

# New Taxa of American Canthonina

(Coleoptera, Scarabaeinae)

by

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## Introduction

Since 1966, both authors of the present paper are involved in a joined effort (see Halffter and Martínez, 1966, 1967 and 1968), to establish, on an analytic and complete basis, the taxonomy of the subtribe Canthonina, by means of the analysis of all the described taxa and the revision of the largest possible amount of material from most diverse collections.

Up to date, we have analyzed the taxonomic status of the subtribe and reviewed 16 genera and subgenera, with 53 species and subspecies, several new among them. The studied genera are: *Eudinopus* Burmeister, *Megathopa* Eschscholtz, *Malagoniella* Martínez (with *Megathopomima* Martínez as subgenus), *Megathoposoma* Balthasar, *Streblopus* Lansberge (with *Streblopoides* Balthasar as a synonym), *Peltecanthon* Pereira, *Canthonella* Chapin, *Ipse-lissus* Olsoufieff, *Agamopus* Bates, *Sinapisoma* Boucomont, *Canthotrypes* Paulian, *Scybalophagus* Martínez and the III part of our monographic revision ends with the description and division in subgenera of *Canthon* Hoffmannsegg, that remains with subgenera *Pseudepilissus* Martínez, *Franc-monrosia* Pereira and Martínez and *Canthon*. Of these, *Pseudepilissus* has been studied and in the IV part, finished and ready to be printed, the gross of species of the genus formed by the subgenera *Francmonrosia* and *Canthon* are studied.

The publishing of this monographic revision has been delayed because of the need to give time and attention to other works, contrary to the former wish of both authors. That is why we are now presenting five new species

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and several subspecies, corresponding to groups not already treated, as well as some complementary comments on those already studied.

Since we began the publication by stops of the Monography, we realized that the key for identification of genera of American Canthonina, could not be presented until the whole study was completed. It is in the last part where we are thinking of including a final discussion of the genera and a key for their identification. This limitation in our work has been pointed out by some colleagues. While waiting for the end of this revision and of the presentation of the keys for the genera, interested people may use the keys appeared in Pereira and Martínez, 1956 (in portuguese, pp. 93–96, in English, pp. 182–185) and Halffter, 1961. This late one is based partly on the former, but it is more complete in regard to the number of genera and it is slightly modified. Both keys comprise the American genera of Canthonina, in the sense followed by us. The modifications that the studies in process have been pointing out as necessary are found in the already published parts of the Monography (Halffter and Martínez, 1966, 1967 and 1968).

We are grateful to Mrs. Ing. Carlos Bordón from Caracas, Venezuela and Juan Salas from Santa Cruz, Bolivia, for giving us specimens of two of the species here described. To Dr. Robert E. Woodruff from the Department of Agriculture, State of Florida, Gainesville, Fla., for the information he kindly gave us.

#### Addenda to the already studied genera

*Malagoniella astyanax* (Olivier) (genus *Malagoniella* was reviewed in part I of the Monography, 1966) comprises 5 subspecies. We have additional data on two of them.

##### *Malagoniella astyanax polita* (Halffter, Pereira and Martínez)

One female of this subspecies was collected in Bolivia, Department of Santa Cruz, Province of Sara, Santa Rosa, II-1969, A. Martínez and R. E. Woodruff coll., being kept at the Martínez Collection. Two other specimens were collected in the same locality, XI-1969 by Antonio Martínez. The former was collected at nighttime in the jungle while forming a ball on human excrement, together with *Eurysternus hamaticollis* Balthasar, *E. caribaeus* (Herbst), *Glaphyrocanthon bridarollii* Martínez, *Canthomoechus quadratus* (Blanchard), *Deltochilum orbigny* Blanchard, *Uroxys* sp., *Ontherus sulcator* (Fabricius), *O. appendiculatus* (Mannerheim) and *Onthophagus* sp.

Through the scarce observations made, we might mention that its behaviour is similar to that of *M. a. yucateca* (Harold) from Mexico and Central America; this means that it is a nocturnal, coprophagous beetle, inhabiting tropical or subtropical jungle.

It is interesting to point out that, up to date, only scarce specimens are known of this subspecies, all from Bolivia, as this one. The locality where the new specimens were collected is more than 500 Km East from the latest point known. The other individuals have been obtained from subtropical mountain forest, the altitude of the collect localities being known; 1800 to 2000 m (see Halffter and Martínez, 1966: 124-125). The new specimens also widen the ecological distribution of the subspecies, as Santa Rosa is located in the Department of Santa Cruz, at an approximate altitude of 400 m and 140 Km Northwest from Santa Cruz de la Sierra City. The area is the limit of the sandy "pampas" of Santa Cruz, the amazonic type jungle beginning near Santa Rosa, with patches of jungle included within the "pampas" in the surroundings. *M. a. punctatostriata* reaches this area of "pampas". It is possible that this is the overlapping area between this subspecies and *M. a. polita*, probably found in some place living together.

We may infer, from this collect, that *polita* inhabits the Bolivian amazonic jungle on mountain slopes, extending to the subtropical orophylic jungle (Las Yungas), to altitudes of 1800 to 2000 m.

#### *Malagoniella astyanax yucateca* (Harold)

This subspecies inhabits jungle-covered areas in Southern Mexico, Guatemala, Nicaragua and Costa Rica (see Halffter and Martínez, 1966: 126-129, map 1). Brownsville, Texas, as locality mentioned in several catalogues, seems odd to us, as it is located far North of the Northernmost surely known locality (Tamazunchale, San Luis Potosí, Mexico), but specially because it would be the only capture of *M. a. yucateca* from outside the tropical jungle and far away from its northernmost limit.

In relation to this, the opinion of Dr. Robert E. Woodruff (leter of 18-XII-1967):

"I mentioned to you about the doubtful records of *Megathopa yucateca* Har. (*Malagoniella a. yucateca*) and *Deltochilum scabriusculum* Bates from the United States. As near as I can determine, the only basis for these two species being recorded from the United States is a single specimen of each in the Chicago Natural History Museum with the following data:

*Megathopa yucateca* Har. – 1 – Esperanza R'h (Ranch) / Brownsville, Tex. VIII: 14–28:06 ' at light L. A. Jayou / (F. Psota Coll.).

*Deltophilum scabriusculum* Bates – 1 – Esperanza R'h (Ranch) / Brownsville, Tex. VII: 19:06 / at light / col. by Adolph Jayou / (F. Psota Coll.).

The two labels are virtually the same and they are suspicious for two reasons: (1) They were both collected at light which apparently is not a common situation for either genus. (2) They were both in the Psota collection which contained many exotic species as well as purchased specimens with somewhat unreliable data. It is my opinion that both specimens are mislabeled.“

## NEW TAXA

### *Canthon* (*Canthon*) *chiriguano* sp. nov.<sup>1</sup>

**Description.** – Small species, dorsally with not very marked convexity. General colour black, with greenish or copper tone shades on head, pronotum, base of elytrae and metasternum, mainly; femurs brown to light brown or yellowish; tibiae, tarsi and antennae brown.

**Male. Head.** – Clypeus with two small central teeth, sharp and triangular, separated by an U-shaped notch; on both sides of teeth, the clypeal border arches continuing on the genae, although these show a small denticle on its anterior part. Clypeo-genal suture fine, but clearly visible. Dorsal eye area small, narrow. Dorsal surface of the head somewhat irregular, slightly depressed on clypeus and genae; fundamental sculpture being a microscopic shagreened, with simple, marked and spaced punctures within; on clypeus, back from the small teeth, the punctures are more flattened and less conspicuous; each puncture with a microscopic seta only perceptible under certain light incidence.

Ventral side of head with clypeal teeth joined by a fine arched carina. Mentum with an ample sulcus, longitudinal, on the ventral face. Submentum separated from the gula by a slightly marked V-shaped suture, its surface covered by fine and quite dense hairing. Antennae's club width roughly equal to the length of the segments 2° to 6°; club blackish brown, with golden tomentum.

