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Two new species of *Leptothorax* "*Nesomyrmex*" fossils in Dominican amber

(Hymenoptera: Formicidae)

With 4 figures

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Summary

Two new fossil species of Neotropical *Leptothorax* "*Nesomyrmex*" are described from Dominican amber (probably Miocene). *Leptothorax caritatis*, is described based on two workers from two samples. *L. caritatis* is close to the recent *L. wilda* SMITH known from Brownsville, Texas, and from orchids of unknown Mexican provenance imported in the USA. A second Dominican amber species, *L. dominicanus*, is described based on a single worker specimen and is close to the recent *L. echinatinodis* FOREL from Central and South America. It is noteworthy that both fossils exhibit the plesiomorphic leptothoracine (and formicid) condition of 12-jointed antennae, a trait distinguishing them from their closest recent relatives, which have 11-jointed antennae.

Zusammenfassung

Zwei neue fossile Arten neotropischer *Leptothorax* "*Nesomyrmex*" werden anhand dominikanischer Bernsteinfunde (wahrscheinlich Miozän) beschrieben. *L. caritatis*, wird anhand zweier Exemplare beschrieben. *L. caritatis* steht der rezenten *L. wilda* SMITH verwandtschaftlich nahe, welche aus Brownsville, Texas und aus Orchideenimporten unbestimmter mexikanischer Herkunft in die USA bekannt ist. *L. dominicanus*, wird anhand eines Exemplares einer Arbeiterin beschrieben. Sie steht der rezenten *L. echinatinodis* FOREL aus Zentral- und Südamerika nahe. Bemerkenswert ist die Tatsache, dass beiden fossilen Arten das plesiomorphe, leptothoracine (und formicide) Merkmal von 12-gliedrigen Antennen aufweisen. In diesem Merkmal unterscheiden sie sich von ihren nächsten rezenten Verwandten, welche 11-gliedrige Antennen besitzen.

Introduction

The ant genus *Leptothorax* was already recorded from Dominican amber by DE ANDRADE (1992) who described *L. praecreolus*, a member of the south nearctic and northern neotropical endemic "subgenus" *Macromischa*. Here we report two other new species belonging to the former subgenus *Nesomyrmex*. This is another very distinctive group of species whose present distribution in the New World is similar to (but broader than) the one of *Macromischa*. The correct generic attribution of these ants is still subject to debate. *Nesomyrmex* was originally described as a genus by WHEELER (1910) and EMERY (1915) merged it with *Leptothorax* where he left it as a subgenus. Later on, myrmecologists (e. g. KEMPF, 1959) stated clearly that *Nesomyrmex* should be treated as

a genus close to but separate from *Leptothorax* but never formally raised it to generic rank. BOLTON (1982) noticed correctly the weakness of the diagnostic characters given by KEMPF (l. c.) and proposed the synonymy with *Leptothorax*. FRANCOEUR & LOISELLE (1988) gave new, convincing evidence for the generic status of *Nesomyrmex* drawn essentially from the male morphology. Their conclusion is drawn from the males of 7 species, i. e. around 1/3 of the species referred to *Nesomyrmex*. Nonetheless FRANCOEUR & LOISELLE (l. c.) refrained from proposing the generic status which is anticipated and formally postponed to a second paper which, as far as we know, was never published. HÖLDOBLER & WILSON (1990) deal with *Nesomyrmex* as a good genus without justifying their action nor referring to information drawn from the literature. BOLTON (1995) reasserted the synonymy of *Nesomyrmex* with *Leptothorax* "until genus group taxonomy of *Leptothorax* can be investigated". Since a full revision of *Nesomyrmex* was clearly beyond the scope of the present paper we thought it useful to stress here the current taxonomic and nomenclatorial insecurity of the ants we will deal with in the following.

Material and Methods

Three specimens of *Leptothorax* have been examined in the two following samples of amber from the Dominican Republic:

A sample (Figs. 1 A & B) in the collection of the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA. The amber sample, from the mine La Toca, measures 0.9x0.5 cm and contains, in addition to the *Leptothorax* worker, a microhymenopteron, a leaf fragment, and few impurities. The *Leptothorax* has been separately cut and polished to allow better vision. Its state of preservation is good.

