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## The Ant Genus *Gnamptogenys* in Dominican Amber

(Amber Collection Stuttgart: Hymenoptera, Formicidae. IV: Ectatommini)

By Cesare Baroni Urbani, Basel

With 9 Figures

### Summary

Two new *Gnamptogenys* species in Dominican amber (Early Miocene) are described from a single specimen each. One of them (*G. pristina*) shows clear relationships with those Recent Central American species which occur also on the Greater Antilles. The second one — (*G. levinates*) — also matches some Recent relatives in several characters, but it strikingly differs from all of them by the lack of gastral costulation. It is argued that this character might not have an important evolutionary value. These first Neotropical fossils of *Gnamptogenys* throw a new light on the palaeogeography of the genus and especially on the past distribution of Recent Caribbean *Gnamptogenys* species.

### Zusammenfassung

Die ersten fossilen Arbeiter der Ameisengattung *Gnamptogenys* werden aus dem Dominikanischen Bernstein (Unter-Miocän) beschrieben. *G. pristina* n. sp. zeigt Beziehungen zu rezenten mittelamerikanischen Arten, die auch auf den Antillen vorkommen. *G. levinates* n. sp. zeigt Ähnlichkeiten mit einigen Rezenten, weicht jedoch durch das Fehlen von Furchen auf dem Gaster deutlich ab; diesem Merkmal wird indessen keine größere Bedeutung für die Evolution beigemessen. Die Funde werfen ganz neues Licht auf die Paläogeographie der Gattung und insbesondere auf die Verbreitungsgeschichte der heutigen karibischen *Gnamptogenys*-Arten.

### 1. Introduction

The ant genus *Gnamptogenys*, nowadays Neotropical and Indomalayan in distribution, is here recorded from amber from the Dominican Republic. These are the first fossil records of the worker caste of this genus, the sexual castes having already been recorded from Baltic amber. No other fossils of the tribe Ectatommini are known.

## 2. Material and methods

The two species described in this paper are represented by a single specimen each. Each specimen is embedded in a different small piece of amber and both belong to the State Museum of Natural History, Stuttgart. The amber specimen Do-1172-K-1 is yellowish in colour and, apart from the ant here described as *Gnamptogenys pristina*, only one additional inclusion, a small coccid, can be detected. The fragment is crossed by one major diagonal fissure and a few minor ones which do not prevent detailed observation. The amber specimen Do-929-K-1 is more reddish in colour, with somewhat greenish reflexes under certain angles of light, and it is also crossed by one oblique, irregular fissure.

Although the preservation conditions are not the best available in Dominican amber, they can be considered as good. For this reason, the drawings presented in this paper can be regarded as very accurate and realistic. Using different optical techniques, every detail has been seen. In order to obtain the figures reproduced here, only a few trivial expedients have been necessary, like drawing the left antenna (missing in *G. pristina*) exactly equal to the right one, or supposing the sculpture on a whole sclerite to be uniform when part of it was not clearly visible.

## 3. *Gnamptogenys pristina* n. sp.

Fig. 1—4

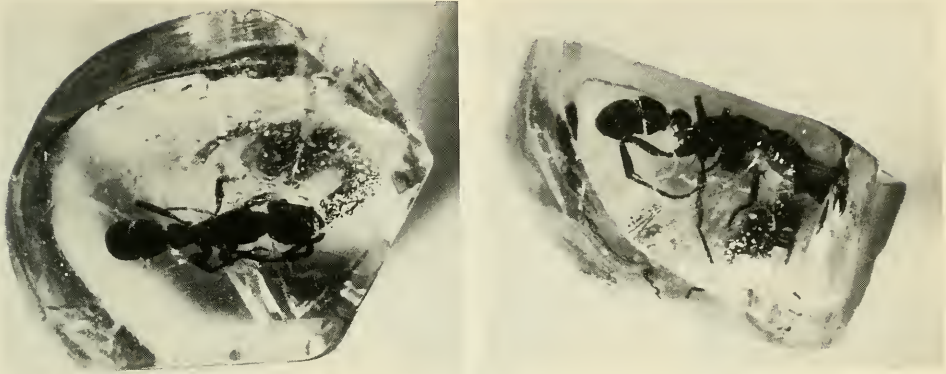
Holotype: Worker (unique) in Dominican amber bearing the number Do-1172-K-1 in the collection of the State Museum of Natural History, Stuttgart (Department of Phylogenetic Research). Left antenna almost entirely missing, otherwise complete.