1.– In descriptions of species belonging to genus *Canthon*, already well defined and rewritten (Halffter and Martínez, 1968: 263–270) we omit the repetition of the characters we consider proper of the genus and which are found in our generic redescription.



a

b

- a *Canthon delpontei* nov. sp. (Holotype ♀)  
 b *Canthon chiriguano* nov. sp. (Holotype ♂)

**Thorax.** – Pronotum width less than two times its length; fairly convex. Anterior angles protruding, acute. Lateral borders in marked arch, although not frankly angulous. Posterior angles marked, obtuse. Posterior border arched, centrally subangulous and with a very shallow notch at each side. Posterior border not marginated. Surface with slight pre-scutelar impression; lateral depressions very slightly marked, circular; the sculpture is a very dense shagreened more marked laterally, with simple and spaced punctures included, each with a microscopic seta, visible only under certain light incidence.

Proepisternae not excavated, only slightly depressed in the middle and posterior part; separated from the proepimerae by a fine carina, shortened, found only on the internal half (towards the coxa); with slight traces of lateral denticle; surface with long and fine setae, shorter and less remarkable on the proepimerae. Mesosternum shagreened as mesoepimerae, metaepisternae and lateral areas of metasternum. Median lobe of metasternum with very obsolete shagreenation, only marked towards the anterior part; disc with very superficial, simple and spaced punctures.

**Elytrae.** – Slightly convex; with small scutelar impression, not very deep, but evident; with no marked humeral tubercule. Obsolete striation; eighth stria marginated by a fine carina that reaches half of the elytra. Interstriae shagreened with microscopic brilliant areas intercalated and microscopic setae only visible under certain light incidence.

**Legs.** – Ventral surface of femur I punctuated; the punctures spaced, printed and each with a short seta. Tibia I flattened, widened distally, with an obliquely truncated apex; distal third of lateral border with three acute teeth, obliquely disposed in relation to tibial axis; with a denticle between the distal and median tooth and two more between the last and the proximal (these denticles may disappear by wearing off), two basal thirds of the external border clearly denticulated. Fine spur, somewhat flattened and widened distally, with a bifurcated apex. Tarsus longer than distal width of tibia; claws small, arched and acute.

Ventral surface of femur II punctuated, punctures with small but evident setae. Tibia II weakly arched, regular but clearly widened at the distal half; long spurs, acute, the dorsal one longer than the first tarsal article. Tarsus about as long as tibia; articles very flat (compressed), trapezoidals; first article shorter than the second. Claws uneven, weakly arched, acute.

Femur III with lesser punctures on the ventral surface, less marked and with lesser conspicuous setae than femur II. Anterior border marginated by a fine sulcus that is lost towards the distal third. Tibia III longer, somewhat more arched and less widened distally than median tibia. Spur larger than first tarsal article, long and acute. Tarsus shorter than tibia, similar in shape to the mesothoracic ones; first article clearly smaller than second. Claws uneven (external somewhat shorter than internal), arched and acute.

**Abdomen.** – Sternites shagreened, V and VI with punctures included, with setae only visible under certain light incidence; lateral depressions on the intersegmentary sutures very shallow; sternite VI slightly notched on the middle posterior border.

**Pygidium.** – Wider than longer, somewhat convex, separated from propygidium by an arched carina; surface shagreened sparsely punctate, fine and superficial, with very short golden setae, only visible under certain light incidence.

**Aedeagus.** – Characteristic of the genus: Simetrical parameres compressed, rectangular from lateral view, with distal border slightly sinuous, ventrally elongated in a small process (Fig. 1).

**F e m a l e .** – Differs from the male in the spiniform spur of the anterior tibia, somewhat arched and acute, and the sternite VI whose posterior border has no trace of notch.

**T o t a l l e n g t h :** 6–7 mm; **m a x i m u m w i d t h :** 3–4 mm.

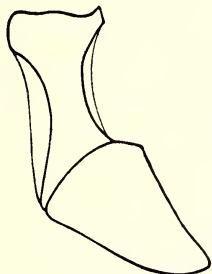


Fig. 1. – *Cantbon chiriguano* nov. sp. – Aedeagus, lateral view.

**E x a m i n e d m a t e r i a l .** – Holotype ♂ and Alotype ♀ from Argentina, Province of Salta, General San Martín Department, Pocitos (Salvador Mazza), I-1967, A. Martínez col., on human excrement at sunset in the jungle; 1 ♀ Paratype from Bolivia, Department of Santa Cruz de la Sierra, Neighbourhood of Santa Cruz City, at the margin of Piray river, XI-1969, A. Martínez col., at night in a jungle patch and on human excrement; 1 ♀ Paratype, same country and department, Province of Sara, Santa Rosa, XI-1969. A. Martínez col. at sunset in the jungle and on human excrement. Holotype ♂, Alotype ♀ and 1 Paratype ♀ in Martínez collection and 1 Paratype ♀ in Halffter collection.

**O b s e r v a t i o n s .** – One of the Bolivian specimens, the one from the neighbourhood of Santa Cruz City, is slightly larger and punctures of head, pronotum and metasternum are more diluted, lacking punctures on pygidium; also the striae in elytrae are practically blurred and the teeth of the anterior tibia are different in both legs. These small differences with the Alotype appear to be mere individual variations, in spite of being somewhat different the ecological conditions of the places where the specimens of Argentina as well as the specimen of Santa Rosa were captured and the conditions of the locality of Santa Cruz; the first found within the thick jungle, the last in an sparse wood, very modified.

The name given to the new species comes from the name of an indian tribe inhabiting the area.

**A f f i n i t i e s .** – The new species falls perfectly within the restricted sense given by Halffter and Martínez (1968: 265–270) to genus *Cantbon*. In it is included – although in a somewhat isolated form – in subgenus

*Canthon* s. str. (see *loc. cit.*). *C. chiriguano* is similar to *C. matthewsi*, which description follows, not for a showy feature, but because of a combination of characters.

***Canthon* (*Canthon*) *matthewsi* sp. nov.**

**Description.** – Small species. Oval body; dorsal and ventral surfaces convex, although the insect is not rounded. Dorsal surface dark copper, darker on elytrae; head and pronotum brilliant, elytrae with silky shine; ventral surface and feet brown, with copper tones.

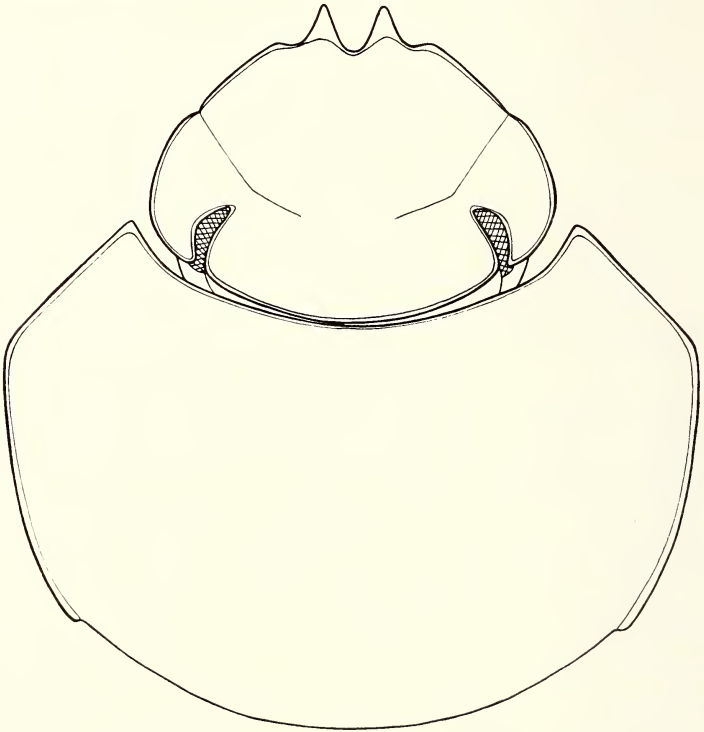


Fig. 2. – *Canthon matthewsi* nov. sp. – Contour of head and thorax.

**Male. Head.** – Bidentate clypeus (fig. 2). Dorsal area of eyes narrow. Cephalic surface fine but clearly and densely punctated, slightly depressed back of clypeal teeth; sculpture, as pronotum are a very fine and flattened shagreened.

Ventral region of head with clypeal teeth joined by a small carina. Labium with a central U-shaped notch not very deep. Gula and submentum separated by a line slightly arched backward. Antennal club yellowish.



**Thorax.** – Well marked anterior angles, quite opened. Lateral borders arched with traces of angle, the apex of this angle is about one third of the length of pronotal border. Posterior angles marked by a slight salient. Posterior border without margin or flange. Pronotal surface with very fine punctures (a little more perceptible towards the posterior border) on a very flattened shagreened.