MCB-0060 (Fig. 1 C). An amber piece called "Jorge Caridad" from the name of its collector and preserved in the collection of the Museu de la Ciència, Barcelona. The sample, from the amber mine Palo Quemado, ca. 10 km NE of Santiago de los Caballeros, contains a single, incomplete, worker of *Leptothorax*, 35 workers, three groups of eggs, 31 larvae and 18 pupae of *Technomyrmex* (BRANDÃO et al., 1998), an unidentified myrmicine male, two wingless Thysanoptera, a dipteran and a juvenile mantid.

H 10-208 (Fig. 2). A sample in the collection of Dr. GEORGE O. POINAR Jr., deposited at the Oregon State University, Corvallis, Oregon, USA. A yellow sample 2.0 x 1.7 cm containing a worker of *Leptothorax*, a mite, a microhymenopteron, three Diptera and insect remains. The state of preservation of the ant is good, although it is surrounded by veins and cracks filled with brownish material, and it is missing the left propodeal spine.

Measurements and indices used in the descriptions are as defined by BARONI URBANI (1978) for this genus.

Description

Leptothorax caritatis DE ANDRADE sp. n.

Figs. 1 & 3

Holotype: worker (complete) in a amber sample from the amber mine La Toca (Dominican Republic) and preserved in the collection of the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA.

Paratype: worker (only petiole, postpetiole, first gastric tergite and hind legs) in an amber sample from the amber mine Palo Quemado (Dominican Republic) and preserved in the sample MCB-0060 in the collection of the Museu de la Ciència, Barcelona.

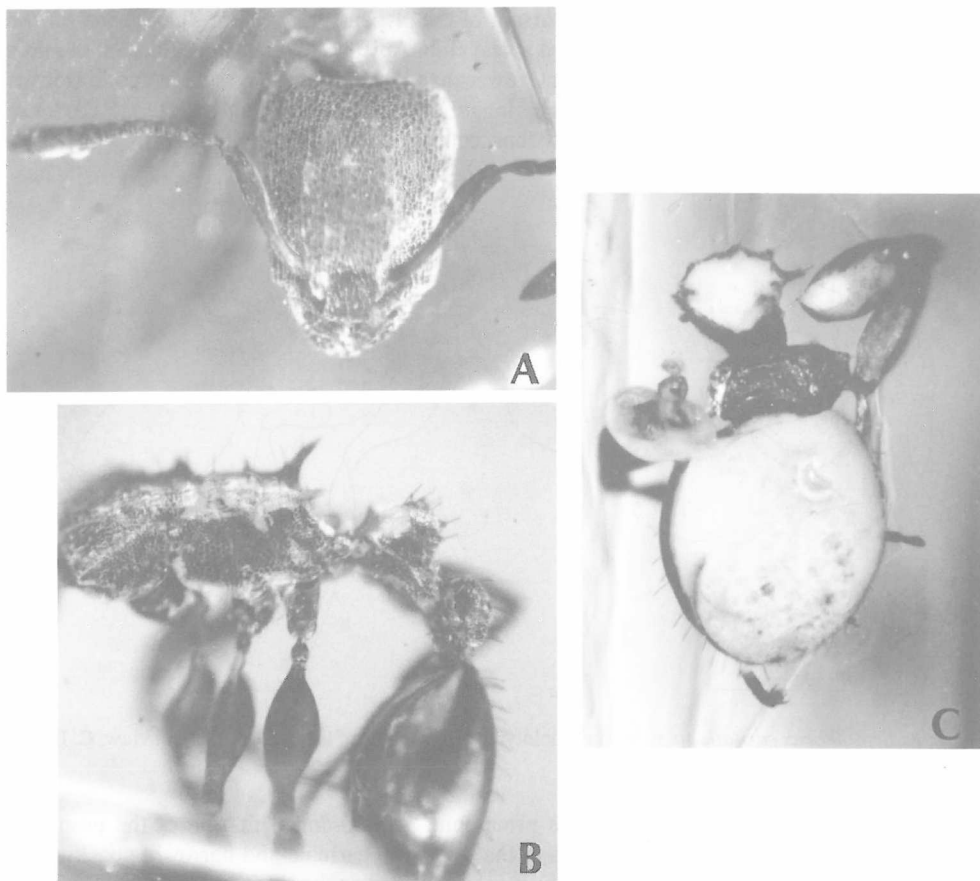


Fig. 1: A. Specimen MCZC without reference number, dorsal view of the head; B. Lateral view of mesosoma, petiole, postpetiole, gaster and legs of the same specimen; C. Specimen MCB-0060, ventral view of part of the petiole, postpetiole, part of the gaster and third pair of legs.

