

NEW FOSSIL TERMITE SPECIES: *DOLICHORHINOTERMES*
DOMINICANUS FROM DOMINICAN AMBER (ISOPTERA,
RHINOTERMITIDAE, RHINOTERMITINAE)

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ABSTRACT

A new fossil termite species, the first Rhinotermitinae in amber, Dolichorhinotermes dominicanus, is described based on a single imago trapped in Dominican Amber. The fossil indicates that a species of the Rhinotermes-complex (Rhinotermes, Dolichorhinotermes, Acorhinotermes) was present in the Caribbean region in the Miocene.

Keywords: Fossils, Termites, Amber, Rhinotermitinae, *Dolichorhinotermes*

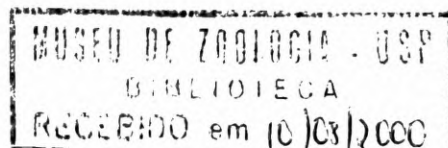
INTRODUCTION

We describe a new Neotropical fossil termite species of Rhinotermitinae (Isoptera: Rhinotermitidae) from Dominican amber; its precise locality is unknown. The presumed age of Dominican Amber is early to middle Miocene (Iturralde-Vinent 1996). So far, no fossil species of Rhinotermitinae in amber has been described.

In the last two decades, various fossil species from Dominican amber have been described. These fossil species are from the termite families Mastotermitidae (Krishna & Emerson 1983, Krishna & Grimaldi 1991),

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Kalotermitidae (Krishna & Bacchus 1987), Termitidae (Krishna 1996) and Rhinotermitidae (Emerson 1971). Emerson (*op cit.*) reviewed the fossil species of Rhinotermitidae of the subfamilies Coptotermitinae, Heterotermitinae and Stylotermitinae and described two new Neotropical amber species of *Coptotermes*. No fossils are known from the Rhinotermitid subfamilies Psammotermitinae and Termitogetoninae.

The fossil specimen here described is a well preserved winged imago. It belongs to the Neotropical group formed by *Rhinotermes*, *Dolichorhinotermes*, and *Acorhinotermes* (*Rhinotermes*-complex). Besides these Neotropical genera, Rhinotermitinae includes also: *Parrhinotermes* from Australia and some islands of the Indo-Malayan Region, and *Schedorhinotermes* (from Africa, Asia, Oceania, and Australia). *Macrorhinotermes* from Southeastern Borneo (Indo-Malayan Region) was considered as a junior synonym of *Schedorhinotermes* by Snyder (1949). Krishna & Emerson (1975) and Quennedy & Deligne (1976) did not accept that synonymy and considered *Macrorhinotermes* as a valid genus of Rhinotermitidae.

We presented comments on this new fossil species, without naming it, in the symposium on "Phylogeny and Evolution of Isoptera", at the XIII Congress of the International Union for the Study of Social Insects (Canello & Schlemmermeyer 1998/1999).

MATERIAL AND METHODS

Material: Dominican Amber fossil, number 248, Museu de la Ciència, la Fundació La Caixa, Barcelona, Spain. This polished, transparent amber piece contains the winged imago here described, one further undetermined termite imago of another species, air bubbles and many undertermined smaller inclusions.

Some of the measurements we took are self-explanatory, the others were taken in the following manner: length of head: the back of the head to the tip of the labrum (in profile); width of the head with eyes: twice the ventral distance between the outer margin of the eye and the middle of the head (between the glossae; width of the head: twice the ventral distance between inner margin of the eye and the middle of the head; maximum diameter of ocellus, minimum diameter of ocellus and eye diameter, were measured as in Roonwal (1970), respectively, nr. 55, nr.56, and nr.57.

The position of the fossil in amber did not allow us to take all measurements with accuracy. Imprecise values are marked with an asterisk. All measurements are in millimeters (mm). The terms "bristles" and "hairs" are used in accordance to Emerson (1925).

Dolichorhinotermes dominicus, n.sp.