Excavated proepisternae, with denticle on the lateral border. Proepisternal carina obliquely directed ahead, reaches half the distance between the coxa and lateral border. Median lobe of metasternum finely punctated.

**Elytrae.** – Fine and superficial, although visible striation; eighth stria finely flanged on its base. Shagreened interstriae, with scattered punctures very superficial, almost unnoticeable.

**Legs.** – Ventral surface of femur I with fine setigerous punctures, specially backwards. Tibiae uniformly enlarged towards the apex. Tibial apex slightly obliquely truncated. Teeth I and II close together. Anterior tibial spur bifurcated: external point larger and more acute than internal.

Tibiae II faintly arched, uniformly enlarged towards the apex. Tarsi slightly shorter than tibia; first tarsal segment clearly shorter than second; tarsites with the compressed trapezoidal shape characteristic of *Canthon*. Claws small and slightly curved.

**Pygidium.** – Pygidium base arched, with some traces of angle. Surface with some dispersed punctures, shagreened.

**Aedeagus.** – See figure 3.

**Total length.** – 6.5 mm.

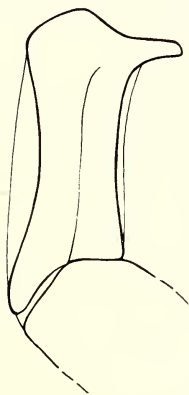


Fig. 3. – *Canthon matthewsi* nov. sp. – Aedeagus, lateral view.

**Examined material.** – Holotype ♂ from Brazil, without a precise locality label (ex Musaeo E. Harold, ex. Collection Oberthur), deposited on the General Collection (boxes of American Canthonina arranged by Halffter) of the Museum National d'Histoire Naturelle of Paris.

We dedicate this species to Dr. Eric G. Matthews, actually at the South Australian Museum of Adelaide, Australia, as a recognition to his brilliant contributions on the knowledge of Scarabaeinae biology and to the taxonomy and zoogeography of the Antillean species in the same group.

**Affinities.** – *C. matthewsi* agrees, in several characteristics with *C. chiriguano*, although there are some differences in others like the shape of the separation between gula and submentum, the more excavated propisternae in *matthewsi* and with a shortened carina that partially separates them from the proepimerae obliquely directed frontward, not approximately perpendicular to the body axis as in *chiriguano*; the carina marginating the eighth elitral stria is much more marked in *chiriguano*. However the essential character separating both species is the presence of scutelar impression on *chiriguano*.

#### **Canthon (Canthon) delpontei sp. nov.**

**Description.** – Female. – Small species; slightly convex dorsally; lengthened oval shape. Dorsal surface of head and pronotum brilliant; elytrae semi-matt, alutaceous; ventral surface with moderate shine. Colour on dorsal surface dark reddish brown on head and elytrae; pronotum light yellowish brown, with all borders marked by a narrow dark brown band, widening to a spot on the prescutelar region; pygidium golden; ventrally, head, thoracic pieces (except proepisternae that are light), and medium part of sternites II to IV, dark brown; lateral parts of sternites II to V and all VI light yellowish brown; anterior legs, tibiae and tarsi of the median and posterior, brown, femurs median and posterior yellowish except for basal and apical extremes which are brown.

**Head.** – Subcircular (fig. 4). Clypeal border with two small central close teeth, separated by a V shaped notch with a rounded apex; triangular teeth; the sculpture is a slightly marked shagreened, changing to a flat reticulate after the clypeo-genal suture, with a slightly marked small tooth. Clypeo-genal suture very slightly noticeable, marked by a fine sulcus. Dorsal region of eyes small, narrow. Surface of head somewhat depressed back of clypeal teeth; the sculpture is a slightly marked shagreened, changing to a flat reticulate towards the median posterior part; with fine but clear punctures (each puncture, as on pronotum, elytrae, pygidium, middle zone of metasternum and

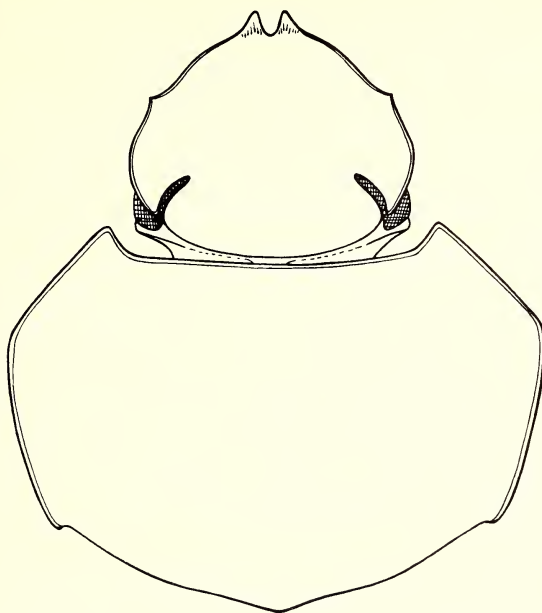


Fig. 4. – *Cantbon delpontei* nov. sp. – Contour of head and thorax.

generally in all the body of animal, with a very short microscopic golden seta, only visible with great enlargement).

Ventrally, close clypeal teeth joined by its enlarged basis. Anterior border of labium with a shallow notch, open V-shaped. Submentum separated from gula by a V-shaped setae line. Antennae with the club clearer than the rest of the organ and covered by golden tomentum.

**T h o r a x .** – Pronotum almost twice wider than longer. Anterior salient angles, tending to a  $90^\circ$  angle shape. Lateral borders arched. Posterior angles marked, obtuse. Posterior border arched, slightly sinuous and with traces of angulosity on its middle part; not marginated. Surface with sculpture formed by a microscopic reticulum without relief; punctures spaced, fine, microsetigerous (that is, with a very short golden microscopic seta). With no lateral impression.

Proepisternal slightly concave; lateral border with slight traces of denticle, separated from proepimerae by a shortened transverse carina, fading towards the lateral half; with some fine and golden setae, shorter in proepimerae. Mesosternum very short, smooth and glabrous. Mesoepimerae, metaepisternae and lateral zones of metasternum with reticulated microsculpture and microscopic disperse pilosity; sculpture of mid zone of meta-

sternum similar to that already described, tending to smooth on disc; mid zone with fine and spaced punctures, microsetigerous.

*Elytrae.* – Almost flat. Striae obsolete and poorly defined; the eighth one marginated by a fine carina, extending from the base to the end of the first third of elytral length. Interstriae with a well defined reticular microscopic appearance, giving alutaceous shine to elytra; with microsetigerous punctures, very fine and superficial.

*Legs.* – Ventral surface of femur I finely punctuated. Tibia I with three teeth, concentrated on distal third of tibia and, specially the most apical one, oblique to the tibial axis; teeth median in size, acute and with a denticle between the median and most basal ones; between this last tooth and tibial base, the external border of this one is finely serrated. Distal apex of tibia obliquely truncated. Spur fine, spiniform, acute, almost straight. Tarsus fine, slightly larger than width of tibial apex; with very fine, acute and curved claws.

Posterior border of trocanter II with a short golden seta. Ventral surface of femur II with some slightly noticeable and disperse punctures, disperse and scarce microscopic setae; anterior border not marginated, posterior one flanged by a fine carina. Tibia II uniformly widened towards the apex. Spurs spiniform, acute; the largest one longer and the smallest as large as the first tarsal article. Tarsus very compressed, longer than tibia; first article notably shorter than second; articles almost rectangular in shape (slightly narrower on proximal base); ventral face, reduced to an edge, bearing a double line of setae, forming a double continuous comb along the length of tarsus. Claws compressed, ending in an acute point.

Trocanter III with a rigid setae, well defined, on its posterior border. Ventral surface of femur III very fine and dispersely punctuated; margination of anterior border fading towards femur apex; posterior border flanged by a fine carina. Tibia III similar to mesothoracic one, slightly longer, practically straight. Spur substraight, spiniform, acute, larger than first tarsal article. Tarsus and claws wholly similar to mesothoracic, only difference being that tarsus III is somewhat shorter than the corresponding tibia.