Derivatio nominis: From Latin „pristinus“ (= primitive).

Diagnosis: A small *Gnamptogenys* of the *regularis* species group with much more dense costulation than in other known species and with a seta interrupting the pectinate area of the fore tarsi.

Description: Worker (Holotype). Total length 3.8 mm; maximum length of head capsule 0.85 mm; maximum width of head behind eyes 0.73 mm; maximum width between frontal carinae 0.42 mm; scape length 0.62 mm; maximum diameter of eyes 0.18 mm; hind femur length 0.83 mm; petiole length 0.42 mm; petiole maximum width 0.45 mm; tergum I of gaster (postpetiole) length 0.52 mm; tergum I of gaster maximum width 0.69 mm.

Colour dark blackish brown nearly uniform, but with slightly paler legs and articulations. Integument shining. Mandibles finely striate longitudinally. Head, alitrunk, petiole, gaster, and, to a minor extent, also the coxae, heavily striate longitudinally or costulate. Ca. 30 longitudinal striae are recognizable between the frontal carinae and ca. 60 between the eyes. Number of longitudinal striae of the trunk about 54 at maximum mesonotum width converging anteriorly. Pleural striae of the trunk longitudinal, but converging transversely on the pronotum. Petiole with longitudinal striae of equal length diverging posteriad from the anterior face; maximum number of striae on the dorsal face ca. 32. Gaster even more densely and finely striate. Antennae and legs very superficially punctato-rugose or shining. Very long, suberect, dark, robust, and acuminate hairs sparsely distributed on the whole body, mostly around the oral region and the occipital angles of the head; shorter on the sides of the trunk and on the propodeal declivity; longer and more curved on the petiolar sides; more abundant and conspicuous on the gaster. Subpetiolar process smooth and shining. Mandibles with thin hairs on the internal margins, but with very short, robust pubescence externally. Antennae with comparatively short, subdecumbent, robust pubescence. Legs covered with moderately short subdecumbent hairs,



Figs. 1—2. *Gnamptogenys pristina* n. sp., worker, holotype. — Fig. 1. Habitus, dorsal view. — Fig. 2. Habitus, lateral view. Photomicrographs by W. SUTER.

longer on tibiae and tarsi. The fore tarsi bear a long pectinate area on the internal margin which is interrupted in the first 4th by a relatively long, dark seta (Fig. 3).

Head as shown in Figs. 1 and 3, subrectangular, with slightly curved, nearly parallel sides and very rounded posterior corners. Occipital border very slightly emarginate, nearly straight. Anterior clypeal border straight and wide, very slightly projecting. Eyes large and convex, situated at about 2/3 along cephalic sides. Mandibular blades elongated and subtriangular; masticatory margin curved, mostly edentate, but with a small row of at least 5 spaced denticles in the basal half; basal border ca. 20% longer than the masticatory margin and forming an ill-defined obtuse angle with it. Clypeal suture obsolete. Frontal carinae short and straight, practically without frontal lobes. Antennal scape continuously incrassated toward the apex and very little curved; reclined posteriad, it doesn't reach the occipital border by at least once its maximum diameter. Funicular segments moniliform and incrassated, but always longer than broad. Last funicular joint slightly shorter than the sum of the two preceding ones.