(figs.1-4)

Alate: With the four wings closed, overlapping, very reticulated; the first wing scale very long, covering the posterior scale. Large and rounded head, with upward lifted frons-clypeal region, and two, large, conspicuous muscle insertions in front of ocelli. Eyes rounded and large, projecting beyond side of the head, distance to lower margin of head small. Ocelli large, elongate, and raised, about their own length distant from eyes. Frons projecting conspicuously upwards in front of fontanelle with a conspicuous, broad, and deep medial groove (fig. 3); some dark wrinkles sloping away from the base of frons-clypeal region, in front of the fontanelle. Fontanelle small, rounded, well forward on head, close to the level of the ocelli, exactly at the base of elevated frons (fig.1); the postclypeus, which forms the extension of the upward lifted region, and bears part of the medial groove, is well separated from the frons by a suture; in frontal view, the postclypeus looks like a V shape above the labrum (fig. 4); in side view, frons and postclypeus form together an upturned, rounded, but not hooked nose (fig. 2). Right Antenna broken; left one 20-segmented, the third longer than second and shorter than first; from 4th to the last subequal in length. Pronotum flat, long, with the posterior third slightly curved downward, anterior margin slightly raised, sides rounded, about the same width of the head without eyes. Tibial spur formula: 2:2:2. Pilosity: a few erect bristles on head, in front of ocelli, around the eyes, one on each side at base of the elevated frons-clypeal region; antennae with many hairs; pronotum with some erected and some backward orientated bristles on the surface, bristles and hairs on lateral and posterior margins. Wing scales with bristles. Color: dorsal surface of head and tergites brown, ventral surface of head, antennae, legs, and sternites lighter. Measurements: length of head: 1.8 *; width of head with eyes: 1.6 *; width of head: 1.3; eye diameter: 0.32; maximum diameter of ocellus: 0.14; minimum diameter of ocellus: 0.1; distance from eye to lower margin of head: 0,08; minimum eye-ocellus distance: 0.1 *; length of first antennal article: 0.2; length of third antennal article: 0.12; width of pronotum: 1.2; length of hind tibia: 1.6; total body length with wings: 10.5 *; total body length without wings: 6.8 *. Holotype: alate in amber (nr. 248) - Museu de la Ciència, Barcelona, Spain. Type- locality: Dominican Republic Etymology: The species was named after the Dominican Republic.

COMPARISONS

Those genera of Rhinotermitinae with known soldier caste can be distinguished on the basis of the soldier caste (Quennedy & Deligne, 1975).

While in *Parrhinotermes* the soldier caste is described as monomorphic, *Schedorhinotermes*, *Rhinotermes*, and *Dolichorhinotermes* have dimorphic soldiers. In the Neotropical genera of the *Rhinotermes*-complex both major and minor soldiers are well differentiated by several characters of the cephalic capsule, mandibles and the defense apparatus. As far as we know no *Macrorhinotermes* soldier has been collected till now.

Like the imagoes of all species of the *Rhinotermes*-complex, *Macrorhinotermes* and *Schedorhinotermes*, the species herein described has a characteristically upward lifted frons-clypeal region. The remaining genus *Parrhinotermes* does not have a very pronounced upward lifted frons-clypeal region. *Prorhinotermes*, from the closely related *Prorhinotermitinae* (Quennedy & Deligne, 1975), also lacks this character state, although the frons-clypeal region is somewhat inflated.

In the fossil here described the frons-clypeal region is strongly uplifted (fig.2), and its medial groove is comparatively broad and deep. The clypeus, however, does not project forward to form a nose. We compared the fossil with imagoes of *Schedorhinotermes intermedius*, *Schedorhinotermes reticulatus*, and *Schedorhinotermes actuosus*. Imagoes of *Schedorhinotermes* differ from those of the fossil described and from the extant species of the *Rhinotermes*-complex by their shallow medial groove, and by the slightly uplifted frons-clypeal region.

The first author had the opportunity to examine the type material of the genus *Macrorhinotermes* (Holmgren 1913). Emerson and Krishna (1975) state that *Macrorhinotermes* and *Parrhinotermes* do have small ridges and wrinkles near the fontanelle, thus sharing this character with the species of the *Rhinotermes*-complex and the fossil species herein described. *Macrorhinotermes* does not bear a nose-like extension of the frons-clypeal region like the species of the *Rhinotermes*-complex. *Macrorhinotermes* can also be easily distinguished from the species of the *Rhinotermes*-complex by its extremely broad head and by its frons-clypeal region which is only slightly uplifted and bears only a shallow medial groove.

The fossil species herein described can be distinguished from all other extant described species of the *Rhinotermes*-complex by the shape of the frons-clypeal region, which is more upturned and does not form "a sort of hooked nose" in profile, as stated by Mathews (1977) for other species of the *Rhinotermes*-complex.

The forewing scale of this fossil is large, covering the hindwing scale. Emerson and Krishna (1975) state, however, that normally the forewing scale covers only one fourth to one fifth of the hindwing scale in the species of the *Rhinotermes*-complex, *Schedorhinotermes*, *Parrhinotermes*, *Macrorhinotermes*, and *Prorhinotermes*.