*Abdomen.* – Sternites with reticular microsculpture, flattened; the VI with some very fine and superficial points; all sternites with microscopic golden disperse setae. Depressions presenting laterally on intersegmentary sutures very shallow.

*Pygidium.* – Slightly wider than longer; apical flange enlarged. Separated from propygidium by a fine and poorly defined small carina

somewhat arched. Surface with a sculpture, that is a transition between a slight reticulum and a fine shagreened; with fine, spaced and micro-setigerous punctures.

Male unknown.

Total length: 6 mm; maximum width: 4 mm.

Examined material. – Holotype ♀ from Bolivia, Beni Department, Guayaramerín, II-1965, A. Martínez col., on human excrement. Deposited at Martínez collection.

Observations and affinities. – This new species is isolated within genus *Canthon*, subgenus *Canthon*. It has similarities with some species of *Scybalocanthon*, marked by the clear and translucent parts of pronotum and femurs, as well as the shape of tibiae and metathoracic tarsi. However, the presence of a fine carina separating pygidium from propygidium as well the coincidence of all the characters with *Canthon* redescription, include it in this last genus, within the nominotypic subgenus.

Within the genus *Scybalocanthon* it would be similar to *Sc. aereus* (Schmidt) and to *Sc. balachowskyi* sp. nov. described ahead. It is distinguished from the first species not only by the separation between pygidium and propygidium already mentioned, but also by presenting the anterior border (ventral surface) of femur III marginated, having a proepisternal carina (that even though shortened is clear on the internal half), elytrae with a humeral striae keel-shaped, appearing on the base, punctures on interstriae very fine and similar through all surface, etc. From *Sc. balachowskyi* besides the fine small carina on the base of pygidium, it is distinguished by the punctures on head, more clear, the pronotum without a lateral angle, elytral striae quite blurred, etc.

The small carina that separates pygidium from propygidium is not a well marked and clear carina as the one found on the most of species of *Canthon*, *Glaphyrocantion* and other genera, but a fine enlargement of the junction arista, being however, clearly marked. Within *Canthon*, *C. delponte* is a species that marks a bond with *Scybalocanthon*, due to its similarities to species of this genus.

We are dedicating this species as a posthumous homage to professor doctor Eduardo del Ponte, Head of the Department of Sanitary Entomology from the Instituto Nacional de Microbiología de la República Argentina, who was the teacher of one of us (Martínez) and friend of both, recently deceased.

**Scybalocanthon balachowskyi sp. nov.**

**Description.** – Small species, elongated oval, slightly brilliant, with more accentuated shine on pronotum. General colour yellowish brown, lighter (yellowish) on pronotum and pygidium, darker on elytrae (in one of the specimens wholly black); head black with greenish shades. Antennae, ventral surface and legs yellowish brown; ventrally, median and posterior femurs yellowish, except for basal and apical extremes which are dark.

**Male. Head** (see fig. 5). – Subcircular. Clypeal border with two small central teeth triangular, somewhat sharp, separated by an U-shaped notch, opened frontward; to both sides of teeth, the border is slightly and poorly conspicuously angulous, not forming a second pair of teeth. Genae widely arched, with traces of angulosity on their anterior extreme. Clypeo-genal suture very fine and poorly conspicuous, the clypeo-frontal suture more marked, lacking however on the center. Dorsal surface of eyes small, narrow. Posterior dorsal border of head (occipital region of front) totally margined by a fine carina. Cephalic surface depressed back of clypeal teeth; sculpture formed by a fine shagreened, with simple and fine punctures, somewhat abundant, included between.

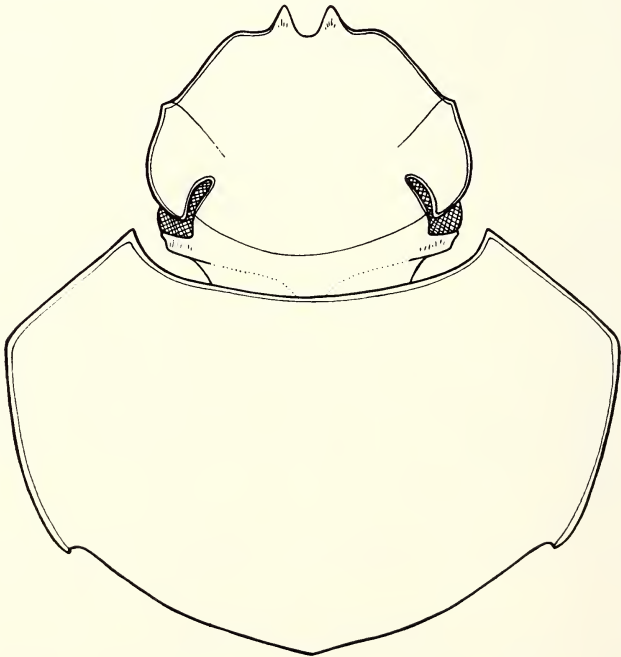


Fig. 5. – *Scybalocanthon balachowskyi* nov. sp. – Contour of head and thorax.

Ventral clypeal structure in form of arched carina, joining the base of both clypeal teeth. Anterior border of labium with a shallow notch, open V-shaped and totally rounded apex; mentum with long and rigid setae, not abundant, lacking on the longitudinal middle line, which is slightly depressed. Separation between submentum and gula open V-shaped. Antennal club yellowish.

**Thorax.** – Pronotum twice wider than longer; moderately convex. Anterior angles salient and acute. Lateral borders forming a mid obtuse angle, with both anterior and posterior side substraight. Posterior angles obtuse, marked by a notch of posterior border. Posterior border very slightly angulous on center. Anterior and lateral borders flanged by a fine carina, with a narrow dark brown band, same as posterior border, which may be wider on the posterior one. Lateral impressions very flat, scarcely perceptible. Pronotal surface covered by a very flattened shagreened with punctuation moderately dense intercalated, formed by very fine punctures, simple, and between them even finer punctures, only visible at great enlargements.

Prosternum with sternelum glabrous, on the posterior border with a comb of fine setae. Proepisternae not excavated, slightly depressed, with a poorly evident lateral denticle; without carina separating them from proepimerae, except for a very short remainder towards the internal border (coxal); with a few, fine and long setae, scarcer and shorter on proepimerae.

Mesosternum very short. Meso and metathoracic ventral surface with fine alutaceous sculpture, derived from a very flattened shagreened, with fine and disperse punctures on the median lobe of metasternum.

**Elytrae.** – Faintly convex, scutelar impression very flat and poorly evident. With nine striae (including lateral one), fine and superficial, although clearly visible; first one with flat punctures, slightly noticeable and defined, but even less apparent may appear on dorsal striae of some specimens; eighth stria reaching base and finely carinated. Interstriae wide, with very flattened sculpture (alutaceous), with fine punctures included, somewhat abundant. Humeral tubercle very slightly noticeable.

**Legs.** – Ventral surface of femur I with reticulated flattened sculpture and fine scattered punctures; on distal extreme and also towards the posterior border with some setigerous punctures, with short and rigid setae. Tibia I slightly enlarged towards the apex; with three close teeth, obliquely in position, triangular and acute; between teeth some denticle, between the most basal one and tibial base the border is serrated; tibial apex very obliquely truncated (apical tooth directed frontwards forming a 45° angle). Tibial

spur small, not widened, somewhat arched dorso-ventrally and with a notched apex forming two points more or less acute. Tarsus fine, provided of small claws, curved and acute.

Sculpture on ventral surface of femur II, same as femur III, similar to anterior femur but more flattened and smooth; with microscopic punctures only visible under great enlargement. Tibia II with internal border sub-straight, the external one marking the gradual enlargement of tibia towards the apex, which is not very accentuated. Spurs fine, spiniform, acute. Tarsus about same length than tibia, compressed; articles rectangular, slightly narrowed on the base; first faintly shorter than second; claws small slightly unequal in length (internal slightly longer), little curved and acute.

Ventral surface of femur III anteriorly margined by a fine sulcus, located practically on anterior border, disappearing towards the apex of femur. Posterior border margined by a fine carina. Without punctuation. Tibia III long, almost straight, fine, on distal two thirds with a slight and gradual enlargement towards the apex. Spur long, fine and acute, larger than first tarsal article. Tarsus shorter than tibia, similar to the mesothoracic one; first article shorter than second. Claws similar to mesothoracic ones.