Derivatio nominis: From the Latin *caritas* (=charity) referring to "Jorge Caridad" the collector of the sample.

Diagnosis: A *Leptothorax* species belonging to the subgenus "*Nesomyrmex*", close to the Recent *wilda*, but differing from it by the following combination of characters: antennae 12-jointed (instead of 11); antennal scrobes less impressed; postpetiolar denticles more numerous and larger; head and mesosoma predominantly reticulate, with few rugulae instead of punctate rugulose.

Description: Head longer than broad. Vertexal angles subround. Vertexal margin concave and with a short, narrow neck. Frontal lobes covering the insertion of the scapes. Frontal carinae prolonging backwards from the frontal lobes up to the posterior sixth of the head in form of a thin carina. Sides of the cephalic dorsum with superficially impressed scrobe-like area. Median portion of the clypeus posteriorly inserted between the frontal lobes. Antero-median margin of the clypeus convex, with few minute crenulations and covering the basal tooth of the mandibles. Antero-lateral

margin of the clypeus slightly concave. Dorsum of the clypeus with a faint, thin carina on the middle. Antennae 12-jointed, with 3-jointed apical club. Apical joint as long as the sum of joints 7-10. Proximal half of the scape about 1/3 narrower than the distal one. Eyes large and in front of the midlength of the head. Mandibles slightly longer than 1/3 of head length. External border of the mandibles convex. Mandibles with only four teeth increasing in size apically (only the right one visible). Palp formula 5,3.

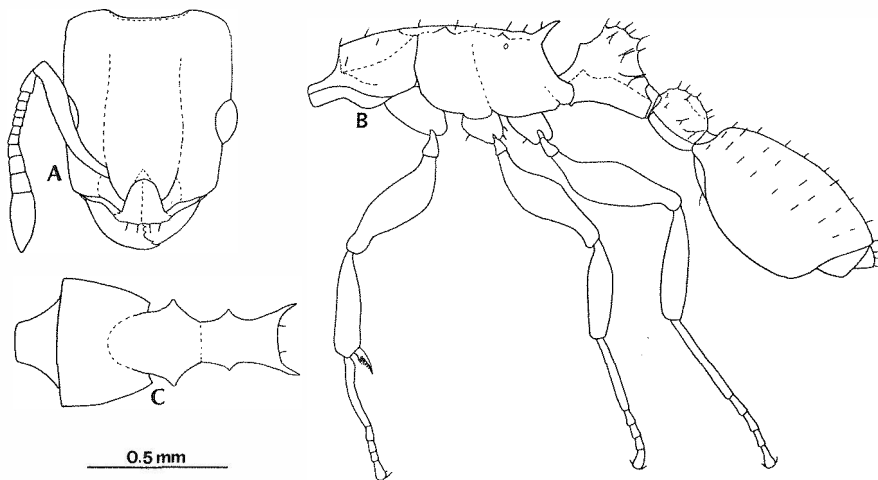


Fig. 3: A. *Leptothorax caritatis* sp. n. worker (holotype), dorsal view of the head; B. Lateral view; C. Dorsal view of the mesosoma.

Mesosoma flat in profile. Humeral angles prominent. Antero-dorsal margin of the pronotum marked by a superficial, thin carina. Sides of the pronotum carinate and narrowing backwards. Promesonotal suture very superficial dorsally, more impressed on the sides. Mesonotum with a pair of large, triangular teeth laterally. Propodeal suture superficially impressed. Basal face of the propodeum with a pair of antero-lateral, triangular teeth. Basal face separated from the declivous face by a pair of relatively long, pointed spines slightly diverging and pointing upwards. Opening of the propodeal spiracle below and slightly behind the antero-lateral propodeal tooth. Lower metapleural lobe slightly angulate and shorter than the upper, round lobe.