Alitrunk (Figs. 3 and 4) broad, with a flat superior face separated from the pleural regions by a marked rounded angle. Superior outline interrupted by a marked trace of promesonotal suture. Propodeal suture absent on the dorsum but visible on the pleurae. Pronotum rounded and depressed anteriorly, continuing indistinctly into the declivity by a rounded angle. Petiole broader than long, narrower in front than behind; sides scarcely convex; nearly flat superiorly. Subpetiolar process bilobed and ventrally prominent. Tergum I of gaster anteriorly narrowly truncate, broader than long. Anterior lobe of sternum I entire and robust. Gastric somite II moderately vaulted superiorly, but with a very reduced sternal portion.

Hind coxae bearing a distinct basidorsal spine. All tibiae with a single pectinate spur. Claws dentate.

Relationships: For the size, colour, costulation, size and position of the eyes, general habitus, etc., this species clearly resembles *G. regularis* MAYR (S. Mexico to Paraguay). However, *G. pristina* differs from *regularis* in a set of important characters. Firstly, there are differences in the number of striae as follows:

	Between frontal carinae	Between the eyes	At maximum mesonotum width	On petiolar dorsum
<i>G. regularis</i>	16—18	ca. 30	20—22	18—20
<i>G. pristina</i>	ca. 30	ca. 60	ca. 54	ca. 32



