is distinctly reticulo-punctate (which appears to have evolved independently several times), and this characteristic varies considerably, at least in *L. silvestrii* (Creighton, 1953). It can be easily distinguished from *L. silvestrii*, as the hind femur in *L. silvestrii* is greatly incrassate, which is not the case in *L. hispidus*. In addition, the impression at the mesopropodeal suture is absent in *L. silvestrii*; the scapes are longer in *L. hispidus*, as compared to *L. silvestrii*. The eye is normal in shape for the genus, which easily separates this species from *L. obliquicanthus*, which has a kidney-shaped eye. In addition the propodeal spines are simple angles in *L. hispidus* and are well developed in the other two species. Although this is clearly a member of the subgenus *Myrafant*, it does



Map 19. Distribution of *Leptothorax hispidus*.

show possible affinities to the subgenus *Dichothorax*. The anterior peduncle of the petiole is relatively long, there is a distinct impression at the mesopropodeal suture, and the propodeal spines are short. This species also has a relatively long antennal scape. These characteristics justify placing this species

in its own complex, together with *L. peninsularis* and *L. punctaticeps*. This species appears to be similar to the Palearctic *L. schaufussi* Forel, which also appears to be related to *L. (Dichothorax) pergandei* Emery (Mackay, 1993a). Both have long antennal scapes, elongate mesosomae, and relatively long petiolar peduncles, although that of *L. hispidus* is much less developed. The mesopropodeal suture is deeply depressed on the dorsum of the mesosoma of both species. Nevertheless these two species are easily separated as *L. hispidus* is roughly sculptured, with rugae on the head, mesosoma and dorsum of the postpetiole, whereas at least the head and pronotum of *L. schaufussi* is smooth and polished. As mentioned above, the peduncle of *L. schaufussi* is elongate, that of *L. hispidus* is much shorter. It is tempting to consider *L. hispidus* as a member of the subgenus *Dichothorax*, but it appears to belong to *Myrafant*, with *L. schaufussi* and *L. pergandei* belonging in the subgenus *Dichothorax*. *Leptothorax hispidus* appears to link the two subgenera.

Biology: Nests under rocks or in soil (Van Pelt, 1983) at higher elevations.

#### ***Leptothorax* (*Myrafant*) *josephi* new species**

Figs. 78, 115, 116, 117, 118, 119, & 120; Map 20

Species complex: *longispinosus*

Diagnosis: *Leptothorax josephi* is a large, bicolored (head and gaster black, mesosoma reddish brown) species which is easily confused with the bicolored form of *Leptothorax* (*Leptothorax*) *muscorum* in the field.

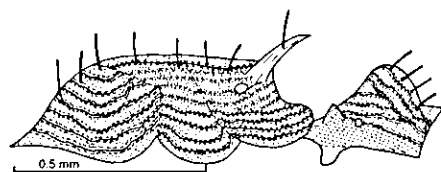


Fig. 115. Mesosoma of the holotype worker of *Leptothorax josephi*.

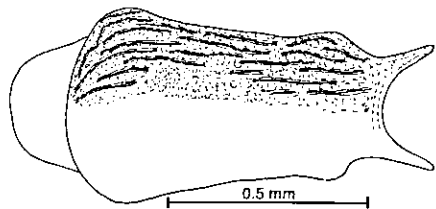


Fig. 116. Dorsum of the mesosoma of a paratype worker of *Leptothorax josephi*. The sculpture is shown only on the right side.

Mandibles with 5 teeth, only 3 most apical reasonably well defined; anterior border of clypeus nearly straight, clypeus with several longitudinal carinae, including well developed medial carina; vertex concave; antenna with 11 segments; mesosoma without any obvious sutures, none break the sculpture of dorsal surface; propodeal spines well developed (length > 0.1mm), about as long as distance between them; petiole with well developed subpeduncular process, well developed flange near point of attachment, anterior petiolar face broadly

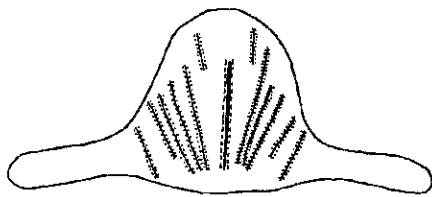


Fig. 118. Clypeus of a paratype worker of *L. josephi*.

The antenna is 11 segmented, the propodeal spines are large, and the mesosoma has coarse rugae. The clypeus has a well-developed medial carina, and 2 prominent lateral carinae. The dorsal surface of the gaster is strongly shining.

Distribution: Southwestern New Mexico (Map 20).

### Description

Worker measurement (mm): HL 0.82-0.84, HW 0.71-0.78, SL 0.55-0.58, EL 0.19-0.20, WL 0.94-1.01, PW 0.23-0.24, PL 0.31-0.37, PPW 0.31-0.34, PPL 0.19-0.22. Indices: CI 87-93, SI 67-69, PI 65-74, PPI 155-163.

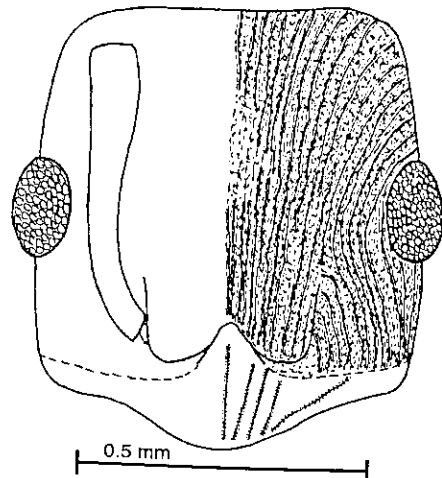


Fig. 117. Head of a paratype worker of *Leptothorax josephi*. The sculpture is shown only on the right side of the figure.

concave, posterior face convex, petiolar node rounded as seen in profile.

Hairs erect (up to 0.08mm in

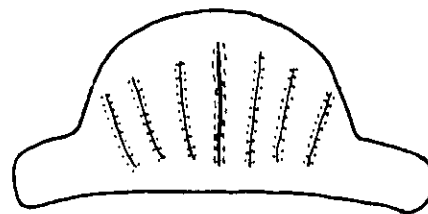


Fig. 119. Clypeus of a paratype male of *L. josephi*.

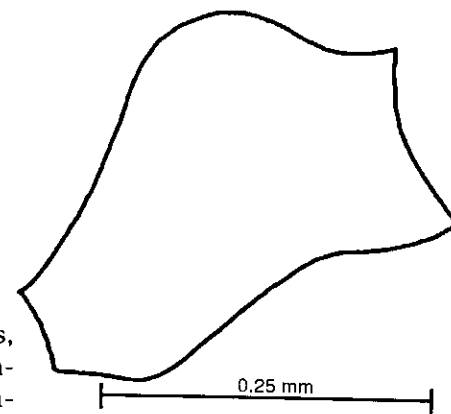
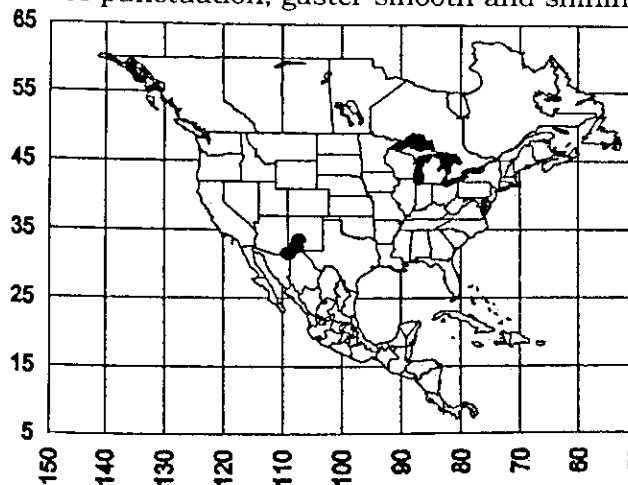


Fig. 120. Petiole of a paratype male of *L. josephi*.

length), covering most body surfaces, except antennae and legs; decumbent pubescence present on antennae and legs.

Entire head covered with coarse, longitudinal rugae, intrarugal spaces punctate and weakly shining, dorsum of mesosoma with longitudinal rugae, both faces of propodeum with transverse rugae, sides of mesosoma, including propodeum, with very rough sculpture, consisting of coarse, predominately longitudinal rugae, interspersed with coarse punctuation, gaster smooth and shining.



Map 20. Distribution of *Leptothorax josephi*.

Bicolored, head and gaster black, mesosoma reddish brown.

Female (dealate) measurements (mm): HL 0.90, HW 0.83, SL 0.62, EL 0.25, WL 1.58, PW 0.37, PL 0.35, PPW 0.44, PPL 0.23. Indices: CI 92, SI 69, PI 106, PPI 191.

Similar to worker in most aspects, except possessing ocelli and having

mesosoma modified for flight. Propodeal spines more robust and relatively shorter, petiole nearly identical in shape.

Male measurement (mm): HL 0.62-0.77, HW 0.68-0.74, SL 0.20-0.22, EL 0.34-0.35, WL 1.36-1.45, PW 0.23-0.28, PL 0.25-0.32, PPW

0.29-0.31, PPL 0.24-0.25. Indices: CI 96-110, SI 29-32, PI 88-92, PPI 116-129.

Mandible with 5 teeth, only apical reasonably well developed; median anterior border of clypeus straight, clypeus convex, with medial carina and 3 on each side of clypeus, remainder of clypeus smooth; eyes large; ocelli well developed; scape very short, about as long as first 2 funicular segments; propodeum without spines, but with dull carinae at positions of armature; petiole without subpeduncular process, anterior petiolar face broadly concave, posterior face convex, petiolar node rounded in profile, weakly bilobate as seen from behind, with depressed, smooth area between lobes.

Hairs sparse, few on mandibles, 1 or 2 on propodeum, very few scattered on gaster.

Sculpture finer than in worker and female, granulate with poorly defined rugae on head, top of mesosoma striolate, side of mesosoma granulate with fine rugae, top of petiole and postpetiole mostly shining, gaster strongly shining.

Color: dark brown.

Type series: Holotype worker (MCZC), 41 paratype workers (AMNH, CASC, CWEM, FMNH, LACM, EMAU, MCSN, MCZC, MHNG, MZSP, USNM, UNAM), 1 paratype female (MCZC), and 6 paratype males (CASC, CWEM, LACM, MCZC, USNM), NEW MEXICO, Socorro Co., near Mount Withington, 33°48'32.2" 107°22'57.2", 7-viii-1994, 2185 meters, W. Mackay #16952. Additional 146 paratype workers from New Mexico, Hidalgo Co., Coronado National Forest, Clayton Draw, 20-iii-1998, Mackay family #17934 (CWEM), 76 paratype workers, 1 paratype dealate female, Coronado National Forest, Peloncillo Mountains, 21-iii-1998, Mackay family #17973 (CWEM), 52 paratype workers, 1 dealate paratype female same locality, 21-iii-1998, Mackay family #17974 (CWEM).

Material examined: Three hundred sixteen workers, 3 females and 6 males, including type series and NEW MEXICO, Sierra Co., 20.7 K 209° from Hillsburro, Road 888 off Highway 26, just inside the Gila Wilderness, 32°45'34.9" 107°40'13.7" 1720 meters, 3-ix-1995, W. Mackay #17213 (50 workers CWEM).

Etymology: This species is dedicated to the memory of my only son, Joseph Luis, born on March 25, 1984 and died on August 17, 1984 from an infection of *Hemophilus influenzae*.

Discussion: This species would key to *L. rugatulus* in Creighton (1950), but differs in being much larger (total length 3mm vs. 2.5mm or less in *L. rugatulus*) and bicolored (yellow brown with dark infuscation on head and gaster of *L. rugatulus*). In addition, the females are

much larger (5mm total length vs. 3.5mm total length in *L. rugatulus*) and the petiole is broadly rounded (apex sharper in *L. rugatulus*), and the males are easily separated by the shape of the petiolar node: high and bilobed (as seen from behind) in *L. josephi*, low and not bilobed in *L. rugatulus* (Compare Figs. 120 & 157). The male has numerous parallel carinae on the clypeus, whereas males of *L. rugatulus* have reticulated and partially transverse rugae on the clypeus. It differs from two other closely related species, *L. bradleyi* and *L. smithi*, in that the intrarugal spaces of the head are punctate, but shining. The long propodeal spines are much longer than those of *L. bradleyi*. *Leptothorax smithi* is never bicolored, usually being a concolorous pale brown to yellow. It can be separated from *Leptothorax (Leptothorax) muscorum* by the convex clypeus with the well-developed medial carina.

Biology: The nest of the holotype series was collected in a dead branch (15-cm diameter) attached to trunk of the oak *Quercus arizonica* Sarg., in a grassy area with scattered oaks within a pine forest. The ants were timid and attempted to hide, larvae and pupae were present in the nest. The entire nest population was collected. The second type series was collected in a branch (3cms diameter) of a *Q. arizonica*, about 1.5 m from soil surface. The third type series was in a dry, dead branch of *Q. arizonica*. The fourth type series was collected in a 3cm diameter dead branch of *Q. arizonica*. The nest in the Gila Wilderness was in a 8cm diameter branch of an oak tree, 3 m from the ground on a very steep, south-facing slope. Two other similar nests were found. The habitat is often near a stream, with oaks, pinyon pines and junipers. This species seems to prefer the driest dead branches of *Q. arizonica*. The soils consist of rocks mixed with very fine sand. The nests contain brood throughout the summer. Nest populations ranged from 41-76 workers, with a single dealate female in each nest.

### *Leptothorax (Myrafant) liebi* new species

Figs. 16, 36, 42, 121, & 122; Map 21

Species complex: *andersoni*

Diagnosis: This is a small, pale yellow, nearly white ant with dark eyes. It is soft bodied, and usually becomes distorted when dried on a point. It can be easily distinguished by the large eyes, which have a maximum diameter greater than the distance between the anterior border of the eye and the base of the mandible. The antenna has 12 seg-

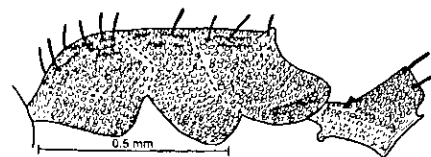


Fig. 121. Mesosoma of the holotype worker of *Leptothorax liebi*.

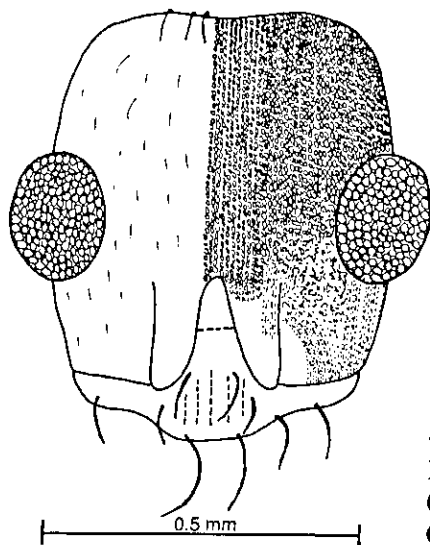


Fig. 122. Head of the holotype worker of *Leptothorax liebi*. The sculpture is shown only on the right side of the figure.

ments, the head is heavily and densely punctate, with the punctures forming weak striae. The propodeal spines are poorly developed, forming small angles. The petiolar node is truncate. These characters will actually separate it from all other members of the genus.

Distribution: Known only from southwestern Texas (Map 21).

### Description

Worker measurement (mm): HL 0.58-0.64, HW 0.52-0.53, SL 0.44-0.47, EL 0.19-0.22, WL 0.70-0.77, PW 0.13-0.18, PL 0.16-0.20, PPW 0.19-0.29, PPL 0.14-0.19. Indices: CI 83-90, SI 73-79, PI 81-150, PPI 136-153.

Mandibles with 5 teeth, basalmost small, less than half volume of distal 2 teeth; anterior border of clypeus

convex, clypeus with poorly defined medial carina and several weak lateral carinae; sides of head convex, wider anterior of eyes than posterior to eyes; vertex weakly concave; eyes very large, extending well past sides of head (Fig. 122); mesosoma with none of the sutures interrupting sculpture, dorsum nearly straight (Fig. 121); propodeal spines developed as small angles, acute apex, base broad; petiole with subpetiolar process well developed, anterior petiolar face concave, posterior face short (0.05mm), and convex, petiolar node obliquely truncate in profile (Fig. 121); postpetiole wide, nearly 1.5 X length.

Erect hairs scattered on most surfaces, mostly coarse and dull at apices; decumbent pubescence nearly absent, except on legs and antennae.

Sculpture consisting primarily of dense punctures, entire dorsum of head punctate, (lining up into faint striae on head), some small areas on head shiny, but most surfaces dull, mesosoma, petiole and postpetiole densely punctate, with a few poorly defined rugae on sides of mesosoma, entire gaster smooth and polished.

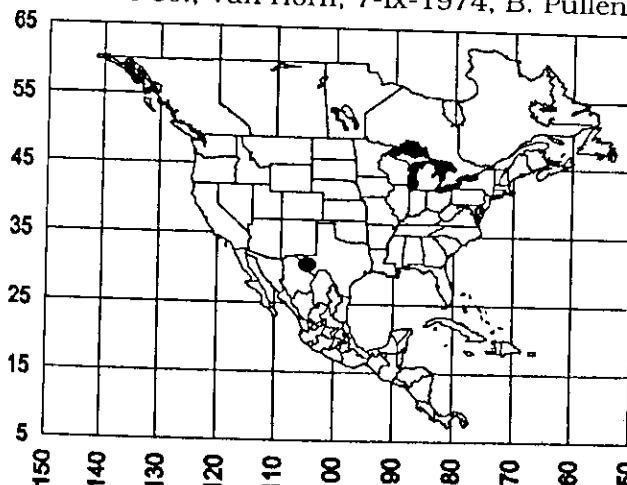
Concolorous pale yellow with strongly contrasting black eyes.

Female and male: Unknown.

Type series: Holotype worker, USA, Texas: Hudspeth Co., 25 KSW Van Horn, 27-x-1991, W. Mackay #15465 (MCZC) and paratype

worker, USA, Texas, Hudspeth Co., 25 KSW Van Horn, 25-viii-1991, W. Mackay #15149 (CWEM). Both specimens were collected in the same area at the Indio Mountain Research Station of the University of Texas.

Material examined: Seven workers, including type series and 5 workers (2 in Pullen collection, CWEM, MCZC, USNM), USA, TX, Culberson Co., Van Horn, 7-ix-1974, B. Pullen.



Map 21. Distribution of *Leptothorax liebi*.

**Etymology:** Named in honor of my close friend and colleague, Dr. Carl Lieb, previous director of the Indio Mountain Research Station, who has made major efforts in promoting and preserving the research station.

**Discussion:** This species could be confused with *L. terrigena* or *L. punctatissimus*, and

could be easily separated with the characters in the diagnosis. It somewhat resembles *L. coleenae* in terms of sculpture, but differs in having the large eyes and a blunt petiolar node. The discussion of *L. coleenae* includes suggestions as to how to distinguish the pale, desert species, including *L. andersoni*, *L. bestelmeyeri*, *L. cokendolphi*, *L. coleenae*, and *L. liebi*. The large eye may cause it to be confused with *L. obliquicanthus*, but the eye is not kidney shaped and the first tergum of the gaster is entirely smooth and shining, not sculptured as in *L. obliquicanthus*. Therefore there is little likelihood that this species would be confused with any other. This is another species of the Chihuahuan Desert that is pale yellow in color with dark eyes. These are presumably adaptations to nocturnal foraging, although the specimens at Van Horn were collected actively foraging at the nest entrance during the day. This coloration appears to be the result of convergent evolution, as these pale, desert species seem to have little in common morphologically other than color.

**Biology:** This species nests in soil in creosotebush scrub in the Chihuahuan Desert. Both specimens of the type series were collected



in the same pitfall trap station, but one in August and the second in October. The site is a low flat area covered with loose, volcanic ash. They are probably active primarily at night, based on the light color and large eyes. Barry Pullen found his series nesting in the soil in a desert scrub habitat.

***Leptothorax (Myrafant) lindae* new species**

Figs. 51, 52, 123, & 124; Map 22

Species complex: *andersoni*

Diagnosis: The antenna of the worker of this species is 12 segmented, the head finely and densely rugose, the rugae are fine, but are well separated from the surface, the intrarugal spaces are mostly smooth and glossy. The mesosoma is also coarsely rugose, especially the dorsum, the sides are partially punctate. The propodeal spines are large, long, and well developed, longer than the distance between the bases. The subpetiolar process is

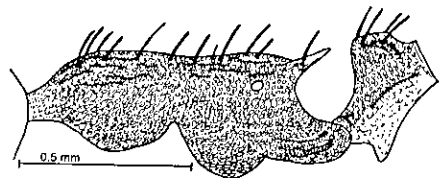


Fig. 123. Mesosoma of the holotype worker of *Leptothorax lindae*.

well developed, blunt tipped, the dorsum of the petiole is somewhat obliquely truncate (Fig. 123), but with rounded edges. The top of the petiole and postpetiole are punctate. The gaster is glossy and completely smooth and shining.

Distribution: South central California (Map 22).

**Description**

Worker measurement (mm):

HL 0.68-0.76, HW 0.58-0.62, SL 0.55-0.59, EL 0.16-0.17, WL 0.74-0.77, PW 0.17-0.19, PL 0.16-0.17, PPW 0.24-0.25, PPL 0.18-0.20. Indices CI 83-84, SI 78-81, PI 108-114, PPI 127-133.

Mandible with 5 teeth; anterior border of clypeus convex, medial clypeal carina well formed, 1 well developed lateral carina on each side of clypeus; vertex weakly concave; eyes extending slightly past sides of head; scape failing to reach occipital corner by first funicular segment; outline of mesosoma not broken at sutures; propodeum with well developed spines (total length 0.18mm); petiole thick in profile, but node relatively sharp (Fig. 123), subpeduncular process well devel-

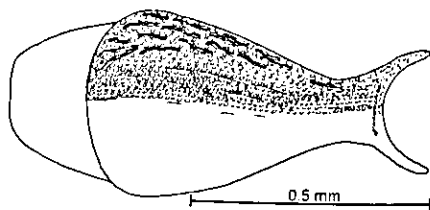


Fig. 124. Top of the mesosoma of the holotype worker of *Leptothorax lindae*. The sculpture is shown only on the right side.

oped, blunt (Fig. 123).

Erect hairs present on most surfaces, short (0.05mm), blunt tipped; decumbent pubescence sparse, few hairs obvious on gaster.

Head punctate, punctures line up and form weak striae, semi-circular striae present posterior to insertions of antennae, side of mesosoma punctate with weak striae on mesopleural area and side of propodeum, dorsum of mesosoma punctate, also with weak striae, sides and top of petiole and postpetiole punctate, gaster smooth and glossy.

Dorsum of head and gaster dark brown, ventral surface of head, mesosoma, petiole, and postpetiole lighter brown.

Female (dealate) measurements (mm): HL 0.95, HW 0.86, SL 0.75, EL 0.28, WL 1.48, PW 0.27, PL 0.19, PPW 0.35, PPL 0.26. Indices CI 91, SI 79, PI 141, PPI 132.

Mandible with 5 teeth; anterior border of clypeus weakly concave, medial carina well developed, with several lateral carinae; vertex weakly convex; eyes extending well past sides of head; propodeum with well developed, thick spines; node of petiole moderately sharp in profile, subpeduncular process well developed, blunt.

Erect hairs abundant on most surfaces (0.1mm); decumbent pubescence sparse, few hairs on gaster.

Sculpture of head rough, consisting of rugae with intrarugal spaces shining, semi-circular carinae posterior to insertion of antenna, dorsum of mesosoma with coarse rugae, with intrarugal spaces shining, side of propodeum with coarse rugae, sides and top of petiole and postpetiole with fine rugae.

Concolorous dark brown.

Male: Unknown.

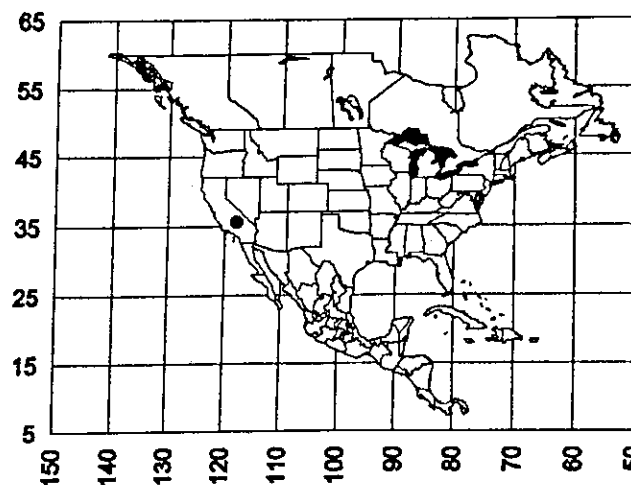
Type series: Holotype worker (MCZC), 70 paratype workers (AMNH, CASC, CWEM, FMNH, LACM, EMAU, MCSN, MCZC, MHNG, MZSP, USNM, UNAM), 1 paratype female (MCZC), California, Tulare Co., Sequoia National Park, Wolverton Campground, 36°35'03.0" 118°44'27.8", 2100m, 9-vii-1998, W. and L. Mackay # 18413.

Material examined: Seventy-four workers, 1 female, including type series and California, San Bernardino Co., San Bernardino Mts., Big Bear Summit, 15-vi-1977, W&E Mackay # 1311 (1 worker CWEM), 2 mi NW Fawnskin, 23-vi-1978, W&E Mackay # 2095 (1 worker CWEM), Mill Creek X Bluff Lake, 23-vi-1978, W&E Mackay # 1296 (1 worker CWEM).

Etymology: This species is named in honor of my daughter, Linda, who was helping me collect in the area.

Discussion: *Leptothorax lindae* appears to be most closely related to



Map 22. Distribution of *Leptothorax lindae*.

punctate and dull, similar spaces on the females of *L. nevadensis* are lightly punctate and moderately shining.

**Biology:** The nest was in the soil, with a 3cm diameter mound, in an open, level, grassy knoll in a redwood forest. The soil was a brown, sandy loam with good drainage. The moisture level and organic matter level were high. Larvae and pupae were in the nest. The entire nest population was collected (71 workers, 1 nest female). Only a single nest was found, although a careful search was done by 4 individuals. The ants were sluggish, but were surprisingly aggressive, and attacked while the nest was being excavated. No foragers were seen outside the nest (17:00 PST). The additional specimens from the San Bernardino Mountains were collected loose on ground in a pine forest. One specimen was a prey item of *Formica ravidia* (# 2095).

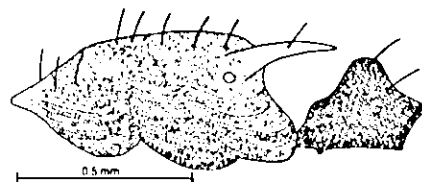
*Leptothorax* (*Myrafant*) *longispinosus* Roger  
Figs. 64, 70, & 125; Map 23

*Leptothorax longispinosus* Roger, 1863:180, worker, "America"; Emery, 1895:321 female; Wheeler, 1903a:236-239 male, Plate 12, Fig. 9; Crozier, 1970:117 karyotype; Wheeler and Wheeler, 1989:323 larva; *Leptothorax* (*Myrafant*) *longispinosus*: Smith, M., 1950:30

*Leptothorax* (*Leptothorax*) *longispinosus laeviceps* Buren, 1944:287, junior primary homonym of *leviceps* Emery, 1898:134, replacement name *iowensis* Buren

*Leptothorax* (*Leptothorax*) *iowensis* Buren, 1945:288 (Creighton, 1950:264)

*L. nevadensis* and the workers are often difficult to distinguish. The dorsum of the pronotum of *L. lindae* is densely covered with punctae, with little or no evidence of striae. The dorsum of the pronotum of *L. nevadensis* has rugae, which can best be seen from the side. The spaces between the rugae on the head of the female of *L. lindae* are

Fig. 125. Mesosoma of a worker of *Leptothorax longispinosus* (WV).

125). The head is nearly mostly smooth and glossy, but with fine striolae.

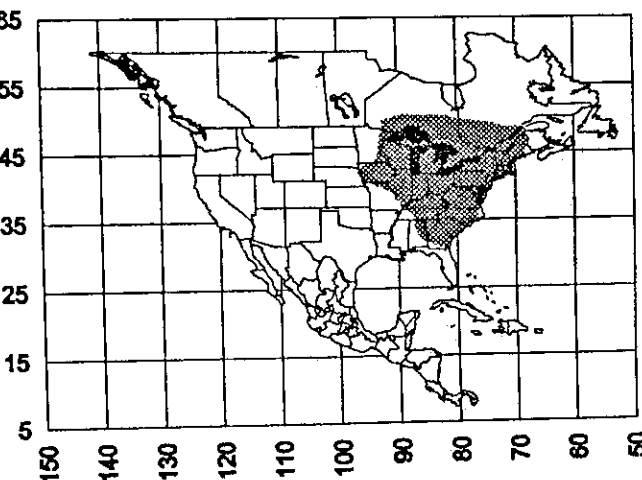
**Distribution:** USA: Minnesota, Wisconsin, Iowa, Missouri, Illinois, Michigan, Indiana, Kentucky, Tennessee, Alabama, Ohio, Maine, New York, Vermont, New Hampshire, Massachusetts, Connecticut, Pennsylvania, New Jersey, Maryland, Washington D. C., West Virginia, Virginia, North Carolina, South Carolina, Georgia; Canada: Quebec, Ontario (Map 23).

**Type series:** None in this country (Creighton, 1950), and the types could not be located in Roger's collection (Museum für Naturkunde Zentralinstitut der Humboldt-Universität zu Berlin) and probably no longer exist.

**Discussion:** The long propodeal spines easily separate this species

from most of the others in the subgenus. It can be separated from *L. ambiguus* and *L. curvispinosus*, which also have long propodeal spines, by the nearly glossy head and by the much darker color. The propodeal spines are nearly in the same plane as the mesosoma, which separates it from *L. tuscaloosae* (in which the spines are pointed somewhat upwards). The top of the mesosoma is roughly sculptured, whereas the top of the mesosoma of *L. tuscaloosae* is smooth.

**Biology:** This species nests in plant cavities such as hollow stems,

Map 23. Distribution of *Leptothorax longispinosus*.

twigs, and in acorns (Headley, 1943), as well as under stones (Wheeler, 1905; Cole, 1940) and between clefts in rocks, in stone walls or under bark (Wheeler, 1903a), including dead, standing trees (Dennis, 1938), or within rotting logs (Cole, 1940). Nests may be small, one nest was 1.2cm deep under a pebble with a diameter of 0.6cms (Cole, 1940). It is found in conifer forests (Letendre and Pilon, 1972) or mixed species forests, where shade of trees is dense (Dennis, 1938; Headley, 1943; Carter, 1962), or prefers open areas with good drainage (Herbers, 1985). It is found occasionally at lower elevations in the southern Blue Ridge of Virginia (Van Pelt, 1963). Nest populations are relatively larger than in other species (Wheeler, 1903a), and average 46 workers, to a total (including sexuals and brood) average of 136 and a maximum of 419 (Headley, 1943). Egg laying begins in mid May, but brood are present in the nest through the year (Headley, 1943). Pupae are present in the nest by the second week of June (Headley, 1943). Worker populations peak late in the season (Headley, 1943). Winged females and males are found in nests in August (Wheeler, 1903a). Workers reproduce in queenright colonies (Frumhoff and Ward, 1992). They are polygynous (Alloway et al., 1982; Herbers, 1984; 1986a) and polydomous (Alloway et al., 1982; Herbers and Tucker, 1986) with many nests found without queens (Headley, 1943). Scarcity of available nest sites may influence the pattern of polygyny (Herbers, 1986b). This species spreads by nest fission and migration (Herbers and Tucker, 1986a). Mating flights occur from mid July until early September (Leprince and Francoeur, 1986), with mating occurring on hilltops. Females are inseminated once, or use sperm from a single male for a given clutch (Herbers, 1986c). Nests are considerably more spread out in the summer than they are in the winter (Herbers, 1985). Apparently nests fractionate in the summer to occupy several nest sites (Herbers, 1986a). Many summer nests are queenless, whereas such nests are rarely found in the winter (Herbers 1986a), and survivorship of nests during the winter may be a function of the resident queen number (Herbers 1986b). Nest density can be as high as 1.7 (Headley, 1943) to 4 (Herbers, 1985) nests per square meter. This species forages on the low vegetation in the shade of trees (Wheeler, 1903a, 1905). Foraging activity peaks in summer and fall (Herbers, 1989). Herbers (1990) and Backus (1993) reported on the investment of this ant in workers and reproductives. Social organization was discussed by Herbers (1983).