Peduncle of the petiole short, with a pair of pointed, small teeth dorso-laterally, close to the node. Petiolar node convex, dorsally with 8 denticles of variable size and postero-laterally with 1 long denticle on each side. Ventral process of the petiole semitransparent, anteriorly triangular and diminishing in size posteriorly. Postpetiole convex and broader than the petiole. Postero-lateral and postero-dorsal halves of the postpetiole concave, the dorsal concavity superficially carinate on the sides. Postpetiole with four, minute, denticles anteriorly, two-three similar denticles dorsally, and with two larger pairs of denticles laterally, the posterior pair larger than the anterior one. Gaster suboval and with a pair of anterior lobes.

Legs with incrassate femora. Femora with deep ventral concavity to receive the tibiae. Fore tibiae each with a pectinate spur. Mid and hind basitarsi thin, elongate and with slightly compressed sides.

Sculpture. Head minutely reticulate. Posterior fourth of the head dorsum with additional, dense, broader reticulation forming short, irregular striation. Remaining head parts also with broader reti-

culation but sparser and with fewer, thinner, longitudinal rugulae. Pronotum with similar sculpture as on the posterior margin of the head dorsum but with deeper, larger reticulation. Mesonotum, propodeum, petiole, postpetiole and pleurae reticulate, the reticulation larger on the lower meso- and metapleurae. Gaster minutely punctate and superficially shining. Legs punctate-granulate.

Pilosity. Head, mesosoma, petiole, postpetiole, gaster and coxae with sparse, erect, truncate hairs, rare on the coxae; on the petiole and on the postpetiole the hairs arise from the apex of the denticles, some denticles bear two hairs. Ventral part of the head and legs with short, appressed hairs, denser on the outer face of the tibiae. Gastric sternites with rare, long, suberect, pointed hairs.

Colour black. Legs ferruginous-brown, proximal and distal parts of femora and of tibiae, and basitarsi darker.

Measurements (in mm) and Indices: Holotype: total length (until first segment of the gaster and mandibles included) 2.91; mesosoma length 0.84; Lc 0.72; lc 0.59; Lsc 0.48; maximum eye length 0.16; Lp 0.29; Lpp 0.20; maximum length of hind femora 0.46; maximum length of hind tibiae 0.41; maximum length of hind basitarsi 0.34; CI 81.9; SI 81.9.

Paratype: Maximum length of petiole, postpetiole and first gastric tergite 1.28; Lp 0.32; Lpp 0.24; length of first gastric tergite 0.72; maximum length of hind femora 0.47; maximum length of hind tibiae 0.44; maximum length of hind basitarsi 0.36.

Leptothorax dominicanus DE ANDRADE sp. n.

Figs. 2 & 4

Holotype: worker preserved in the collection of Dr. George O. Poinar Jr., deposited at the Oregon State University, Corvallis, Oregon, USA.

Derivatio nominis: *Dominicanus* is a neologism indicating the provenance from the Dominican Republic.

Diagnosis: A *Leptothorax* species belonging to the subgenus "*Nesomyrmex*", close to the Recent *echinatinodis*, but differing from it by the following combination of characters: antennae 12-jointed (instead of 11); opening of the propodeal spiracle below and behind the propodeal tooth instead of attached to it; propodeal spines shorter.

Description: Head longer than broad. Vertexal angles convex. Vertexal margin medially concave and with a short, narrow neck. Frontal lobes partially covering the insertion of the scapes. Frontal carinae prolonging posteriorly up to the middle of the eyes in form of thin margin, and continuing caudally close to the vertexal border in form of a superficial line. Median portion of the clypeus inserted posteriorly between the frontal lobes. Anterior margin of the clypeus broadly convex and covering the basal mandibular teeth. Dorsum of the clypeus with a faint, thin carina on the middle. Antennae 12-jointed, with 3-jointed apical club. Apical joint as long as the sum of joints 6-10. Proximal half of the scape about 1/3 narrower than the distal one. Eyes large, with the posterior third behind the midlength of the head. Mandibles slightly longer than 1/3 of the head. External border of the mandibles convex. Mandibles with five teeth increasing in size apically. Palp formula 5,3.