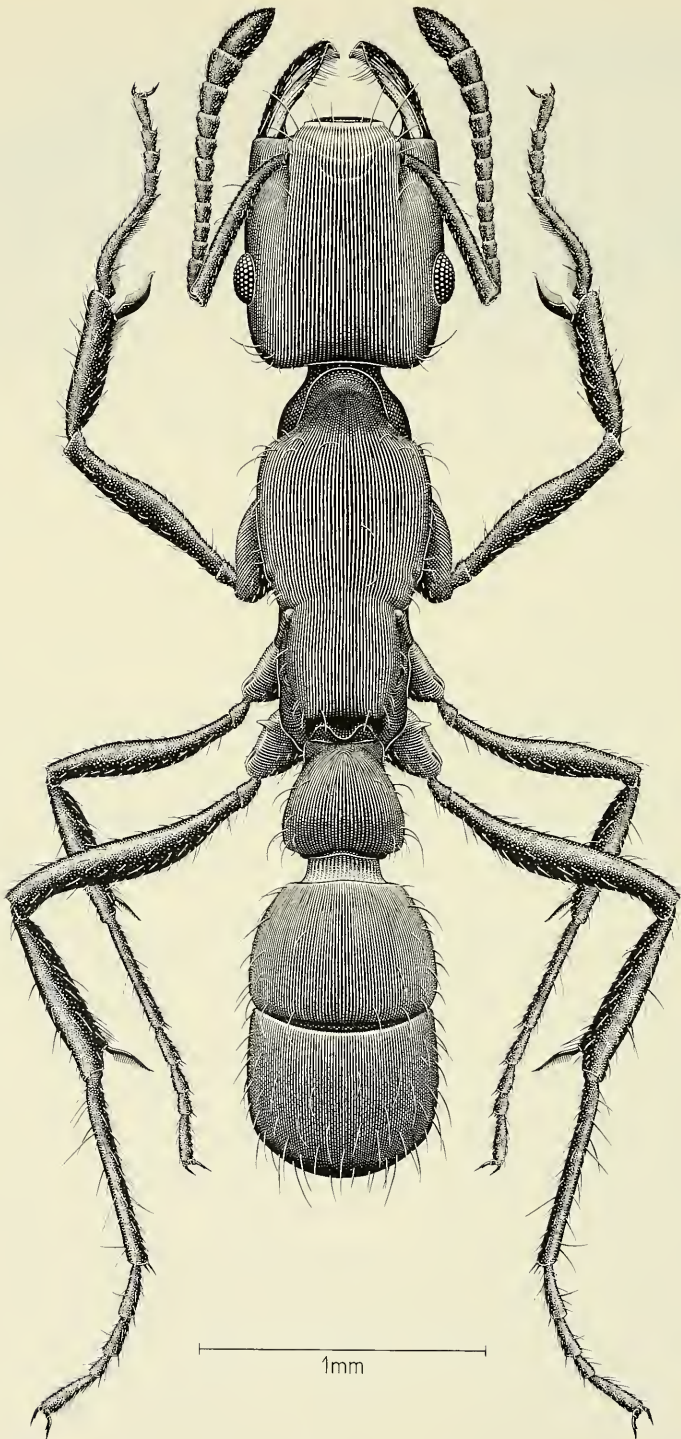


Fig. 3. *Gnamptogenys pristina* n. sp., worker. Dorsal view. Drawing by ARMIN CORAY.

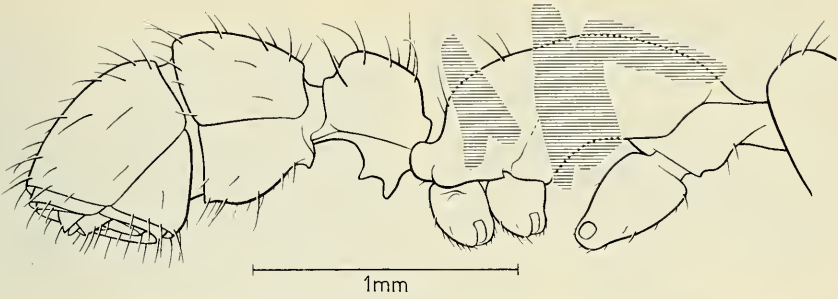


Fig. 4. *Gnamptogenys pristina* n. sp., worker. Lateral view of trunk and gaster. The shaded areas represent non-visible parts covered by the legs or by amber impurities. Drawing by ARMIN CORAY.

Moreover, the propodeum of *pristina* is much more rounded in profile, the mandibular dentition much more reduced and the petiolar costulation converges on the anterior face, as much as in *G. horni* SANTSCHI (Panama, Trinidad to Bolivia). But the latter also differs from *G. pristina* in the other previously mentioned characters and is, moreover, lighter in colour and smaller in size.

Finally, the peculiar seta interrupting the pectinate area of the fore tarsi in *pristina* is missing from all the Recent *Gnamptogenys* species which I have been able to examine, although some morphologically non-related species possess more or less abundant setae by the side of the pectinate area. Such setae are absent in *G. regularis* and *horni*.

#### 4. *Gnamptogenys levinates* n. sp.

Figs. 5—8

Holotype: Worker (unique) in Dominican amber bearing the number Do-926-K-1 in the collection of the State Museum of Natural History, Stuttgart (Department of Phylogenetic Research). Tarsomeri 3—5 of the right posterior leg missing, otherwise complete.

Derivatio nominis: From Latin „levis“ (= smooth) and „nates“ (= buttocks), to underline the lack of gastric costulation.

Diagnosis: A small *Gnamptogenys* not very different from *pristina* or from *continua* in morphology, but differing from all known related species for the entire lack of costulation of the gaster.

Description: Worker (Holotype). Total length 4.2 mm; maximum length of head capsule 0.94 mm; maximum width of head behind eyes 0.77 mm; maximum width between frontal carinae 0.39 mm; scape length 0.81 mm; maximum diameter of eyes 0.09 mm; hind femur length 0.94 mm; petiole length 0.36 mm; petiole maximum width 0.29 mm; tergum I of gaster (postpetiole) length 0.55 mm; tergum I of gaster maximum width 0.56 mm.