**A b d o m e n .** – Sternites with alutaceous sculpture, without punctuation. Sternite V very short; the VI approximately twice as long as V, middle part of its posterior border slightly and very open notched.

**P y g i d i u m .** – Large, somewhat convex, as long as wide. With no carina separating it from propygidium; its base markedly angulous; free borders flanged by a fine carina, very widened on apex of pygidium. Surface with very flattened reticular sculpture, with no defined punctures.

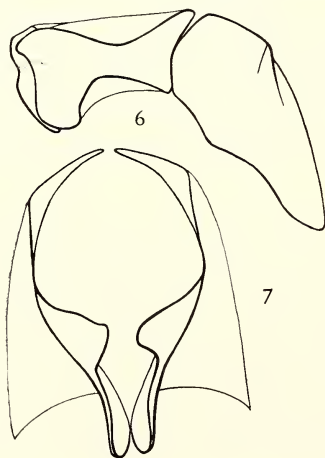


Fig. 6–7: *Scybalocanthos balachowskyi* nov. sp.: 6. – Aedeagus, lateral view;

7. – Aedeagus, frontdorsal view.



**A e d e a g u s** with compressed paramerae, widened in a ventrodiscal lobe (see fig. 6); apex slightly asymmetrical (fig. 7).

**F e m a l e** unknown.

**T o t a l l e n g t h** : 5.5–6.5 mm; **m a x i m u m w i d t h** : 4–5 mm.

**E x a m i n e d m a t e r i a l** : Holotype and one paratype males from Venezuela, State of Aragua, Parque Nacional de Rancho Grande, 1 200 m altitude, VI-1963, A. Martínez col., on human excrement in the jungle, during the day, deposited at Martínez Collection; a male paratype, same locality, 25-V-1968, C. Bordon col. on Halffter Collection. The locality is covered by mountain subtropical forest, with rain and fog during most part of the year.

**O b s e r v a t i o n s** : After observations by one of the authors (Martínez) this species, as the great majority of the ones of this genus, has diurnal activity, specially during hours of greater insolation. It is attracted by fresh human excrements, and is as good flyer as agile in movements. It elaborates rapidly small excrement balls, hiding soon under fallen leaves of jungle and burying at few centimeters deep.

We are honored in dedicating this species to the very distinguished French entomologist, Prof. A. S. Balachowsky, Member of the Institute, Director of the Laboratory of General and Applied Entomology of the Muséum National d'Histoire Naturelle of Paris, who has always given greatest facilities so that the authors may work on the rich collections of Canthonina in his Institution.

**A f f i n i t i e s**. – *Sc. balachowskyi* is related to *Sc. aereus* (Schmidt), being different by having margination on ventral border of posterior femur; posterior angles of pronotum marked by a lateral notch of the anterior border and its smaller size.

### **Glaphyrocantion (Glaphyrocantion) reyesi sp. nov.**

**D e s c r i p t i o n**. – Small species, globular, brilliant. Dorsal surface of head and pronotum, pygidium and median zone of metasternum black with greenish reflexes, very marked in pronotum; elytrae, ventral surface and legs very dark reddish-brown.

**M a l e . H e a d**. – Wider than long. Clypeal anterior border with two small central teeth, triangular, faintly reflexed dorsally, of obtuse apex, separated between them by a V shaped notch of rounded apex. On both sides of these teeth the clypeal border slightly angulous, but without forming a

second pair of teeth. Genae in open arc with a small angulosity – immediately after the clypeogenal suture – which does not form a small tooth. Clypeo-genal suture fine but well defined. Dorsal region of eyes small and narrow. Posterior border of front, totally marginated by a fine complete carina; more backwards, in the occipital part of head, a second carina more accentuated, interrupted in the center and accompanied by a comb of setae directed frontwards (to see well this carina the head must be slightly bent down). Dorsal surface of head somewhat depressed in the anterior part of clypeus, shagreened with simple punctures, fines but well marked, of medium density; each puncture with a very short and golden microscopic seta only visible under certain light incidence.

Ventral region of head, with ventral clypeus structure formed by an arched carina which joins the bases of the clypeal teeth. Anterior border of labium notched in wide V quite deep. Mentum with abundant and long setae lacking on the medium longitudinal line which is very slightly depressed. Submentum separated from gula an almost straight suture accompanied by a comb of rigid setae of median length. Antennal club well developed, wider than longer, blackish. Ventral region of eye more reduced than what is general in *Canthonina*, very slightly globular, marginated in its posterior part by a ventral extension of the occipital carina mentioned when describing the dorsal part of head.

**T h o r a x .** – Width of pronotum approximately equal than twice its length. Anterior angles salient, acute. Lateral borders clearly angulous; angle of apex situated more anteriorly than medium point of lateral border. Posterior angles acute, well defined, marked by a notch of posterior border. Posterior border arched. Anterior and lateral borders flanged by a fine carina, obsolete on the medium part of anterior border. Posterior border without flange or margination. Pronotum surface with disc very convex, flattened towards the lateral borders. Sculpture, punctuation and microsetae to those of the head, although setae are much more visible than in this one; punctuation diluted on lateral borders. Without defined prescutelar impression, but a very slight depression of the pronotal surface is marked in this part. A very small and little evident prominence (not a tubercle) exists on the medium part of each lateral border; lacks lateral impression.

Proepisternae markedly excavated, separated from proepimerae by a well defined carina which disappears when reaching external border (at the height of apex of angle of this external border). Without lateral denticle. With long setae reduced in the proepimerae to a ones, shorter, disposed in a parallel line to external border.

Mesosternum short. Mesoepimerae, metaepisternae and lateral lobes of metasternum with reticulated sculpture; median lobe with flattened shagreened, with microsetigerous punctures moderately abundant; very short microsetae, golden, only visible under certain light incidences.

Elytrae. – Without net scutelar impression. Obsolete striae, hardly visible. Eighth stria notcarinated. Interstriae finely shagreened, with very short and golden microsetae spaced, little abundant, visible under certain light incidences. Humeral tubercle un conspicuous.

Legs. – Ventral surface of femur I with reticulated sculpture very flattened and some very superficial punctures, plus some some long setae towards apex and posterior border; anterior border flanged by a well marked carina. Tibia I relatively short, widened towards apex. Apical half of external border with three triangular teeth, growing towards the distal, not very acute, disposed in perpendicular form to the axis of tibia; between teeth, well marked denticles, of rounded apex, which continue between the basal tooth and the apex of tibia. Distal apex of tibia truncated in straight form. Tibial spur small, somewhat arched, with the apex notched in angular shape forming two sharp points. Length of tarsus slightly superior to distal width of tibia; with small claws, arched and acute.

Posterior border of trochanter II with one long and rigid seta. Ventral surface of femur II with anterior border marginated, in its basal half, by a fine carina; reticular flattened sculpture, with fine punctures disperse, each one with a microseta short and golden. Tibia II short with distal half widened; lateral border arched, with faint inflection angle in distal third. Spurs spiniform, long and acute. Tarsus slightly shorter than tibia, compressed; articles trapezoidal, except V which is rectangular; first article shorter than second. Small claws, faintly arched and acute.

Trochanter III with a large and rigid seta in its posterior border. Femur III lengthened, its ventral surface with anterior border completely marginated by a fine carina; posterior border of femur very sharp forming a flange in fine carina more visible in distal half; sculpture similar to one of femur II. Tibia III of inferior length to the femur one, lengthen, slender, poorly and gradually widened towards the apex, almost straight with only a slight arched indication. Spur very long, larger than the two first tarsal articles, spiniform, fine and very acute. Tarsus markedly shorter than tibia; articles similar to the ones of II pair, though more lengthened; first article clearly smaller than second. Claws small, slightly arched, acute.

Abdomen. – V sternite short, VI with caudal border slightly

notched in the center. At the sides, impressions on the intersegmentary sutures faintly marked. Surface with little defined shagreened, with scattered microsetae.

*Pygidium*. – Slightly wider than longer, convex. Separated from propygidium by a well defined carina, regularly arched; free border also margined by a carina which thickens slightly towards apex. Surface shagreened, with very fine punctures, spaced, provided of microsetae.