Length of head and width of head with eye are larger than those of *Dolichorhinotermes longilabius*, *Dolichorhinotermes tenebrosus* and *Acorhinotermes subfusciceps*, but smaller than those of *Rhinotermes marginalis* and *Rhinotermes nasutus* [measurements taken from Emerson (1925) and from MZUSP specimens].

The total body length with wings and body length without wings of this new species are also a little larger than those of *Dolichorhinotermes longilabius* and *Dolichorhinotermes tenebrosus*, but smaller than those of *Rhinotermes nasutus* and *Rhinotermes marginalis*, given by Emerson (1925).

The 3rd article of the antenna of this fossil is shorter than the first. That is the only imago character which was mentioned in the literature that distinguishes the genus *Dolichorhinotermes* from those of *Rhinotermes* (Snyder & Emerson in Snyder 1949).

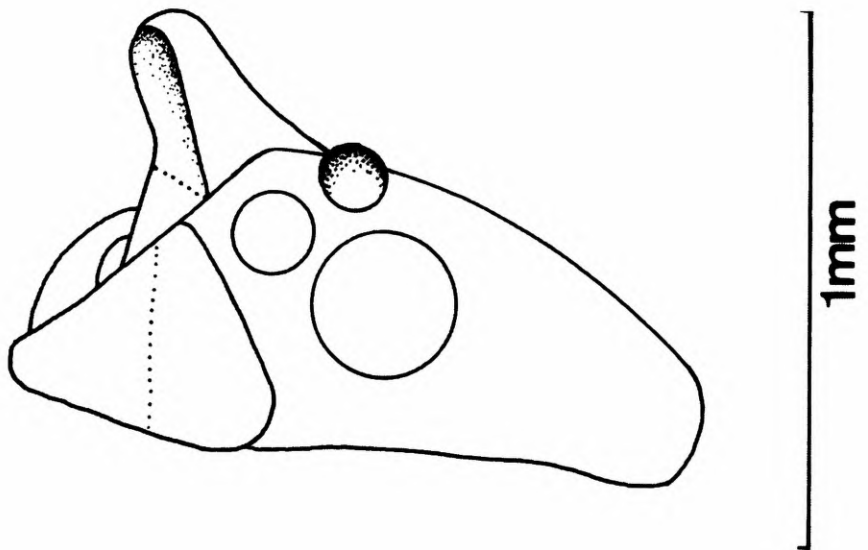
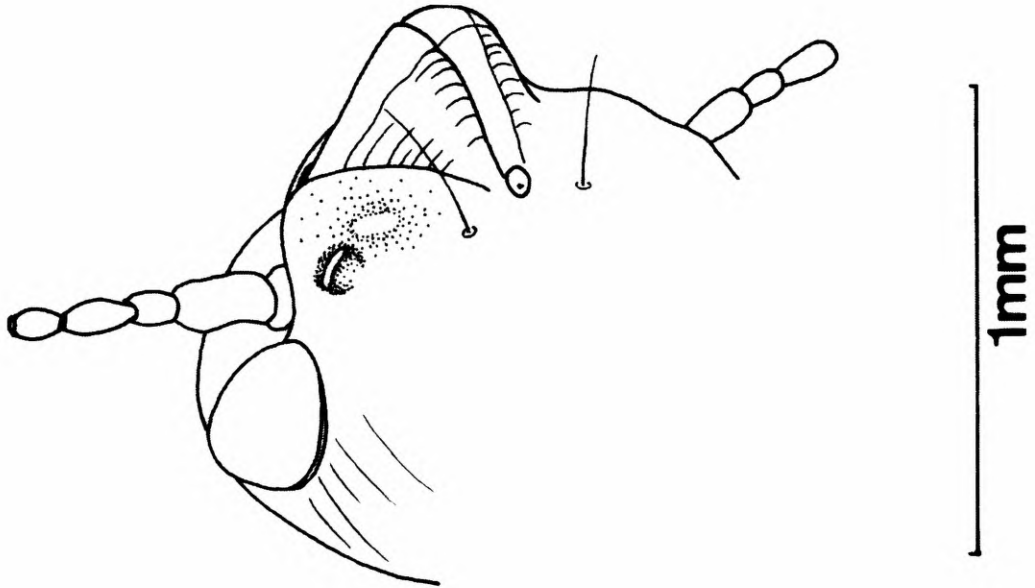
DISCUSSION

Mathews (1977) states that any future revisor of the *Rhinotermes*-complex should retain all the species of *Acorhinotermes*, *Dolichorhinotermes*, and *Rhinotermes* in the last genus "unless better evidence comes to light to support their separation". Quennedey & Deligne (1975), on the other hand, discuss the morphological characters of the soldiers' cephalic capsule of all genera of Rhinotermitinae and recognize generic differences among them.