Colour brown with lighter gaster and appendages. In the single available specimen the coxae, part of the legs, and some of the antennal joints show infuscations of various degrees which are probably alterations due to the embedding in amber. Integument shining. Mandibles longitudinally striate. Head, alitrunk superiorly, petiole and coxae very finely and regularly longitudinally costulate. The costulae less impressed and somewhat less regular than in *G. pristina*. Ca. 25 longitudinal striae are recognizable between the frontal carinae and ca. 60 between the eyes. Number of longitudinal striae of the trunk about 36 at maximum mesonotum width, converging anteriorly. Petiole somewhat more finely longitudinal-



Figs. 5—6. *Gnaptogenys levitates* n. sp., worker, holotype. — Fig. 5. Habitus, dorsal view. — Fig. 6. Habitus, lateral view. Photomicrographs by W. SUTER.

ly striate with the striae diverging posteriad from the anterior face. Maximum number of striae on the dorsal face ca. 22. Gaster deeply punctate and shining. Remaining surfaces less deeply punctate, but equally shining. Rare, elongated, and pointed yellowish hairs, mostly subdecumbent, on the body, erect and longer around the oral and anal regions. The remainder being very short, sparse, obsolete on the cheeks, on the sides of the humeri, and on the superior sides of the propodeal declivity; more abundant and longer on the sides of the gaster and of the petiole. Antennae and legs essentially with sparse and inconspicuous subdecumbent hairs increasing in size and density towards the extremities. A few very short and tiny bristles on the external mandibular border. Pectinate area of the internal face of fore tarsi without setae.

Head as shown in Figs. 5 and 7, subrectangular, with curved sides, and narrower behind than in front. Occipital border slightly emarginate. Anterior clypeal border produced into a median lobe with the anterior margin slightly curved. Clypeal suture visible. Eyes much smaller than in *G. pristina*, more flat, but equally situated at about  $\frac{2}{3}$  of the head sides. Mandibular blades subtriangular, elongated, and remarkably curved on their major axis. Masticatory margin subdentate with a trace of diastema before the apical tooth. The internal margin passes through a continuous curve into the chewing margin and is shorter than the latter. Frontal carinae short and greatly curved; their distance slightly greater than  $\frac{1}{3}$  of head width. Antennal scape continuously incrassated towards the apex and curved; reclined posteriad, it exceeds the occipital border by about  $\frac{1}{2}$  of its maximum diameter. Funicular segments moniliform, nearly always longer than broad, only segment IX (antennal joint X) slightly broader than long. Last funicular joint slightly shorter than the sum of the two preceding ones.

Alitrunk (Figs. 6 and 8) relatively slender and with the flat superior face separated from the pleural regions by a smooth, rounded angle. Superior outline clearly interrupted by the promesonotal suture. Mesonotum continued forwards into the pronotum by a gentle slope. Humeral angles rounded and nearly obsolete. Propodeal sutures absent on the dorsum. Superior face of the propodeum about twice as long as the declivity and forming with it an angle of about  $100^\circ$ . Propodeal declivity sagittally concave and costulate on the sides. Petiole longer than broad, narrower in front than behind, with convex sides converging cranially and rounded superiorly. Subpetiolar process bilobed and ventro-caudally prominent. Tergum I of gaster inconspicuously truncated anteriorly, subequal in length to width and with relatively