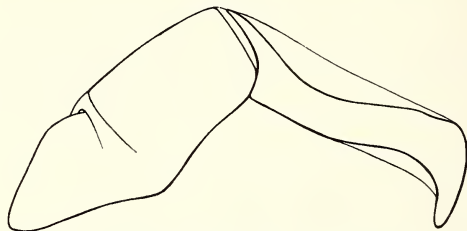


Fig. 8. – *Glaphyrocanthon revesi* nov. sp. – Aedeagus, lateral view.

*Aedeagus*. – Rectangular parameres, lengthened, with apex provided of a ventral spine well developed (fig. 8).

*Female*. – Different from male in the spur of anterior tibia which is arched and acute, not bifurcated. VI sternite without any notch in its caudal border, and the proepisternae, which have on the lateral border traces of a microdenticle, obsolete, which is totally lacking in the examined male.

*Total length*: 3.5–4 mm; *maximum width*: 2.5–2.8 mm.

*Examined material*. – Holotype ♂ and Allotype ♀ from Bolivia, Department of Santa Cruz de la Sierra, village of Puerto Alegre, located on Paragua river, tributary of Guaporé river, II-1968, Juan Salas col., in Martínez collection.

*Affinities*. – This new species is one of the smallest of the genus, easily recognized by the combination of characters: ventral surface of posterior femurs anteriorly margined; dorsal surface of eyes small; head, pronotum and in general surface of body shagreened, elytrae without humeral carinated stria and posterior tibia without intern angulosity.

In 1964, Martínez, G. Halffter and V. Halffter establish two subgenera clearly delimited within genus *Glaphyrocanthon*. Of these two subgenera, the new species is evidently included in the nominotypic, characterized by the dull elytrae and the anterior tibiae with the apex truncated in form

striaght. In the same work, subgenus *Glaphyrocanthon* is divided in three groups, of which two represent phyletic lines very well defined and the remaining, named "group juvenus" an ensemble of species derived independently from several species of one of the well defined groups, the "group variabilis" which is the central one of subgenus *Glaphyrocanthon*. Species from "group juvenus" have in common anterior border of ventral surface of posterior femurs marginated and ocular dorsal surface small. (Martínez, Halffter and Halffter, 1964: 5).

In this heterogeneous group ("juvenus") must be comprised *Gl. (Gl.) reyesi*. As it happens with other species of "group juvenus", also *Gl. (Gl.) reyesi* appear to have derived from species of "variabilis group". In this case it shows affinities with *Gl. (Gl.) variabilis* Martínez, and with species very similar between them, *Gl. (Gl.) lamprimus* Bates and *Gl. (Gl.) caelius* Bates.

*Gl. (Gl.) reyesi* is similar in many characters to *G. (Gl.) variabilis* Martínez and it is possible that it derived from this species, known from Brazil and Venezuela from localities of amazonic jungle. The most important characters that distinguish both species are the following in *variabilis*: Lack of margination in the anterior border of posterior femur (ventral surface) and shape of parameres of aedeagus<sup>1</sup> where ventral spine is totally lacking, being very showy in *reyesi*. Other characters that separate both species are (compare with *reyesi* description) the presence in *variabilis* of a noticeable denticle in the external border of proepisternae; position of apex of angle that forms lateral border of pronotum which is middle in *variabilis*, with anterior side of angle of lateral border slightly sinuous; the size, as the total length of *variabilis* (6.9 to 7.4 mm) is almost the double of the *reyesi* one and the presence in Alotype ♀ of *variabilis*, of a fine carina marginating base of humeral stria, same that lacks totally in *reyesi*, but it is poorly marked and is not present in all *variabilis* specimens.

Of *Gl. (Gl.) acutus* Harold, species close to *variabilis*, the new species can be easily separated by the lack of margination in the posterior femur as well as by the shape of aedeagus, both characters where *acutus* is similar to *variabilis*, but besides by the larger size of *acutus*, species found in Colombia, Venezuela and Trinity island.

From *Gl. (Gl.) lamprimus* (Bates) and *Gl. (Gl.) caelius* (Bates), exclusive species of Panama, *reyesi* may be distinguished by the different colouration of the dorsal surface; by the Panamenian species having pronotum (in *lam-*

1.— (see schemes in Martínez 1949: 286; Martínez, Halffter and Halffter, 1964: 39).

*primus* the whole dorsal surface) very brilliant, without shagreened, and by the lack in Panamenian species of anterior margination in the ventral surface of posterior femurs. We shall profit of the occasion to correct a lapsus from Howden (1966: 729). While designating lectotype of *Gl. (Gl.) lamprimus* he says: "Martínez, Halffter and Halffter (1964) place *lamprimus* in *Glaphyrocantion* and record it from Panama, Bolivia, Venezuela, Brazil and Colombia". The quotation of the placing of *lamprimus* in *Glaphyrocantion* is absolutely correct, but in the paper mentioned by Howden it is given as distribution of *lamprimus* (same as of *caelius*) Panama, insisting besides that both species are exclusive of that country (Martínez, Halffter and Halffter 1964: 10).

We dedicate this species to Biologist Pedro Reyes Castillo, from the Escuela Nacional de Ciencias Biológicas, Mexico, author of a recent and excellent paper where he intends to put order in the confuse generic division of American Passalidae.

#### ***Geocantion femoralis* (Chevrolat)**

Described as *Coprobius femoralis* by Chevrolat in 1834, this species is mentioned as *Canthon* by Harold in 1867 for the first time and transferred to genus *Geocantion* by Pereira and Martínez (1956: 146–151). These later authors give a detailed description of *G. femoralis* as well as drawings of the mouth parts, antenna, posterior tibia and tarsus and aedeagus. This makes useless the redescriptions of the species as such. We are giving, the descriptions of the subspecies in which, in our opinion, should be divided this species, descriptions which do not contain any more characters than those with sub-specific value or those necessary to describe, in order to precise the limits between the species and other close taxa.

#### ***Geocantion femoralis femoralis* (Chevrolat)**

**Subspecific description.** – Colour on dorsal surface (head, pronotum and elytrae) and on pygidium, brilliant bluish black; ventral surface black; median and posterior legs with femurs and tibiae, yellow, except for the basal and apical extremes which are brown; tarsi brown. Antennal club yellowish orange.

Anterior border of clypeus with two median teeth well marked and two obtuse lateral teeth, less evident. Carina separating proepisternae from proepimerae reaches lateral border of pronotum. Anterior tibia widened towards the apex in a uniform and quite noticeable fashion; tibial teeth trian-

gular, acute; tibial apex truncated in a slightly oblique shape; anterior tibial spur different in males and females. Dorsally, the apex of last article of anterior tarsi with two rigid setae.

Without setigerous punctures on ventral surface of median femurs. Without a row of setae on the anterior border of posterior femur. Elytrae very bright, smooth, with fine and abundant micropunctures (punctures of two kinds, one of them finer than the other); striation obsolete, poorly visible, except the sutural stria. Pygidium base base with a fine arched carina; its surface slightly convex towards the apex, with clear and abundant punctuation, although superficial.

**M a l e.** – Anterior tibial spur bifurcated, with internal bifurcation tooth slightly smaller than external one. Pygidium one and one third wider than longer; base arched, marked by a fine complete carina. Last abdominal segment very shortened on its median part. Aedeagus after fig. 9.

**F e m a l e.** – Anterior tibial spur narrow, curved, with an acute apex. Pygidium very shortened with traces of gibbosity on the center of the basal border, where the carina separating pygidium from propygidium is interrupted.

Last abdominal segment wide and uniform, with no shortening in the center.

**V a r i a t i o n.** – The anterior description corresponds to topotypic specimens (the typical locality is Córdoba, Veracruz) or coming from localities near to the typical one.

Towards the South of Mexico and Guatemala there is a variation which goes from specimens corresponding to the former description to others which may show one or several of the following characters: Head and pronotum with marked green shines; in elytrae green reflexes poorly marked; elytrae with a very flattened shagreened, which may do less noticeable the punctuation; ventral surface of median femurs with some setigerous puncture towards the distal extreme.

The examined specimen coming from Bolivia has greenish reflexes on pronotum. We have also studied an specimen labeled (with writing of Edgar von Harold): *ochropus* Harold (Ex musaeo E. Harold, Museum of Paris). His study confirms the synonymy of this species with *G. femoralis femoralis*.

We have been able to examine a numerous series of specimens collected in San Blas, Nayarit, all of them very uniform in their characteristics: Co-

lour of head and pronotum very dark green; elytrae black, finely shagreened, with very fine punctuation intercalated; pygidium black.