Mesosoma flat in profile. Humeral angles protruding. Antero-dorsal margin of the pronotum marked by a superficial, thin carina. Sides of the pronotum carinate and narrowing backwards. Promesonotal suture very superficial dorsally, more impressed on the sides. Mesonotum with a pair of lateral, triangular teeth. Propodeal suture superficially impressed. Basal face of the propodeum antero-laterally with a small triangular tooth on each side. Basal face separate from the declivous face by a pair of short, pointed spines pointing upwards. Opening of the propodeal spiracle placed below and behind the propodeal tooth. Metapleural lobes round, the dorsal lobes broader and longer than the ventral lobes.

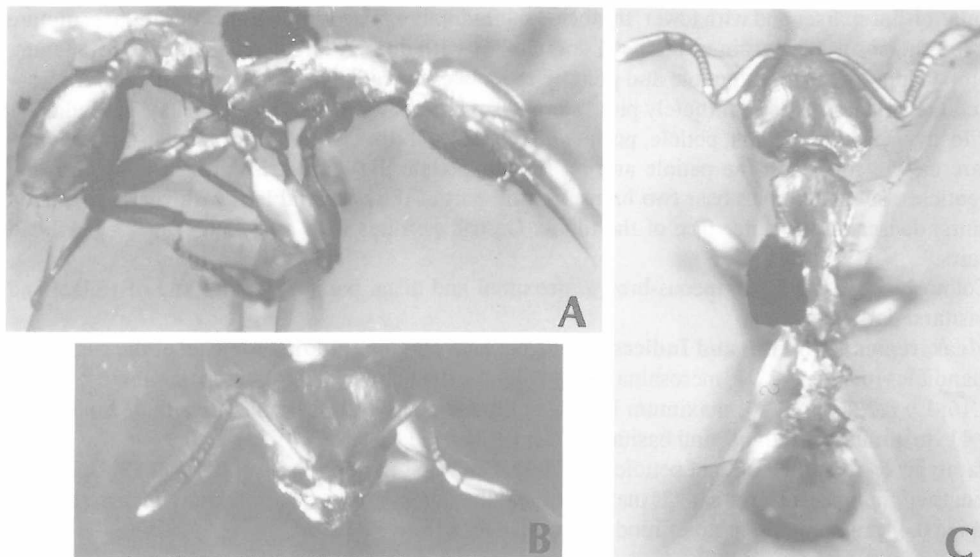


Fig. 2: A. Specimen H 10-208 (coll. G. O. Poinar, Jr.) lateral view; B. Dorsal view of the head; C. Entire specimen.

Peduncle of the petiole with a pair of dorso-lateral, pointed, small teeth close to the node. Petiolar node convex, with 6 dorsal denticles variable in size and with a pair of postero-lateral, long denticles. Ventral process of the petiole semitransparent, anteriorly round and diminishing in size posteriorly. Postpetiole convex and broader than the petiole. Postero-lateral half of the postpetiole concave. Posterior third of the postpetiole dorso-medially concave and with a pair of minute denticles. Postpetiole with three, minute, posterior denticles and with two larger pairs of denticles on each side, the posterior pair larger than the anterior pair. Gaster suboval and angulate antero-laterally.

Legs with incrassate femora. Femora with deep ventral concavity to receive the tibiae. Fore tibiae with a pectinate spur. Mid and hind basitarsi thin, elongate and slightly cylindrical.

Sculpture. Head minutely punctate and with small, very superficial foveae, the punctures more impressed on the anterior half of the head dorsum. Head dorsum with additional, thin, longitudinal rugulae. Mesosoma punctate. Pronotum with sparse, deep, large, irregular reticulation, and with few longitudinal rugulae extending to the mesonotum and propodeum. Petiole, postpetiole and pleurae reticulate, the reticulation larger on the lower meso- and metapleurae. Gaster minutely punctate and superficially shining. Legs punctate-granulate.