It is enslaved by *Leptothorax* (*Leptothorax*) *duloticus* and *Protomognathus americanus* (Headley, 1943; Alloway et al., 1982; Alloway and del Rio Pesado, 1983; Alloway and Keough, 1990), and can recognize *Protomognathus americanus* as an enemy (Alloway, 1990).

*Leptothorax* (*Myrafant*) *manni* Wheeler

Figs. 27, 126, & 127; Map 24

*Leptothorax manni* Wheeler, 1914:53-55, worker, female, male, México, Hidalgo, Guerrero Mill (eastern slope of high mountain range east of Pachuca); *Leptothorax* (*Myrafant*) *manni* Kempf, 1972:132

Species complex: *andrei*

Diagnosis: The workers of this species are concolorous medium brown, with most surfaces smooth and shining. The antenna has 12 segments. The dorsum of the head is glossy, the area posterior to the insertions of the antennae have a number of concentric whorls of striae, which extends to the side of the head and posterior to the eye. The top of the mesosoma, especially the pronotum, is mostly smooth and glossy, the sculpture on the dorsum of the pronotum has fine rugae, the side of the pronotum is mostly smooth and shining, but with fine striae, and the sides of the mesosoma have striae or rugae, which become fine rugae on the propodeum. The surfaces that are sculptured are still glossy and shiny. The propodeal spines are

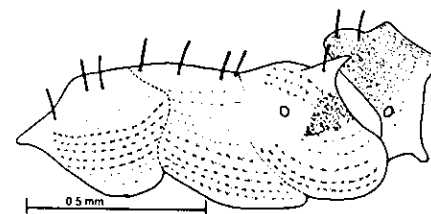


Fig. 126. Mesosoma of a cotype of worker of *Leptothorax manni*.

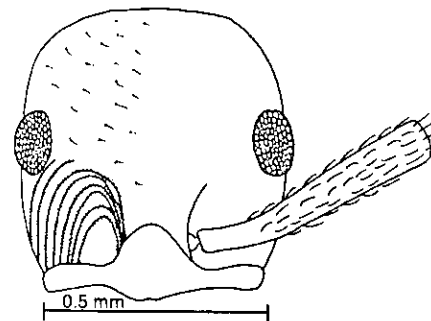


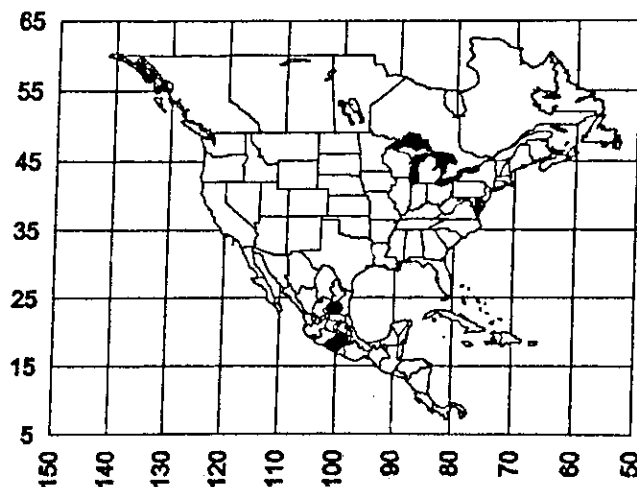
Fig. 127. Head of a cotype worker of *Leptothorax manni*.

small, but developed. The area between the spines and the descending face of the pro-podeum has transverse striae. The side of the petiole is roughly sculptured, with punctures mixed and merging into striae, the top of the node is more finely punctate, with coarse irregular rugae, the side of the postpetiole is finely sculptured, with fine punctures, the top has similar sculpture. The petiolar node is rounded as seen in profile.

Distribution: MEXICO: Hidalgo (type locality: Guerrero Mill), Morelos (Cuernavaca, CWEM). Another specimen from Nuevo León, appears to be *L. manni* (CWEM). The data are: 30.5 K E. Dr. Arroyo, 10-vi-1988, 1670 m, W. Mackay #10979-14, collected in a surface trap baited with Vienna Sausage (Map 24).

Type series: USNM [seen].

Discussion: This species is a member of a group of species (part of the *andrei* species complex) in which the dorsum of the head is

Map 24. Distribution of *Leptothorax manni*.

completely smooth and shining, but there are striae or rugae on the sides of the head. The propodeal armature consists of small spines. It could be confused with *L. brevispinosus*, but differs in that the hairs on the scape are mostly decumbent (suberect to nearly erect in *L. brevispinosus*). The propodeal armature of *L. manni* consists of spines (Fig. 126), whereas the propodeal armature of *L. brevispinosus* is developed into tiny angles, which are little higher than the surrounding surface of the propodeum (Fig. 95). It is perhaps most closely related to *L. bristoli*. It can be differentiated in that the mesopleuron and sides of the propodeum are covered with coarse rugae. These surfaces are punctate in *L. bristoli*. The dorsum of the propodeum of the two species has sculpture similar to the sides. The propodeal spines and shape of the petiole (in profile) are nearly identical. It can be easily separated from the similar *L. punctithorax* as the side of the pronotum is predominantly smooth and shining (roughly sculptured in *L. punctithorax*).

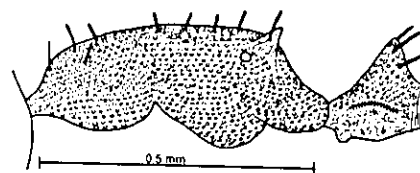
**Biology:** The types were collected at an elevation of 2600-2800 m (8,500-9,000') (Wheeler, 1914). The area was wooded with oaks and pines. The deeper canyons were riparian, but the hillsides were dry.

*Leptothorax (Myrafant) mariposa* Wheeler  
Figs. 33 & 128; Map 25

*Leptothorax nitens* var. *mariposa* Wheeler, 1917:507-508, worker; junior synonym of *L. nitens*: Creighton, 1950:265; revived from synonymy by Cole, 1958a:536-337; *Leptothorax (Myrafant) mariposa*: D. Smith, 1979:1393

**Species complex:** *nitens*

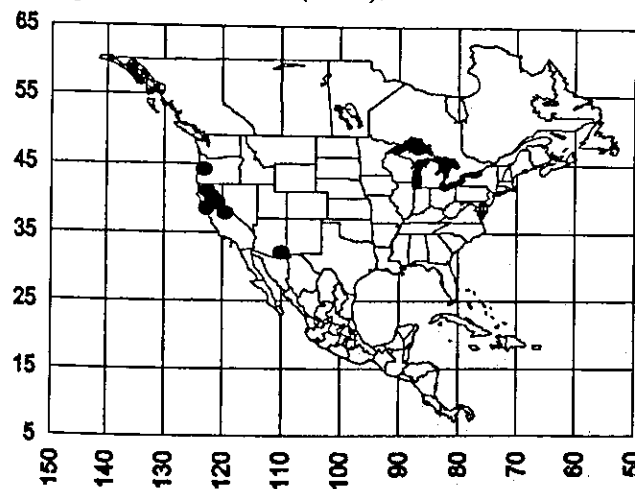
**Diagnosis:** This is a small species with a 12-segmented antenna, usually light brown, the petiolar node has a sharp apex, the subpetiolar process is usually a poorly formed, angulate structure (Fig. 128), most

Fig. 128. Mesosoma and petiole of a cotype worker of *Leptothorax mariposa*.

of dorsum of the head is smooth and polished, the side has striae or rugulae, the propodeal spines well formed, acute, but short (about  $\frac{1}{2}$  length or less of distance between bases), the mesosoma is predominantly punctate, but with fine striolae, especially obvious on the pronotum and top of the mesonotum.

**Distribution:** USA: Oregon, Lane Co. (H. J. Andrews Exp. Forest), California, Tehama Co., Placer Co., Butte Co., Marin Co., Monterey Co., Mariposa Co. (Yosemite Nat. Park, Tenaya Canyon), Tuolumne Co. (Yosemite Valley), Arizona, Cochise Co. (Chiricahua Mountains) (Map 25).

**Type series:** AMNH (seen).

Map 25. Distribution of *Leptothorax mariposa*.

Discussion: This subspecies was elevated to specific status by Cole (1958b), due to morphological differences and that *L. mariposa* and *L. nitens* occur at the same site (Tenaya Canyon, Yosemite National Park), with no sign of hybridization. It can be separated from the others in the *nitens* group by the extremely acute petiolar node as seen in profile, and the smooth and polished dorsum of the head. The head is more quadrate than that of *L. nitens* (Cole, 1958a states the cephalic index of *L. mariposa* is 96, that of *L. nitens* is 79). The sculpture is rougher than in *L. nitens*, consisting of coarse punctures as well as prominent longitudinal rugae. It is larger than *L. nitens* (Cole, 1958a states the total thoracic length of *L. mariposa* is 0.95mm, that of *L. nitens* is 0.71mm). It is closely related to *L. melinus*, from which it can be separated by having rugulae on the posterior face

of the node (see *L. melinus* discussion).

Specimens from the Chiricahua Mountains of Arizona differ somewhat from the type material. They are darker brown; the flange and tooth on the anterior peduncle of the petiole are somewhat more developed, there are more costulae on the dorsum of the head; the dorsum of the pronotum is somewhat smooth and shiny versus the completely punctated pronotum in the type material. Even though the populations are widely separated geographically and isolated by desert regions, I feel there would be little justification for recognition of a separate species.

**Biology:** This species nests under rocks in pine-fir forests (Wheeler, 1917; Cole, 1958a; Mackay, pers. obs.). They are found in leaf litter of Douglas fir, *Rhododendron*, life oak and laurel (Anderson, pers. obs.). This species is also found in relatively dry sites. Cole (1958a) reports nest size as 58-97 workers. Thirty-seven workers were collected in one nest (Mackay, pers. obs.).

***Leptothorax (Myrafant) maryanae* new species**

Figs. 34, 129, 130, & 131; Map 26

Species complex: *nitens*

**Diagnosis:** This is a brown species with a 12-segmented antenna.

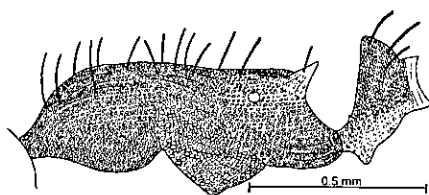


Fig. 129. Mesosoma and petiole of the holotype worker of *Leptothorax maryanae*.

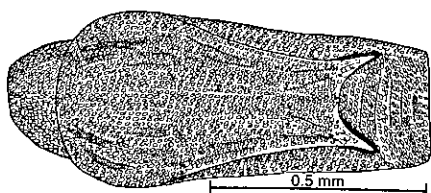


Fig. 130. Mesosoma of the holotype worker of *Leptothorax maryanae*, as seen from above.

The eye of the female has abundant, obvious, short, bristly hairs. The worker and male have similar hairs, but they are finer and difficult to see. The head has fine striolae, with a glossy, shiny background. The clypeus is shiny and polished, with a fine median carina and several very fine lateral carinae. The mesosoma is primarily punctate, but with many rugae, especially on the top of the pronotum and top of the propodeum. The petiole has a sharp apex, when viewed in profile. The petiole and postpetiole are punctate, with rugae on the side of the petiole. The dorsum of the first gastral tergite is smooth and polished.

**Distribution:** San Bernardino Mountains of southern California.

(Map 26).

**Description**

Worker measurement (mm): HL 0.57-0.74, HW 0.47-0.65, SL 0.50-0.64, EL 0.16-0.17, WL 0.67-0.85, PW 0.16-0.17, PL 0.16-0.17, PPW 0.20-0.23, PPL 0.13-0.16. Indices: CI 82-87, SI 85-88, PI 100-104, PPI 146-155.

Mandible with 5-6 teeth, apical and pre-apical teeth much more developed than others; anterior border of clypeus convex, clypeus with poorly developed medial carina and several poorly developed lateral carinae; distance from an anterior border of eye to insertion of mandible about 1.5 times to maximum eye diameter, eye with microscopic, short bristles; vertex weakly concave; scape extending slightly past occipital border; none of the sutures breaking outline of mesosoma, as seen in profile; propodeal spines well developed, approximately 0.1 mm in length, nearly as long as distances between bases; node of petiole sharp in profile, subpeduncular process well developed, but blunt and rounded.

Erect, blunt hairs abundant on most surfaces (Fig. 129), most short (0.1 mm), few longer (0.13 mm), hairs on scape only slightly elevated from surface; decumbent hairs sparse, but long (0.05 mm), scattered on head, and a few on gaster.

Dorsum of head mostly glossy and shiny, with fine costulae, concentric whorls around the insertion of antenna, cheeks and malar area with smooth, but coarse rugae, mesosoma coarsely sculptured, dorsum mostly punctate, with a few fine rugae on the pronotum and

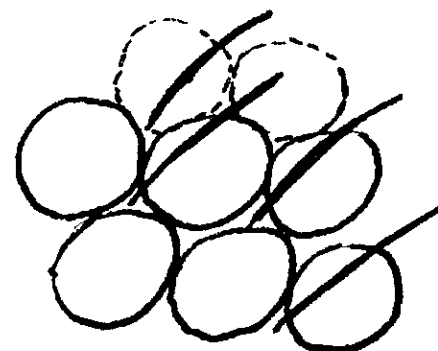
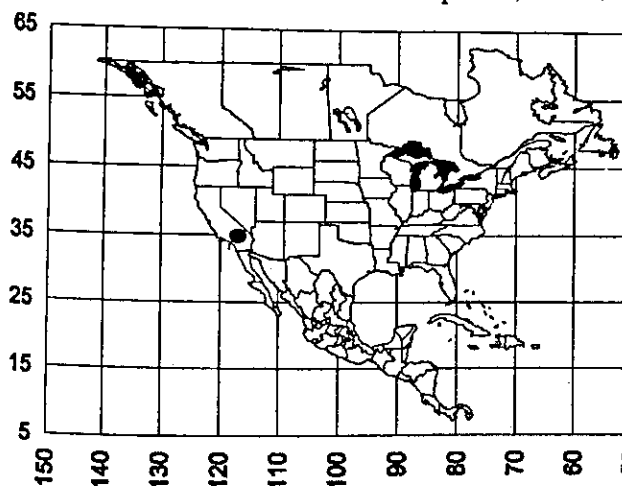


Fig. 131. Erect hairs on the eyes of a paratype female of *Leptothorax maryanae*. The circles are the ommatidia.



Map 26. Distribution of *Leptothorax maryanae*.

propodeum, side of mesosoma predominantly punctate, but with punctures forming lines that are nearly striae, punctures on mesopleural area large, foveolate, side of petiole and postpetiole mostly punctate, 2 fine rugae on side of petiole, dorsum of petiolar node and dorsum of postpetiole punctate, gaster smooth and glossy.

Concolorous medium brown.

Female measurements (mm): HL 0.83-0.91, HW 0.78-0.80, SL 0.74-0.76, EL 0.23-0.25, WL 1.50-1.52, PW 0.28-0.29, PL 0.16-0.19, PPW 0.35-0.38 PPL 0.23-0.25. Indices: CI 88-94, SI 83-90, PI 150-177, PPI 152-153.

Mandible with 6 teeth; clypeus with several carinae, which are mostly poorly developed, maximum diameter of eye approximately equal to distance between anterior border of eye and insertion of mandible, eye with several erect, short, bristly hairs; vertex straight; scape reaching occipital corner; propodeal spines well developed, forming blunt angles; petiole sharp in profile, subpeduncular tooth formed into blunt angle.

Erect hairs abundant on most surfaces, except scapes and tibiae, similar to those of worker. Eyes with abundant, erect, bristly hairs (Fig. 131)

Dorsum of head glossy, but with abundant, smooth rugae, concentric whorls present posterior to insertion of antenna, malar area and cheeks with coarse, but shiny rugae, surface of clypeus mostly smooth and polished; dorsum and sides of mesosoma mostly smooth and polished, side of the pronotum with rugae, side of propodeum and posterior face of propodeum with rugae, side of petiole punctate, with rugae, dorsum of petiolar node with rugae, dorsum of postpetiolar node mostly punctate, but with fine rugae, dorsum of gaster smooth and polished.

Dorsum of head punctate with punctures forming costulae, central region free of sculpture and smooth and shining, dorsum of mesosoma with fine rugulae, some forming foveolate punctures, especially on the dorsal face of propodeum, sides with heavy, dense punctures, that are nearly foveolate on mesopleuron, dorsum of petiole and postpetiole punctate, sides of both punctate, dorsum of gaster smooth and shining.

Concolorous brown.

Male measurement (mm): HL 0.46, HW 0.47, SL 0.20, EL 0.19 WL 0.98, PW 0.16, PL 0.13, PPW 0.22, PPL 0.18. Indices: CI 103, SI 45, PI 118, and PPI 120.

Mandible with 4 teeth; clypeus with transverse rugae; eyes large, maximum diameter about 3 times length from anterior border of eye to

base of mandible; scape short, extending about 2/3 distance to occipital corner; propodeal spines completely absent; node of petiole low in profile, blunt at apex, subpeduncular process nearly absent.

Erect hairs fine, absent from most surfaces, including scape and tibiae.

Head densely and evenly punctate, malar area with rugae; most of mesosoma smooth and polished, propodeum finely punctate, petiole and postpetiole mostly smooth and shining, gaster completely smooth and shining.

Concolorous medium brown.

Type series: Holotype worker (MCZC) and 40 paratype workers (AMNH, CASC, CWEM, FMNH, EMAU, LACM, MCSN, MCZC, MHNG, USNM), 6 paratype females (CASC, CWEM, LACM, MCZC, USNM), 3 paratype males (CWEM, LACM, MCZC), California, San Bernardino County, 4 mi NW Fawnskin, Hanna Flat, 20-vii-1978, W&E Mackay # 2329.

Material examined: Forty four workers, 9 females, 3 males, including California, San Bernardino Co., type series, same locality, 20-vii-1978, W&E Mackay # 2327 (1 worker CWEM), same locality, 30-viii-1978, W&E Mackay # 2614 (1 alate female CWEM), 2 mi NW Fawnskin, 3-viii-1978, 29-viii-1978, W&E Mackay # (2 workers CWEM), same locality, 9-viii-1978, W&E Mackay # 2468 (1 dealate female CWEM), same locality, 29-viii-1978, W&E Mackay # 2609 (1 small dealate female CWEM).

Etymology: Named in honor of my oldest daughter, Mary Ana, who has helped out in a number of projects involving ants. It is especially a pleasure to name this species after her, as her mother, Emma, and I collected the type series and all of the additional specimens while working together.

Discussion: This worker of this species has the characteristic of the *nitens* species complex, including multiple carinae on the clypeus, none of which are much more prominent than the others. Additionally, the apex of the petiole is sharp. It could be confused with others in the complex, but separated from *L. nitens*, *L. mariposa*, and *L. melinus* by the roughly sculptured head. The well-developed propodeal spines separate it from *L. adustus*, *L. chandleri*, and *L. coleenae*. It would be most likely confused with *L. rugosus* or *L. stollii*. As it is known only from California, and the other two are from northeastern México and Guatemala, they can be easily separated. Additionally, the side of the pronotum is punctate, whereas the latter 2 species have rugae on the sides of the pronotum. Thus this species can be confidently separated from the others. The erect hairs on the eyes may link this species to

*Formicoxenns.*

**Biology:** The type series was collected nesting in the soil in an open area in a pine forest nesting very closely to a *Pogonomyrmex montanus* Mackay nest, but were apparently not actually in the harvester ant nest. The alate female (# 2614) was collected in a *P. montanus* nest, at the 10cm depth. The small dealate female (# 2609) and a second, normal sized female (# 2468) were prey items of *P. montanus*, but may have been dead when encountered, as they are dirty and in poor shape. It is possible that this species is an inquiline of *P. montanus*, and if so, is not very common as it was only collected associated with 2 nests of a total of 80 nests that were completely excavated (Mackay, 1981)

***Leptothorax (Myrafant) melinus* new species**

Figs. 29, 33, &amp; 132; Map 27

Species complex: *nitens*

**Diagnosis:** This is a small species of honey colored *Leptothorax* with 12 segmented antennae, in which the head is nearly completely smooth and shining and the mesosoma is completely and densely punctate.

Distribution: USA: west central New Mexico (Map 27).

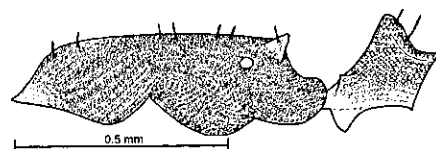


Fig. 132. Mesosoma of holotype of worker of *Leptothorax melinus*.

**Description**

Worker measurement (mm): HL 0.62-0.66, HW 0.52-0.56, SL 0.46-0.50, EL 0.13-0.14, WL 0.66-0.67, PW 0.13-0.14, PL 0.16-0.17, PPW 0.17-0.19, PPL 0.13-0.14. Indices: CI 84-85, SI 74-76, PI 81-82, PPI 131-136.

Mandibles with 5 teeth, only apical 3 well defined; anterior border of clypeus convex, clypeus with medial carina and 3 or 4 lateral carinae; vertex concave; mesosoma with none of the sutures breaking surface sculpture; propodeum with small, angle-like spines; petiole with large, blunt, subpetiolar process, anterior petiolar face nearly straight, posterior face convex, petiolar node with relatively sharp apex.

Hairs erect, but sparse, and found on most surfaces, except antennae and legs (coxae with erect hairs); decumbent pubescence on scapes and legs.

Sculpture consisting of fine striae on both sides of central strip of head without sculpture, mesosoma completely and densely punctate, petiole and postpetiole punctate, gaster smooth and shining.

Concolorous honey colored.

Female and male: Unknown.

**Type series:** Holotype worker (MCZC) and 12 paratype workers (CASC, CWEM, LACM, MCZC, MZSP, USNM), NEW MEXICO, Socorro Co., Beartrap Canyon, 42.7 K 133° from Datil, 33°50'13.0" 107°34'04.5", near intersection of roads 476 X 549, 6-viii-1994, 2286 meters, W. Mackay #16889.

**Material examined:** Thirteen workers.

**Etymology:** From Latin, *melinus* for honey colored.

**Discussion:** This species is most similar to *L. mariposa*, and differs in that the posterior surface of the petiole is primarily punctate, whereas the posterior surface of the *L. mariposa* has fine rugulae. It may be

shown to be a synonym of *L. mariposa*, when the variability of this new species is better known. It is also similar to *L. nitens*, but is easily recognized in being much lighter in color and having a mesosoma which is completely and densely punctate. *Leptothorax nitens* has a mesosoma of which the dorsum is primarily smooth and polished.

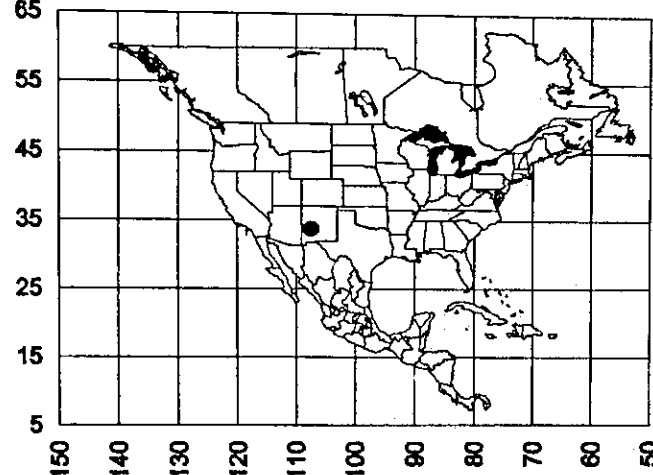
**Biology:** The nest was collected under a small, hard log in the soil on a south-facing slope. The site was in a recently burned ponderosa pine forest. The soil was a fine sand with scattered rocks. Brood were found in the nest (August). The ants are very timid and feign death. Only one nest of this species was found at the site. A *Myrmica* sp. female was under the same log.

***Leptothorax (Myrafant) mexicanus* new species**

Figs. 26, 30, 133, &amp; 134; Map 28

Species complex: *tricarinatus*

**Diagnosis:** This is a small, black species, with a smooth and strongly shining head, 12 segmented antenna, and very poorly developed propodeal spines (simple bumps). The dorsum of the pronotum and of



Map 27. Distribution of *Leptothorax melinus*.

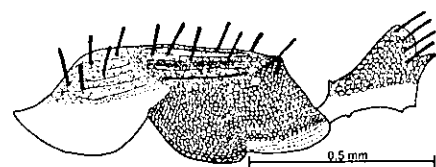


Fig. 133. Mesosoma and petiole of the holotype worker of *Leptothorax mexicanus*.

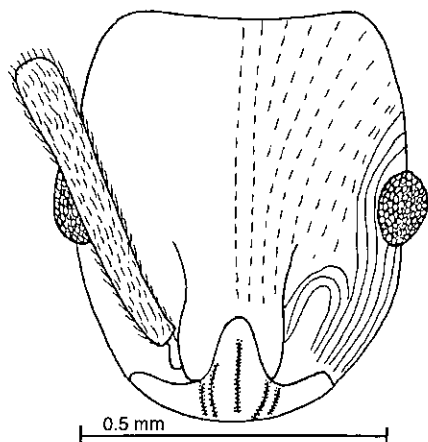


Fig. 134. Head of a paratype worker of *Leptothorax mexicanus*. The sculpture is shown only on the right side of the figure.

convex sides, vertex concave; eyes small, but exceeding sides of head; scape not reaching occipital corner; pronotum with promesonotal suture visible when seen from above, but none of sutures impressed with mesosoma in profile; propodeum with dorsal and posterior face equal in length, propodeal spines consisting of poorly developed angles; petiole with weakly concave anterior face, posterior face convex, petiolar node rounded in profile.

All surfaces with scattered, coarse, blunt hairs, hairs on legs and antennae (including scapes) much finer and semierect; decumbent pubescence nearly absent, except for a few coarse hairs on gaster.

Sculpture mostly smooth and shining, head with barely perceptible fine costulae on sides and dorsum of head, malar area with scattered punctures and fine rugae, mesopleuron and sides and faces of propodeum with scattered punctures, sides and part of tops of petiole and postpetiole with fine punctures, gaster shining.

Color: dark brown.

the mesonotum are mostly smooth and polished. The dorsal face of the propodeum is punctate with transverse striae. The petiolar node is blunt and rounded. The female is considerably different from the worker as it is more heavily sculptured, has well-developed propodeal spines, and the node of the petiole is more acute.

Distribution: MEXICO, Coahuila and San Luis Potosi (Map 28).

### Description

Worker measurement (mm): HL 0.60-0.65, HW 0.52-0.53, SL 0.49-0.52, EL 0.13-0.16, WL 0.70-0.72, PW 0.16-0.18, PL 0.20-0.22, PPW 0.19-0.22, PPL 0.16-0.17. Indices: CI 82-87, SI 80-82, PI 80-82, PPI 119-129.

Mandibles with 5-6 teeth, only 3 or 4 well defined; anterior border of clypeus moderately convex, clypeus mostly smooth and shining, with poorly developed carinae and a median carina; head with weakly convex

Female measurements (mm): HL 0.79-0.90, HW 0.77-0.82, SL 0.59-0.62, EL 0.22-0.23, WL 1.31-1.39, PW 0.22-0.25, PL 0.25-0.30, PPW 0.36-0.38, PPL 0.19-0.20. Indices: CI 91-97, SI 66-78, PI 73-100, PPI 189-190.

Mandible with 5 or 6 teeth, only 3 or 4 are well defined; clypeus shining, with medial carina and several lateral carinae; clypeal border slightly concave; eyes large, extending past sides of head; ocelli well developed; scape extending slightly past posterior corners of head; vertex straight; propodeal spines large and well developed; petiole with nearly straight anterior and posterior faces, petiolar node sharply angulate.

Erect hairs abundant on most surfaces, mostly with sharpened ends, legs and antennae with semierect hairs; decumbent pubescence consisting of long, scattered hairs on gaster.

Sculpture much more coarse than in worker, head with fine rugae, those between eye and mandible in form of semicircle, with center at point of insertion of antennae, much of mesosoma smooth and shining, sides of mesosoma strongly polished, propodeum with rugae which converge on tip of propodeal spines, sides of petiole and postpetiole shining, but with a few fine rugae and scattered punctures, gaster completely smooth and shining.

Concolorous dark brown.

Male measurement (mm): HL 0.44-0.49, HW 0.44-0.46, SL 0.10-0.11, EL 0.19-0.20, WL 0.88-0.90, PW 0.11-0.13, PL 0.14-0.18, PPW 0.17-0.19, PPL 0.14-0.15. Indices: CI 94-100, SI 22-23, PI 72-79, PPI 121-127.

Mandible with apical and subapical teeth defined, others present as small denticles; medial anterior border of clypeus nearly straight (slightly convex), clypeus with transverse rugae; eyes large; ocelli well developed; scape short; propodeal spines or angles absent; petiole with convex anterior face, posterior face convex, but broadly curving into posterior collar, petiolar node blunt and rounded.

Hairs erect and scattered on most surfaces, suberect on antennae and legs; decumbent pubescence sparse and only on gaster, consisting of long hairs.

Sculpture consisting of dense punctures on head, transverse rugae on anterior of clypeus, sides of mesosoma mostly smooth and shining, propodeum with scattered punctures on most surfaces, petiole and postpetiole mostly smooth and shining, gaster completely smooth and shining.

Color: dark concolorous brown.

Type series: Holotype worker (MCZC), 12 paratype workers, 12



paratype females and 21 paratype males (AMNH, CASC, CWEM, FMNH, LACM, MCZC, USNM, UNAM), taken from the same nest series, MEXICO, Coahuila, 16 KE San Antonio, 20 May 1988, W. Mackay #10270, nest collected under rock.

Material examined: Forty workers, 13 females and 21 males, including type series, and 53 KSE Arteaga, 24 Sept. 1987, W. Mackay #10035 (26 workers, 1 dealate female CWEM), and 10 KS San Luis Potosí, 21 May 1988, W. Mackay #10309 1 worker CWEM).

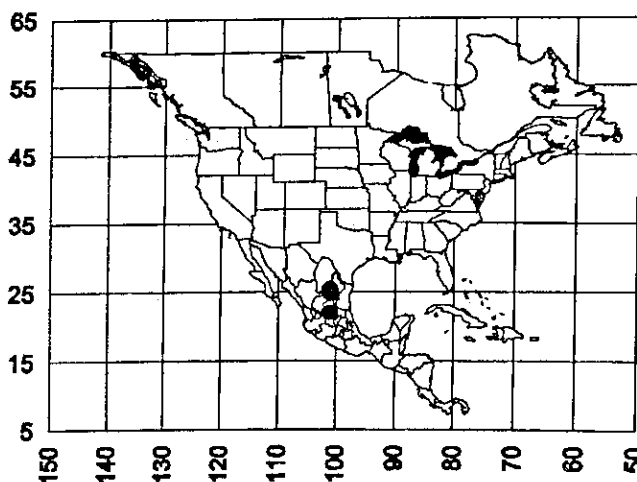
**Etymology:** Based on wide distribution in northeastern Mexico.

**Discussion:** The smooth, shining dorsum of the head with very fine striae differentiates this species from most of the others in the subgenus.

The glossy pronotum and mesonotum will further distinguish this species from

most others. Additionally the blunt petiolar node will separate it from other similar species, such as *L. mariposa*, *L. melinus*, *L. nitens*, *L. adustus* and *L. chandleri*. It would be most likely to be confused with *L. cokendolpheri* and *L. punctithorax*. The smooth dorsal surface of the postpetiole would separate it from both of these species, which have the dorsum of the postpetiole punctate. Note that the posterior surface of the postpetiole of *L. mexicanus* is punctate. *Leptothorax mexicanus* and *L. punctithorax* are both dark brown, but differ in the sculpture of the top of the postpetiole, and the dorsum of the mesonotum is nearly smooth and shining (with foveolate punctures in *L. punctithorax*). It could be confused with *L. brevispinosus*, from which it can be distinguished as the side of the pronotum is covered with striae (mostly smooth and glossy in *L. brevispinosus*). The sexuals of the two species are distinct (see key to the *tricarinatus* species complex).