**Examined material.** – MEXICO. – Colima: 1 specimen. Nayarit: San Blas, 24-VI-1968, 11 specimens, Halffter et als. col. Oaxaca: Juquila, 2 specimens, Hoege col. (H. W. Bates, Biol. Centr. Amer.). Tabasco: Teapa, III, 2 specimens. Veracruz: Córdoba, 1 specimen, Salle col. (H. W. Bates, Biol. Centr. Amer.); Presidio, IX-1940, 2 specimens, F. Islas col.; Sontecomapan (Monte Pío), 1 specimen, G. Halffter col.; Tecolutla, VIII-1953, 1 specimen, G. Halffter col.; Tezonapa, 9-IV-1941, 1 specimen, F. Islas col. GUATEMALA. – Escuintla: Mirandilla, 1700 ft., 3 specimens, Champion col. (H. W. Bates, Biol. Centr. Amer.). Suchitepéquez: San Isidro, 1600 ft., 2 specimens, Champion col. (H. W. Bates, Biol. Centr. Amer.). COLOMBIA. – 1 specimen (Ex Museo E. Harold). The whole material corresponds to the collection of the Museum of Paris and Halffter.

**Complementary localities registered in the literature.** – Costa Rica (Harold, 1868: 63). British Honduras (Blackwelder, 1944: 199). Mexico. – Chiapas: Tapachula; Guatemala. – Alta Verapaz: Cobán; Escuintla: El Zapote; British Honduras. – Sarstoon River, Toledo; Colombia. – Cauca; Villa Elvira; Pacho (Pereira and Martínez, 1956: 151). Mexico. – San Luis Potosí: El Salto de Agua; British Honduras; Costa Rica (Howden, 1966: 728).

Discussion of the geographic distribution of this subspecies is made in ensemble with the one of the other subspecies.

**Ecological and ethological notes.** – All captures of this subspecies correspond to tropical forest always green or subdeciduous. The highest locality would be Juquila (Oaxaca), at an altitude of 1600 m and wet forest of wide leave; however the label is quite old and does not mention the altitude, so being a mountain region we cannot know the exact altitude of collect of the *G. f. femoralis*. The well known altitudes variate between sea level and 800 m. In various cases there are specific indications that point out that *G. f. femoralis* has been captures in human or monkey excrement, inside the forest; apparently it has never been collected outside this kind of community. It does not seem to be a common species. In many years of collects in the Mexican forests and several expeditions to the ones of Central America, only in San Blas, Nayarit, we captured this subspecies in a certain number. It is possible that it is an stenotopyc animal, with well defined ecological demands.

The only biological observations more or less complete belong to the



San Blas captures, 24-VI-1968. *Geocanthon femoralis femoralis* was collected only in a glen located on the road to San Blas, at 25 Km from this village. This glen wetter than the greatest part of the near places, is occupied by a tropical subdeciduous forest, tending to evergreen, with great abundance of palm trees (*Orbignya cohune*). All specimens were collected by night (as they were not collected with diurnal traps, we can establish that it is a nocturnal species), with traps with carcasses and, in larger numbers, with human excrement. *Canthon cyanellus cyanellus* Leconte, another forest's species, goes to carcasses during the day, this species being of about the same size and quite similar in general aspect. Both *Canthonina* complement each other in the same ecological niche, *cyanellus* during the day and *femoralis* by night. During the night, *Deltochilum* also goes to carcasses. The coprofagous fauna is much more varied.

Although we collected intensively the area for several days, *G. f. femoralis* was only found in the mentioned locality, lacking in areas with tropical subdeciduous perturbed forest, with a greater insolation and tree vegetation less dense.

Two of the specimens were maintained alive on terrariums. On August 6th, 42 days after collection, they made up a broad ball; a second one was made on August 31st; a third one on September 9th, and a fourth one on September 14th. Because of very powerful reasons, we had to abandon the terrarium and the observations were not continued.

Brood balls are remarkable. Piriform in shape, they have a long neck. Total height of ball is 27 mm, of which 6 are neck. Maximum width – near the base – 19 mm and neck width, 4 mm. Each one of the brood balls was totally covered by a thick coat of soil. The central chamber with dung, in which the larva develops is communicated by a very well marked channel which crosses through the neck and opens at its distal extreme.

As remarkable as the shape of the brood ball was the fact that the balls were not buried, but left on surface, or at the most, in a very shallow excavation.

This behaviour pattern, different from almost all Scarabaeini which bury their brood balls, has also been found in some other forest species. In this particular environment, moist and protected from sunlight, it seems proper to merely hide the ball among the dead leaves on the ground, so that several species have lost the habit of burying their brood balls (see Halffter and Matthews, 1966: 146–147). The only *Canthonina* known to leave its brood balls on surface was *Deltochilum gibbosum* (Fabricius), to which *G. f.*

*femoralis* must be added. Other Scarabaeinae following this evolutive pattern are species (although not all) of *Eurysternus* and *Sisyphus*, as well as all the species of *Nesosisyphus*.

The necessary amount of dung for the making of the brood ball must have been rolled, since the balls were found far away (23 cm) from the place where the dung was deposited. However, no ball rolling was observed, nor making or rolling of the feeding balls.

**Affinities.** – A species with many similarities and specially a general aspect likely to *Geocanthon femoralis femoralis* is *Geocanthon columbianus* (A. Schmidt). Since its description in 1920 as *Canthon columbianus* (Pereira and Martínez, 1960: 47, transfer it to genus *Geocanthon*) this species has not been redescribed. Balthasar's key (1939) is prone to have some misinterpretations and does not show the proximity to *G. femoralis*. That is why we have believed proper to give a diagnoses based upon the same characters used to distinguish among subspecies of *G. femoralis*.

#### ***Geocanthon femoralis bimaculatus* (Schmidt) nov. status**

**Subspecific description.** – Colour on dorsal and ventral surface black, with barely marked bluish shades on pronotum and two reddish brown spots towards the apex of elytrae. Head, pronotum and elytra brilliant, specially the later ones; pygidium with silky shine. Anterior and median coxae light brown; femurs of all three pairs of legs orange (except for basal and apical extremes); tibiae and tarsi brown. Antennal club brown to light brown.

Anterior border of clypeus and carina separating proepisternae from proepimerae as in nominotypic subspecies. Anterior tibia widened on its distal half forming a certain angulosity on the median point of interior border where widening begins. Tibial teeth and tibial apex as in *G. f. femoralis*, although in *bimaculatus* the apical one is somewhat more separated from the median and slightly more curved downwards than in the nominotypic subspecies. Without setigerous punctures on the ventral surface of median femurs. With a comb of very spaced setae on the distal half of the anterior border of femur III; an even more sparse comb on the equivalent position of femur II. Elytrae brilliant, in some specimens finely shagreened, with very short white microsetae only visible under great enlargement and fine micropunctuation. Striation very thin and superficial (the sole well defined stria, same as in *G. f. femoralis* is the sutural one) although more

marked on base of striae than in nominotypic subspecies. Pygidium as in nominotypic subspecies, shagreened.

**Male.** – Same characteristics as in nominotypic subspecies. Aedeagus slightly different (see fig. 10).

**Female.** – Anterior tibial spur as in nominotypic subspecies. Pygidium less shortened, one and one-half times wider than longer; gibbosity on the center of base very diluted, but basal carina clearly interrupted. Last abdominal segment as in nominotypic subspecies.