Pilosity. Head, mesosoma, petiole, postpetiole, gaster and coxae with sparse, erect, truncate hairs; on the petiole and on the postpetiole the hairs arise from the tip of denticles; some denticles bear two hairs. Ventral part of the head with short, subpointed, appressed hairs. Legs with similar hairs as on the ventral part of the head but shorter and sparser. Gastric sternites with few, long, suberect, pointed hairs.

Colour ferruginous, with coxae, femora and tibiae yellowish-orange.

Measurements (in mm) and Indices: Holotype: total length (until first segment of the gaster and mandibles included) 2.90; mesosoma length 0.89; Lc 0.69; lc 0.61; Lsc 0.48; maximum eye length 0.16; Lp 0.28; Lpp 0.20; maximum length of hind femora 0.56; maximum length of hind tibiae 0.46; maximum length of hind basitarsi 0.37; CI 88.4; SI 78.7.

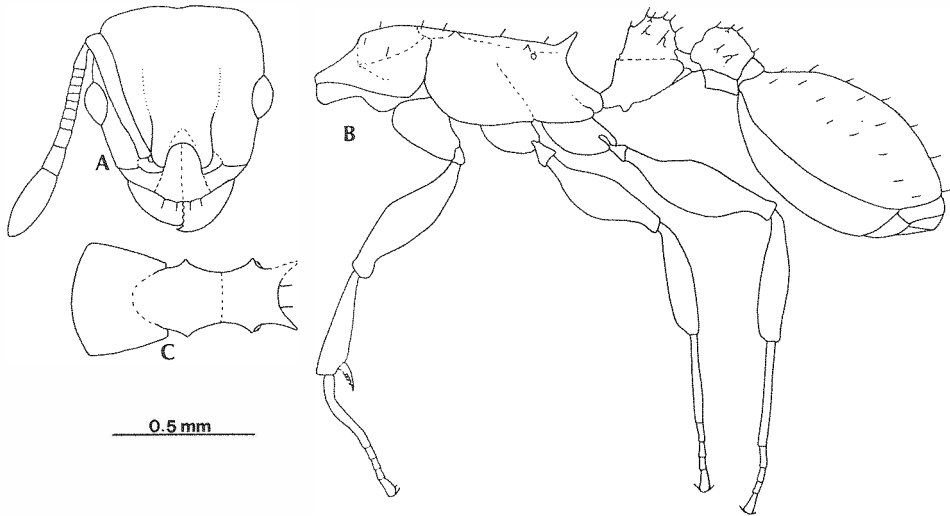


Fig. 4: A. *Leptothorax dominicanus* sp. n. worker (holotype), dorsal view of the head; B. Lateral view; C. Dorsal view of the mesosoma.

Discussion

Both fossil *Leptothorax* described in this paper differ from their closest extant species by the antennae 12-jointed instead of 11. *Leptothorax caritatis* is very similar to *L. wilda* SMITH described from Brownsville, Texas, and later also intercepted on orchids of unknown Mexican provenance imported in the USA. *L. wilda* and *L. caritatis* differ from the members of the *echinatinodis*-group and from the other fossil species, *dominicanus*, mainly by having the opening of the propodeal spiracle not visible in dorsal view. *Leptothorax dominicanus* is more similar to *L. echinatinodis* FOREL from Central and South America than to *wilda*. As already stressed by KEMPF (1959), the species of the *echinatinodis*-group (*argentinus*, *echinatinodis* and *spininodis*) are similar to *wilda* in antennal segmentation and in some traits of the mesosoma and pedicel. The propodeal teeth of *L. dominicanus* are similar to those of *wilda* and *caritatis*, but the opening of the propodeal spiracle is different.

The three Recent members of the *echinatinodis*-group have the propodeal lateral teeth different from those of both fossils and of *L. wilda*. In these species the teeth are subtriangular or round and the opening of the spiracle is located on the teeth. The combination of triangular propodeal teeth with the opening of the propodeal spiracle below the teeth is likely to be shared synapomorphically by *L. wilda* and *L. caritatis*.

It is noteworthy that both fossils exhibit the plesiomorphic leptothoracine (and formicid) condition of 12-jointed antennae.

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