Besides the relatively small body measurements when compared with species of *Rhinotermes*, the main reason which lead us to include this new species in *Dolichorhinotermes*, is the third article of the antenna which is shorter than the first. Another possibility would be to describe this new species in a new genus, but we do not have enough material to base this description. So, we describe this new species under *Dolichorhinotermes*, although we are aware of some shortcomings of this decision. Adopting this new classification for the *Rhinotermes*-complex implies the need of a new diagnosis for the complex: the elevated frons-clypeal region may bear a nose-like extension, which phylogenetic significance is not known.

The amber specimen condition does not allow us to do a detailed description of the wing venation, as it is preserved at the middle of a thick piece, fully encapsulated by bubbles and other inclusions, and, moreover, with the four wings overlapped.

Seven of the described, extant species of the *Rhinotermes*-complex have been collected only in continental South America (*Rhinotermes hispidus*, *Rhinotermes manni*, *Rhinotermes nasutus*, *Dolichorhinotermes japuraensis*, *Dolichorhinotermes latilabrum*, *Dolichorhinotermes tenebrosus*, and *Acorhinotermes subfusciceps*); two species are recorded both from Continental



Figs1-2: schematic drawings of imago in dorso-lateral view : fig.1, and in profile: fig.2

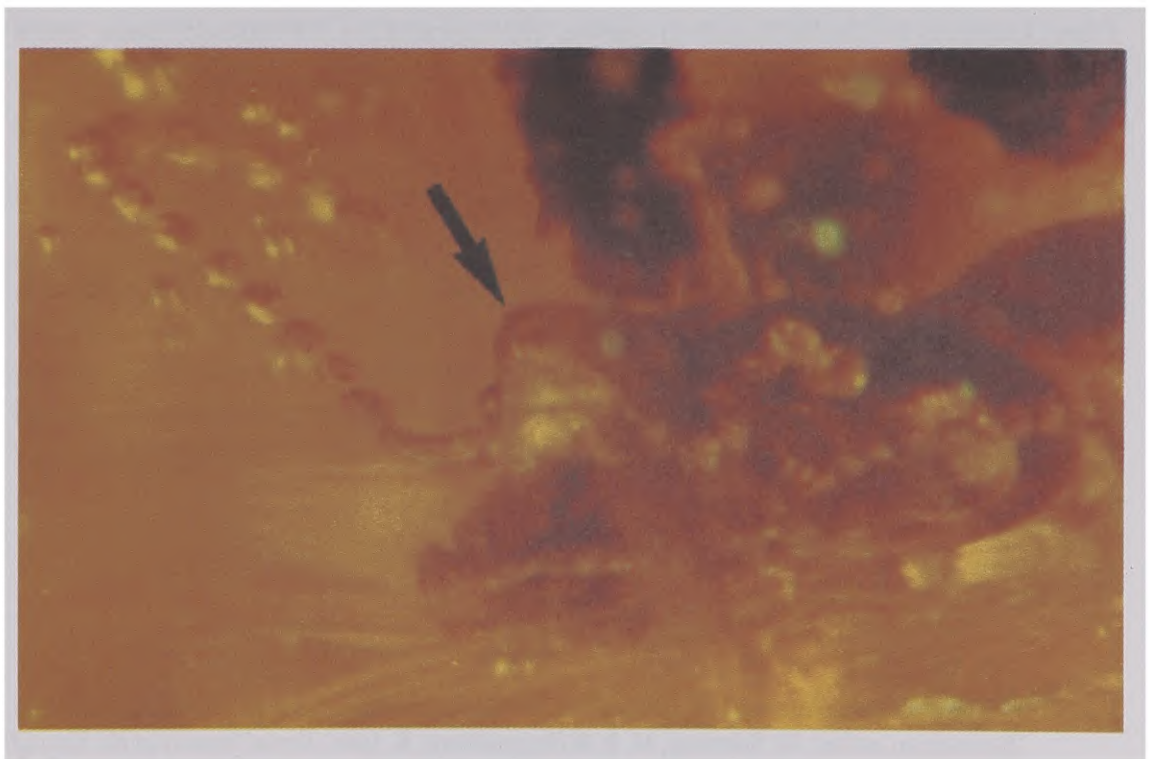
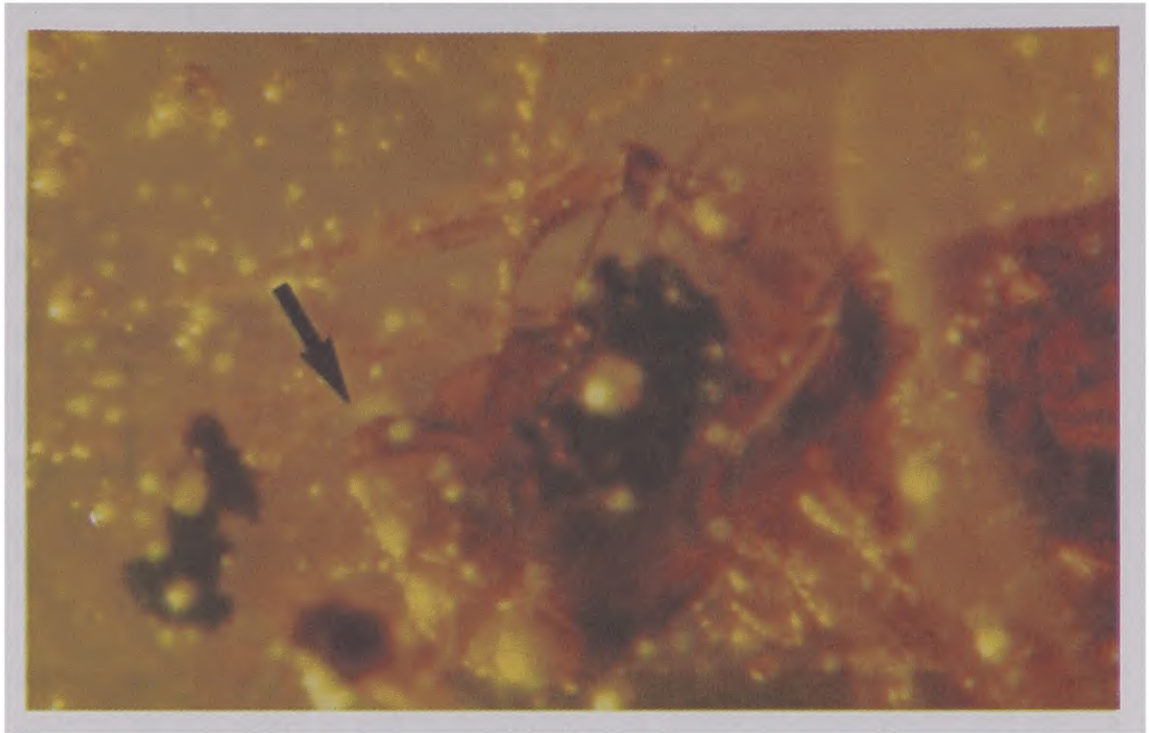


Fig. 3: imago head, in dorso-lateral view; fig.4, and imago head, in fronto-lateral view. The arrows point the upward lifted frons-clypeal region.