**Biology:** The type series was collected nesting under a rock in a pine forest on a west-facing slope, covered with abundant rocks. The specimen collected near San Luis Potosí was together with *Pheidole*



Map 28. Distribution of *Leptothorax mexicanus*.

sp., nesting in the soil in a mesquite/*Yucca* sp. scrub, with fine textured soils. The second series from Coahuila was under a stone, which was part of a rock wall. The soil was very rocky clay, on a south-facing slope. The vegetation consisted of dry scrub of pinyon pine, *Yucca* sp., etc. It was an open area with lots of stones and an abundance of interesting ants (*Formica*, *Lasius*, *Camponotus*, *Monomorium*, *Liometopum*, *Pheidole*, *Myrmica*).

*Leptothorax (Myrafant) minutissimus* M. Smith

Figs. 75, 77, & 135; Map 29

*Leptothorax minutissimus* M. Smith, 1942:59, Plate 6, female, USA, District of Columbia, Eastern Branch; *Leptothorax (Myrafant) minutissimus*: D. Smith, 1979:1393

Species complex: *schaumii*

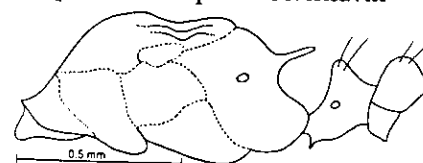
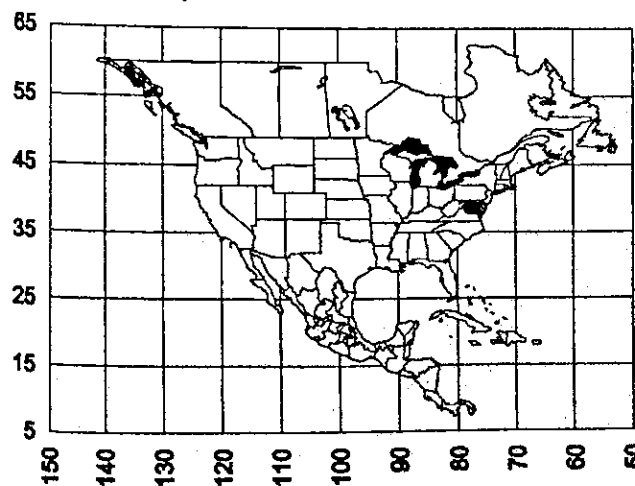


Fig. 135. Mesosoma, petiole and postpetiole of a paratype of female of *Leptothorax minutissimus*.

**Diagnosis:** This species is known only from the female. It differs from all other species in the subgenus in that the propodeal spines are blunt and are about the same diameter from the base to the tip (Fig. 135). It is a small, pale yellow species with an 11-segmented antenna.

**Distribution:** Known only from the type locality in Washington, D. C. (Map 29).

**Type series:** Holotype female and three paratype females, USNM, #56210 [seen].



Map 29. Distribution of *Leptothorax minutissimus*.

**Discussion:** This species is only known from the female. It is obviously a member of *Myrafant*, as the clypeus is convex with a medial carina, but which is not as well developed as in other species in the subgenus. It could be confused with females of *L. curvispinosus* or *L.*



*ambiguus*. It differs from both in its smaller size (Weber's length 0.7mm), versus the larger *L. curvispinosus* (WL 1.2mm) and *L. ambiguus* (WL 1.1mm) and in that the eyes are small and round (Fig. 77). Eyes of the females of the other two species are larger and oblong (Fig. 76). There is little likelihood that this species could be confused with any others in the subgenus. The petiole has a relatively sharp apex, but the worker (if it exists) would be expected to have a blunt petiole, as this pattern of the shape of the petiole between the worker and female is common throughout the subgenus.

**Biology:** The four specimens were collected at the edge of a marsh (Eastern Branch, 6-I-1921, H. S. Barber), apparently together with *Leptothorax curvispinosus*. It may be a workerless social parasite.

*Leptothorax (Myrafant) neomexicanus* Wheeler  
Figs. 46, 62, & 136; Map 30

*Leptothorax neomexicanus* Wheeler, 1903a:248-249, Plate 12, Fig. 18, worker, New Mexico, Manzanares; *Leptothorax tricarinatus neomexicanus*: Creighton, 1950:273; *Leptothorax (Myrafant) tricarinatus neomexicanus*: M. Smith, 1952:100-102

Species complex: *tricarinatus*

**Diagnosis:** Workers of this species have a 12-segmented antenna, the medial clypeal carina is well developed; the lateral carinae may be somewhat weakly developed. The anterior edge of the medial clypeal lobe is usually somewhat delineated by 1 or more transverse carinae. The head is covered with fine striolae, except for a central strip, which is partially smooth and shining. The node of the petiole is rounded or weakly truncate. The postpetiole is broad as seen from above (more than 1.5 times the width of the postpetiole), but much less

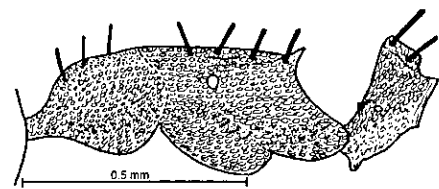
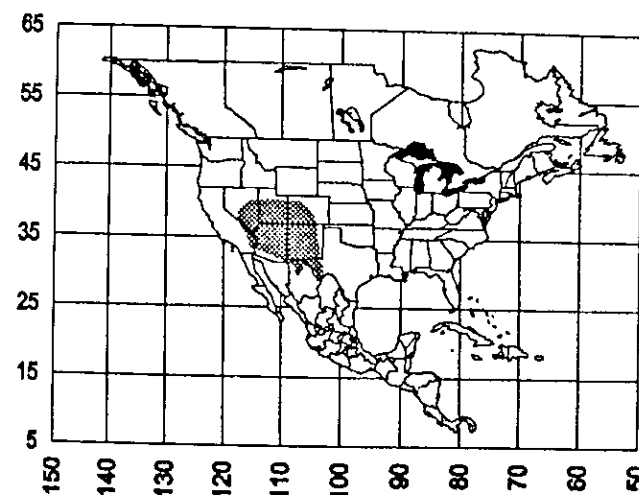


Fig. 136. Mesosoma and petiole of a worker of *Leptothorax neomexicanus* (NM).

than  $\frac{1}{2}$  the width of the gaster. The propodeal spines are short and dentiform. The side of the mesosoma, petiole and postpetiole are more or less uniformly covered with a granulate or punctulate sculpture, which is so delicate that much of these areas, especially the mesosoma, are shining under various lighting conditions. The top of the mesosoma is covered with fine rugulae, which nearly form foveolate punctures. The subpeduncular process is poorly developed, consisting of a tiny bump (Fig. 136).

**Distribution:** USA: Nevada, Utah, Colorado, Arizona, New Mexico,

Texas, Chihuahua (Mpio. Madera, 23 k N Madera) (Map 30).  
Type series: AMNH, MCZC [seen].



Map 30. Distribution of *Leptothorax neomexicanus*.

**Discussion:** Wheeler (1903a) stated, comparing this species with *L. carinatus*, and without actually seeing *L. tricarinatus*, that the typical *L. tricarinatus* has a more opaque head, the mesonotum is shiny and the first funicular joint is larger than the 3 succeeding joints and the remaining joints of the funicu-

lus are shorter than broad. He also stated that the postpetiole is also apparently considerably larger than in *L. neo-mexicanus*. Smith (1952) redescribed the species, based on a cotype worker (and several non-type workers), although Gregg (1963) disagreed with Smith's interpretation. Gregg (1963) concluded that *L. tricarinatus* has an opaque to sub-opaque head (owing to heavy sculpture) whereas *L. neomexicanus* has a head which is largely smooth and shining, especially in the median and posterior regions (because of weak sculpture). The dorsum of the mesosoma of *L. tricarinatus* is also opaque and weakly shining, whereas in *L. neomexicanus* it is rather strongly shining. *Leptothorax neomexicanus* has longer propodeal spines, they are more stout, triangular and toothlike in *L. tricarinatus*. Although *L. neomexicanus* is similar to *L. tricarinatus*, as was pointed out by Wheeler (1903a), they both appear to be valid species, as they are sympatric throughout much of their ranges (compare Maps 30 & 54), with no apparent evidence of hybridization.

The lateral carinae of the clypeus of both *L. neomexicanus* and *L. nevadensis* are very similar, in that they curve medially at the anterior part of the medial lobe of the clypeus, and connect. They can be easily separated as the head of *L. neomexicanus* is at least partly smooth and shining, whereas the dorsum of the head of *L. nevadensis* is nearly completely sculptured. It can be separated from *L. carinatus* in being

much darker in color (*L. carinatus* is pale brown or brown-orange). The propodeal spines are well developed, but short (1/3 to 1/2 length of distance between bases), whereas the propodeal armature of *L. carinatus* consists of poorly developed angles.

**Biology:** Nests in open, dry grassy areas, in ponderosa pine forests (Cole, 1954; Mackay et al., 1987), or even in desert areas (Smith, 1952; Mackay, pers. obs.), under rocks or in soil (Wheeler, 1906; Cole, 1954; Van Pelt, 1983; Wheeler and Wheeler, 1986; Mackay, pers. obs.). Nests are monogynous (Frumhoff and Ward, 1992) and are marked by a hole in the ground and occasionally with a light, asymmetrical scattering of fine soil (Cole, 1954). Colonies are "rather small" (Cole, 1954).

*Leptothorax (Myrafant) nevadensis* Wheeler  
Figs. 49, 50, 137, & 138; Map 31

*Leptothorax nevadensis* Wheeler, 1903a:252-254, Plate 12, Fig. 20 worker, female, male, Texas, Travis Co., Austin and McNeil; Wheeler and Wheeler, 1973b:71, larva; *Leptothorax (Myrafant) nevadensis*: D. Smith, 1979:1393

*Leptothorax eldoradensis* Wheeler, 1915: 414-415, worker **New Synonymy**

*Leptothorax melanderi* Wheeler, 1909:81, **New Synonymy**

*Leptothorax nevadensis rudis* Wheeler, 1917:508-509, **New Synonymy** [note: this is an unresolved junior primary homonym, see Bolton, 1995]

Species complex: *tricarinatus*

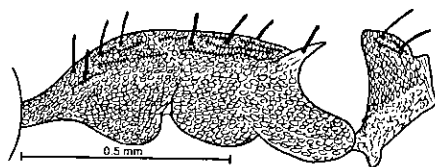


Fig. 137. Mesosoma and petiole of a worker of *Leptothorax nevadensis* (WY).

Diagnosis: This species is fairly common throughout the western United States. The clypeus has a moderately well defined medial carina and 2 well-defined lateral carina, which curve and cross the anterior part of the medial lobe of the clypeus. It has a completely and strongly striated head with punctures between the striae, and with rarely a slender median strip without sculpture. The sides of the pronotum are distinctly and coarsely rugose, with the background weakly punctate, but shining. The dorsum of the mesonotum is striate to finely rugose, but mixed with background punctures and not as shiny as the background of the sides of the pronotum. The petiole and postpetiole are primarily punctate, but fine rugulae can be seen on the dorsum of the petiole. There is usually a single ruga on the side of the petiole. Some larger

specimens have several poorly defined rugae on the side of the petiole (making it look "wrinkled"), and occasionally on the anterior face. These larger specimens usually have longer propodeal spines, sometimes as long as the distance between the bases. These specimens were referred to as *L. nevadensis* subsp. *melanderi* in the

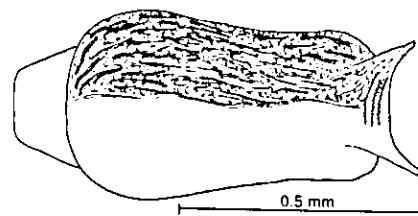


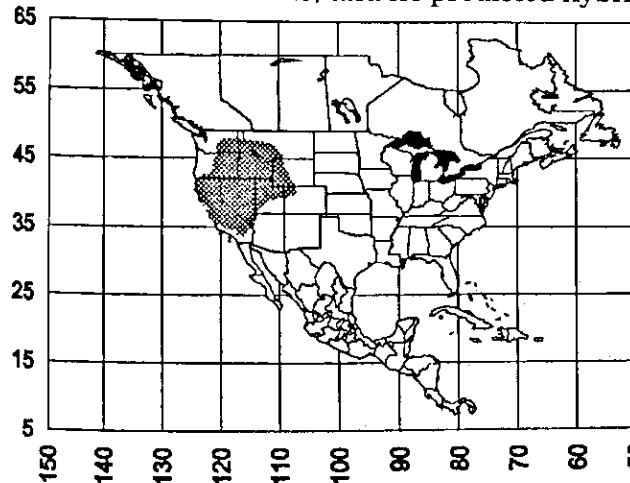
Fig. 138. Top of the mesosoma of a worker of *L. nevadensis* (CA). The sculpture of only the right side is shown.

past.

**Distribution:** Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, California, Colorado (Map 31).

**Type series:** AMNH, MCZC [seen].

**Discussion:** Several forms were described by Wheeler (*L. eldoradensis*, *L. melanderi*, *L. nevadensis rudis*) and recognized by Creighton (1950) as subspecies of *L. nevadensis*, based on differences in the sculpturing of the mesosoma and petiole and shape of the head. Creighton (1950) noted that hybrids were found between these, except for *L. nevadensis* and *L. nevadensis rudis*, and he predicted hybrids between these two



Map 31. Distribution of *Leptothorax nevadensis*.

would be found in the Lake Tahoe area where the ranges overlap. In addition, *rudis* is an unresolved junior primary homonym of *rudis* Mayr (1868). As a consequence I can see no justification in recognizing different taxa based on these characters, and propose all three as synonyms of *L. nevadensis*.

This species can be distinguished from the closely related *L. gallae* as the petiole is not pinched and the node of the petiole is rounded as seen from behind and the propodeal spines are shorter (see *gallae* discussion for more details). In addition, the top of the petiole is rugose as in *L. gallae*, but the anterior edge is curved, not constricted as in *L. gallae*. The head has

fine striae, which separate it from those species with punctate heads, including *L. punctaticeps*, *L. terrigena* and *L. punctatissimus*. The rugae on the pronotum are well defined, and distinguished from the background, which is mostly smooth and shining, not punctate as in *L. gallae*.

*Leptothorax nevadensis* and *L. neomexicanus* have similar lateral clypeal carinae, which usually curve and connect on the anterior part of the medial lobe of the clypeus. They are thus apparently closely related. They can be easily separated as the dorsum of the head of *L. nevadensis* is nearly completely sculptured, whereas part of the head of *L. neomexicanus* is smooth and shining. This species is also closely related to *L. lindae*. Workers can be separated as the dorsum of the pronotum is rugose (easiest to see from the side), whereas the dorsum of the pronotum of *L. lindae* is densely punctate, without rugae. The intrarugal spaces on the head of the female of *L. nevadensis* is moderately shining, with fine sculpture, intrarugal spaces of the female of *L. lindae* are dull and punctate.

Note Wheeler (1903a) stated that *L. nevadensis* was closely related to *L. andrei*, without actually seeing specimens of *L. andrei*. This is incorrect. The 3 clypeal carinae of *L. nevadensis* are well developed; *L. andrei* has a number of poorly developed carinae on the clypeus. Additional, more superficial characters which would separate these 2 species would include the punctae or striae on the dorsum of the head of *L. nevadensis*, which contrast with the rugulae on the head of *L. andrei*. The propodeal spines of *L. nevadensis* are well formed and elongate; the armature of *L. andrei* consists of simple angles.

**Biology:** This species nests in soil (Wheeler, 1903a; Wheeler and Wheeler, 1973a, 1986) in moist areas (Cole, 1934), usually under stones (Wheeler, 1903a; Cole, 1942; Wheeler and Wheeler, 1986), or in rotten wood. Wheeler and Wheeler (1986) report this species from several communities, including cool desert, pinyon-juniper forests (Cole, 1966), coniferous forest (Wheeler and Wheeler, 1973a) and alpine areas. D. S. Chandler (pers. comm.) collected this species in litter in a number of plant communities, including tanbark oak, oak leaf litter near a spring, maple and oak litter, Douglas fir, and laurel. It may be involved in plesiobiosis, as Wheeler (1903a) reported it nesting at the entrance of a *Trachymyrmex turrifex* nest and at the edge of a flourishing colony of *Pheidole tepicana* (= *P. instabilis*). Insecticide treatments for the spruce budworm in eastern Oregon had little impact on this species (Murphy and Croft, 1990).

*Leptothorax (Myrafant) nitens* Emery

Figs. 21, 34, 139 & 140; Map 32

*Leptothorax nitens* Emery, 1895:322-323, Plate 8, Fig. 16, worker, Utah, American Fork Canyon, near Salt Lake; Wheeler, 1903a:244-245, Plate 12, Fig. 15, worker; Cole, 1958a:536 female, male; Wheeler and Wheeler, 1973:71 larva

*L. nitens occidentalis* Wheeler, 1903a:245 (Creighton, 1950:265).

*L. nitens heathi* Wheeler, 1903a:245 (Cole, 1958a:536).

Species complex: *nitens*

**Diagnosis:** This species has a 12-segmented antenna. The tops of the mesosoma and head are nearly always smooth, glossy and shining, or finely punctate. The sculpture that is present consists of fine,

longitudinal costulae. The propodeal armature consists of small angles (Fig. 139). The node of the petiole is sharp. Color ranges from concolorous yellow to medium tan.

**Distribution:** Washington, Oregon, California, Idaho, Wyoming, Nevada, Utah, Arizona, New Mexico, Texas (Map 32). Some of the records may be based on misidentifications.

**Type series:** Although Creighton (1950) states there are no types in this country, the holotype (consisting of only a mesosoma) is in the USNM (labeled AmFkCan, 23-6 Ut; USNM Type # 54075) [seen]. A specimen labeled as a type in Emery's collection (MCSN) is incorrectly labeled [seen]. The locality is: USA, San Francisco. The specimen is

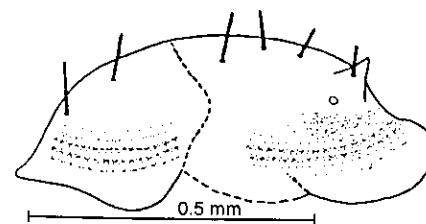


Fig. 139. Mesosoma of the holotype worker of *Leptothorax nitens*.

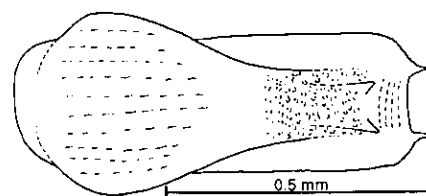
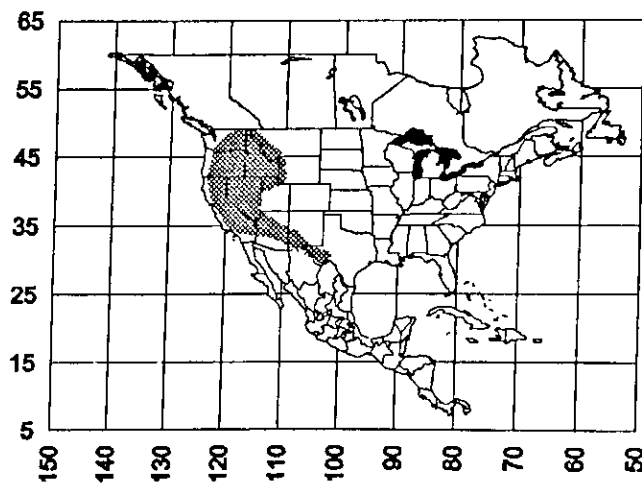


Fig. 140. Dorsum of the mesosoma of the holotype worker of *Leptothorax nitens*.

poorly mounted and the head is covered with glue, so it is impossible to identify it.

**Discussion:** The mesosoma of the holotype of this species is nearly completely smooth and shining. Wheeler (1903a) stated that smooth workers are found in nests together with workers that are more roughly sculptured. Cole (1958) also found considerable variability in this species in terms of color, scape length, surface sculpture and length of propodeal spines. Thus this species is difficult to characterize. The

Map 32. Distribution of *Leptothorax nitens*.

propodeal spines are nearly always relatively small, which would distinguish it from other species with smooth sculpture, such as *L. schmittii*. This species appears to be closely related to several others, including *L. mariposa*, *L. melinus* and *L. adustus*. Based on the holotype, it can be separated from these other species by the nearly smooth

and polished dorsum of the mesosoma, as all of the other species have mesosomae that are densely sculptured. I am not convinced that we really know the true identity of *L. nitens* and it is possible that some of the records from the literature are based on misidentifications.

**Biology:** This species nests under stones (Wheeler, 1906; Cole, 1942; Moody and Francke, 1982; Wheeler and Wheeler, 1986), or logs (Wheeler and Wheeler, 1973a). One nest was found in a termite nest (Wheeler, 1903a). Nests contain 69-276 workers (Cole, 1958a). Nests are monogynous (Frumhoff and Ward, 1992). This species occurs in ponderosa pine and, pinyon-juniper forests (Gregg, 1944; Wheeler and Wheeler, 1986; Mackay et al., 1987). Cole (1958a) reports sexuals in the nest from June to August. It is one of the last ants to colonize an area (Mackay, 1993b).

*Leptothorax (Myrafant) obliquicanthus* Cole  
Figs. 16 & 141; Map 33

*Leptothorax (Myrafant) obliquicanthus* Cole, 1953:28-30 worker, USA, NM, 10 mi S Santa Fe, 6,500'; *Leptothorax (Leptothorax) obliquicanthus*: Gregg, 1953:2-3

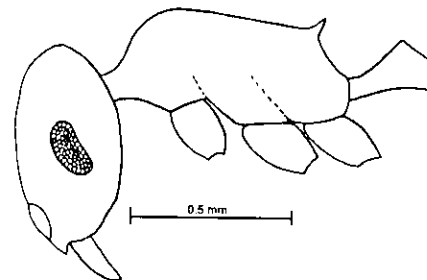
Species complex: *tricarinatus*

**Diagnosis:** The worker of this species is easily recognized due to the large, kidney shaped eye (Fig. 141). In addition, nearly all surfaces are densely and coarsely punctate. The entire first tergum is punctate, but the punctures are fine and difficult to see unless the light is placed to reflect from the surface. The antenna has 12 segments.

**Distribution:** USA: Nevada, Colorado, New Mexico, Texas (Brewster Co., Lubbock Co. Potter Co., Randall Co.) (Map 33).

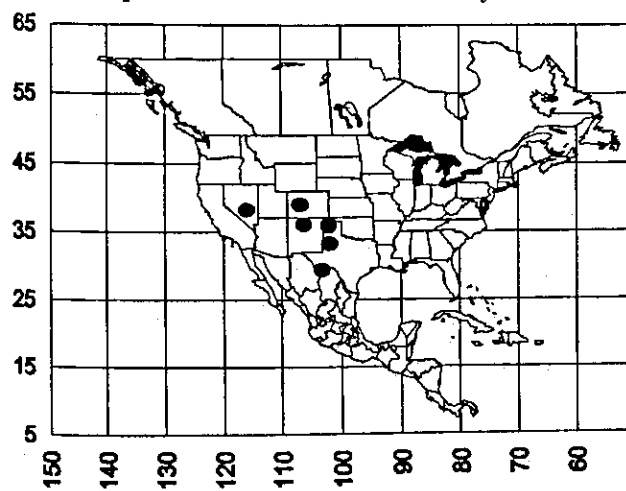
**Type series:** Holotype in Cole collection, paratypes in Cole collection and USNM, MCZC, AMNH [seen].

**Discussion:** This species is easily recognized and separated from all other known North America *Leptothorax* by the large, oblong eyes. It could only be confused with *L. liebi*, which is pale yellow, with black eyes and has a completely smooth first tergum of the gaster. The sculpturing of the gaster would serve to further confirm the identity of this species.

Fig. 141. Head, mesosoma and petiole of a paratype worker of *Leptothorax obliquicanthus*.

This species was independently discovered by Gregg (1953), but Cole described it first.

**Biology:** Found in dry grassy areas (Cole, 1953; 1954; Gregg, 1953; Mackay, pers. obs.) to semi-moist meadows (Gregg, 1953) and to sagebrush or highly disturbed areas (Mackay et al., 1987) and high, dry short-grass plains above a river valley (Gregg, 1953). One nest was in an exposed area surmounted by a 10-cm crater (Wheeler and

Map 33. Distribution of *Leptothorax obliquicanthus*.

Wheeler, 1986). One nest in New Mexico was in the soil together with *Pheidole* sp. Nests are monogynous (Frumhoff and Ward, 1992). The large eyes may be connected with the diurnal habitats of the ants in open areas, where the workers could scan the surrounding area before exiting the nest (Gregg, 1953). Cole (1954) was unable to locate this species at

the type locality in 1952 (year after initial collection).

*Leptothorax (Myrafant) obturator* Wheeler

Figs. 43 &amp; 142; Map 34

*Leptothorax obturator* Wheeler, 1903a:249-252, Plate 12, Fig. 19, worker, female, male, Texas, Austin; Wheeler, 1903b:662, gynandromorph; Wheeler and Wheeler, 1955:24 larva; *Leptothorax (Myrafant) obturator*: D. Smith, 1979:1394

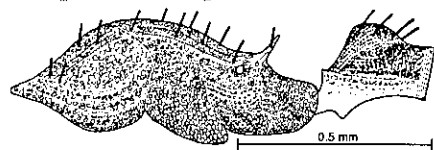
Species complex: *obturator*

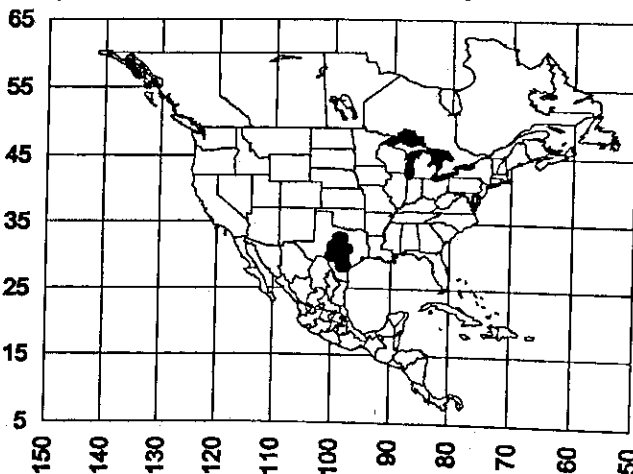
Fig. 142. Mesosoma and petiole of a paratype worker of *Leptothorax obturator*.

genus. The propodeum is lower than the mesonotum and appears depressed (Fig. 142). The antenna has 12 segments.

Distribution: Central Texas (Bexar Co., Erath Co., Kerr Co., Real Co., Travis Co., Uvalde Co.) (Map 34).

Type series: AMNH, MCZC [seen].

Diagnosis: The peculiar propodeal spines united by a carina easily distinguish this species from all other known North American *Leptothorax*. The petiolar node is also rounded and poorly defined (Fig. 142), which will also help separate it from other species in the



Map 34. Distribution of *Leptothorax obturator*.

North America has this combination of characters.

Biology: Colonies are found in live oak galls (*Quercus virginiana* Mill.) or hollow twigs of the wafer ash and ironwood (Wheeler, 1903a; Moody and Francke, 1982; Longino and Wheeler, 1987; Wheeler and

Discussion: This species is easily recognized and would not be confused with any of the other known species in the subgenus, based on two characters: the propodeal spines are closely placed at the base and connected by a carina (Fig. 43) and the propodeum is much lower than the remainder of the mesosoma (Fig. 142). No other species in

Longino, 1988). Nests are monogynous (Frumhoff and Ward, 1992). The female enters the gall, plugs the entrance and begins egg laying. Later the workers open gall, but the entrance hole is so small, the queen remains trapped in the gall. Sexuials appear in nests in late May, but it is not clear how the virgin females exit through the tiny exit hole. Nests contain up to 36 or 40 workers. They are extremely hostile to workers from other nests.

*Leptothorax (Myrafant) ocellatus* new species

Figs. 19, 143, 144, &amp; 145; Map 35

Species complex: *andersoni*

Diagnosis: This species can be easily recognized by the small eyes (Fig. 145) and the 12-segmented antenna. The dorsum of the mesosoma is arched and convex (Fig. 143), the propodeal angles are poorly developed. The node of the petiole is thickened and blunt, the subpetiolar process is well developed and blunt (Fig. 143). The central portion of the head is smooth

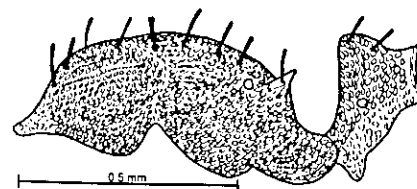


Fig. 143. Mesosoma and petiole of the holotype worker of *L. ocellatus*, as seen from the side.

and shining, the sides of the dorsal surface of the head has fine striae, the sides of the mesosoma are finely punctate, as is the dorsum. The specimen is a relatively small, pale brown species.

Distribution: Known only from the type locality in northern California (Map 35).

**Description**

Worker measurement (mm): HL 0.59, HW 0.44, SL 0.41, EL 0.10, WL 0.64, PW 0.12, PL 0.16, PPW 0.19, PPL 0.17. Indices CI 76, SI 69, PI 77, PPI 114.

Mandibles with 5 teeth; anterior border of clypeus slightly concave, medial clypeal carina well developed, as are 2 lateral carinae; head elongate, with sides nearly parallel, vertex straight; eyes small, maximum length about half length of distance between base of mandible and anterior edge of eye; scape short, extending slightly more than half length to occipital corner; mesosoma convex in profile; propodeal spines moderately developed; node of petiole thick

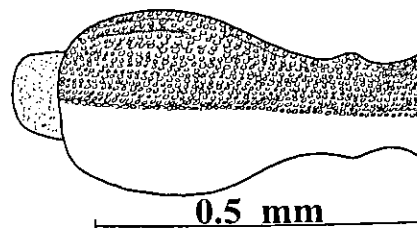


Fig. 144. Mesosoma of the holotype worker of *Leptothorax ocellatus* as seen from above. The sculpture is shown only on the right side.

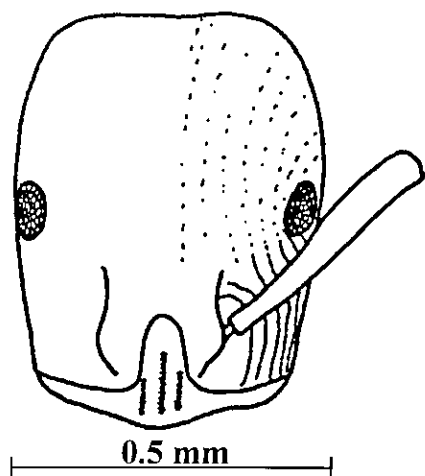
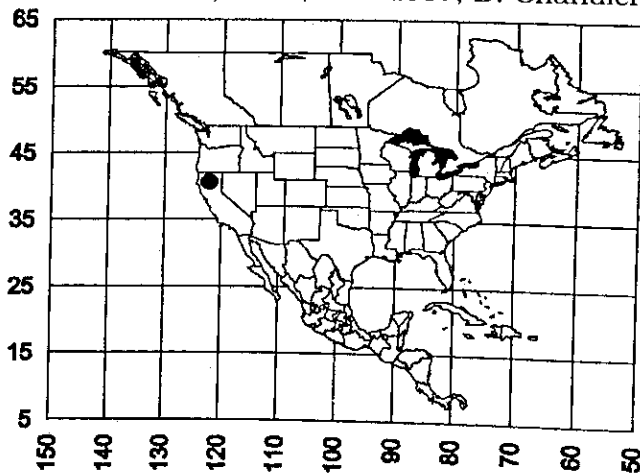


Fig. 145. Head of the holotype worker of *Leptothorax ocellatus*.

Concolorous pale brown.