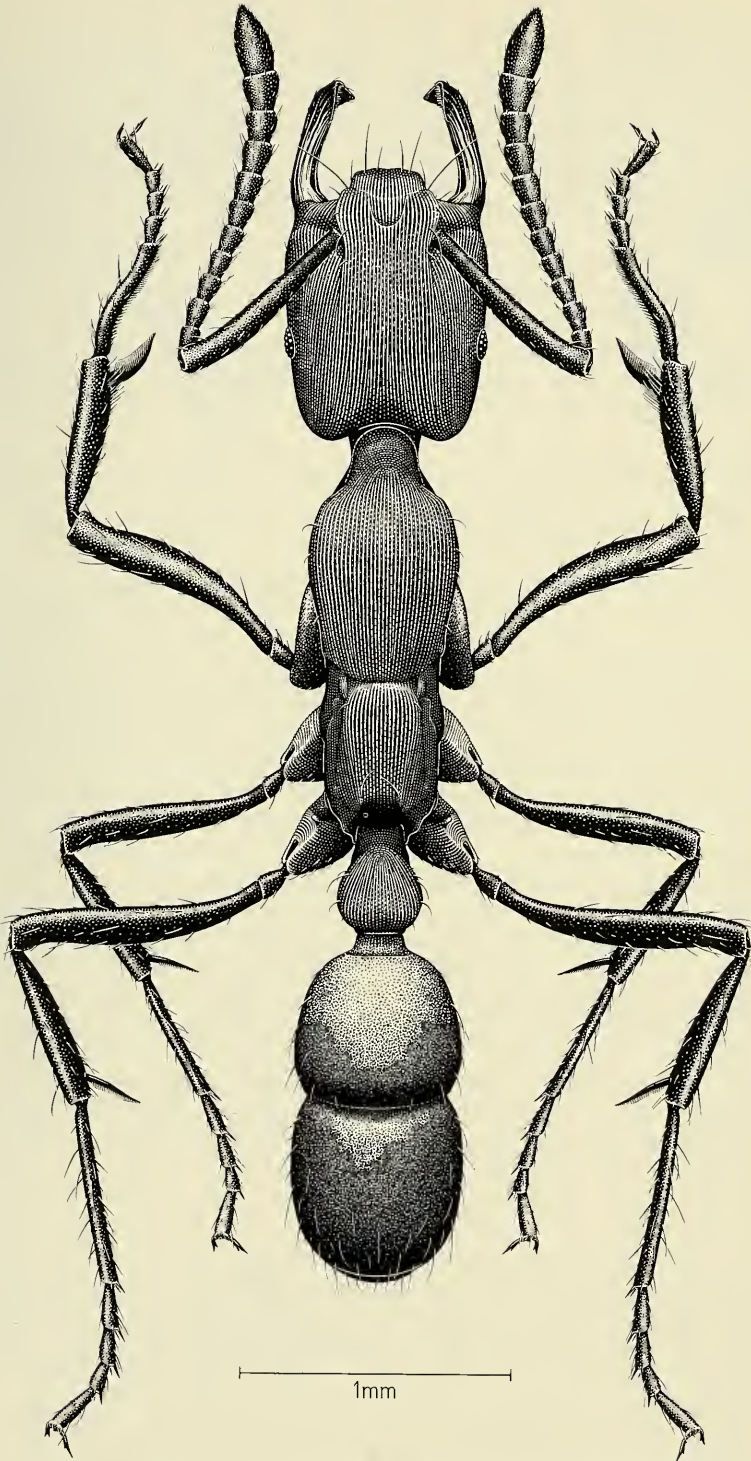


Fig. 7. *Gnamptogenys levinates* n. sp., worker. Dorsal view. Drawing by ARMIN CORAY.

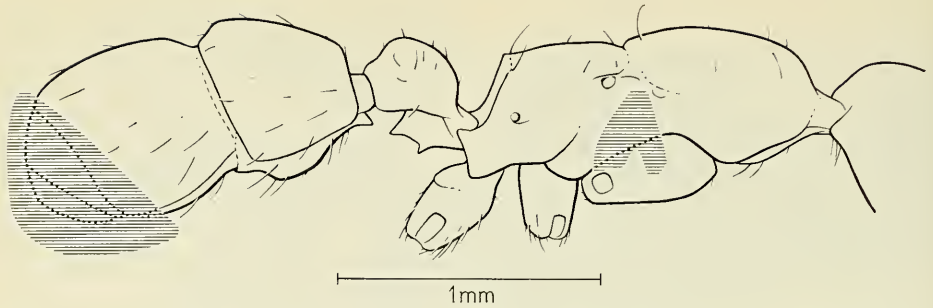


Fig. 8. *Gnamptogenys levinates* n. sp., worker. Lateral view of trunk and gaster. The shaded areas represent non-visible parts covered by the legs or by amber impurities. Drawing by ARMIN CORAY.

curved sides converging anteriorly. Anterior lobe of sternum I small and dentiform. Gastric somite II nearly straight.