South America and from West Indies (*Dolichorhinotermes longilabius* and *Rhinotermes marginalis*). One species (*Dolichorhinotermes longidens*) has been described from the Central-American mainland (Constantino, 1998). Thus, the fossil species locality fits well into the known distribution of the genera in the Neotropical Region. Nevertheless, it is well known that the Dominican ambar fauna can harbour *taxa* which do not fit into extant distribution patterns, as for instance, *Mastotermes electrodominicus*, which genus is today restricted to Northern Australia.

The only fossil of Rhinotermitinae described before this study (not in amber), *Rhinotermes miocenicus* (Nel *et. al.* 1993), is from the Palearctic region (Italy). Its description is based on one single fossilized wing, and it has a rather uncertain status, as stated by the authors. The related genus *Schedorhinotermes* shows the highest number of species in the Indo-Malayan Region. Endemic, Neotropical groups with widely distributed Old World relatives constitute a frequent, biogeographical pattern.

The species of the *Rhinotermes*-complex are known for living in rotten wood in tropical rain forest or open formations. We suppose that the species herein described lived in forest, as Dominican amber is known to be derived from resin produced by dense forest vegetation. (Grimaldi, 1996).

This new fossil species is the first described species of Rhinotermitinae from Dominican Amber, and it shows that genera of Rhinotermitinae were differentiated already in the Tertiary.

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