Female and male: Unknown.

Type series: Holotype worker (MCZC), USA, California, Tehama Co., 5 mi W Mineral, 4250', 6-xii-1987, D. Chandler.



Map 35. Distribution of *Leptothorax ocellatus*.

The partially smooth and shining dorsal surface of the head would separate it from *L. liebi*, which has the head mostly punctate. The larger eye of *L. liebi* would also separate them. It can be easily distinguished

in profile, apex of node rounded, subpetiolar process well developed (Fig. 143).

Erect hairs scattered on dorsum of head, dorsum of mesosoma, petiole, postpetiole, and gaster, those on mesosoma blunt-tipped or even spatulate (Fig. 143); few decumbent hairs on gaster.

Sculpture of head consisting of fine striae, with the central strip smooth and shining, area posterior to insertion of antenna with concentric rugae, malar area with longitudinal rugae, mesosoma, petiole and postpetiole mostly finely punctate, dorsum of gaster smooth and glossy.

Material examined: One worker.

Etymology: Term based on Latin, meaning "having little eyes", which refers to the small eyes of this species.

Discussion: The small eye would distinguish *L. ocellatus* from nearly all of the other species in the subgenus. The pale color would separate it from *L. bicolor*, *L. lindae*, and *L. gallae*.

from *L. andersoni*, *L. punctatissimus*, and *L. rugosus*, which all have the dorsum of the head roughly sculptured. It can be separated from *L. cokendolphi* and *L. carinatus*, in which the dorsum of the head is at least partially smooth and shining, by the lack of a well-defined medial carina on the clypeus, which is well defined in both of the latter species.

Biology: Holotype collected in forest leaf litter.

### *Leptothorax (Myrafant) oxynodis* new species

Figs. 63 & 146; Map 36

Species complex: *nitens*

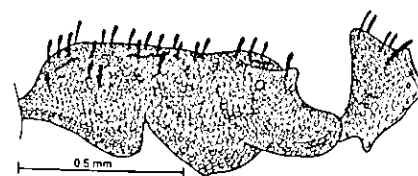


Fig. 146. Mesosoma and petiole of the holotype worker of *Leptothorax oxynodis*.

Diagnosis: This species is distinct and easily recognized as it has an 11-segmented antenna, and the node of the petiole is sharply acute (Fig. 146). Additionally, the head is finely rugose, the mesosoma is densely punctate and the propodeal spines are tiny, blunt angles. The area on the dorsum of the mesosoma

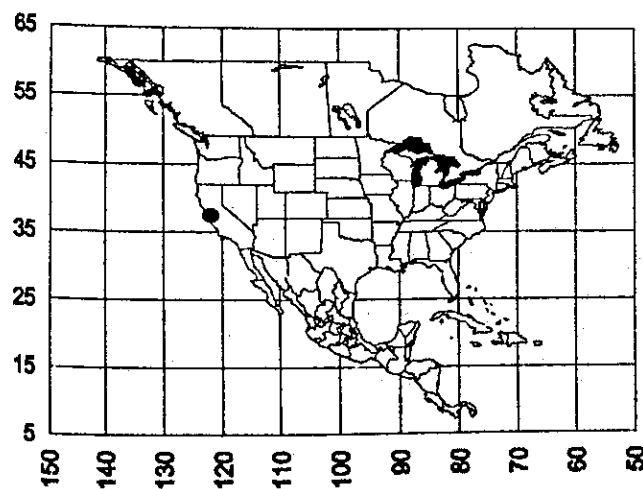
at the mesopropodeal suture is depressed below the remainder of the mesosoma. The mesosoma has abundant blunt-tipped hairs (nearly spatulate), those on petiole are finer (Fig. 146).

Distribution: Known only from the type locality in Santa Cruz Co., California (Map 36).

### Description

Worker measurement (mm): HL 0.76, HW 0.64, SL 0.52, EL 0.17, WL 0.83, PW 0.17, PL 0.15, PPW 0.24, PPL 0.20. Indices: CI 84, SI 68, PI 113, PPI 120.

Anterior border of clypeus straight, clypeus with well developed medial carina and several lateral carinae; ver-



Map 36. Distribution of *Leptothorax oxynodis*.

tex concave; mesosoma with none of the sutures breaking surface, although the mesosoma is slightly depressed at the mesopropodeal suture, which is obvious on dorsum of mesosoma; propodeal angles small (Fig. 146); petiole with very sharp apex (Fig. 146) as seen in profile.

Erect hairs scattered over surface, maximum length 0.6mm, blunt or weakly spatulate, absent from antennae and legs, which have decumbent hairs.

Sculpture generally rough, head with fine rugae, surface shining between rugae, mesosoma densely punctate, punctures on side in rows forming weak striae, side of petiole punctate, forming striae which pass vertically to top of node, side of postpetiole punctate, posterior face of petiolar node with rugae which pass from the base to node, lateral edges of top of postpetiole with fine rugae, top mostly punctate, gaster smooth and shining.

Color: medium brown, gaster infuscated, eye black.

Female and male: Unknown.

Type series: Holotype worker (CASC), California, Santa Cruz Co., near Big Basin, ix-1957, D. Giuliani.

Material examined: One worker.

Etymology: From Greek *oxys*, sharp, acute, referring to the acute apex of the petiolar node.

Discussion: *Leptothorax oxynodis* keys to near *L. schaumii* in the main key, but is apparently not closely related to *L. schaumii* nor any other species with an 11 segmented antenna. It can be easily separated from *L. schaumii* and most of the other species in the subgenus *Myrafant*, as the petiolar node is so sharply acute (the petiolar node of *L. schaumii* is low and rounded, see Fig. 163). Thus it is easily distinguished from all other species with an 11-segmented antenna. It could be confused with *L. mariposa*, based on the shape of the petiole, but can be easily separated on the basis of the 11-segmented antenna.

Biology: Unknown, except label states "Emerging fr.: Knob-cone pine IV-1958". It was probably extracted from pine needle litter.

*Leptothorax (Myrafant) peninsularis* Wheeler  
Figs. 36, 44, 147, & 148; Map 37

*Leptothorax (Goniothorax) peninsularis* Wheeler, 1934:134-135 female, Mexico, Baja California Sur, Magdalena Bay.

Species complex: *hispidus*

Diagnosis: This species is known only from the female, which is a small, light brown ant. The head is entirely sculptured with coarse rugae, and is punctate between the rugae. The antennae have 12

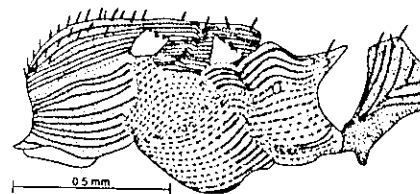


Fig. 147. Mesosoma and petiole of a cotype female of *Leptothorax peninsularis*.

segments and the scapes extend slightly past the occipital corners. The sculpture of the mesosoma is very similar to that of the head, the propodeal spines are large, well developed with thick bases. The petiole has a long peduncle with a square node (Fig. 147). The

postpetiole and gaster are missing, but Wheeler (1914) states that the gaster is smooth and shining. The rough sculpture and the shape of the petiole (long peduncle, quadrate node) would probably separate this species from all others in the New World. It would also be easily to recognize as it is presently one of the only 2 species known from the Baja peninsula (The other is *L. andrei*, undoubtedly others occur there).

Distribution: Known only from type locality, Magdalena Bay, Baja California Sur (Map 37).

Type series: Two cotype females (CASC, MCZC) [seen].

Discussion: This species is known only from the female and is difficult to place in any subgenus as it is somewhat intermediate between the subgenus *Myrafant* and what was previously considered the subgenus *Macromischa* (synonymized by Snelling, 1986). It is not closely related to *Nesomyrmex* (= *Goniothorax*) as Wheeler (1934) speculated, as there are no spines on the petiole. Characters in common with *Macromischa* would include the structure of the clypeus, which is somewhat bulging dorsoventrally and is covered with striae and the petiole has a long peduncle. On the other hand, the peduncle is not as elongate as in most *Macromischa* and is not that different from some of the *Myrafant*, such as *L. silvestrii* and *L. punctaticeps*, in which the clypei are similar. It is also possible that it is a member of the subgenus *Dichothorax*. It can be easily separated from *L. pergandei* as it is much more roughly sculptured. The entire head is rugose with punctures

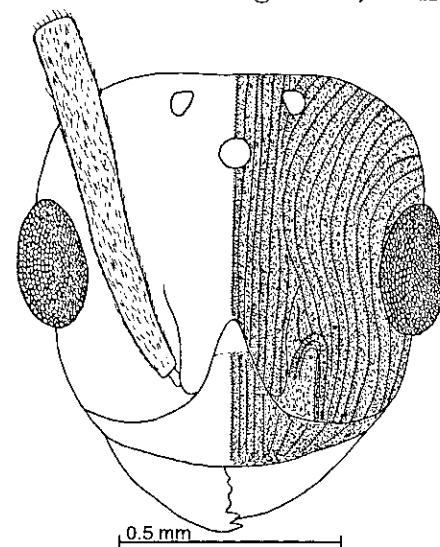
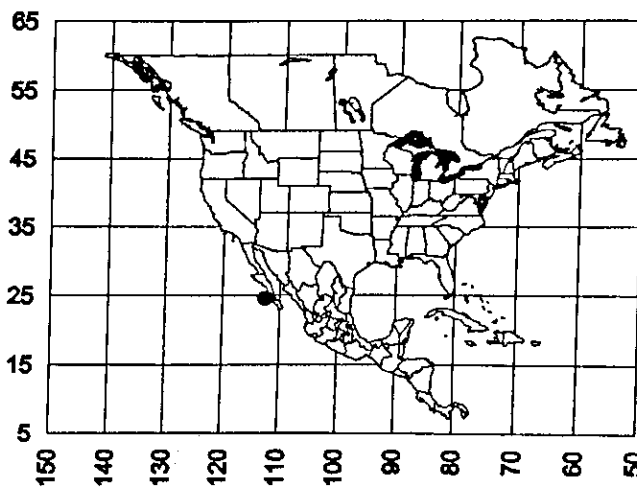


Fig. 148. Head of a cotype female of *Leptothorax peninsularis*. The sculpture on only the right side of the figure is shown.



Map 37. Distribution of *Leptothorax peninsularis*.

between the rugae. The head of the female of *L. pergandei* is predominantly smooth and glossy. The sculpture of the mesosoma of *L. peninsularis* is rugose, similar to the head. Nearly the entire mesosoma of the female of *L. pergandei* is smooth and glossy. This species could also be confused with *L. rugithorax*, but can be separated by the pedunculate petiole and the well-developed propodeal spines. We will be able to further clarify the proper placement of this species once the workers are known, but in the meantime I propose that we consider this species a member of *Myrafant* and of the *hispidus* species complex.

Biology: Unknown.

### *Leptothorax (Myrafant) punctaticeps* new species

Figs. 38 & 149; Map 38

Species complex: *hispidus*

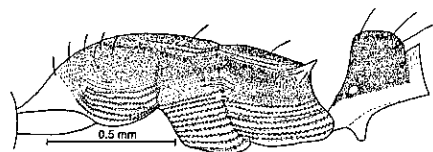
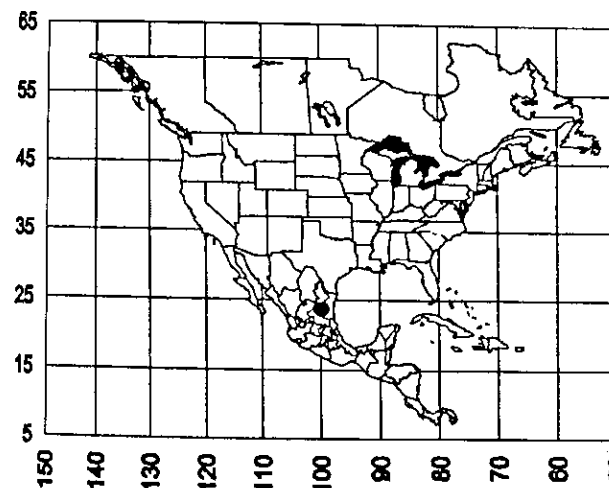


Fig. 149. Mesosoma and petiole of the holotype worker of *Leptothorax punctaticeps*.

Diagnosis: This species is distinct from all others in the subgenus, as it is a relatively large, light brown colored species, with a large dark splotch or band on the dorsum of the first tergum. The sculpture consists mostly of dense punctures, especially on the dorsum of

the head. The medial clypeal carina is poorly developed, several lateral carinae are prominent. The antenna has 12 segments. The petiole is thick as seen in profile with a blunt, rounded node. The dorsum of the first gastral tergite is smooth and polished.

Distribution: Known only from type locality in the state of Nuevo León, México (Map 38).

Map 38. Distribution of *Leptothorax punctaticeps*.

### Description

Worker measurement (mm): HL 0.79-0.82, HW 0.70-0.79, SL 0.67-0.68, EL 0.18-0.21, WL 1.03-1.07, PW 0.19-0.23, PL 0.31-0.36, PW 0.30-0.31, PPL 0.17-0.23. Indices: CI 89-96, SI 83-85, PI 53-74, PPI 130-182.

Mandibles with 5 teeth, most apical 3 well defined, basal most pair poorly developed; anterior border of clypeus

concave, nearly forming a notch, clypeus with numerous longitudinal carinae, medial carina not more developed than others; sides of head broadly convex; vertex nearly straight; eyes large, extending past sides of head; scape extending slightly past posterior corner of head; sutures of mesosoma not obvious when seen in profile; propodeal spines small, but well formed; petiole with relatively long peduncle, with large subpetiolar process (Fig. 149); anterior petiolar face concave, posterior face convex, petiolar node broadly rounded.

Erect hairs with blunt tips abundant on nearly all surfaces, except legs and scapes, where they are nearly decumbent; those on funiculus somewhat more erect; decumbent pubescence only present as long hairs on gaster.

Sculpture consisting mostly of coarse, dense punctures, especially obvious on dorsum of head, mesosoma, petiole and postpetiole, rugae present on mandibles, sides of head and side of pronotum; gaster entirely smooth and polished.

Concolorous light reddish-brown, but with a broad, dark band on first tergum.

Female and male: Unknown.

Type series: Holotype worker (MCZC) and 26 paratype workers (CWEM, LACM, MHNG, MZSP, MCZC, USNM, UNAM), MEXICO, Nuevo León: 61 KNE Dr. Arroyo, 10 June 1988, 2540 meters, W. Mackay #11004.

Material examined: Twenty-seven workers from type series.



**Etymology:** Name based on the densely punctate head.

**Discussion:** This species could be confused with *L. punctatissimus* or with *L. terrigena*. See discussion of *L. punctatissimus* for details useful for distinguishing the three species. The densely punctate head (compared with a rugose head in the other species) will easily separate it from the others in the *hispidus* complex.

**Biology:** The nest of the type series was found in a log in a pine forest, with few other types of trees. The soil was a dark loam.

***Leptothorax (Myrafant) punctatissimus* new species**

Figs. 40 & 150; Map 39

Species complex: *andersoni*

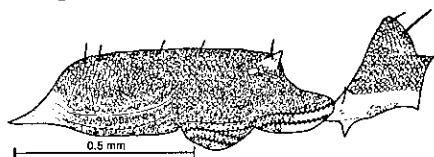


Fig. 150. Mesosoma and petiole of the holotype worker of *Leptothorax punctatissimus*.

**Diagnosis:** This species is easily recognized as nearly the entire ant (except ventral surface of head and the gaster) is covered with dense, coarse punctures. Some of the punctures, especially those on dorsum of head, are in rows which nearly form poorly defined striae.

The antenna has 12 segments, the propodeal spines are small, and the petiolar node is usually blunt, rounded and somewhat truncate as seen in profile. The subpetiolar process is well developed and sharp. The hairs on the mesosoma are blunt and a few are nearly spatulate.

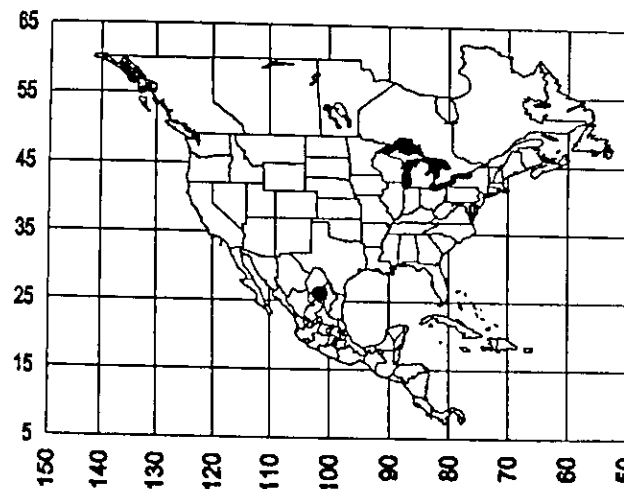
**Distribution:** Known only from the state of Nuevo León, México (Map 39).

**Description**

Worker measurement (mm): HL 0.55-0.64, HW 0.49-0.53, SL 0.43-0.47, EL 0.10-0.12, WL 0.64-0.70, PW 0.17-0.18, PL 0.20-0.22, PPW 0.20-0.24, PPL 0.17-0.19. Indices: CI 83-89, SI 73-78, PI 77-90, PPI 118-126.

Mandibles apparently with 5 teeth; anterior border of clypeus convex and broadly rounded, clypeus with about 12 carinae, including a medial carina; vertex straight; eyes small (measurements above); mesosoma with none of the sutures breaking surface sculpture; propodeal angles very small, consisting of tiny angles; petiole with well developed subpetiolar tooth, directed slightly anteriorly (Fig. 150); petiolar node blunt and rounded in profile.

Erect hairs blunt, up to 0.1mm in length, scattered on most surfaces, except scapes and legs, where they are much finer and nearly decumbent.



Map 39. Distribution of *Leptothorax punctatissimus*.

**Sculpture** very characteristic of this species: entire ant, with the exception of the ventral surface of the head and the gaster, is evenly and densely covered with coarse punctures.

**Color:** yellowish brown, gaster with darker, transverse band on posterior third of first tergum, head with dorsum noticeably darker, especially when

viewed from side.

Female (dealate) measurements (mm): HL 0.64, HW 0.55, SL 0.44, EL 0.18, WL 0.91, PW 0.18, PL 0.15, PPW 0.29, PPL 0.18. Indices: CI 87, SI 70, PI 120, PPI 160.

Similar to worker in most aspects, dorsum of head finely rugose, top of mesosoma with parallel, longitudinal striae, propodeal spines consisting of simple angles, node of petiole with transverse rugae, node of postpetiole punctate, petiolar node as seen from side with moderately sharp apex.

Male: Unknown.

Type series: Holotype worker (MCZC, #11013-5) and paratype worker (CWEM, #11009-10), MEXICO, Nuevo León: El Salto (Zaragoza), 11-vi-1988, 1415 meters, W. Mackay, 5 paratype workers (CASC, CWEM, MCZC, USNM) and 1 paratype female (MCZC), MEXICO, Nuevo León, Monterrey, Parque Chipinque, vii/ix-1989, J. Garcia.

Material examined: Seven workers, 1 female.

**Etymology:** Based on the densely punctured body surfaces.

**Discussion:** This species is superficially similar to 3 other species: *L. punctatissimus* (*andersoni* species complex), *L. punctaticeps* (*hispidus* species complex), and *L. terrigena* (*andrei* species complex). *Leptothorax punctaticeps* can be easily separated, as it is considerably larger than the other two species (see key and descriptions). *Leptothorax punctatissimus* and *L. terrigena* are more difficult to distinguish. *Leptothorax punctatissimus* is slightly larger and the erect hairs are finer, especially obvious when comparing the hairs of the petiole

(compare Figs. 150 & 178). Additionally the propodeal spines of *L. terrigena* are small, but are developed into spines, whereas the propodeal angles of *L. punctatissimus* are very poorly developed.

**Biology:** The holotype was captured in a pitfall trap, the paratype in a Vienna sausage baited trap on the soil surface. The habitat was a very steep, south-facing slope of a mountain, covered with oak trees. The two specimens were collected about 50 meters distant from one another.

***Leptothorax (Myrafant) punctithorax* new species**

Figs. 31, 151, & 152; Map 40

Species complex: *tricarinatus*

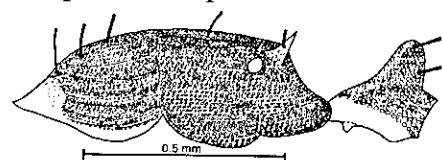


Fig. 151. Mesosoma and petiole of the holotype worker of *Leptothorax punctithorax*.

the medial clypeal carina is moderately well developed. The propodeal spines are small, but acute, and the node of the petiole is blunt.

**Distribution:** Central México (México) (Map 40).

**Description**

Worker measurement (mm): HL 0.62-0.70, HW 0.52-0.54, SL 0.49-0.54, EL 0.14-0.17, WL 0.65-0.77, PW 0.13-0.18, PL 0.20-0.23, PPW 0.23-0.25, PPL 0.16-0.17. Indices: CI 77-84, SI 77-79, PI 65-78, PPI 144-147.

Mandibles with 5 teeth, only 2 or 3 well defined; anterior border of clypeus straight, clypeus concave, but with well formed medial carina and a few carinae near lateral edges, remainder of clypeus polished and shining; vertex slightly concave; none of the sutures break sculpture of mesosoma; propodeal spines short ( $> 0.04\text{mm}$ ), but toothlike; petiole with well developed, subpeduncular flange, anterior petiolar face concave, posterior face convex, petiolar node rounded and blunt as

**Diagnosis:** This species is easily recognized as the mesosoma (side of pronotum with striae mixed with punctae) is completely punctate with large punctures, which are nearly foveolate. The head is predominantly smooth and shining. The antenna has 12 segments and

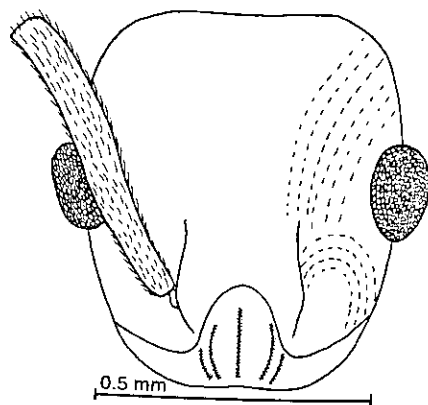
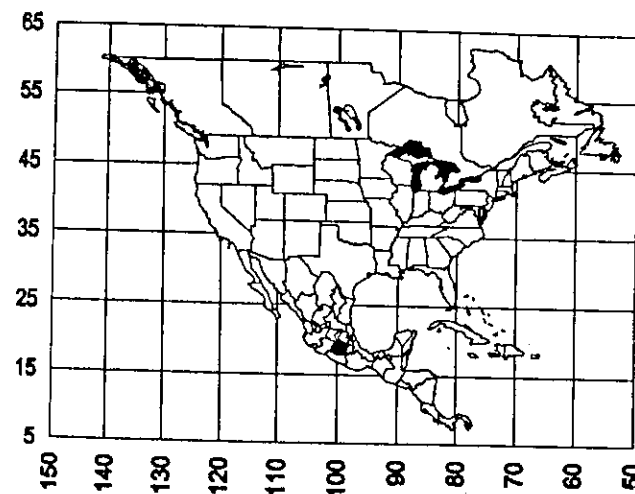


Fig. 152. Head of a paratype worker of *Leptothorax punctithorax*. The sculpture on only the right side of the figure is shown.



Map 40. Distribution of *Leptothorax punctithorax*.

punctures, nearly the size of foveolate punctures, especially on top of mesosoma, bottoms strongly shining, making them reflect like jewels, petiole and post-petiole strongly and densely punctate, gaster smooth and shining.

**Color:** medium brown.

**Female and male:** Unknown.

**Type series:** Holo-type worker (MCZC) and 2 paratype workers (CWEM, UNAM), MEXICO, México, 19 mi. E. Toluca, 9600', 6-viii-1961, L. B. Carney #41.

**Material examined:** Three workers.

**Etymology:** Name based on the heavily punctate mesosoma of the worker.

**Discussion:** The nearly foveolate punctures on the dorsum of the mesosoma would separate this species from nearly all others in North America. This species differs from *L. mexicanus* as the dorsum of the postpetiole is punctate (smooth and shining in *L. mexicanus*) and from *L. cokendolpheri* in that the postpetiole is not noticeably broadened and it is dark brown in color (*L. cokendolpheri* is pale yellow). The propodeal spines are also developed and acute, whereas the armature of *L. cokendolpheri* are simple, blunt angles. The distributions (central México vs. New Mexico and Texas for *L. cokendolpheri*) will help in the confirmation of the identification. This species can be distinguished from *L. manni* and *L. bristoli* by the presence of a moderately well developed medial clypeal carina (absent or not more developed than the surrounding carinae in *L. manni* and *L. bristoli*). Additionally the

seen in profile.

Hairs erect on most surfaces, except antennal scape and legs, where they are suberect or decumbent.

Sculpture characteristic of this species, consisting of costulae mixed with punctures on head, with strongly shining background, entire mesosoma densely covered with large

side of the pronotum is covered with punctae and striae in *L. punctithorax*; the sides of the pronoti of *L. manni* and *L. bristoli* are predominantly smooth and shining, with fine striae.

Biology: Unknown.

*Leptothorax (Myrafant) rugatulus* Emery

Figs. 4, 72, 153, 154, 155, 156, & 157; Map 41

*Leptothorax rugatulus* Emery, 1895: 321, worker, S. Dakota, Colorado [restricted to Colorado by Creighton, 1950]; *Leptothorax curvispinosus rugatulus*: Wheeler, 1903a:241, Plate 12, Fig. 12; *Leptothorax rugatulus*: Wheeler, 1917:509; *Leptothorax (Myrafant) rugatulus*: M. Smith, 1950:30; Taber and Cokendolpher, 1988:98-100, karyotype

*Leptothorax curvispinosus rugatulus cockerelli* Wheeler, 1903a:241-242; *Leptothorax rugatulus* var. *cockerelli*: Wheeler, 1917:509 (Creighton, 1950:267-268)

*Leptothorax curvispinosus annectens* Wheeler, 1903a:242, Plate 12, Fig. 13 (Creighton, 1950:267-268)

*Leptothorax rugatulus mediorufus* Wheeler, 1917:510 (Creighton, 1950:267-268)

*L. rugatulus dakotensis* Wheeler and Wheeler, 1944:247 (Creighton, 1950:268)

*L. rugatulus brunnescens* Wheeler, 1917:510-511. **New Synonymy**  
Species complex: *longispinosus*

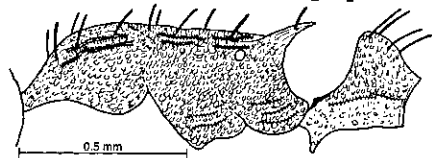


Fig. 153. Mesosoma of a worker of *Leptothorax rugatulus* (NM).

tween their bases, the dorsum of the postpetiole has rough punctures.

Distribution: Washington, Oregon, Idaho, Montana, North Dakota, South Dakota, Wyoming, California, Nevada, Utah, Colorado, Arizona, New Mexico, Texas; Canada: British Columbia, Alberta. (Map 41).

Type series: AMNH, MCSN [seen].

Discussion: This species can be recognized by the coarse rugae on the head, the areas between the rugae are punctured, but shiny (Fig. 156). This characteristic separates *L. rugatulus* from *L. bradleyi* and *L. smithi*. It is smaller than *L. josephi* and is basically concolorous

Diagnosis: Workers of this species have an 11 segmented antenna, a coarsely rugose dorsal surface of the head, the dorsum (and sides to a lesser extent) of the mesosoma and petiole are rugose as the head, the propodeal spines are well developed, longer than the distance between their bases, the dorsum of the postpetiole has rough punctures.

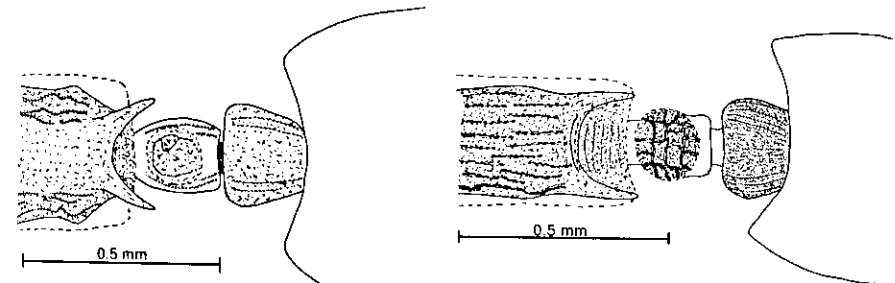


Fig. 154. Top of the propodeum, petiole, postpetiole and first gastral tergite of a worker of *L. rugatulus* (NM).

Fig. 155. Top of the propodeum, petiole, postpetiole and first gastral tergite of a worker of the extreme form of *Leptothorax rugatulus*.

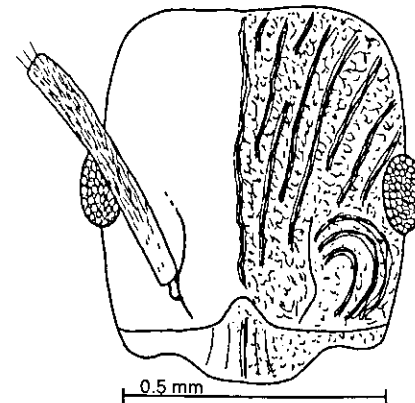


Fig. 156. Head of a worker of *Leptothorax rugatulus*. Sculpture is shown only on the right side of the figure.

medium yellowish-brown, often with dark infuscation on the head and mesosoma. The node of the petiole is rounded in profile, not truncate as in *L. ambiguus*. The subpetiolar process is often about as wide at the tip as it is at the base, although specimens that were previously referred to as *L. rugatulus* tend to have a tapered subpetiolar process. The propodeal spines are well developed, which separates it from *L. schaumii*, and *L. whitfordi*.

One of the forms of this species is distinct, and until nearly the end of the revision I considered it to be a

valid species. The typical form of *L. rugatulus* can be distinguished from this form as the intrarugal spaces are lightly punctate, partially shiny, whereas the other form is roughly sculptured, with the intrarugal areas of the head, mesosoma, petiole and postpetiole densely and coarsely punctate. The side of the mesosoma is predominantly punctate, with scattered rugae, as compared to this form in which the side of the mesosoma is coarsely rugose. The petiole and

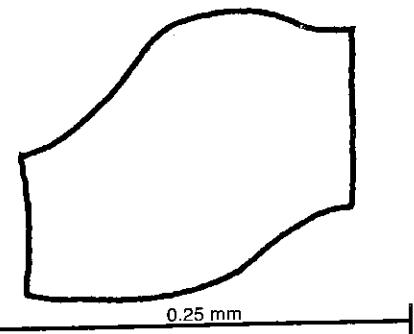
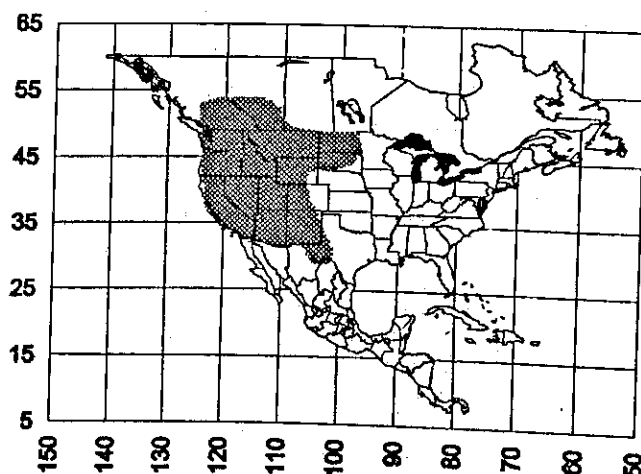


Fig. 157. Petiole of a male of *Leptothorax rugatulus*.

postpetiole of *L. rugatulus* are rarely rugose (Fig. 154), whereas in this form they are always rugose and roughly sculptured (Fig. 155). The anterior lateral angles of the gaster are blunt as seen from above (Fig. 154), whereas the identical angles of this form are sharp (Fig. 155). When specimens from the extremes are examined, it seems obvious that this form is a valid species, but would one looks at the entire variability of *L. rugatulus*, the striking differences are no longer that distinct. None of the characters listed above will consistently separate this form from *L. rugatulus*. Thus this form will be considered as being within the range of the variability of this species. It was collected at two localities: California, Tulare Co., Sequoia National Park, 36°31'42.9" 118°46'27.0", 990 m, 8-vii-1998, Mackay family #18410 (CWEM); and CALIFORNIA, Humboldt Co., Humboldt Redwood State Park, 40°17'6.6" 123°53'41.1", 11-vii-1998, Mackay family # 18483 (1 worker CWEM).