Hind coxae with trace of the basidorsal spine. All tibiae with a single pectinate spur. Claws dentate.

Relationships: On the general habitus, size, and morphology, there is no doubt that the new species belongs to *Gnamptogenys* and to the large group of species formerly included into this genus s. str. On the basis of the fine and dense longitudinal costulation, it can be compared with *G. continua* MAYR (from Vera Cruz in S. Mexico and Jamaica to Brazil) or, due to its larger size, with the related species *interrupta* MAYR (about the same distribution as *continua*), but besides numerous minor details, one important character of *G. levinates* does not match any of the known living species formerly included in the genera *Gnamptogenys* s. str. or *Holcoponera*; i. e. the entire lack of costulate striation on the gaster. A non costulated gaster is frequent in several other *Gnamptogenys* species groups formerly considered separate genera such as *Stictoponera*, *Rhopalopone*, etc. However, I believe that *G. levinates* shows a too typical „*Gnamptogenys* s. str.“ habitus to be considered as a stem taxon for both costulate and non-costulate species groups.

Although the integumental costulation is highly characteristic and constant through several different species, it is likely that this character represents a secondary adaptation and appeared several times in the course of *Gnamptogenys* evolution as it did also in other not closely related genera (e. g. *Diacamma*).

It is interesting to recall, in this connection, that *G. continua*, the nearest living relative of *levinates*, is peculiar for presenting populations with more or less shining parts of the second gastric somite. Such a geographic variation also points against an important evolutionary meaning of this structure.

## 5. Discussion

The genus *Gnamptogenys*, with about 90 described species, has a discontinuous distribution in the Indomalayan and Neotropical regions (Fig. 9). Besides the two new species described in this paper, a third fossil from Baltic amber, originally described as *Ectatomma europaeum* by MAYR (1868) from a single female, the male being described later by WHEELER (1915), has been transferred to *Gnamptogenys* by BROWN (1958). However, despite the different castes represented, the recognizable characters leave no ground to suppose a strict relationship between the Baltic and the Dominican fossils, as was to be expected.





Fig. 9. Known distribution of the ant genus *Gnampptogenys*.

The Dominican amber is now referred to the lower part of Early Miocene (BARONI URBANI & SAUNDERS, 1980), which corresponds to some 20—23 million years B. P. and hence it is some 12—30 million years younger than the Baltic one. While *G. pristina* does not differ in a very striking way from the Recent Central American and Antillean representatives of the genus, *G. levinates* is much more puzzling as far as the relationships are concerned. It might actually represent a member of a phyletic line now extinct.

The fossils indicate a much wider distribution of the genus during Tertiary times and the present astonishing lack of *Gnampptogenys* records on big and apparently favourable land masses such as Africa, the major part of India, and Australia, has been already tentatively explained by BROWN (1958) as probably due to the invasion of these lands by better adapted competitors rather than to palaeogeographic events. I entirely agree with this hypothesis which may be partly confirmed by my own observations in the Indian states of Assam and Meghalaya and in South Bhutan, where *G. bicolor* is not uncommon in primary forests as well as in cultivated areas. This relative abundance sharply contrasts with the apparently total absence of the genus from very similar areas nearby in West Bengala and South Nepal.

In view of these facts and of the fossil records from Hispaniola reported in this paper, some Caribbean records of the genus which had been considered as due to Recent introduction, might be now regarded under an entirely new light. We know in fact that the Greater Antilles constitute a unique land mass probably connected with Florida during Early Miocene times (KHUDDOLEY & MEYERHOFF, 1971), and, through the fossil records described in this paper, that the genus was already present on it with at least one species very similar to the Recent ones.

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Author's address:

Dr. C. Baroni Urbani, Naturhistorisches Museum, Augustinergasse 2, CH-4000 Basel, Switzerland.

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