*Leptothorax rugatulus brunnescens* continued to be recognized by Creighton (1950) as a valid subspecies, based on "rather elusive characters" (Gregg, 1963). Creighton (1950) stated that the thoracic rugae of this subspecies are largely obliterated by punctures and the cephalic rugae are feeble, whereas the thoracic rugae of the typical subspecies are well developed and the cephalic rugae are stronger. I agree with Creighton that the differences between specimens are extreme in some cases, but as there is considerable variation in the thoracic rugae, even from individuals from the same nest (Wheeler and Wheeler, 1963), this character is not sufficient to separate the two taxa. The cephalic rugae are quite variable as was stated by Creighton (1950)



Map 41. Distribution of *Leptothorax rugatulus*.

and are useless as a character to separate these two. I have seen specimens with less development of the thoracic rugae than the type series of *brunnescens* and others with much better developed rugae than the type series of *rugatulus*. Therefore if we continue to recognize *brunnescens* as a separate taxon, we will be forced to rec-

ognize all of the subspecies and describe a series of other subspecies of equal distinction. Creighton (1950) also thought there was an elevational difference in the distributions of the two subspecies, although Gregg (1963) found this was not the case. Thus *L. rugatulus brunnescens* is proposed as a synonym of *L. rugatulus*.

**Biology:** This tends to be a high coniferous forest species which occurs in moist habitats (Cole, 1934, 1942; Wheeler and Wheeler, 1986) in shaded grassy slopes with pines (Cole, 1954), or grasslands (Wheeler and Wheeler, 1963), although Conklin (1972) states it does not usually enter meadows or even ecotones. It also occurs in pinyon-juniper forests and cool desert habitats (Wheeler and Wheeler, 1986). Nests are found in the soil, under rocks (Cole, 1942, 1954; Wheeler and Wheeler, 1963; Mackay et al., 1988), in decaying wood (Wheeler and Wheeler, 1986) in grasses (Wheeler, 1917; Cole, 1953, 1954; Gregg, 1963; Borchart and Anderson, 1973; Moody and Francke, 1982), or in trees (Van Pelt, 1983). One nest had more than 100 workers and eight females (Wheeler, 1903a), although Frumhoff and Ward (1992) state that nests are monogynous. Cole (1954) found that nests are very populous and also found multiple queens in nests. There are 2 queen morphs in this species, with mostly macrogynes found in monogynous colonies and microgynes in polygynous colonies (Rüppell et al., 1998). Sexu- als occur in nests in July and Aug. (Gregg, 1963) to September in Idaho (Cole, 1934). This species moves the nest if it is disturbed (Moeglich, 1978). The beetle *Amecocerus* sp. (Melyridae) occurred in a nest in Nevada (Wheeler and Wheeler, 1986). Insecticide treatments for the spruce budworm in eastern Oregon had little impact on this species (Murphy and Croft, 1990).

### *Leptothorax (Myrafant) rugithorax* new species

Figs. 22, 53, 158, & 159; Map 42

Species complex: *tricarinatus*

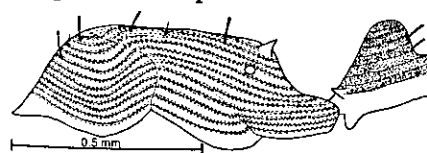


Fig. 158. Mesosoma and petiole of the holotype worker of *Leptothorax rugithorax*.

**Diagnosis:** This is a small (less than 2mm total length) brown species in which the head is covered with rugulae and the mesosoma is covered with coarse rugae. The clypeus is convex, nearly smooth and shining with a well-developed median carina. The head is partially glossy and shining. The antenna has 12 segments. The propodeal spines are tiny and the petiolar node is broadly rounded as seen in

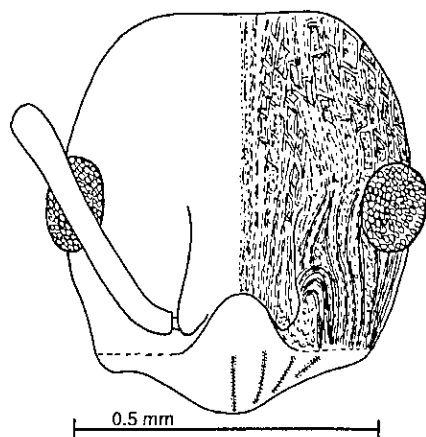
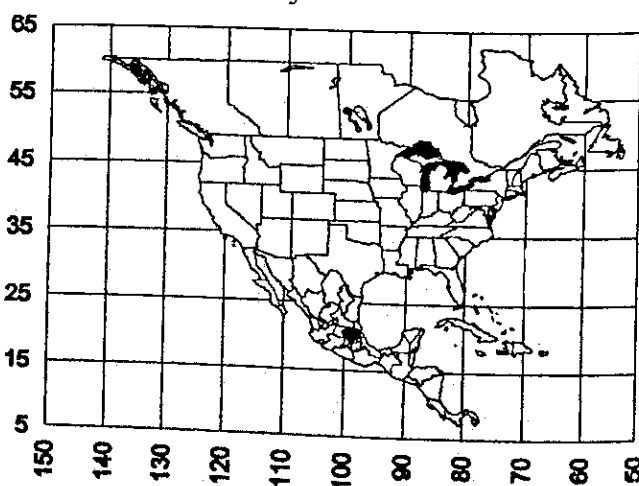


Fig. 159. Head of the holotype worker of *Leptothorax rugithorax*. The sculpture is shown only on the right side of the figure.

mesosoma without sutures breaking surface; propodeal spines poorly developed, consisting of tiny angles with acute points; petiole with well developed subpetiolar tooth, petiolar node rounded and blunt in profile.

Erect hairs scattered on most surfaces, most hairs less than 0.05mm in length, a few up to 0.1mm, absent on scapes and lower legs, where smaller, decumbent hairs are present, hairs on coxae to femora erect, but finer than those on remainder of body.

**Sculpture** coarse, consisting of striae on upper surface of head, clypeus and area posterior to frontal area smooth and shining, dorsum of mesosoma and sides of pronotum covered with coarse rugae, with dense punctures in intrarugal areas, mesopleuron and propodeum with



Map 42. Distribution of *Leptothorax rugithorax*.

profile (Fig. 158). The postpetiole is about 1.5 times as wide as the petiole.

**Distribution:** Known only from type locality in the state of Hidalgo, México (Map 42).

### Description

Worker measurement (mm): HL 0.66, HW 0.54, SL 0.44, EL 0.14, WL 0.71, PW 0.18, PL 0.23, PPW 0.26, PPL 0.17. Indices: CI 82, SI 67, PI 78, PPI 153.

Mandibles with 5 (? difficult to see mandible) teeth; anterior border of clypeus convex, clypeus with medial carina and a few poorly defined lateral carinae; vertex straight;

rough sculpture, consisting in part of punctures, petiole rugose with scattered punctures, postpetiole roughly sculptured with coarse punctures, gaster polished and shining.

**Color:** medium brown.

**Female and male:** Unknown.

**Type series:** Holotype worker (MCZC), MEXICO, Hidalgo, El Chico, 23-ix-1938, L. J. Lipovsky.

**Material examined:** Holotype worker.

**Etymology:** Name based on the rugose mesosoma.

**Discussion:** The sculpture of the head and meso-soma, and the shape of the petiolar node will separate this species from all others in the subgenus. It would be most likely to be confused with *L. tricarinatus*, which also has a wide postpetiole. It can be easily separated by the much finer sculptured head, and in being much smaller. The shape of the node could cause it to be confused with *L. peninsularis* (known only from the female from Baja California). The petiole has a short peduncle and the propodeal spines are poorly developed in *L. rugithorax*, workers of *L. peninsularis* would be expected to have a well-developed peduncle and well developed propodeal spines. The simple propodeal angles would separate it from *L. gallae* and *L. nevadensis*, which have propodeal spines that are at least  $\frac{1}{2}$  the distance between the bases. The blunt petiolar node would separate it from *L. furunculus*, which has a node with a sharp apex, and *L. andrei* in which the top of the node is rounded. Additionally the side of the mesosoma of *L. rugithorax* is coarsely sculptured, whereas the side of the mesosomae of *L. furunculus* and *L. andrei* are densely and evenly punctate. It could be confused with *L. rugulosus*, but differs as the propodeal spines are much less developed, the pronotum has only fine rugae, and the mesonotum is punctate.

**Biology:** Unknown.

### *Leptothorax (Myrafant) rugosus* new species

Figs. 18 & 160; Map 43

**Species complex:** *nitens*

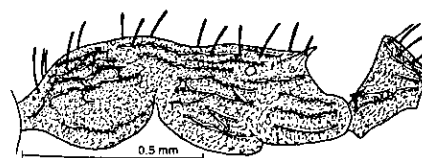
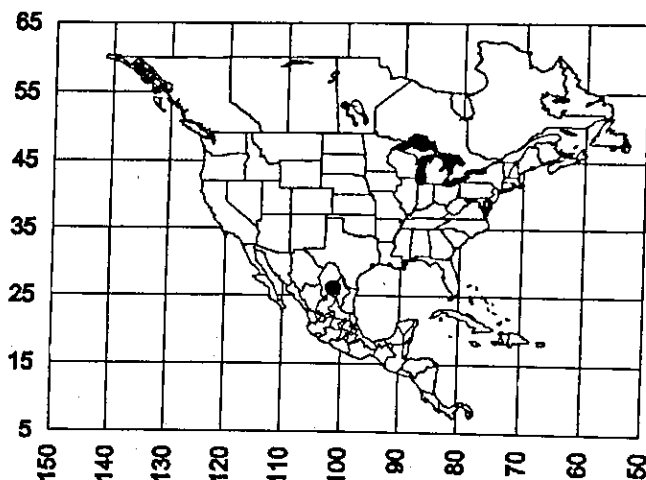


Fig. 160. Mesosoma and petiole of the holotype worker of *Leptothorax rugosus*.

**Diagnosis:** This is a medium sized, light brown species with a 12-segmented antenna, in which the head and mesosoma are coarsely rugose. It is one of the few species in the subgenus which has a very lightly sculptured gaster, which is not always obvious. The

hind femur is somewhat incrassate. The petiole is narrow as seen from above, with a laterally "pinched" node, the postpetiole has fine, longitudinal striae.

Distribution: Known only from the type locality in Nuevo León in northeastern México (Map 43).



Map 43. Distribution of *Leptothorax rugosus*.

### Description

Worker measurement (mm): HL 0.67-0.70, HW 0.58-0.59, SL 0.49-0.50, EL 0.16-0.17, WL 0.82-0.83, PW 0.14-0.15, PL 0.19-0.23, PPW 0.27-0.28, PPL 0.18-0.19. Indices: CI 84-87, SI 71-73, PI 65-74, PPI 147-150.

Mandibles with 5 well defined teeth; anterior border of clypeus convex,

clypeus with well developed medial carina and several lateral carinae; vertex concave; mesosoma with none of the sutures breaking surface, although area of mesopropodeal suture depressed; propodeal angles well developed, acute, nearly formed into spines, about half as long as distance between bases; petiole with dull spine on peduncle, directed anteriorly, anterior and posterior faces nearly straight, meeting at a distinct angle (Fig. 160), petiolar node thus acute in profile; femora of all legs, especially posterior leg, thickened.

Erect hairs scattered over surface, coarse and blunt, maximum length 0.05mm, absent from antennae and legs, which have decumbent hairs.

Sculpture very rough, consisting of rugae on all surfaces except gaster, intrarugal spaces heavily punctate, gaster with very fine punctation, nearly smooth and shining.

Color: light brownish-yellow, gaster and top of head slightly darker. Female and male: Unknown.

Type series: Holotype worker (MCZC), and two paratype workers (CWEM, UNAM), MEXICO, Nuevo León; El Salto (Zaragoza), 10-vi-1988, 1415 meters, W. Mackay #11012-8 and #11012-10.

Material examined: Three workers.

Etymology: Name based on the rugose head and mesosoma.

Discussion: This species may be related to *L. silvestrii*, with similar sculpturing on the gaster (note: the sculpturing is very fine and difficult to see in some specimens), and a thickened hind femur, but is easily distinguished as the apex of the petiolar node is rather sharp, not broad and blunt as in *L. silvestrii*. The top of the mesosoma of both species is rugose. The shape of the petiole (forming an acute peak where anterior face meets top of node) easily separates it. It is quite different from all of the other species with sculptured gasters. It is very distinct from *L. maryanae*, and can be easily distinguished as the side of the pronotum is rugose, whereas the side of the pronotum of *L. maryanae* is punctate.

The sculpture on the gaster of the holotype is very obvious, that on the 2 paratypes is less obvious. The latter specimens could key to *L. tricarinatus*. *Leptothorax rugosus* differs in that the sculpture is much coarser, with the rugae on the head and dorsum of the mesosoma very well developed. The petiole is much narrower as seen from above, and pinched. The sculpture of the postpetiole is more coarsely sculptured, with costulae at least on the sides. The clypeus has several poorly developed carinae, not the 3 well developed carinae as in *L. tricarinatus*. *Leptothorax rugosus* could also be confused with *L. texanus*, but can be separated as the rugae on the dorsum of the postpetiole of *L. texanus* are transverse, whereas the rugae in the same position of *L. rugosus* are longitudinal.

Biology: The type series was collected in a trap baited with Vienna sausage, placed in oak trees, about 2-meter height. The habitat was a very steep, south-facing slope of a mountain, covered with oak trees. The specimens were collected within 20 meters distant from one another.

### *Leptothorax (Myrafant) rugulosus* new species

Figs. 58, 60, 161, & 162; Map 44

Species complex: *tricarinatus*

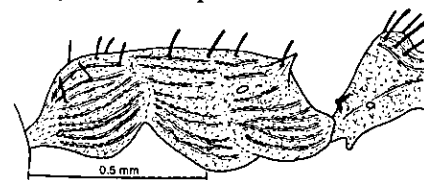


Fig. 161. Mesosoma and petiole of the holotype worker of *Leptothorax rugulosus*.

Diagnosis: This is a light brown species with fine rugae covering the entire dorsum of the head and the mesosoma, and the peduncle has a well-developed tooth. The antenna has 12 segments. The hairs on the scape are suberect. The subpeduncular process is well devel-

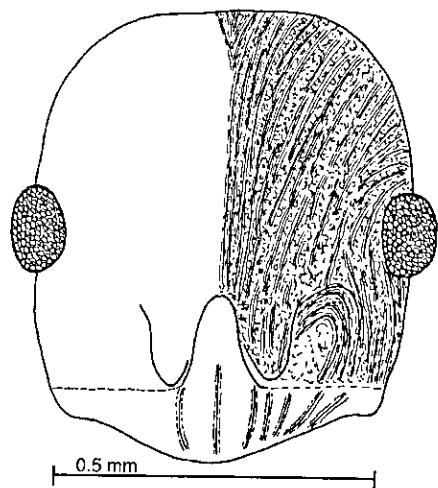


Fig. 162. Head of the holotype worker of *Leptothorax rugulosus*. The sculpture is shown only on the right side of the figure.

weakly developed; petiolar peduncle with well developed ventral tooth, petiolar node rounded in profile, blunt.

Erect hairs scattered on all surfaces, up to 0.06mm in length, blunt tipped but not spatulate, finer hairs on scapes and legs nearly decumbent.

Sculpture characteristic, consisting of fine, longitudinal rugae on dorsum of the head, which diverge on vertex, becoming nearly parallel with nuchal collar, those near eye forming poorly defined concentric circles, concentric semicircles posterior to in-

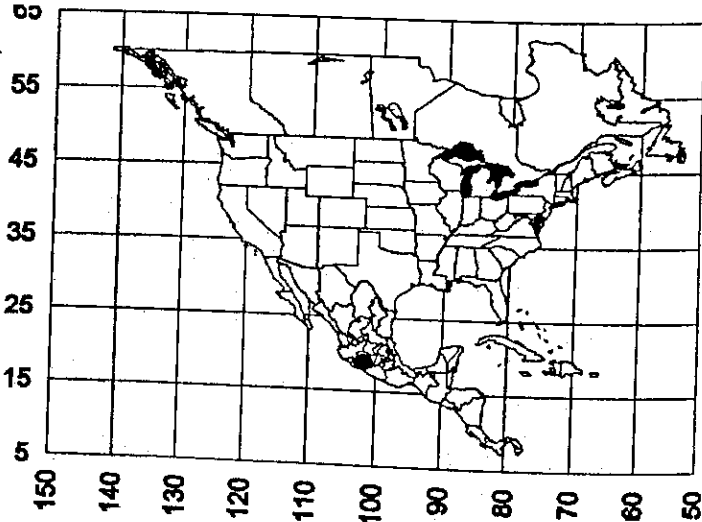
oped.

Distribution: Known only from type locality in Michoacán, México (Map 44).

### Description

Worker measurement (mm): HL 0.68, HW 0.59, SL 0.58, EL 0.16, WL 0.79, PW 0.19, PL 0.23, PPW 0.28, PPL 0.18. Indices: CI 87, SI 85, PI 83, PPI 156.

Mandibles with 5 teeth, 2 basalmost tiny; anterior border of clypeus slightly concave, clypeus with several delicate carinae, including a medial carina; vertex slightly concave; mesosoma without any of the sutures breaking surface; propodeal angles small and



Map 44. Distribution of *Leptothorax rugulosus*.

sections of antennae, rugae on sides of pronotum and mesopleural area coarse, other rugae on mesosoma poorly defined and mixed with coarse punctures, most rugae on dorsum of mesosoma longitudinal and mixed with punctures, rugae on dorsal face of propodeum longitudinal, extending between teeth and meeting and forming a perpendicular angle with transverse striae on the descending face, dorsum of petiole with coarse rugae mixed with punctures, node of postpetiole mostly punctate, sides of petiole and postpetiole with rugae mixed with punctures, gaster smooth and shining. The gaster is essentially the only part of this ant not covered by dense, coarse sculpture, although the intrarugal spaces on head, the clypeus and a small area posterior to frontal area are also somewhat smooth and shining.

Color: light brown.

Female and male: Unknown.

Type series: Holotype worker (MCZC), MEXICO: Michoacán, 10.5 KN Cheran, 28-vii-1988, 2255 meters, R. Anderson #88-9.

Material examined: Holotype worker.

Etymology: Diminutive of *ruga*, Latin for wrinkle, referring to the fine rugae on the head.

Discussion: This species could be confused with *L. carinatus* or *L. neomexicanus*. It differs from both by having fine rugulae on the tops and sides of the mesosoma (the other two species are primarily punctate on these surfaces). The sculpture on the dorsum of the mesosoma of *L. neomexicanus* is somewhat rugose (with weak foveolate punctures), but *L. rugulosus* is yellow-brown, *L. neomexicanus* is black (or dark brown). The subpeduncular process of *L. rugulosus* is developed into an elongate tooth (Fig. 161), whereas the process of *L. neomexicanus* is a tiny tooth. The hairs on the scape are raised from the surface, nearly suberect. Similar hairs in *L. neomexicanus* and *L. carinatus* are completely decumbent. This new species differs from *L. rugithorax* as the propodeal spines are more developed, and the rugulae on the dorsum of the pronotum extend posteriorly onto the dorsum of the mesonotum.

Biology: Collected in an oak-pine-*Crataegus* litter sample.

*Leptothorax* (Myrafant) *schaumii* Roger  
Figs. 65, 66, 163, & 164; Map 45

*Leptothorax schaumii* Roger, 1863:180 worker, Pennsylvania; Mayr, 1886:451-452, male; Wheeler, 1903a:232-233, Plate 12, Fig. 7; Wesson and Wesson, 1940:95, female; Wheeler and Wheeler, 1960:23 larva; *Leptothorax* (Myrafant) *schaumii*: D. Smith, 1979:1394.

*Leptothorax fortinodis* Mayr, 1886:452 worker, female, District of



Columbia; Wheeler, 1903a:233-235, Plate 12, Fig. 8; *Leptothorax schaumii* var. *fortinodis*: Wesson and Wesson, 1940:96 (Creighton, 1950:269-271)

*Leptothorax fortinodis* var. *gilvus* Wheeler, 1903a:235-236, worker, female (Creighton, 1950:269-271)

*Leptothorax fortinodis* var. *melanoticus* Wheeler, 1903a:235, worker, female; Wesson and Wesson, 1940:94-95, male (Creighton, 1950:271); *Leptothorax fortinodis melanoticus*: Buren, 1944:287 (Creighton, 1950:269-271)

Species complex: *schaumii*

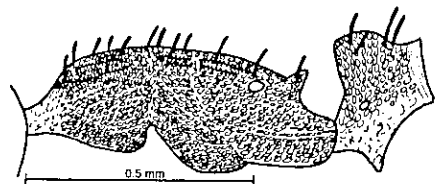


Fig. 163. Mesosoma and petiole of a worker of *Leptothorax schaumii* (TX).

somewhat shining. The top of the mesosoma is mostly punctate, with a few striae, the side of the mesosoma has numerous striae with punctures between them. The propodeal spines range from tiny angles to small spines, which are dull and rounded. The petiole and postpetiole are punctate and the node of the petiole is weakly truncate, with round edges.

Distribution: USA: Kansas, Indiana, Iowa, Missouri, Oklahoma, Texas, Arkansas, Louisiana, Illinois, Kentucky, Tennessee, Alabama, Mississippi, Ohio, Pennsylvania, New Jersey, Washington D. C., West Virginia, Virginia, North Carolina, South Carolina, Georgia (Map 45).

Type series: The types could not be located in Roger's collection (Museum für Naturkunde Zentralinstitut der Humboldt-Universität zu Berlin), and probably no longer exist.

Discussion: The 11 segmented antenna and tiny propodeal spines separate this species from all other

Diagnosis: These ants have 11 segmented antennae and are usually concolorous dark brown, but are occasionally concolorous yellow. The head is nearly completely covered with fine striae, which merge with the dense punctures. Occasionally there is a central strip, which is partly free of sculpture and

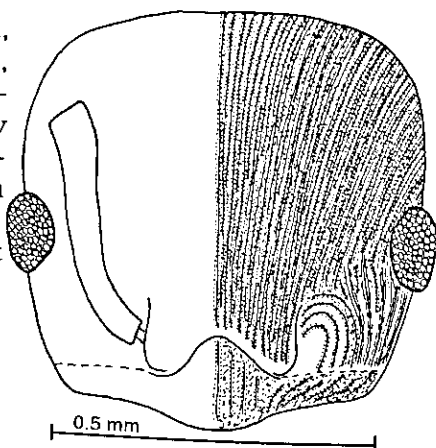
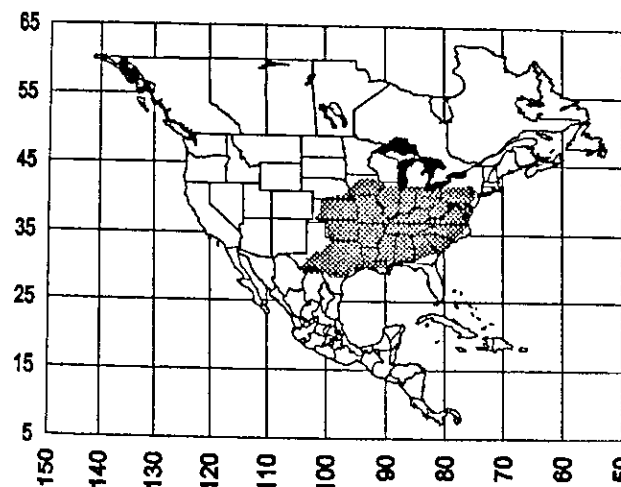


Fig. 164. Head of a worker of *Leptothorax schaumii* (MS). The sculpture is shown only on the right side of the figure.



Map 45. Distribution of *Leptothorax schaumii*.

species with 11 segmented antennae in the subgenus, except *L. whitfordi*. It can be easily distinguished from *L. whitfordi* as the head and pronotum are predominantly punctate (predominantly smooth and shining in *L. whitfordi*, but the pronotum may be punctate as in *L. schaumii*). The punctures on the

pronotum of *L. schaumii* are fine and completely cover the surfaces, whereas in *L. whitfordi* they are coarse and do not densely cover the surface. The small spines separate it from the others in the *schaumii* species complex.

Biology: This species nests in bark of living trees, in branches, logs and oak galls of trees (Wheeler, 1905, 1916; Cole, 1940; Gregg, 1944; Carter, 1962; Moody and Francke, 1982; DuBois, 1985; Wheeler and Longino, 1988) in many habitats ranging from desert canyons in trees (Van Pelt, 1983), to grasslands, to shaded deciduous forests (Carter, 1962; DuBois, 1985). It is found occasionally at lower elevations in the southern Blue Ridge of Virginia (Van Pelt, 1963). It is the most common *Leptothorax* in Mississippi (Smith, 1924). All large oak trees in south-central Ohio have nests (Wesson and Wesson, 1940). One nest contained 143 workers, 35 larvae and a single queen (Wheeler, 1903a), although nests may have more than a single queen (Frumhoff and Ward, 1992). The nest entrance is simply a small hole (Wheeler, 1903a).

*Leptothorax (Myrafant) schmittii* Wheeler

Figs. 19, 20, 165, & 166; Map 46

*Leptothorax schmittii* Wheeler, 1903a:242-244, Plate 12, Fig. 14, worker, Colorado, Canyon City; *Leptothorax (Myrafant) schmittii*: D. Smith, 1979:1395

Species complex: *tricarinatus*

Diagnosis: The workers of this species have 12-segmented anten-



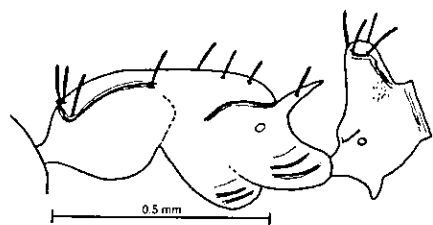


Fig. 165. Mesosoma and petiole of a cotype worker of *Leptothorax schmittii*.

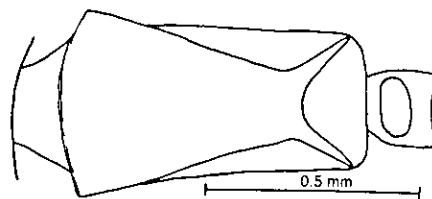
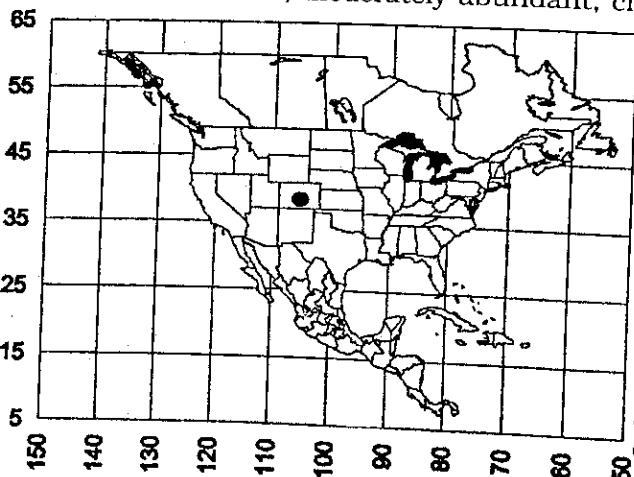


Fig. 166. Top of the mesosoma and petiole of a cotype worker of *Leptothorax schmittii*.

nae; the clypeus has a well developed, medial, longitudinal carina extending nearly full length; the humeral angles are sharp and prominent, with a carina which extends posteriorly, forming a transverse ridge across the pronotum, giving the pronotum a square-shouldered appearance (Fig. 166); the mesosoma is without a constriction at the mesopropodeal suture; the propodeal spines are well formed, longer than width at bases, tapering and pointed, directed distinctly backward though slightly pointed upward and outward, ventral outline of spine is distinctly concave, dorsum convex (Fig. 165); petiolar node narrow in profile, subpeduncular process well developed. The head is very smooth and shining, sides of frontal area, cheeks and subocular region subopaque and delicately and longitudinally rugose. The pronotum and mesonotum are very smooth and shining, the pleurae with delicate longitudinal rugae which are coarser on side of propodeum. Erect hairs are white, moderately abundant, clavate. These ants are



Map 46. Distribution of *Leptothorax schmittii*.

dark brown, almost black, with the mandibles, neck, funiculus and legs yellow.

Distribution: USA: Colorado (known only from type material, Fremont Co., Canyon City) (Map 46).

Discussion: This is a very unusual species due to the smoothness of the head and mesosoma, and the

angulate corners of the pronotum. The types are light brown in color, but it is also black with white hairs and yellow legs (Gregg, 1963). It would not be confused with any other known North American species, except possibly *L. nitens*, which has legs with the same shade of light brown as the mesosoma. It can be easily separated, as the propodeal spines of *L. nitens* are poorly developed.

Biology: Unknown.

Type series: Four cotype workers, AMNH, MCZC [seen].

*Leptothorax (Myrafant) silvestrii* (Santschi)

Figs. 15, 17, & 167; Map 47

*Tetramorium silvestrii* Santschi, 1911:6, worker; *Leptothorax silvestrii*: Santschi, 1922:68; *Leptothorax (Leptothorax) silvestrii*: Creighton, 1953:2-7, female, male; *Leptothorax (Myrafant) silvestrii*: D. Smith, 1979:1395

Species complex: *silvestrii*

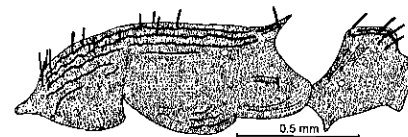


Fig. 167. Mesosoma and petiole of a worker of *Leptothorax silvestrii* (AZ).

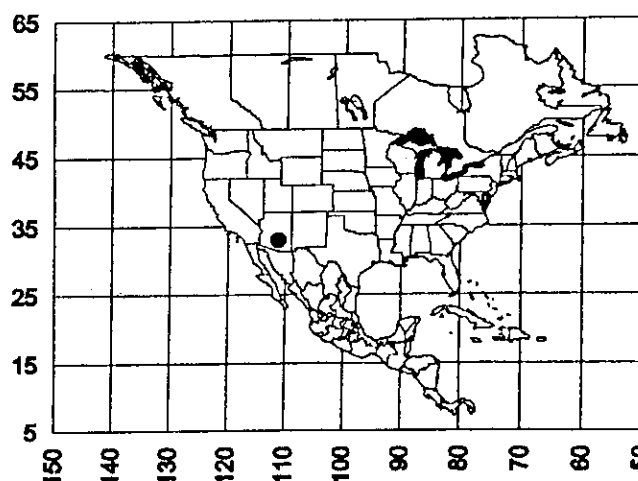
Diagnosis: This species is yellow brown in color with a 12-segmented antenna. The head is completely and coarsely punctate, with fine rugae interspersed among the punctures. The top of the mesosoma and petiolar node have similar

sculpture. The side of the mesosoma, side of the petiole and entire postpetiole are similarly punctate, with reduced extensive rugae when compared to the top of the mesosoma. The entire dorsum of the first tergum is evenly, but finely punctate. The petiolar spines are sharp and well developed. The peduncle of the petiole is elongate and the top of the node is truncate and square in shape. All of the femora, especially the hind femur, are incrassate. The maxillary palp has 5 segments, the labial palp 3 segments, the mandible has 5 teeth.

Type series: Not found.

Distribution: USA: southern Arizona (Pima Co.: Tucson, Santa Catalina Mts., Baboquivari Mts.; Santa Cruz Co., Ruby) (Map 47).

Discussion: The reticulo-punctate disc of the first gastral tergite separates this species from all others except *L. hispidus* and *L. obliquicanthus*, and should separate it from the unknown workers of *L. peninsularis*. It differs from *L. hispidus* in that the propodeal spines are well developed and the hind femora are greatly thickened (Fig. 16). It differs from *L. obliquicanthus* in that the eye is normal in shape and the petiolar node is very blunt in profile. It is most similar to *L. smithi*, but can be easily separated on the basis of the distribution (Arizona,

Map 47. Distribution of *Leptothorax silvestrii*.

*L. smithi* is found in eastern US), 12-segmented antenna (11-segmented in *L. smithi*) and by the rough sculpturing on the surface of the gaster (smooth and glossy in *S. smithi*). Creighton (1953) considered it to be closely related to *L. bradleyi* and *L. smithi* and provides characters to separate them.

There was previously doubt as to the

generic placement of this species, either in *Leptothorax* or in *Tetramorium* (Creighton, 1950). Emery (1922) considered it to be a member of *Leptothorax*, which was supported by Creighton (1953) and Bolton (1979). The 5-segmented maxillary palps and 3-segmented labial palps, together with the 5 toothed mandible, show it is clearly a member of *Leptothorax*. The shape of the clypeus, with a well defined mid clypeal carina and tiny mid tibial spur and posterior tibial spur also suggest affinities with *Leptothorax*. The petiolar node is shaped somewhat like that of species of *Tetramorium*, but other species have a petiole with a similar shape. The long propodeal spines also suggest *Tetramorium*, but others in the genus *Leptothorax* (*L. longispinosus*, *L. curvispinosus* etc.) also have long spines. The lateral portions of the clypeus are raised into a semicircular ridge in front of the antennal fossa, as in members of *Tetramorium*, but not as sharply defined. Thus the preponderance of characters show that this species should remain in *Leptothorax*, and it appears to be a member of *Myrafant*. It is possibly a transitional species between the tribes Leptothoracini and Tetramoriini, which are considered to be closely related (Bolton, 1976).

**Biology:** Creighton (1953) summarized the biology of this species. Arboreal nests are found in large branches of oaks, especially *Quercus emoryi* Torr. Nests contain 50-70 workers, and a single queen. The type locality is probably not Tucson, but the surrounding Santa Catalina Mountains above 3500' elevation (Creighton, 1953).

### *Leptothorax (Myrafant) smithi* Baroni Urbani

Figs. 79, 168, 169 & 170; Map 48

*Leptothorax wheeleri* Smith, 1929:547, Fig. 1 worker, female; Wheeler and Wheeler, 1989:323, larva (Junior secondary homonym of *Macromischa wheeleri* Mann, 1920:422); *Leptothorax (Myrafant) wheeleri*: D. Smith, 1979:1395

*Leptothorax smithi* Baroni Urbani, 1978:557 (Replacement name for *wheeleri*)

Species complex: *silvestrii*

**Diagnosis:** This is a large (total length over 3mm), concolorous red-dish-brown species in which the head is very roughly sculptured with coarse rugae and roughened intrarugal spaces, that are only slightly shiny. The antenna has 11 segments. The propodeal spines are very well developed, their length is nearly equal to the distance between the tips. The subpetiolar process is developed, but not large. The node of the petiole is truncate in profile.

**Distribution:** Ohio, Kentucky,



Fig. 168. Mesosoma, petiole, and postpetiole of a worker of *Leptothorax smithi* (cotype of *L. wheeleri*)

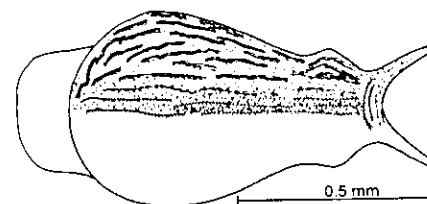


Fig. 169. Top of the mesosoma of a worker of *Leptothorax smithi* (cotype of *L. wheeleri*). The sculpture is shown only on the right side.

Carolina, Georgia, Florida, Mississippi and Alabama (Map 48).

**Type series:** AMNH, MCZC, USNM [seen].

**Discussion:** This species is similar to *L. silvestrii*, having the same roughened sculpture, the raised area anterior to the antennal fossa (similar to *Tetramorium*), the long propodeal spines and the nearly quadrate petiolar node. Thus it is considered to be a member of the *silvestrii* species complex. It is unlikely that this species would be confused with any other species in

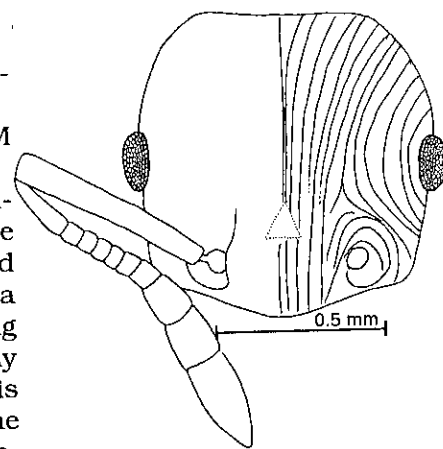
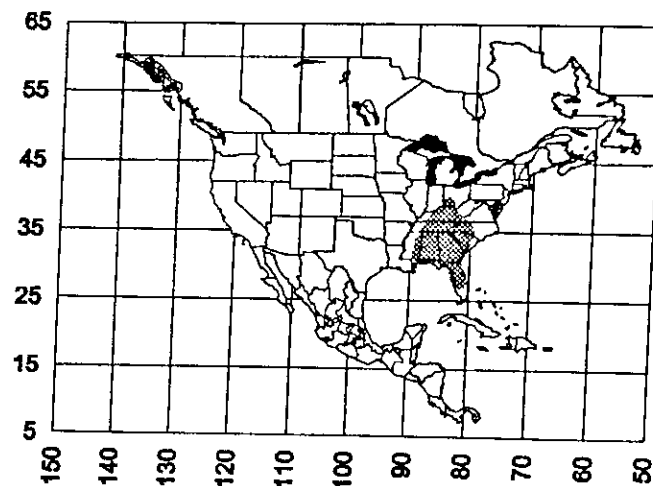


Fig. 170. Head of a worker of *Leptothorax smithi* (cotype of *L. wheeleri*). The sculpture is shown only on the right side of the figure.

Map 48. Distribution of *Leptothorax smithi*.

the subgenus *Myrafant*. It can be easily separated from *L. silvestrii* on the basis of the distribution (*L. smithi* in the eastern half of the US, *L. silvestrii* in Arizona) and the gaster is completely smooth and glossy (sculptured in *L. silvestrii*). In addition, *L. smithi* has an 11-segmented antenna, whereas *L. silvestrii* has a 12-

segmented antenna.

**Biology:** Arboreal (Hood and Tschinkel, 1990), nesting in cavities in trees under bark. This species is common in Ohio, nesting in galleries of hardened, weathered logs and old, deserted cabins exposed to the sun (Wesson and Wesson, 1940). Nests are monogynous (Frumhoff and Ward, 1992). Sexuals were found in nests in early August (Wesson and Wesson, 1940). Workers were observed feeding on exuviae of wood-boring beetles (Wesson and Wesson, 1940). This species is very desiccation resistance, having 3 rectal pads, which are used to absorb water from the feces (Hood and Tschinkel, 1990).

*Leptothorax (Myrafant) stenotyle* Cole

Figs. 45, 47, 171; Map 49

*Leptothorax (Leptothorax) angustinodus* Cole, 1956a:28-30 worker, female, Arizona, Chiricahua Mts., Rustler's Park (junior primary homonym of *angustinode* Stitz, 1917:336)

*Leptothorax stenotyle* Cole, 1956b:214 (Replacement name for *angustinodus*); *Leptothorax (Myrafant) stenotyle*: D. Smith, 1979:1395

Species complex: *tricarinatus*

**Diagnosis:** This is a roughly sculptured (Fig. 171), relatively large, dark brown ant, with a 12 segmented antenna. The head, mesosoma, petiole and postpetiole are covered with coarse rugae, the

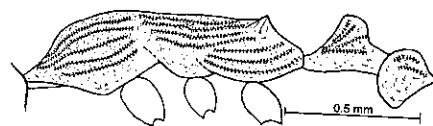
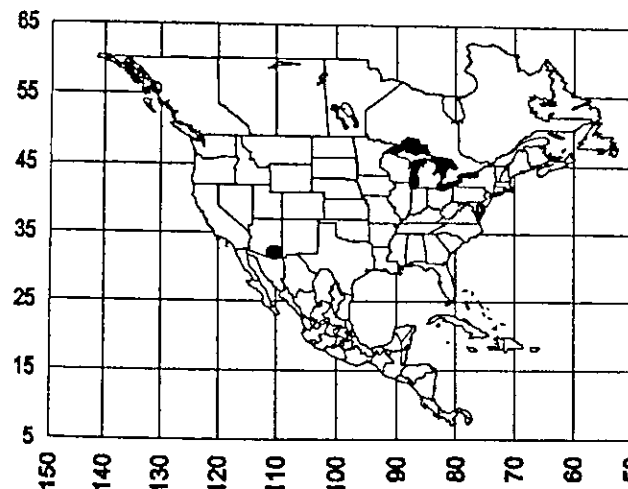


Fig. 171. Mesosoma, petiole and postpetiole of a paratype worker of *Leptothorax stenotyle*.

intrarugal spaces are shining. There may be a central area at the vertex without sculpture. The propodeal spines are poorly developed and are essentially elongate angles (approximately 0.05mm in length). The petiole is thick in profile with a blunt apex (Fig. 171).

**Distribution:** Southeastern Arizona, Cochise Co., Chiricahua Mountains (Rustler's Park and 13.0 mi NW of Junction of Rt. 80 on FSR 74, 5850') (Map 49).

Map 49. Distribution of *Leptothorax stenotyle*.

**Type series:** Holotype worker and paratype female in Cole collection, paratype workers in USNM, MCZC, Cole collection, W. Creighton collection and R. Gregg collection [seen].

**Discussion:** This species can be distinguished from *L. tricarinatus* as it has a more slender mesosoma and a narrower post-petiole node.

It differs from *L. neo-mexicanus* in that it is longer, more rugose and has an opaque head, which lacks distinct punctures and smaller postpetiole. It differs from *L. obliquicanthus* as the eye is of normal size and shape for the genus. It can be separated from the smaller *L. rugithorax* as the head is covered with coarse sculpture; the head of *L. rugithorax* has fine rugulae.

**Biology:** The nest of the type colony was found under a stone on a moist slope covered with pine and spruce. A second nest was also under a stone. The populations range from 53-55 workers. Alate females were found in a nest in August (Cole 1956a). I have been unable to collect this species at the type locality, although I have made 11 visits throughout various seasons and years.

*Leptothorax (Myrafant) stollii* Forel,

Figs. 22, 25, 26, 172, 173, 174, & 175; Map 50

*Leptothorax stollii* Forel, 1885:352-354, worker, male, Guatemala, Volcán de Agua, 14,000' elevation; Forel, 1899:54 female; *Leptothorax (Myrafant) stollii*: Kempf, 1972:132

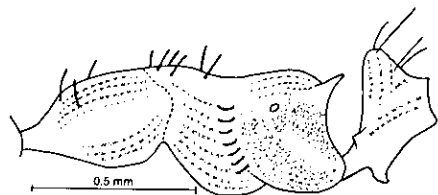
Species complex: *nitens*

Fig. 172. Mesosoma and petiole of a cotype worker of *Leptothorax stollii*.

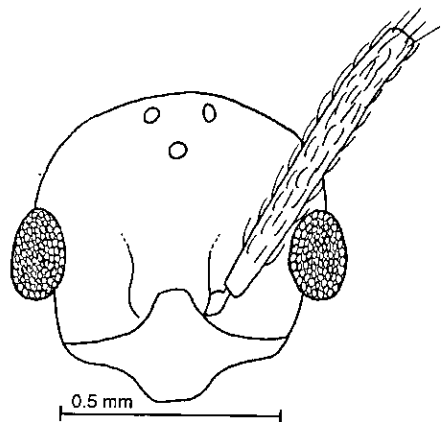


Fig. 174. Head of a cotype male of *Leptothorax stollii*.

occipital corner (Fig. 174) and the "swollen" and thickened (Fig. 175).

Distribution: Guatemala (Map 50).

Type series: Seven workers and 1 male cotypes (MHNG, MCZC) [seen].

Discussion: This species is included in the *nitens* species complex, although it does not fit well and probably deserves to belong to its own complex. The carinae on the clypeus are similar to those of the *nitens* complex, except they terminate in teeth on the anterior border of the clypeus. The petiolar node is relatively sharp, and is slightly cari-

Diagnosis: Workers of this species can be recognized by a 12-segmented antenna, by the offset basalmost tooth (Fig. 173), the coarse carinae on the clypeus, which terminate as teeth on the anterior border of the clypeus, which give the anterior edge a crenulate appearance (Fig. 173). The malar area has numerous coarse rugae, the area posterior to the insertions of the antennae is without concentric, curved striae, as are found in most species. The scape extends to the occipital corner; the dorsum of the head is nearly smooth, interspersed with piligerous punctures, the pronotum is finely striate, the remainder of the mesosoma is rugose, the propodeal spines are well developed and the node of the petiole is rounded in profile (Fig. 172). The mesosoma is slightly depressed at the mesopropodeal suture (Fig. 172). The male is unusual in that the scape extends well past the petiole and postpetiole appear

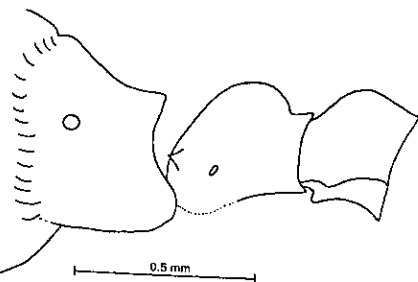
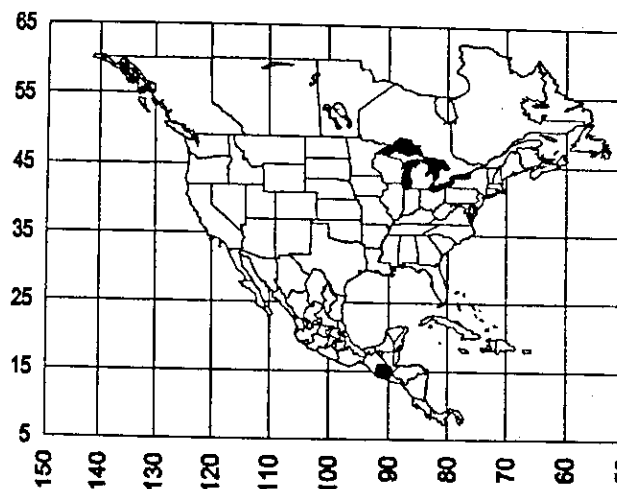


Fig. 175. Propodeum, petiole and postpetiole of a cotype male of *Leptothorax stollii*.



Map 50. Distribution of *Leptothorax stollii*.

nate on each side, but it is not as sharp as it is in other species in the complex. The scapes of both the worker and male are exceptionally long, which would separate it from other members of the subgenus. Thus, these unusual characters, and the offset basal tooth, would separate this species from all others

in the subgenus. It is also the only species known from Guatemala.

Biology: Unknown, other than they were collected at high elevation.

*Leptothorax* (Myrafant) *striatulus* Stitz

Figs. 176 & 177; Map 51

*Leptothorax striatulus* Stitz, 1937:133, worker; *Leptothorax* (Myrafant) *striatulus*: Kempf, 1972:132

Species complex: *striatulus*

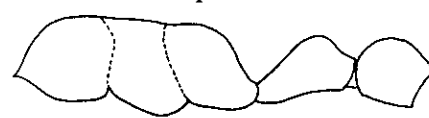


Fig. 176. Mesosoma, petiole and postpetiole of the holotype worker of *Leptothorax striatulus* (modified from Stitz, 1937).

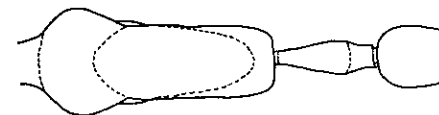


Fig. 177. Dorsum of mesosoma, petiole and postpetiole of the holotype worker of *Leptothorax striatulus* (modified from Stitz, 1937).

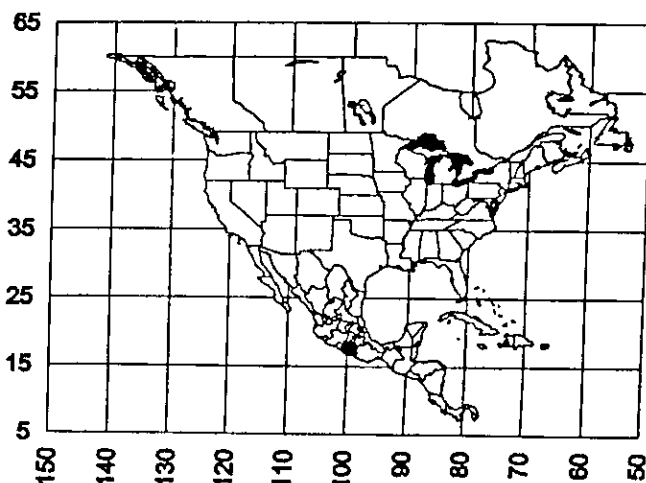
Diagnosis: Based on the description and illustrations in Stitz (1937), this species should be easy to recognize as the propodeum is without propodeal spines or angles and completely rounded. The node of the petiole is also low and rounded. The antenna is 12-segmented.

Distribution: Known only from the type locality: MEXICO, Guerrero, Texquitzin near Chilopa, xii-1929, L. Schultze (Map 51).

Type series: Three workers [not found].

Discussion: The rounded propodeum will separate this species from all others in the New World.

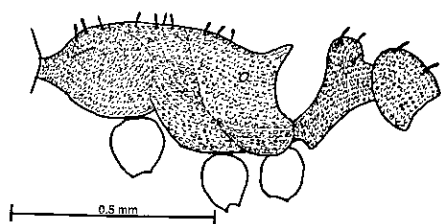
Biology: Unknown

Map 51. Distribution of *Leptothorax striatulus*.

*Leptothorax (Myrafant) terrigena* Wheeler  
Figs. 39, 41, 178, & 179; Map 52

*Leptothorax terrigena* Wheeler, 1903a:254-256, Plate 12, Fig. 21, worker, female, Texas, Austin; *Leptothorax (Myrafant) terrigena*: D. Smith, 1979:1395

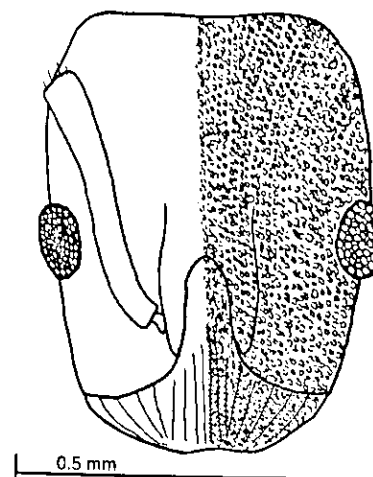
Species complex: *andrei*

Fig. 178. Mesosoma, petiole and postpetiole of a cotype worker of *Leptothorax terrigena*.

Diagnosis: The workers of this species have a 12-segmented antenna, and are small (total length 1.5mm), yellow ants with black eyes. The maximum diameter of the eye is less than the distance from the anterior border of the eye to the anterior edge of the head near the insertion of the antennae.

The propodeal spines are small and the node of the petiole is rounded. The subpeduncular process is small and weakly developed. The postpetiole is massive with the node being nearly twice as wide as the node of the petiole. The petiolar node is somewhat truncate in profile with the anterior and posterior faces being almost parallel. The entire dorsum of the head is densely and evenly punctate, the punctures lining up into poorly defined rows. The dorsum and side of the mesosoma, as well as the petiole and postpetiole, are densely and evenly punctate, similar to the sculpture of the head. The gaster is smooth and glossy.

Distribution: USA, Texas: Travis Co. (Austin, McNeil); Brewster Co.

Fig. 179. Head of a cotype worker of *Leptothorax terrigena*. The sculpture is shown only on the anterior margin of eye and base of right side of the figure.

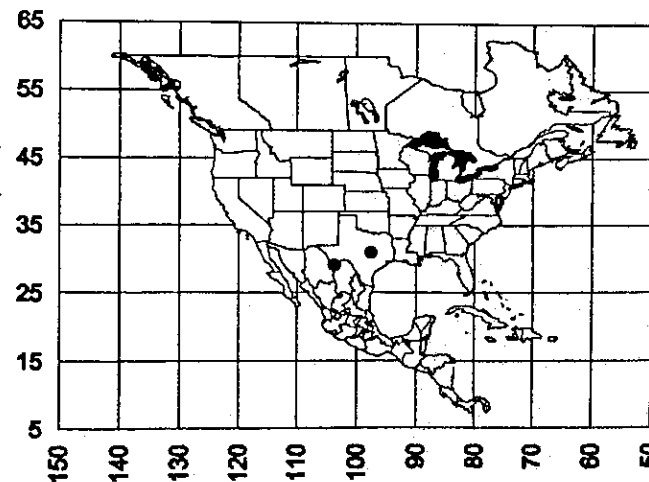
(Chisos Mountains) (Map 52).

Type series: AMNH, MCZC [seen].

Discussion: This is an easily recognized species. Its light yellow color and very finely, but distinctly and completely punctate head separate it from most other species in the genus. The mesosoma is punctate in a similar manner, although the punctures are somewhat coarser. The heavily and densely punctate head would separate this species from most other species, including *L. furunculus* and *L. andrei*. The relatively small eyes (maximum diameter about equal to distance between

*bestelmeyeri*. This species can be distinguished from the similar *L. andersoni* by the smooth and glossy dorsum of the gaster.

Biology: This species nests in and on the ground and under stones. It is reasonably common in Austin (Feener, 1981) and in the Chisos Mountains of southwestern TX in pinyons, desert canyons and high forests (Van Pelt, 1983).

Map 52. Distribution of *Leptothorax terrigena*.

*Leptothorax (Myrafant) texanus* Wheeler  
Figs. 57, 180, & 181; Map 53

*Leptothorax texanus* Wheeler, 1903a:223, 245-247, Plate 12, Fig. 16 worker, female, male, Texas, Milan Co., Milano; Wheeler and Wheeler,

1960:24, larva; *Leptothorax (Myrafant) texanus*: M. Smith, 1950:30; 1952:102-104

Species complex: *tricarinatus*

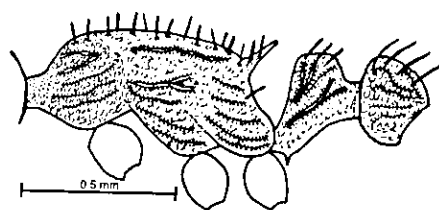


Fig. 180. Mesosoma, petiole and postpetiole of a cotype worker of *Leptothorax texanus*.

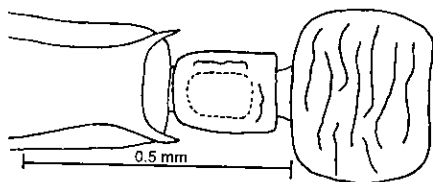
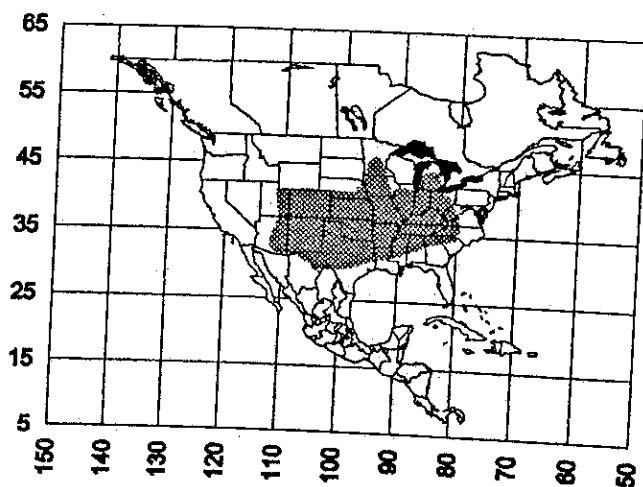


Fig. 181. Dorsum of mesosoma, petiole, and postpetiole of a cotype worker of *Leptothorax texanus*.

1952), Missouri, Oklahoma, Arkansas, Louisiana, Illinois, Indiana, Ohio, Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia (Map 53).



Map 53. Distribution of *Leptothorax texanus*.

Type series: A M N H , M C Z C [seen].

Discussion: The massive postpetiolar node, which is coarsely reticulo-rugose or punctate, separates this taxon from all others in the genus. *Leptothorax davisii* differs in that the postpetiole is somewhat wider and is covered with poorly defined punctures.

Diagnosis: This is a small (total length 2.25mm), dark brown species with a 12-segmented antenna, in which the postpetiole is more than 1.5 X the width of the petiole. The entire ant is roughly sculptured, with rugae on the head, top and side of the mesosoma, on the petiole and on the postpetiole. The gaster is smooth and glossy. The subpeduncular process is poorly defined and consists of a tiny tooth. The node of the petiole is truncate. The propodeum has well-developed spines.

Distribution: USA: Utah, Colorado, Kansas, Arizona, New Mexico, Oklahoma, Texas, Minnesota (Cole, 1952), Michigan (Gregg, 1946; Cole, 1952), Missouri, Oklahoma, Arkansas, Louisiana, Illinois, Indiana, Ohio, Kentucky, Tennessee, North Carolina, Mississippi, Alabama, Georgia (Map 53).

The head of *L. texanus* is mostly covered with punctures, but the central region is partially smooth, without striae, which are found in *L. davisii*. The node of the petiole is not truncate as it is in *L. davisii*. *Leptothorax texanus* is found in the mid west and western part of the United States, *L. davisii* from eastern US.

Biology: This species nests in sandy soil (Wheeler, 1903a; Talbot, 1934; Wesson and Wesson, 1940; Gregg, 1944; Smith, 1952) or even sand dunes (Talbot, 1934; Cole, 1952), or clay soils (Cole, 1952) in damp spots under post-oaks, cedars and pines (Talbot, 1934; Carter, 1962; Mackay et al., 1988), often in the driest sites (Carter, 1962). They often nest at the base of a grass clump (Smith, 1952). Males have been collected from late May to late July in the nests (Wesson and Wesson, 1940; Cole, 1952; Smith, 1952). These ants form foraging trails which are nearly invisible, across sand dunes and moss (Smith, 1952), and apparently use tandem running.

*Leptothorax (Myrafant) tricarinatus* Emery

Figs. 58, 59, 182, & 183; Map 54

*Leptothorax tricarinatus* Emery, 1895:318, 321-322, Plate 8, Fig. 14, worker, South Dakota, Hill City; Wheeler, 1903a:247-248, Plate 12, Fig. 17; Smith, 1952:98-100 male; *Leptothorax (Myrafant) tricarinatus*: Smith, 1950:30

Species complex: *tricarinatus*

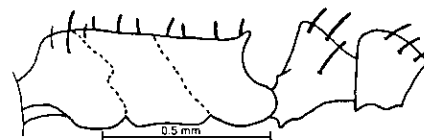


Fig. 182. Mesosoma, petiole and postpetiole of the holotype worker of *Leptothorax tricarinatus*.

Diagnosis: Antenna 12-segmented, antennal scape nearly reaching occipital corner, clypeus with well developed carinae, including a medial carina and two lateral carinae, area between carinae mostly smooth and shining, dorsum of head rugulose, intrarugal spaces shining, area around eye with nearly foveolate punctures, dorsum of mesosoma finely rugulose, with a nearly smooth back-

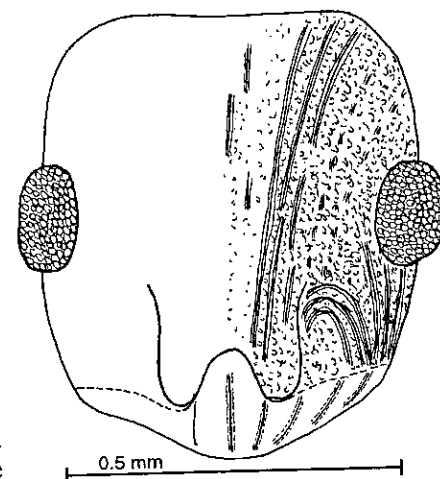


Fig. 183. Head of a worker of *Leptothorax tricarinatus* (UT).

ground, side of mesosoma rugose, propodeal spines well developed, length about half distance between bases of spines, subpetiolar process moderately well developed, apex blunt, node of petiole moderately sharp, top of node obliquely truncate, top of petiole and postpetiole with rugae, background surface smooth, dorsum of gaster shiny.

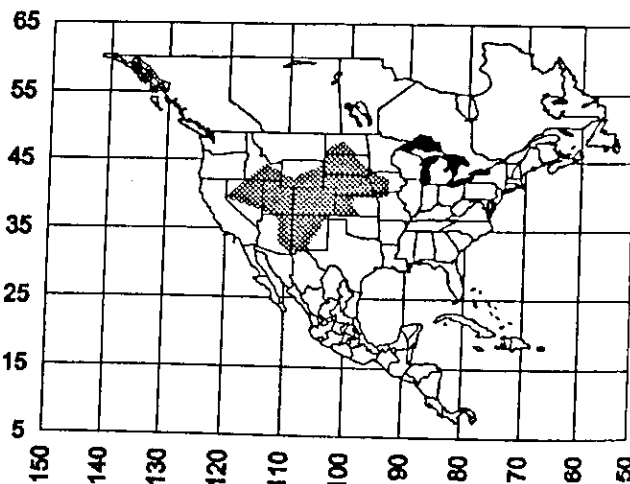
Distribution: USA: North Dakota, South Dakota, Idaho, Wyoming, Utah, Nevada, Arizona, Colorado, New Mexico, Nebraska, Iowa. (Map 54).

Type series: Holotype worker (MCSN) [seen].

Discussion: *Leptothorax tricarinatus* could be confused with several other species, especially *L. stenotyle*, and *L. rugithorax*. It can be separated from *L. stenotyle* as the postpetiole is noticeably widened when compared with the petiole

(compare Fig. 45 & 46). The head is much more coarsely sculptured, with coarse rugae, whereas the head of *L. rugithorax* is more finely sculptured, with fine rugulae, and even some areas that are nearly smooth and shining. Specimens of *L. rugosus* with a lightly sculptured gaster may key here. They differ in being much more coarsely sculptured, with coarse rugae on the head and dorsum of the mesosoma. The petiole is broader and not laterally "pinched" as it is in *L. rugosus*. The clypeus of *L. tricarinatus* has the medial and 2 lateral clypeal carinae well developed, whereas they are not much more developed than any of the other carinae in *L. rugosus*.

Biology: This species nests under rocks and in moist soil in open grassy areas (Cole, 1953; DuBois, 1985), including foothill meadows, canyon deciduous forests, oak woodlands, oak-hickory forest (DuBois, 1985), ponderosa pine forests (Mackay et al., 1988), shortgrass prairie, sagebrush and pastures (Gregg, 1963), as well as cedar forests and areas with scant vegetation (Wheeler and Wheeler, 1963). It appears to do well in disturbed sites (Cole, 1952). Nests are small (Buren, 1944)



Map 54. Distribution of *Leptothorax tricarinatus*.

and are monogynous (Frumhoff and Ward, 1992). Males have been found in nests from July to September (Cole, 1952).

*Leptothorax (Myrafant) tuscaloosae* Wilson  
Figs. 68, 71, 72, 184, 185, 186, & 187; Map 55

*Leptothorax (Myrafant) tuscaloosae* Wilson, 1950:128-130, worker, female

Species complex: *longispinosus*

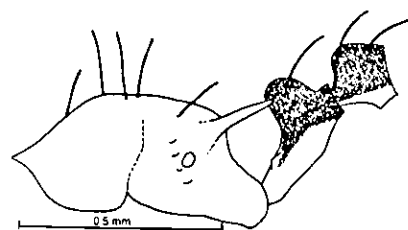


Fig. 184. Mesosoma, petiole and postpetiole of the holotype worker of *Leptothorax tuscaloosae*.

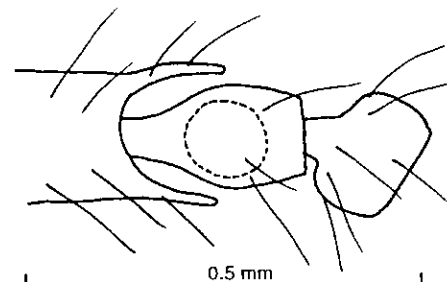


Fig. 185. Dorsum of propodeum, petiole and postpetiole of the holotype worker of *Leptothorax tuscaloosae*.

Diagnosis: This is a small, dark species with an 11-segmented antenna. Most of the head and mesosoma are smooth and shining, rugae are present on the lower surfaces of the side of the mesosoma, the petiole and postpetiole are finely punctate, the gaster is smooth and glossy. None of the sutures break the dorsum of the mesosoma, the propodeal spines are well developed, long and slender (Fig. 185), the petiolar node is low and rounded and the subpeduncular process is poorly developed.

Distribution: Known from the two type localities in west central Alabama (Tuscaloosa Co.), and from North Carolina (Carter, 1962) (Map 55).

Type series: USNM, MCZC, University of Alabama [seen].

Discussion: Wilson (1950) carefully compared this species to the 2 species which are morphologically most similar. It is superficially similar to *L. curvispinosus*, differing in being dark brown (*L. curvispinosus*

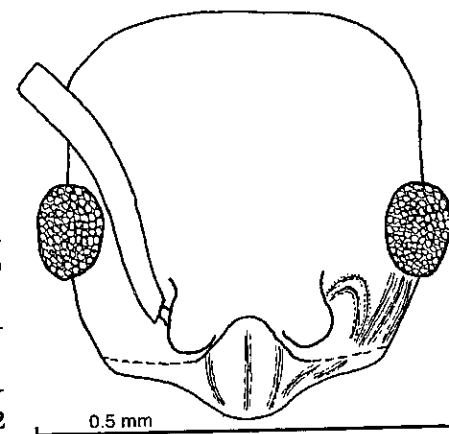


Fig. 186. Head of the holotype worker of *Leptothorax tuscaloosae*. The sculpture is shown only on the right side of the figure.



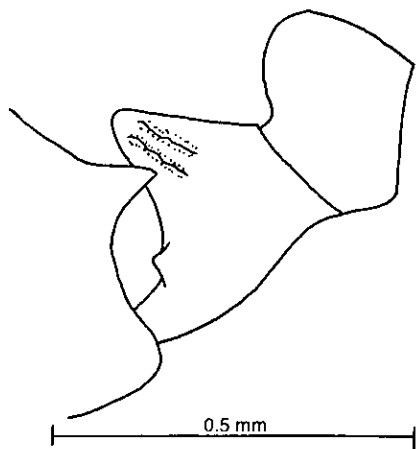
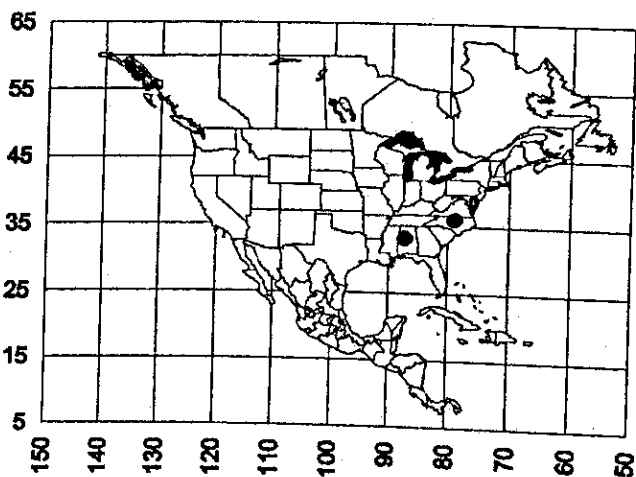


Fig. 187. Propodeum, petiole and postpetiole of the paratype female of *Leptothorax tuscaloosae*.

is light brown), having a nearly smooth dorsal surface of the head (heavily punctate in *L. curvispinosus*). The smooth dorsum of the head could result in it being confused with *L. longispinosus*. It differs as the propodeal spines are shorter (0.12mm) (0.25mm in *L. longispinosus*) and more elevated (angle of about 150° with the dorsal face of the propodeum, whereas the angle in *L. longispinosus* is about 180°). Thus it is a distinct species that would be difficult to confuse with any of the others.

**Biology:** The type series was taken at the base of a large oak in an open

area fringing a bay-gum swamp at Guthrie's Nursery (Wilson, 1950). It was in a small cavity in the bank of earth under a bed of moss. The additional colony from near Elrod was found in a small cavity in the earth covered partly by an overhanging root and partly by thin leaf litter. This locality was in a densely shaded area also on the fringes of a bay-gum swamp. Both colonies were apparently polygynous. Stray workers were collected during the day on low bushes near both nests, thus this species is diurnally active.



Map 55. Distribution of *Leptothorax tuscaloosae*.

My family and I visited both type localities on 8-vi-1998, and discussed the situation with Mrs. Nevada B. Hubbard, who has been secretary at the Memorial Park Cemetery since the 1940's. The site of Guthrie's Nursery (33° 11'33.4"N 87°23' 37.7"W) is now part of the Tuscaloosa Memorial Park

Cemetery. The type locality is now north of the cemetery shop, situated in Lots 7 and 8 of the cemetery, which is now in use. We were unable to locate this species inside the cemetery. Mrs. Hubbard graciously allowed us to collect in an undeveloped area of the Cemetery, covered with trees and dense foliage. Unfortunately this area is heavily infested with *Solenopsis invicta* (even the dense forest) and few ant genera were found in the area (*Camponotus*, *Hypoconer*, *Paratrechina*, *Crematogaster*, *Aphaenogaster*, *Monomorium*). It is doubtful that this species is still found at the type locality.

We also visited the second type locality on the same day, which is located at the Sipsey River Swamp, 2 k E Elrod (33°15'24.9"N 87.6°45'34.7"W). This area is heavily disturbed, but is still a swamp with dense vegetation. We thoroughly searched the area, including vegetation, but did not find this species. *Solenopsis invicta* also occurs in the area, but is not the dominant ant. We expect that *L. tuscaloosae* still occurs in this area.

Carter (1962) reported this species from North Carolina, from numerous Berlese funnel collections of leaf mold and litter, especially from oak-hickory-beech forest located west of Durham on NC State Highway 98. It is a moderate slope facing a densely shaded, mixed hardwood bottomland forest. They were especially common from oak-beech forests of Flanner's Beach near the Nuese River. Nearly all samples were collected in the vicinity or at the base of beech trees, during June, July and August.

### *Leptothorax (Myrafant) whitfordi* new species

Figs. 65, 67, 188, 189, & 190; Map 56

Species complex: *emmae*

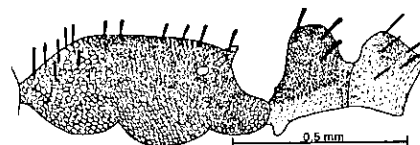


Fig. 188. Mesosoma, petiole and postpetiole of the holotype worker of *Leptothorax whitfordi*.

**Diagnosis:** The workers of this species are small, dark brown specimens with an 11-segmented antenna. The dorsum of the head is mostly smooth and shining, the pronotum is almost completely covered with coarse punctures. The dorsum of the head and pronotum may be smooth and shining. The propodeal spines consist of tiny angles. The petiole is thickened with a round node.

**Distribution:** Southeastern New Mexico, western Texas, Nuevo León and San Luis Potosí in northern México (Map 56).

### Description

Worker measurement (mm): HL 0.54-0.62, HW 0.47-0.55, SL 0.37-0.41, EL 0.15-0.18, WL 0.62-0.71, PW 0.14-0.18, PL 0.16-0.22, PPW 0.18-0.22, PPL 0.14-0.17. Indices: CI 87-93, SI 66-69, PI 70-100, PPI 113-157.

Mandibles with 5 or 6 teeth; an-

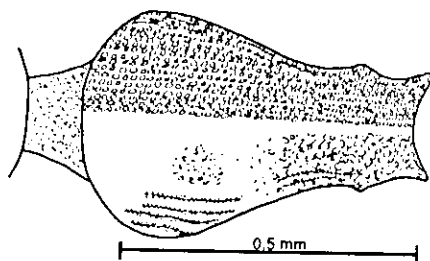


Fig. 189. Mesosoma of a paratype worker of *Leptothorax whitfordi*. The sculpture on the right is that of the paratype, the sculpture on the left is that of a specimen from San Luis Potosi, in which the pronotum is mostly smooth and shining.

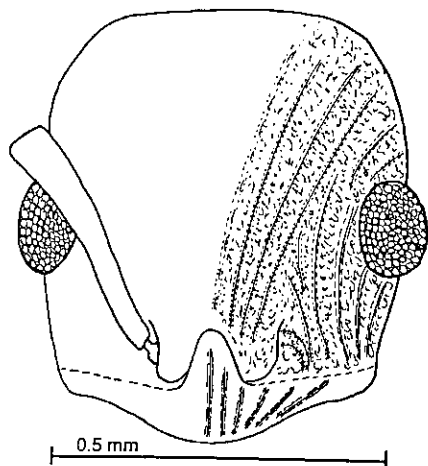


Fig. 190. Head of a paratype worker of *Leptothorax whitfordi*. The sculpture is shown only on the right side of the figure.

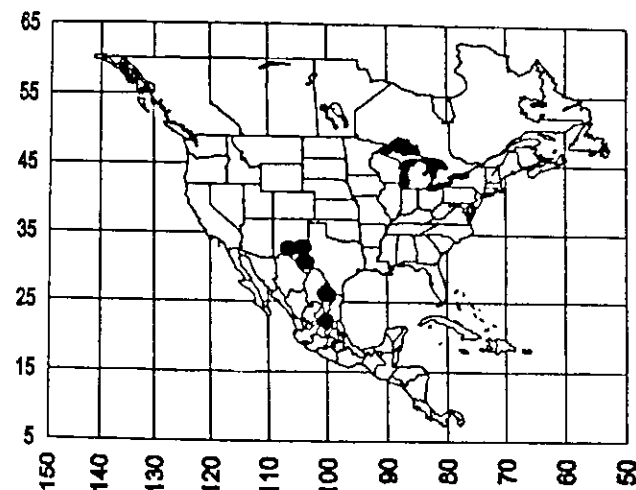
terior border of clypeus concave to convex, clypeus with well defined medial carina, 2 or 3 lateral carinae; sides of head and vertex straight or weakly concave; scape short, extending about 3/4 distance to posterior corner of head, antenna with 11 segments; mesosoma with none of sutures breaking surface sculpture; propodeal spines consisting of tiny angular processes; peduncle of petiole with well developed ventral tooth, with prominent flange above point of attachment, anterior petiolar face straight, posterior face convex, petiolar node broadly rounded and blunt.

Hairs scattered and erect, with blunt or weakly spatulate tips, present on most surfaces, except legs and antennae, especially coarse and blunt tipped on petiole and postpetiole; decumbent pubescence sparse, present on legs and antennae.

Sculpture characteristic of this species: head in large part smooth and shining, lateral parts with fine costulae, fine rugae between eye and frontal carinae and eye and base of mandibles, entire mesosoma, petiole and postpetiole completely covered with coarse, dense punctures, but shining, pronotum may be lightly punctate, but gaster smooth and polished.

Color: medium to dark brown.

Female (dealate) measurements (mm): HL 0.65, HW 0.64, SL 0.44, EL 0.20, WL 1.15, PPW 0.31, PPL 0.19. Indices: CI 98, SI 68, PPI 163.



Map 56. Distribution of *Leptothorax whitfordi*.

Similar to worker in most aspects, differing in that rugae extend over entire surface of head, intrarugal spaces shining, sides of mesosoma shining, but with abundant striae and rugae, propodeal spines consisting of only angles, apex of node of petiole more angulate.

Male measurements (mm): HL

0.42-0.43, HW 0.46-0.47, SL 0.08-0.10, EL 0.22-0.23, WL 0.86-0.91, PW 0.14-0.17, PL 0.13-0.16, PPW 0.17, PPL 0.14-0.16. Indices: CI 107-112, SI 19-24, PI 88-131, PPI 106-121.

Mandible with 3 or 4 teeth; median anterior border of clypeus convex, clypeus with longitudinal carinae, without any transverse carinae; eyes large; ocelli well developed; scape very short, about as long as first 3 funicular segments; propodeum rounded posteriorly, without evidence of angles; petiole with low, rounded node, ventral surface of peduncle without tooth or flange.

Erect hairs very sparse on body, some, with pointed tips, especially on gaster; decumbent pubescence absent.

Sculpture mostly smooth and shining, dorsum of head lightly punctate with rugae on sides of head.

Color: light brown.

Type series: Holotype worker (MCZC) and 63 paratype workers (AMNH, CASC, CWEM, FMNH, LACM, EMAU, MCSN, MCZC, MHNG, MZSP, USNM, UNAM), USA, New Mexico, Eddy Co., Guadalupe Mountains, 5.3 k SE Sitting Bull Falls, 32°12'15"N 104°40'23"W, 1559 meters, 31-viii-1997, W&E Mackay # 17575, 17566.

Material examined: Two hundred thirty-nine workers, 1 female and 2 males, including type locality and UNITED STATES: New Mexico, Doña Ana Co.: 18 KNE Las Cruces, Rancho La Cueva, 23-v-1986, W. Mackay # 7678 (1 worker CWEM), Hidalgo Co., Peloncillo Mts., 21-iii-1998, Mackay family # 17975 (116 workers CWEM); Texas, Jeff Davis Co., Davis Mts., 1829 m, 31-vii-1997, W&E Mackay # 17515 (2 workers

CWEM), Davis Mts., McIves Ranch, 1732 m, 2-viii-1997, W&E Mackay # 17518 (2 workers CWEM). MEXICO: Nuevo León, Monterrey, Parque Chipinque, vii/ix-1989, J. García (19 workers from 4 nest series); San Luis Potosí, 41 KSE Santo Domingo, Kilometer 61 on Route 80, 9 June 1988, 1005 meters, W. Mackay #10956 (35 workers, 1 female, 2 males MCZC, CWEM).

**Etymology:** Named in honor of my close friend, Dr. Walter Whitford, who has published many papers on the ants of southwestern United States.

**Discussion:** The presence of an 11-segmented antenna easily separates *L. whitfordi* from all of the other species in the subgenus with similar sculpture. The smooth dorsum of the head and partially smooth pronotum would separate it from *L. schaumii*. The sculpture of the mesosoma is nearly identical to that of *L. mexicanus* (Fig. 133). The specimen from near Las Cruces differs from the type series in that the propodeal spines are more developed, the subpeduncular process is poorly developed (well developed in the type series) and the pronotum is covered with larger punctures that approach the form of foveolae (punctures in "normal" *L. whitfordi*, with a few wavy striae and areas that are nearly smooth and shining). Specimens from the Davis Mountains are similar in having more developed spines (they are still small), nearly foveolate punctures on the pronotum, but have a well developed subpeduncular process. Some of the specimens from México (San Luis Potosí) differ from the New Mexican specimens. The pronotum of these specimens is partially smooth and shining (Fig. 189), whereas the entire mesosoma *L. whitfordi* is usually heavily punctate, nearly foveolate (Fig. 189). The top of the dorsal face of the propodeum of this form has fine transverse rugulae, the similar surface of *L. whitfordi* is punctate (sides of the propodeum may have poorly defined longitudinal striae). There is a transition between the sculpturing of all of these various extremes, and they are thus considered to be *L. whitfordi*. It is possible that *L. whitfordi* is a species complex, but further collecting will be necessary to evaluate the variability within the species.

**Biology:** This species nests in branches of *Quercus* oaks (gray oak, Arizona oak) and other trees, including a mesquite branch (*Prosopis glandulosa*), which was full of tunnels, at a height of 3 meters (San Luis Potosí). The habitat ranges from desert scrub, with *Yucca* sp., *Prosopis* sp., and *Opuntia* spp. to oak forests. Brood were found in nests in August. One completely excavated nest contained 1 queen, 2 males and 35 workers (#10956), a second contained 1 queen and 116 workers (#17975). A single worker was collected loose in an unspecified tree, in a desert arroyo with oaks and *Celtis*. Specimens in the Davis Mts.

were collected in mixed pine-juniper-oak forests. Nests in the Guadalupe Mts. were found in mixed oak-pinyon pine-juniper forests. The soil is a rocky loam, or rocky fine sand. When the nests are disturbed, they primarily attempt to rescue the brood. They are also much more aggressive than the typical *Leptothorax*, attacking and stinging. The sting is surprisingly painful, similar to that of the thief ants in the genera *Solenopsis* or *Wasmannia*. *Liometopum apiculatum* also nests in branches of the oaks, and this *Leptothorax* may be so aggressive as it must protect nests from the former species, which were attempting to prey on the brood of *Leptothorax* during excavation.

## DISCUSSION

The subgenus *Myrafant* of the genus *Leptothorax* is a group of fascinating ants, which are restricted to North America in the New World. Most species are found at lower latitudes at low to moderate elevations. Nesting sites range from soil, to tree and shrub branches, to insect galls. The nest populations are usually small, and these ants

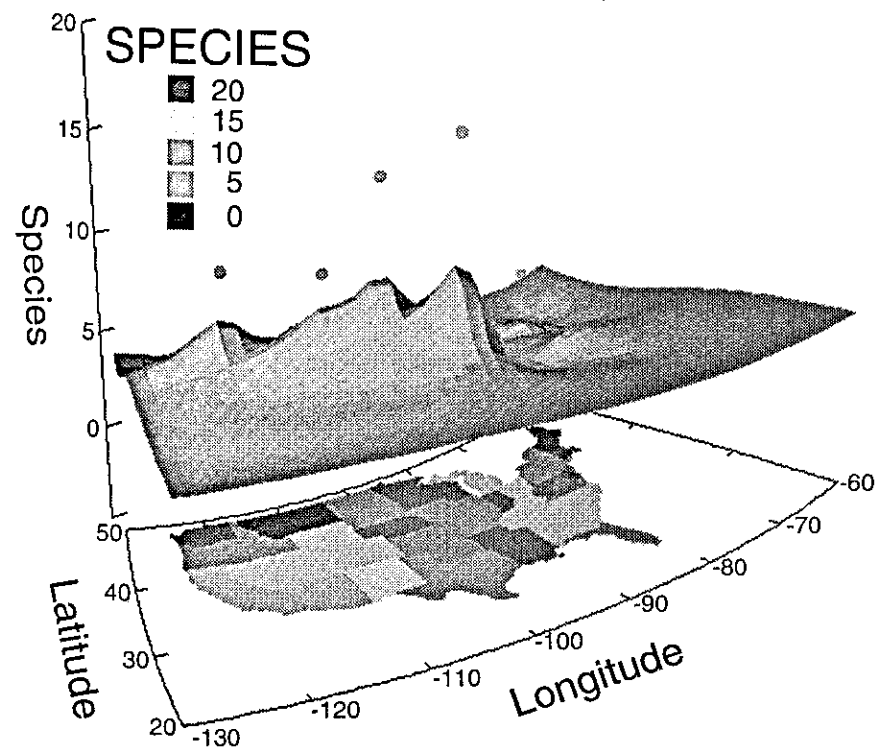


Fig. 191. Distribution of species richness of the subgenus *Myrafant* in the United States.

are rarely aggressive, although some species attack and sting when the nest is disturbed. Some of the species are social parasites on others. Most species are attractive, with a variety of types of sculpture. Some species are bicolored, and the contrast of a dark head and gaster with a red mesosoma makes an attractive combination. Unfortunately most species of these ants are rarely collected, due to their small size and cryptic habits. We carefully search for these ants whenever we collect, and have amassed a large and diverse collection of species.

There are 56 species found in North America, with many more awaiting discovery, especially in México. This group appears to be most diverse in the southwest of the United States and in México, although this may be an artifact based on our extensive collecting in these areas. Unfortunately little can be concluded about the diversity in México, as much of the country has been little collected. We can map the species richness in the United States, where much material is available. The southwestern part of the United States has the greatest number of species (Fig. 191). There appears to be a transition from California through Arizona, New Mexico and into Texas, which shows a general increase in species richness (Fig. 191). Many of the species in these states range into the mountains of Coahuila and Nuevo León, a pattern which is common in the distribution of North American ants. Apparently the ranges of these species were larger during the mesic late Wisconsin interval (ca. 30,000 to 12,000 before present, see Mackay and Elias, 1992).

Hopefully this review will make it easier to identify these ants, and encourage others to look more closely at this interesting group of ants.

#### ACKNOWLEDGMENTS

Emma Mackay, Isidra Moreno, and Fernando Fernández provided critical reviews of the manuscript, and offered many suggestions that improved the text and the keys. I would like to thank several individuals, which loaned or donated material, especially Robert Anderson, William Clark, André Francoeur, Barry Pullen and Stefan Cover. Mrs. Nevada Hubbard helped us locate the type locality of *L. tuscaloosae*. The research was supported by the Department of Biological Sciences and by the Fire Ant Initiative of the Texas Department of Agriculture. Funding for collection of some of the specimens was provided by The National Geographic Society, Robert Anderson, Principal Investigator.

#### REFERENCES

- Alloway, T.M. 1990. Slave-species ant colonies recognize slavemakers as enemies. *Anim. Behav.* 39:1218-1220.

- Alloway, T.M. & M.G. del Rio Pesado. 1983. Behavior of the slave making ant, *Protomognathus americanus* (Emery), and its host species under "seminatural" laboratory conditions (Hymenoptera: Formicidae). *Psyche* 90:425-436.
- Alloway, T.M. & G. Keough. 1990. Slave marking by the slave-making ant *Harpagoxenus americanus* (Emery) (Hymenoptera: Formicidae). *Psyche* 97:55-64.
- Alloway, T.M., A. Buschinger, M. Talbot, R. Stuart & C. Thomas. 1982. Polygyny and polydomy in three North American species of the ant genus *Leptothorax* Mayr (Hymenoptera: Formicidae). *Psyche* 89:249-274.
- Allred, D.M. & A.C. Cole. 1971. Ants of the National Reactor Testing Station. *Great Basin Natur.* 31:237-242.
- Backus, V.L. 1993. Packaging of offspring by nests of the ant, *Leptothorax longispinosus*: parent-offspring conflict and queen-worker conflict. *Oecologia* 95:283-289.
- Baroni Urbani, C. 1978. Materiali per una revisione dei *Leptothorax* neotropici appartenenti al sottogenere *Macromischa* Roger, n. comb. (Hymenoptera: Formicidae). *Entomol. Basiliensia* 3:395-618.
- Bingham, C.T. 1903. *The fauna of British India, including Ceylon and Burma. Hymenoptera 2. Ants and Cuckoo-Wasps.* 506 pp., London.
- Bolton, B. 1976. The ant tribe Tetramoriini (Hymenoptera: Formicidae), constituent genera, review of smaller genera and revision of *Triglyphothrix* Forel. *Bull. Brit. Mus. Nat. Hist. (Entomol.)* 34:283-378.
- Bolton, B. 1979. The ant tribe Tetramoriini (Hymenoptera: Formicidae), the genus *Tetramorium* Mayr in the Malagasy region and in the New World. *Bull. Brit. Mus. Nat. Hist. (Entomol.)* 38:129-181.
- Bolton, B. 1982. Afrotropical species of the myrmicine ant genera *Cardiocondyla*, *Leptothorax*, *Melissotarsus*, *Messor* and *Cataglyphis* (Formicidae). *Bull. Brit. Mus. Nat. Hist. (Entomol.)* 45:307-370.
- Bolton, B. 1995. *A New General Catalogue of the Ants of the World.* 504 pp., Harvard University Press.
- Borchert, H.F. & N.L. Anderson. 1973. The ants of the Bearpaw Mountains of Montana (Hymenoptera: Formicidae). *J. Kans. Entomol. Soc.* 46:200-224.
- Brown, W.L. 1973. A comparison of the Hylean and Congo-West African rain forest ant faunas. In: *Tropical Forest Ecosystems in Africa and South America: A Comparative Review.* Eds. B. J. Meggers, E. S. Ayensu and W. D. Duckworth. Smithsonian Institution Press, Washington, D. C. pp. 161-185.
- Buren, W. 1944. A list of Iowa ants. *Iowa State Coll. J. Sci.* 18:277-312.
- Buren, W. 1945. *Leptothorax longispinosus* subsp. *iowensis*, nom. n. *Proc. Entomol. Soc. Wash.* 47:288.
- Buschinger, A. 1981. Biological and systematic relationships of social parasitic Leptothoracini from Europe and North America. In: *Biosystematics of Social Insects*, P. E. Howse and J.-L. Clement (eds.) pp. 211-222, Academic Press.
- Carter, W.G. 1962. Ant distribution in North Carolina. *J. Mitchell Soc.* 78:150-

- 204.
- Cole, A.C. 1934. An annotated list of the ants of the Snake River plains, Idaho (Hymenoptera: Formicidae). *Psyche* 41:221-227.
- Cole, A.C. 1940. A guide to the ants of the Great Smoky Mountains National Park, Tennessee. *Amer. Midl. Natur.* 24:1-88.
- Cole, A.C. 1942. The ants of Utah. *Amer. Midl. Natur.* 28:358-388.
- Cole, A.C. 1953. Notes on the genus *Leptothorax* in New Mexico and a description of a new species (Hymenoptera, Formicidae). *Proc. Entomol. Soc. Wash.* 55:27-30.
- Cole, A.C. 1954. Studies of New Mexico ants. 10. The genus *Leptothorax* (Hymenoptera: Formicidae). *J. Tenn. Acad. Sci.* 29:240-241.
- Cole, A.C. 1956a. A new species of *Leptothorax* from Arizona (Hymenoptera: Formicidae). *J. Tenn. Acad. Sci.* 31:28-31.
- Cole, A.C. 1956b. *Leptothorax stenotyle* (n. nov.) for *Leptothorax angustinodis* Cole. *J. Tenn. Acad. Sci.* 31:214.
- Cole, A.C. 1957. A new *Leptothorax* from Texas (Hymenoptera: Formicidae). *J. Tenn. Acad. Sci.* 32:42-45.
- Cole, A.C. 1958a. North American *Leptothorax* of the *nitens-carinatus* complex (Hymenoptera: Formicidae). *Ann. Entomol. Soc. Amer.* 51:535-538.
- Cole, A.C. 1958b. Another new *Leptothorax* from Texas (Hymenoptera: Formicidae). *J. Tenn. Acad. Sci.* 33:213-215.
- Cole, A.C. 1966. Ants of the Nevada Test Site. Brigham Young Univ. Sci. Bull. Biol. Ser. 7:1-27.
- Conklin, A. 1972. A study of ant populations at the plains-foothill border, Colorado. *Southwest. Natur.* 17:43-54.
- Creighton, W.S. 1950. The ants of North America. *Bull. Mus. Comp. Zool.* 104:1-585 + 57 plates.
- Creighton, A. C. 1953. The rediscovery of *Leptothorax silvestrii* (Santschi) (Hymenoptera, Formicidae). *Amer. Mus. Novitates* #1635, 7pp.
- Creighton, W.S. & R.R. Snelling. 1966. The rediscovery of *Camponotus (Myrmaphaenus) yogi* Wheeler (Hymenoptera: Formicidae). *Psyche* 73:187-195.
- Crozier, R.H. 1970. Karyotypes of twenty-one ant species, with reviews of the known ant karyotypes. *Canad. J. Genetics Cytol.* 12:109-128.
- Dennis, C.A. 1938. The distribution of ant species in Tennessee with reference to ecological factors. *Ann. Entomol. Soc. Amer.* 31:267-308.
- Douglas, M.M. 1983. Defense of bracken fern by arthropods attracted to axillary nectaries. *Psyche* 90:313-320.
- DuBois, M.B. 1985. Distribution of ants in Kansas: Subfamilies Ponerinae, Ecitoninae, and Myrmicinae (HYMENOPTERA: FORMICIDAE). *Sociobiology* 11:153-188.
- Emery, C. 1895. Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna. *Zool. Jahrb., Abt. f. Syst., Oekologie u. Geograph. der Tiere* 8:257-360 + 1 plate.
- Emery, C. 1896. Studi sulle formiche della fauna Neotropica. *Bull. Soc. Entomol. Ital.* 28:33-107.
- Emery, C. 1898. Beiträge zur Kenntniss der palaearktischen Ameisen.

- Översigt af Finska Vetenskaps-Societetens Förhandlingar 40:124-151.
- Emery, C. 1922. *Hymenoptera, Fam. Formicidae, subfam. Myrmicinae*. In: Wytman, P. (ed.), *Genera Insectorum*, fasc. 174, 397 pp.
- Fabricius, J.C. 1793. *Entomologia Systematica emendata et aucta*. Secundum classes, ordines, genera, species adjectis synonymis, locis, observationibus, descriptionibus 2:519 pp. Hafniae.
- Feener, D.H. 1981. Notes on the biology of *Pheidole lamia* (Hymenoptera: Formicidae) at its type locality (Austin, Texas). *J. Kans. Entomol. Soc.* 54:269-277.
- Fellers, J. 1989. Daily and seasonal activity in woodland ants. *Oecologia* 78:69-76.
- Fellers, G.M. & J.H. Fellers. 1982. Scavenging rates of invertebrates in an eastern deciduous forest. *Amer. Midl. Nat.* 107:389-392.
- Forel, A. 1885. Etudes myrmécologiques en 1884; avec une description des organes sensoriels des antennes. *Bull. Soc. Vaud. Sci. Natur.* 20:316-380.
- Forel, A. 1890. Fourmis de Tunisie et de l'Algérie orientale récoltées et décrites par Auguste Forel. *Ann. Soc. Entomol. Belg. Comptes-rendus* 34: lxi-lxxvi.
- Francoeur, A. & R. Loiselle. 1985. Biosystematique de la tribu Leptothoracini (Formicidae, Hymenoptera). 1. Le genre *Formicoxenus* dans la region holarctique. *Naturaliste Can. (Rev. Ecol. Syst.)* 112:343-403.
- Frumhoff, P.C. & P.S. Ward. 1992. Individual-level selection, colony-level selection, and the association between polygyny and worker monomorphism in ants. *Amer. Natur.* 139:559-590.
- Gregg, R.E. 1944. The ants of the Chicago region. *Ann. Entomol. Soc. Amer.* 37:447-480.
- Gregg, R.E. 1953. Notes on the ant, *Leptothorax obliquicanthus* Cole (Hymenoptera: Formicidae). *Breviora, Mus Comp. Zool.* #22, 3pp.
- Gregg, R.E. 1963. *The Ants of Colorado*. Univ. Colorado Press. 792 pp.
- Headley, A.A. 1943. Population studies of two species of ants, *Leptothorax longispinosus* Roger and *Leptothorax curvispinosus* Mayr. *Ann. Entomol. Soc. Amer.* 36:743-753.
- Heithaus, E.R. 1981. Seed predation by rodents in three ant-dispersed plants. *Ecology* 62:136-145.
- Herbers, J.M. 1983. Social organization in *Leptothorax* ants: within- and between- species patterns. *Psyche* 90:361-386.
- Herbers, J.M. 1984. Queen-worker conflict and eusocial evolution in a polygynous ant species. *Evolution* 38:631-643.
- Herbers, J.M. 1985. Seasonal structuring of a north temperate ant community. *Insectes Sociaux* 32:224-240.
- Herbers, J.M. 1986a. Nest site limitation and facultative polygyny in the ant *Leptothorax longispinosus*. *Behav. Ecol. Sociobiol.* 19:115-122.
- Herbers, J.M. 1986b. Effects of ecological parameters on queen number in *Leptothorax longispinosus* (Hymenoptera: Formicidae). *J. Kans. Entomol. Soc.* 59:675-686.
- Herbers, J.M. 1986c. Ecological genetics of queen number in *Leptothorax longispinosus* (Hymenoptera: Formicidae). *Entomol. Gener.* 11:119-123.

- Herbers, J.M. 1989. Community structure in north temperate ants: temporal and spatial variation. *Oecologia* 81:201-211.
- Herbers, J.M. 1990. Reproductive investment and allocation ratios for the ant *Leptothorax longispinosus*: sorting out the variation. *Amer. Natur.* 136:178-208.
- Herbers, J.M. & C.W. Tucker. 1986. Population fluidity in *Leptothorax longispinosus* (Hymenoptera: Formicidae). *Psyche* 93:217-229.
- Hood, W.G. & W.R. Tschinkel. 1990. Desiccation resistance in arboreal and terrestrial ants. *Phys. Entomol.* 15:23-35.
- Kannowski, P. 1959. The flight activities and colony-founding behavior of bog ants in southeastern Michigan. *Insectes Soc.* 6:115-162.
- Kempf, W.W. 1959. A synopsis of the New World species belonging to the *Nesomyrmex*-group of the ant genus *Leptothorax* Mayr (Hymenoptera: Formicidae). *Studia Entomologica* 2:391-432.
- Kempf, W.W. 1972. Catálogo abreviado das formigas da Região Neotropical. *Studia Entomol.* 15:3-344.
- Lavigne, R. & V. Tepedino. 1976. Checklist of the Insects in Wyoming. I. Hymenoptera (ants on pp. 24-26). *Agric. Exper. Sta., Univ. Wyoming Res. J.* 61 pp.
- Leprince, D.J. and A. Francoeur. 1986. Hilltop swarming by ants (Hymenoptera: Formicidae) in southwestern Quebec and interspecific competition at the swarm marker. *Ann. Entomol. Soc. Amer.* 79:865-869.
- Letendre, M. and J.G. Pilon. 1972. Écologie des populations de *Leptothorax longispinosus* Roger et *Stenamma diecki* Emery dans les peuplements forestiers des basses Laurentides, Québec (Hymenoptera: Formicidae). *Natur. Canad.* 99:73-82.
- Longino, J.T. and J. Wheeler. 1987. Ants in live oaks in Texas. *Nat. Geogr. Res.* 3:125-127.
- Mackay, W.P. 1981. A comparison of the nest phenologies of three species of *Pogonomyrmex* harvester ants (Hymenoptera: Formicidae). *Psyche* 88:25-74.
- Mackay, W.P. 1993a. The status of the ant *Leptothorax pergandei* Emery (Hymenoptera: Formicidae). *Sociobiology* 21:287-297.
- Mackay, W.P. 1993b. Succession of ant species (Hymenoptera: Formicidae) on low-level nuclear waste sites in northern New Mexico. *Sociobiology* 23:1-11.
- Mackay, W.P. and S.A. Elias. 1992. Late Quaternary ant fossils from packrat middens (Hymenoptera: Formicidae): implications for climatic change in the Chihuahuan Desert. *Psyche* 99:169-184.
- Mackay, E.E. & W.P. Mackay. 1984. Biology of the thatching ant *Formica haemorrhoidalis* Emery (Hymenoptera: Formicidae). *Pan-Pac. Entomol.* 60:79-87.
- Mackay, W.P., D. Lowrie, A. Fisher, E. Mackay, F. Barnes & D. Lowrie. 1988. The ants of Los Alamos County, New Mexico (Hymenoptera: Formicidae). *Advances in Myrmecology*, pp. 79-132, J. Trager (ed.), E. J. Brill.
- Mann, W.M. 1911. Notes on the guests of some California ants. *Psyche* 18:27-31.

- Mann, W.M. 1920. Additions to the ant fauna of the West Indies and Central America. *Bull. Amer. Mus. Nat. Hist.* 42:403-439.
- Mayr, G.C. 1855. Formicina austriaca. Beschreibung der bisher im österreichischen Kaiserstaate aufgefundenen Ameisen nebst Hinzufügung jener in Deutschland, in der Schweiz und in Italien vorkommenden Ameisen. *Verhand. Zool.-Botan. Ver. in Wien* 5:273-478.
- Mayr, G.C. 1861. *Die Europäischen Formiciden (Ameisen)*. 80 pp., Wien.
- Mayr, G.C. 1866. Myrmecologische Beiträge. *Sitzb. Akad. wiss. Wien.* 53:484-517.
- Mayr, G.C. 1868. Die Ameisen des baltischen Bernsteins. *Betr. Natur. Preussens. Königlichen Physik.-Ökonomischen Gesell. Königsberg* 1:1-102.
- Mayr, G.C. 1886. Die Formiciden der Vereinigten Staaten von Nordamerika. *Verh. zool.-bot. Ges. Wien.* 36:419-464.
- Moeglich, M. 1978. Social organization of nest emigration in *Leptothorax* (Hym., Form.). *Insectes Soc.* 25:205-226.
- Moeglich, M. 1979. Tandem calling pheromone in the genus *Leptothorax* (Hymenoptera: Formicidae): Behavioral analysis of specificity. *J. Chem. Ecol.* 5:35-52.
- Moody, J.V. & O.F. Francke. 1982. The ants (Hymenoptera, Formicidae) of western Texas. Part 1: Subfamily Myrmicinae. *Graduate Studies, Texas Tech University* #27, 80 pp.
- Murphy, C.F. & B.A. Croft. 1990. Forest ant composition and foraging following aerial spraying of carbaryl to suppress western spruce budworm. *Can. Entomol.* 122:595-606.
- Patten, W.H. 1879. A gall inhabiting ant. *Amer. Natur.* 13:126-127.
- Roger, J. 1863. Die neu aufgeführten Gattungen und Arten meines Formiciden-verzeichnisses nebst Ergänzungen einer früher gegebenen Beschreibungen. *Berl. Entomol. Z.* 7:131-214.
- Rüppell, O., J. Heinze & B. Hölldobler. 1998. Size-dimorphism in the queens of the North American ant *Leptothorax rugatulus* (Emery). *Insectes Soc.*, 45:67-77.
- Ruzsky, M. 1904. O murav'yakh Arkhangel'skoi gubernii. *Zapiski po Obshchei Geografii Imperatorskago Russkago Geograficheskago Obshchestva* 41:287-294.
- Santschi, F. 1911. Formicides recoltés par Mr. le Prof. F. Silvestri aux Etats Unis en 1908. *Bolletino della Società Entomologica Italiana* 41:3-7.
- Santschi, F. 1922. Quelques nouvelles variétés des fourmis paléarctiques. *Bull. Soc. Hist. Natur. Afrique du Nord* 13:66-68.
- Seevers, C.H. & H.S. Dybas. 1943. A synopsis of the Limulodidae (Coleoptera): a new family proposed for myrmecophiles of the subfamilies Limulodinae (Ptiliidae) and Cephaloplectinae (Staphylinidae). *Ann. Entomol. Soc. Amer.* 36:546-586.
- Smith, D.R. 1979. Formicoidea. Pp. 1323-1467, In: Krombein, K., P. Hurd, D. Smith and B. Burks. *Catalog of Hymenoptera in America North of Mexico*, Vol. 2 Apocrita (Aculeata). Smithsonian Institution Press, pp. 1323-1467, Washington D. C.

- Smith, M.R. 1924. An annotated list of the ants of Mississippi (Hym.). Entomol. News 35:47-54.
- Smith, M.R. 1929. Descriptions of five new North American ants, with biological notes. Ann. Entomol. Soc. Amer. 22:543-551.
- Smith, M.R. 1942. A new, apparently parasitic ant. Proc. Entomol. Soc. Wash. 44:59-61.
- Smith, M.R. 1949. A new *Leptothorax* commonly inhabiting the canyon live oak of California (Hymenoptera: Formicidae). Psyche 56:112-115.
- Smith, M.R. 1950. On the status of *Leptothorax* Mayr and some of its subgenera. Psyche 57:29-30.
- Smith, M.R. 1952. North American *Leptothorax* of the *tricarinatus-texanus* complex (Hymenoptera: Formicidae). J. New York Entomol. Soc. 40:96-106.
- Snelling, R.R. 1986. New synonymy in Caribbean ants of the genus *Leptothorax*. Proc. Entomol. Soc. Wash. 88:154-156.
- Sützi, H. 1917. Ameisen aus dem westlichen Mittelmeergebiet und von den Kanarischen Inseln. Mitt. Zool. Mus. Berlin 8:333-353.
- Sützi, H. 1937. Einige Ameisen aus Mexiko. Sitzungs. Gesellsch. Naturforsch. Freunde Berlin. 1937:132-136.
- Stuart, R.J. 1985. Spontaneous polydomy in laboratory colonies of the ant *Leptothorax curvispinosus* Mayr (Hymenoptera: Formicidae). Psyche 92:71-81.
- Stuart, R.J. 1987a. Transient nestmate recognition cues contribute to a multicolonial population structure in the ant, *Leptothorax curvispinosus*. Behav. Ecol. Sociobiol. 21:229-235.
- Stuart, R.J. 1987b. Individual workers produce colony-specific nestmate recognition cues in the ant *Leptothorax curvispinosus*. Anim. Behav. 35:1062-1069.
- Stuart, R.J. 1991. Nestmate recognition in leptothoracine ants: testing for effects of queen number, colony size and species of intruder. Anim. Behav. 42:277-284.
- Taber, S. & J. Cokendolpher. 1988. Karyotypes of a dozen ant species from the southwestern U. S. A. (Hymenoptera: Formicidae). Caryologia 41:93-102.
- Talbot, M. 1934. Distribution of ant species in the Chicago region with reference to ecological factors and physiological toleration. Ecology 15:416-439.
- Talbot, M. 1957. Population studies of the slave-making ant *Leptothorax duloticus* and its slave, *Leptothorax curvispinosus*. Ecology 38:449-456.
- Talbot, M. 1965. Populations of ants in a low field. Insectes Soc. 12:19-48.
- Van Pelt, A. 1958. The ecology of the ants of the Welaka Reserve, Florida (Hymenoptera: Formicidae). Part II. Annotated list. Amer. Midl. Nat. 59:1-57.
- Van Pelt, A. 1963. High altitude ants of the southern Blue Ridge. Amer. Midl. Natur. 69:205-223.
- Van Pelt, A. 1983. Ants of the Chisos Mountains, Texas (Hymenoptera: Formicidae). Southwest. Natur. 28:137-142.
- Wesson, L.G. & R.G. Wesson. 1940. A collection of ants from south-central

- Ohio. Amer. Midl. Natur. 24:89-103.
- Wheeler, J. and J. Longino. 1988. Arthropods in live oak galls in Texas. Entomol. News 99:25-29.
- Wheeler, E.W. & G.C. Wheeler. 1944. The ants of North Dakota. North Dak. Hist. Quarterly 11:231-270.
- Wheeler, G.C. & J. Wheeler. 1955. The ant larvae of the myrmicine tribe Leptothoracini. Ann. Entomol. Soc. Amer. 48:17-29.
- Wheeler, G.C. & J. Wheeler. 1960. Supplementary studies on the larvae of the Myrmicinae. Proc. Entomol. Soc. Wash. 62:1-32.
- Wheeler, G.C. & J. Wheeler. 1963. *The Ants of North Dakota*. Univ. of N. Dakota Press. 326 pp.
- Wheeler, G.C. & J. Wheeler. 1973a. *Ants of Deep Canyon*. Univ of Calif. 162 pp.
- Wheeler, G.C. & J. Wheeler. 1973b. Ant larvae of four tribes: second supplement. Psyche 80:70-82.
- Wheeler, G.L. & J. Wheeler. 1986 *The Ants of Nevada*. Allen Press, 138 pp.
- Wheeler, G.C. & J. Wheeler. 1988. A checklist of the ants of Wyoming (Hymenoptera: Formicidae). Insecta Mundi 2:231-239.
- Wheeler, G.C. & J. Wheeler. 1989. Notes on ant larvae: Myrmicinae. Trans. Amer. Entomol. Soc. 114:319-327.
- Wheeler, G.C., J. Wheeler, T. Galloway & G. Ayre. 1989. A list of the ants of Manitoba. Proc. Entomol. Soc. Manitoba 45:34-49.
- Wheeler, W.M. 1903a. A revision of the North American ants of the genus *Leptothorax*. Proc. Acad. Natur. Sci. Phil. 55:215-260 + 1 plate.
- Wheeler, W.M. 1903b. Some new gynandromorphous ants, with a review of the previously recorded cases. Bull. Amer. Mus. Nat. Hist. 19:653-683.
- Wheeler, W.M. 1905. An annotated list of the ants of New Jersey. Bull. Amer. Mus. Nat. Hist. 41:371-403.
- Wheeler, W.M. 1906. The ants of the Grand Canyon. Bull. Amer. Mus. Nat. Hist. 22:329-345.
- Wheeler, W.M. 1909. A decade of North American Formicidae. J. New York Entomol. Soc. 17:77-90.
- Wheeler, W.M. 1910. *Ants, Their Structure, Development and Behavior*. 663 pp. Colombia Univ. Press.
- Wheeler, W.M. 1913. Ants collected in Georgia by Dr. J. C. Bradley and Mr. W. T. Davis. Psyche 20:112-117.
- Wheeler, W.M. 1914. Ants collected by W. M. Mann in the state of Hidalgo, Mexico. J. New York Entomol. Soc. 22:37-61.
- Wheeler, W.M. 1915. Some additions to the North American ant-fauna. Bull. Amer. Mus. Nat. Hist. 34:389-421.
- Wheeler, W.M. 1916. A list of Indiana ants. Proc. Ind. Acad. Sci. 26:460-466.
- Wheeler, W.M. 1917. The mountain ants of western North America. Proc. Amer. Acad. Arts Sci. 52:457-569.
- Wheeler, W.M. 1934. Ants from the islands off the west coast of Lower California and Mexico. Pan-Pac. Entomol., 10:132-144.
- Williams, C.E. 1989. Ants (Hymenoptera: Formicidae) nesting in serotinous cones of table mountain pine, *Pinus pungens*. Entomol. News 100:125-



126.  
 Wilson, E.O. 1950. A new *Leptothorax* from Alabama (Hymenoptera: Formicidae). *Psyche* 57:128-130.  
 Wilson, E.O. 1952. Notes on *Leptothorax bradleyi* Wheeler and *L. wheeleri* M. R. Smith (Hymenoptera: Formicidae). *Entomol. News* 63:67-71.  
 Wilson, E.O. 1974a. The population consequences of polygyny in the ant *Leptothorax curvispinosus*. *Ann. Entomol. Soc. Amer.* 67:781-786.  
 Wilson, E.O. 1974b. Aversive behavior and competition within colonies of the ant *Leptothorax curvispinosus*. *Ann. Entomol. Soc. Amer.* 67:777-780.  
 Wilson, E.O. & R.M. Fagen. 1974. On estimation of total behavioral repertoires in ants. *J. New York. Entomol. Soc.* 82:106-112.

## Index

## A

**adustus**

Comparison, 326, 336,  
367, 379

Diagnosis, distribution  
and description,  
309

Key, 309

## Alabama

*bradleyi*, 322

*curvispinosus*, 337

*longispinosus*, 358

*schaumii*, 404

*smithi*, 409

*texanus*, 152

*tuscaloosae*, 416

## Alberta

*rugatulus*, 394

**ambiguus**

Comparison, 358, 373, 394

Diagnosis and description,  
312

Key, 286

*Amecocerus* sp. (Melyridae), 397

**andersoni**

Comparison, 319, 334,  
355, 384, 415

Diagnosis, distribution  
and description,  
314

Key, 274

Key to species complex,  
299

**andrei**

Comparison, 319, 329,  
344, 377, 386, 398,  
415

Diagnosis and distribu-  
tion, 316

Key, 282

Key to species complex,  
301

*Andricus spectabilis*, 347

*angustinodus* Cole. See  
*stenotyle*

## Arizona

*andrei*, 316

*carinatus*, 328

*curvispinosus*, 337

*mariposa*, 362

*neomexicanus*, 374

*nitens*, 378

*rugatulus*, 394

*silvestrii*, 407

*stenotyle*, 410

*texanus*, 416

*tricarinatus*, 417

## Arkansas

*curvispinosus*, 337

*schaumii*, 404

*texanus*, 416

## B

## Baja California Norte

*andrei*, 316

## Baja California Sur

*peninsularis*, 387

**bestelmeyeri**

Comparison, 315, 316,  
334, 336, 355, 415

Diagnosis, distribution  
and description,  
318

Key, 280

**bicolor**

Comparison, 384

Diagnosis, distribution  
and description,  
320

Key, 276

**bradleyi**

Comparison, 352, 394, 407

Diagnosis and distribution, 321

Key, 286

**brevispinosus**

Comparison, 325, 331, 372

Diagnosis, distribution and description, 323

Key, 276

**bristoli**

Comparison, 334, 361, 393

Diagnosis, distribution and description, 326

Key, 276

British Columbia

*rugatulus*, 130**C**

California

*andrei*, 316*chandleri*, 330*gallae*, 346*lindae*, 355*mariposa*, 362*maryanae*, 364*nevadensis*, 376*nitens*, 378*ocellatus*, 382*oxynodis*, 384*rugatulus*, 394**carinatus**

Comparison, 329, 334, 336, 374, 375, 384, 402

Diagnosis and distribution, 328

Key, 284

**chandleri**

Comparison, 346, 367, 372

Diagnosis, distribution

and description,

330

Key, 278

Chiapas

*bicolor*, 319

Chihuahua

*adustus*, 309*carinatus*, 328

Coahuila

*bristoli*, 326*hispidus*, 347*mexicanus*, 369**cokendolpheri**

Comparison, 315, 319, 336, 372, 384, 393

Diagnosis, distribution and description, 332

Key, 278

**coleenae**

Comparison, 315, 319, 334, 355, 367

Diagnosis, distribution and description, 335

Key, 280

Colorado

*furunculus*, 344*neomexicanus*, 374*nevadensis*, 376*obliquicanthus*, 380*rugatulus*, 394*schmitti*, 406*texanus*, 416*tricarinatus*, 417

Connecticut

*curvispinosus*, 337*longispinosus*, 358**curvispinosus**

Comparison, 313, 358, 373, 419

Mackay, W.P. — Review of the New World Ants of the Subgenus *Myrafant*

Diagnosis, distribution

and description,

337

Key, 286

*curvispinosus annectens*. See *rugatulus**curvispinosus rugatulus*\. See *rugatulus**curvispinosus rugatulus**cockerelli*. See *rugatulus***D****davisi**

Comparison, 416

Diagnosis and distribution, 340

Key, 283

*Dichothorax*, 269, 348, 387**E***eldoradensis*. See *nevadensis***emmae**

Comparison, 343

Diagnosis and distribution, 342

Key, 285

Key to species complex, 302

**F**

Florida

*bradleyi*, 322*curvispinosus*, 337*davisi*, 340*smithi*, 409*Formica haemorrhoidalis*. See*Leptothorax andrei**Formica occidua*. See*Leptothorax andrei**Formica ravidia*. See *Leptothorax**andrei* and *L. lindae*.*Formicoxenus*

Key, 275

*fortinodis*. See *schaumi**fortinodis melanoticus*. See*schaumii**fortinodis* var. *gilvus*. See*schaummi**fortinodis* var. *melanoticus*. See*schaumii**foveatus*, 313**furunculus**

Comparison, 316, 319, 336, 398, 415

Diagnosis and distribution, 344

Key, 282

**G****gallae**

Comparison, 377, 384, 398

Diagnosis and distribution, 346

Key, 282

Georgia

*bradleyi*, 322*curvispinosus*, 337*davisi*, 340*longispinosus*, 358*schaumii*, 404*smithi*, 409*texanus*, 416

Goniothorax, 269

Guatemala

*stollii*, 412

Guerrero

*striatulus*, 413**H**

Hidalgo

*manni*, 361

*rugithorax*, 397

# **hispidus**

- Comparison, 315, 407
- Diagnosis and distribution, 347
- Key, 274
- Key to species complex, 302

## **I**

### **Idaho**

- nevadensis*, 376
- nitens*, 378
- rugatulus*, 394
- tricarinatus*, 417

### **Illinois**

- curvispinosus*, 337
- longispinosus*, 358
- schaumii*, 404
- texanus*, 416

### **Indiana**

- curvispinosus*, 337
- longispinosus*, 358
- schaumi*, 404
- texanus*, 416

### **Iowa**

- ambiguus*, 312
- curvispinosus*, 337
- lobispinosus*, 358
- schaumii*, 404
- tricarinatus*, 417

*iowensis*. See *longispinosus*

## **J**

### **josephi**

- Comparison, 394
- Diagnosis, distribution and description, 349
- Key, 287

## **K**

### **Kansas**

- ambiguus*, 312
- curvispinosus*, 337
- schaumii*, 404
- texanus*, 416

### **Kentucky**

- curvispinosus*, 337
- longispinosus*, 358
- schaumii*, 404
- smithi*, 409
- texanus*, 416

## **L**

### **Leptothorax**

Key (subgenus), 272

### **Leptothorax (Leptothorax)**

*duloticus*, 312, 339, 360

### **Leptothorax (Leptothorax)**

*muscorum*, 347, 349, 352

### **Leptothorax (Dichothorax)**

*pergandei* 272, 349, 387

### **liebi**

- Comparison, 315, 319, 334, 355, 380, 384
- Diagnosis, distribution and description, 353

Key, 280

*Limulodes parki*, 340

### **lindae**

- Comparison, 377, 384
- Diagnosis, distribution and description, 356

Key, 282

### **longispinosus**

- Comparison, 313, 338, 419
- Diagnosis and distribution, 358
- Key, 285

## **Key to species complex, 303**

*longispinosus laeviceps*. See *longispinosus*

### **Louisiana**

- curvispinosus*, 337
- schaumii*, 404
- texanus*, 416

## **M**

*Macromischa*, 269, 272

Subgenus, 272

*Macromischa wheeleri*. See *smithi*

### **Maine**

*longispinosus*, 358

### **Manitoba**

*ambiguus*, 312

### **manni**

- Comparison, 326, 327, 393
- Diagnosis and distribution, 361
- Key, 276

### **mariposa**

- Comparison, 331, 336, 346, 362, 367, 368, 372, 379, 386
- Diagnosis and distribution, 362

Key, 278

### **maryanae**

- Comparison, 400
- Diagnosis, distribution and description, 364

Key, 278

### **Maryland**

*longispinosus*, 358

### **Massachusetts**

- davisi*, 340
- longispinosus*, 358

## **melanderi**. See *nevadensis melinus*

Comparison, 363, 367, 372, 379

Diagnosis, distribution and description, 103

Key, 14

## **mexicanus**

Comparison, 61, 70, 129, 159

Diagnosis, distribution and description, 368

Key, 278

### **México (State)**

*punctithorax*, 391

### **Michigan**

- ambiguus*, 312
- curvispinosus*, 337
- longispinosus*, 358
- texanus*, 416

### **Michoacán**

- brevispinosus*, 323
- rugulosus*, 401

### **Minnesota**

- ambiguus*, 312
- curvispinosus*, 337
- longispinosus*, 358
- texanus*, 416

### **minutissimus**

Diagnosis and description, 373

Key, 286

### **Mississippi**

- schaumii*, 404
- smithi*, 409
- texanus*, 416

### **Missouri**

- curvispinosus*, 337
- longispinosus*, 358
- schaumii*, 404

- texanus*, 416  
 Montana  
*nevadensis*, 376  
*rugatulus*, 394  
 Morelos  
*manni*, 361  
*Mycothorax*, 269  
*Myrafant*, 269  
 Diagnosis, discussion and biology, 270  
 Key to Mexican species (Spanish), 287  
 Key to New World species, 272  
*Myrmica*, 369
- N**
- Nebraska  
*ambiguus*, 312  
*curvispinosus*, 337  
*tricarinatus*, 417  
**neomexicanus**  
 Comparison, 329, 345, 375, 377, 402, 411  
 Diagnosis and distribution, 374  
 Key, 284  
*Nesomyrmex*, 269  
 Subgenus, 272  
 Nevada  
*andrei*, 316  
*carinatus*, 328  
*neomexicanus*, 374  
*nevadensis*, 376  
*nitens*, 378  
*obliquicanthus*, 380  
*rugatulus*, 394  
*tricarinatus*, 417  
**nevadensis**  
 Comparison, 316, 344, 357, 375, 398  
 Diagnosis and distribution, 376  
 Key, 282  
**nevadensis rudis**. See *nevadensis*  
 New Hampshire  
*curvispinosus*, 337  
*longispinosus*, 358  
 New Jersey  
*curvispinosus*, 337  
*davisi*, 340  
*longispinosus*, 358  
*schaumii*, 404  
 New Mexico  
*adustus*, 309  
*andrei*, 316  
*bestermeyeri*, 318  
*cokendolpheri*, 332  
*coleenae*, 335  
*emmae*, 341  
*josephi*, 349  
*melinus*, 367  
*neomexicanus*, 374  
*nitens*, 378  
*obliquicanthus*, 380  
*rugatulus*, 394  
*texanus*, 416  
*tricarinatus*, 420  
*whitfordi*, 421  
 New York  
*ambiguus*, 312  
*curvispinosus*, 337  
*davisi*, 340  
*longispinosus*, 358  
**nitens**  
 Comparison, 336, 362, 367, 368, 372, 406  
 Diagnosis and distribution, 379  
 Key, 274, 278  
 Key to species complex, 304

- nitens heathi*. See *nitens*  
*nitens occidentalis*. See *nitens*  
*nitens* var. *mariposa*. See *mariposa*  
 North Carolina  
*curvispinosus*, 337  
*davisi*, 340  
*longispinosus*, 358  
*schaumii*, 404  
*smithi*, 409  
*texanus*, 416  
*tuscaloosae*, 419  
 North Dakota  
*ambiguus*, 312  
*curvispinosus*, 337  
*rugatulus*, 394  
*tricarinatus*, 417  
 Nuevo León  
*hispidus*, 347  
*manni*, 361  
*punctaticeps*, 388  
*punctatissimus*, 390  
*rugosus*, 399  
*whitfordi*, 421
- O**
- obliquicanthus**  
 Comparison, 315, 348, 355, 407, 411  
 Diagnosis and distribution, 380  
 Key 274  
**obturator**  
 Diagnosis and distribution, 382  
 Key, 280  
 Species complex, 304  
**ocellatus**  
 Comparison, 383  
 Diagnosis, distribution and description, 383
- Key, 274  
 Ohio  
*ambiguus*, 312  
*curvispinosus*, 337  
*longispinosus*, 358  
*schaumii*, 404  
*smithi*, 409  
*texanus*, 416  
 Oklahoma  
*curvispinosus*, 337  
*schaumii*, 404  
*texanus*, 416  
 Ontario  
*longispinosus*, 358  
 Oregon  
*mariposa*, 362  
*nevadensis*, 376  
*nitens*, 378  
*rugatulus*, 394  
**oxynodis**  
 Comparison, 385  
 Diagnosis, distribution and description, 385  
 Key, 284
- P**
- peninsularis**  
 Comparison, 348, 398, 407  
 Diagnosis and distribution, 386  
 Key, 280  
 Pennsylvania  
*ambiguus*, 312  
*curvispinosus*, 337  
*longispinosus*, 358  
*schaumii*, 404  
*Pheidole*, 372, 381  
*Pheidole tepicana*, 378  
*pinetorum*, 318  
*Pogonomyrmex montanus*, 367

*Populus fremontii*, 311  
*Prosopis glandulosa*, 424  
*Protomognathus americanus*,  
 313, 329, 360

### **punctaticeps**

Comparison, 348, 377,  
 387, 391  
 Diagnosis, distribution-  
 and description,  
 388

Key, 280

### **punctatissimus**

Comparison, 354, 377,  
 384, 389  
 Diagnosis, distribution  
 and description,  
 390

Key, 280

### **punctithorax**

Comparison, 327, 334,  
 362, 372, 393  
 Diagnosis, distribution  
 and description,  
 392

Key, 305

## **Q**

Quebec

*ambiguus*, 312

*longispinosus*, 358

*Quercus*, 285, 424

*Quercus arizonica*, 352

*Quercus chrysolepis*, 347

*Quercus emoryi*, 343, 408

*Quercus virginiana*, 381

## **R**

### **rugatulus**

Comparison, 352  
 Diagnosis and distribu-  
 tion, 394

Key, 286

*rugatulus brunnescens*. See

*rugatulus*

*rugatulus cockerelli*. See

*rugatulus*

*rugatulus dakotensis*. See

*rugatulus*

*rugatulus mediorufus*. See

*rugatulus*

### **rugithorax**

Comparison, 311, 345,  
 387, 400, 411, 417

Diagnosis, distribution  
 and description,  
 397

Key, 284

### **rugosus**

Comparison, 315, 367,  
 384, 418

Diagnosis, distribution  
 and description,  
 399

Key, 274

### **rugulosus**

Comparison, 329, 399,  
 Diagnosis, distribution  
 and description,  
 401

Key, 284

## **S**

San Luis Potosí

*mexicanus*, 369

*whitfordi*, 421

*schaufussi*

Comparison, 348

### **schaumii**

Comparison, 322, 385,  
 394, 423

Diagnosis and distribu-  
 tion, 403

Key, 284

Key to species complex,  
 305

*schaumii* var. *fortinodis*. See  
*schaumii*

### **schmittii**

Comparison, 379

Diagnosis and distribu-  
 tion, 405

Key, 274

### **silvestrii**

Comparison, 315, 348,  
 387, 400, 409

Diagnosis and distribu-  
 tion, 407

Key, 274

Species complex, 305

### **smithi**

Comparison, 322, 352,  
 394, 407

Diagnosis and distribu-  
 tion, 409

Key, 286

*Solenopsis invicta*, 420

South Carolina

*curvispinosus*, 337

*davisi*, 340

*longispinosus*, 358

*schaumii*, 404

*smithi*, 409

South Dakota

*ambiguus*, 312

*curvispinosus*, 337

*rugatulus*, 394

*tricaratus*, 417

*Stenamma gallarum*. See

*curvispinosus*

### **stenotyle**

Comparison, 417

Diagnosis and distribu-  
 tion, 410

Key, 282

### **stollii**

Comparison, 321, 367

Diagnosis and distribu-  
 tion, 411

Key, 276

### **striatulus**

Diagnosis and distribu-  
 tion, 413

Key, 272

Species complex, 306

## **T**

*Temnothorax*, 269

Tennessee

*curvispinosus*, 337

*longispinosus*, 358

*schaumii*, 404

*smithi*, 409

*texanus*, 416

### **terrigena**

Comparison, 315, 316,  
 319, 354, 377, 389,  
 391

Diagnosis and distribu-  
 tion, 414

Key, 280

*Tetramorium silvestrii*. See  
*silvestrii*

### **texanus**

Comparison, 340, 400, 416  
 Diagnosis and distribu-  
 tion, 415

Key, 283

*texanus davisi*. See *davisi*

Texas

*andersoni*, 314

*bristoli*, 326

*carinatus*, 328

*cokendolpheri*, 332

*curvispinosus*, 337

*hispidus*, 347

*liebi*, 354

*neomexicanus*, 374

*nitens*, 378

*obliquicanthus*, 380

*obturator*, 381

*rugatulus*, 394

*schaumii*, 404

*terrigena*, 414

*texanus*, 416

*whitfordi*, 421

*Trachymyrmex turrifex*, 378

### ***tricarinatus***

Comparison, 329, 374, 398,  
400, 410, 417

Diagnosis and distribution,  
417

Key, 20

Key to species complex, 307

*tricarinatus neomexicanus*. See  
*neomexicanus*

### ***tuscaloosae***

Comparison, 359

Diagnosis and distribution,  
419

Key, 286

## **U**

Utah

*neomexicanus*, 374

*nevadensis*, 376

*nitens*, 378

*rugatulus*, 394

*texanus*, 416

*tricarinatus*, 417

## **V**

Vermont

*longispinosus*, 358

Virginia

*curvispinosus*, 337

*davisi*, 340

*longispinosus*, 358

*schaumii*, 404

## **W**

Washington

*nevadensis*, 376

*nitens*, 378

*rugatulus*, 394

Washington D. C.

*longispinosus*, 358

*minutissimus*, 372

*schaumii*, 404

West Virginia

*curvispinosus*, 337

*longispinosus*, 358

*schaumii*, 404

*wheeleri*. See *smithi*

### ***whitfordi***

Comparison, 343, 394, 404,  
424

Diagnosis, distribution and  
description, 421

Key, 286

Wisconsin

*ambiguus*, 312

*curvispinosus*, 337

*longispinosus*, 358

Wyoming

*carinatus*, 328

*furunculus*, 344

*nevadensis*, 376

*nitens*, 378

*rugatulus*, 394

*tricarinatus*, 417

## **Z**

Zacatecas

*hispidus*, 347