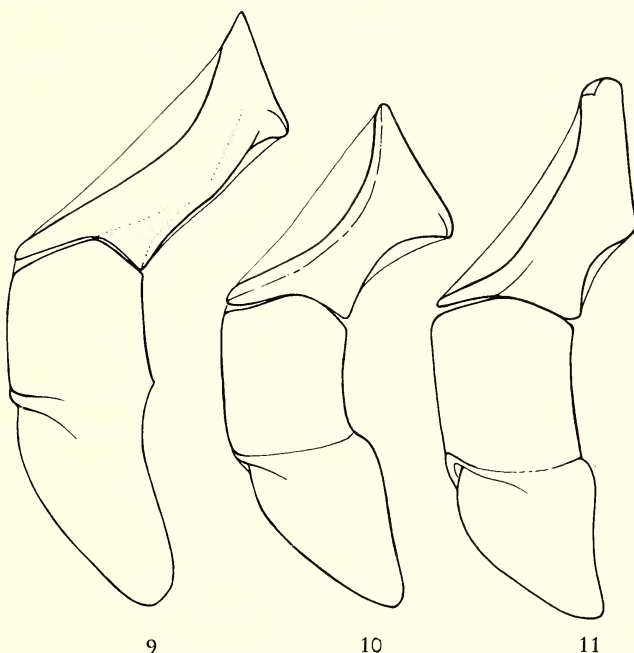


Fig. 9–11: 9. – *Geocanthon femoralis femoralis* (Chevrolat) – Aedeagus, lateral view.  
 10. – *Geocanthon femoralis bimaculatus* (Schmidt) – Aedeagus, lateral view.  
 11. – *Geocanthon columbianus* (Schmidt) – Aedeagus, lateral view.

**Comments.** – *Canthon bimaculatus* was described by Schmidt in 1922 and redescribed in detail and with drawings of mouth parts, antenna, posterior tibia and tarsi, as well as aedeagus, by Pereira and Martínez, 1956: 144–147, who moved the species from genus *Canthon* to *Geocanthon*.

We have studied *bimaculatus* in detail and seen that it does agree in many characters with *Geocanthon femoralis femoralis* (these characters being omitted in the preceding description). The only characters of some importance distinguishing *bimaculatus* from *G. f. femoralis* are the following which

correspond to the first taxa: 1) The presence of an orange-brown spot near the apex of each elytra; 2) Median and posterior tibiae brown and with the central part not yellowish-orange; 3) The more or less sudden widening (never too accentuated) of the internal border of tibia I, instead of a widening from the base to the apex; 4) Sparse comb of setae on the anterior border of femur III; 5) Striation slightly more marked; 6) Little differences in shape of aedeagus and of female's pygidium, slightly longer in *bimaculatus*.

These differences allow us, without doubt, to distinguish among both taxa; however what value should we give to these characters and as a consequence which is the taxonomic degree that ought to be assigned to the taxa? Mathematical analysis of the variability in both taxa, their comparison and the determination of a geographic fringe with transition specimens is totally impossible today and highly improbable in the near future, since this fringe would be located on the Upper Amazons or Eastern slopes of the Andes, both zones poorly collected.

It remains then to evaluate the differences following the experience that other closely related Canthonina can give us.

The slight differences in colour (characters 1 und 2) have not enough weight as to separate two species in these circumstances. Thus, the so-called variety *humeralis* Horn of *Borecanthon simplex* (LeConte) has two coloured spots on elytrae and this is not considered a specific character, even though in this case it could be more significant, since the species is homocromous matt black. Variation of light spots on elytrae and tibiae in many South-american Canthonina with light femurs is considerable.

The angulosity on the internal border of the anterior tibia is but slightly marked and is the result from the slightly more abrupt widening of the tibia's apical half, as compared to the narrower basal half. This widening, by no means is as marked as in other Canthonina, nor even as in *Canthon humectus assimilis* Robinson, where it is taken as a subspecific character (see Halffter, 1961). Characters 2, 5 and 6 may only have subspecific value. Due to all these reasons and to the alopatric distribution with a possible overlap of both taxa: we are regarding *Geocanthon bimaculatus* as a subspecies of *G. femoralis*, thus being *Geocanthon femoralis bimaculatus* (Schmidt).

Examined material. Brasil. — Amazonas: Manicoré, 1 specimen; Ega, 2 specimens. Ex Musaeo H. W. Bates, 1892. In the collections of Museum of Paris and Halffter.

Manicoré locality is in the Amazonas state, on the Madeira river, in the fluency to this one of Manicoré river (at approximately 6° S and 62° W).

Ega is a classic locality of the British great explorer and naturalist H. W. Bates, today known as Tefé; it is found in the fluency of the river of this name with the Amazon (approximately 4° S and 65° W). Both localities belong to the jungle of the Upper Amazons.

Pereira and Martínez (1956: 147) give Colombia, Brazil and Ecuador as distribution of this subspecies, certainly following Balthasar (1939) who indicates: Amazon, Colombia and Ecuador. However, the only specimen examined by Pereira and Martínez is labelled "Brazil, Amazonas".

**C o m m e n t s .** – The subspecific status given to *G. femoralis bimaculatus* Schmidt, has been confirmed by a specimen which morphologically may be considered of transition and which proceeding locality is placed within what could be the geographic transition fringe among the areas of the two subspecies.

This specimen has the same colouration as *G. f. bimaculatus* but without traces of the two spots of the elytral apex. Antennal club orange. Anterior tibiae gradually widened from base of apex, although something which could be taken as an indication of angulosity can be seen towards the middle of interior border. It presents a very sparse comb of setae in anterior border of femur III. Elytrae smooth, shiny, with very fine micropunctuation and very superficial and scarce punctures in striae, wider than these. Aedeagus and other characteristics as in *G. f. bimaculatus*.

Except presenting very superficial punctures on striae, well separated between them and scarce, this specimen has morphological characters totally of transition between *G. f. femoralis* from Colombia and *G. f. bimaculatus* from the Upper Amazons. Their proceeding locality is also intermediate. The label says "Thomar (Amazonas) (Hahnel)".

The locality with this name, Tomar in portuguese, is in the Upper Negro river (slightly south of Ecuador and 65° W), to the North of Tef (Ega), on an area which relief is starting to raise.

#### ***Geocanthon femoralis balsensis* subsp. nov.**

Dorsal surface very dark green; pronotum very brilliant; head, elytrae and pygidium with silky shine; ventral surface black with greenish shades; femurs and tibiae dark green, brilliant; tarsi brown; antennal club brown. Anterior border of clypeus and carina separating proepisternae from proepimerae as in the nominotypic subspecies. Anterior tibia widened gradually from base of apex, although basal half is narrowed; tibial teeth triangular;

apex truncated slightly oblique. Apex of last anterior tarsal article same as in *G. f. femoralis*. Median femurs with some setigerous punctures in ventral surface towards apex. Anterior border of femur III with a sparse comb of setae; some setae also in anterior border of femur II. Elytrae shagreened, with intercalated micropunctuation; striation obsolete, except the sutural stria which is fine, but clearly visible and the base of discal striae which are wide, but very superficial and only marked on the immolation of basal border. Pygidium as in the nominotypic subspecies, surface shagreened, with punctuation fine and abundant. Other characters as in the nominotypic subspecies.

**Examined material.** – Mexico. – Guerrero: Cacahuamilpa, G. Halffter col. Holotype ♂ (in Halffter collection) and Allotype ♀ (in Martínez collection).

### ***Geocanthon columbianus* (A. Schmidt)**

As it has already been pointed out, *Canthon columbianus* was described by Schmidt in 1920 and placed in genus *Geocanthon* by Pereira and Martínez (1960: 47).

The purpose of the following diagnosis is to make easier its differentiation from the two subspecies of *G. femoralis* with which it shows similarities and on the other hand proximity of the distribution areas.

**Diagnosis.** – Ventral and dorsal surface black, with slight reddish-brown shades in elytrae and pygidium; dorsally brilliant. Anterior (in the majority of specimens), median and posterior femurs yellowish orange, except apical and basal extremes which are dark; median and posterior tibiae, yellowish orange; anterior tibiae and tarsi of all the legs brown. Antennal club light brown.

Anterior border of clypeus with two median teeth well marked, at which sides there is an insinuation of lateral teeth fully rounded. Carina separating proepisternae from proepimerae diluted before reaching the external border. Anterior tibia gradually but poorly widened towards apex; tibial teeth, specially the apical one, narrow and long, sharp; apical tooth directed obliquely towards the front; apex very obliquely truncated; anterior tibial spur different in males and females. Ventral surface of median femurs without setigerous punctures, in some specimens only one towards apex. Without a line of setae in anterior border of posterior femur. Elytrae very brilliant, smooth, with very fine and faint micropunctuation; striation obsolete. Base of pygidium with a fine carina, which according to sex, may or may

not be interrupted; pygidium's surface shagreened, with poorly marked punctuation.

**Male.** – Anterior tibial spur with shape of circle sector (with one border straight and the other arched), curved in ventral sense with sharp apex. Pygidium slightly wider than longer; carina separating pygidium from propygidium complete, arched. Last abdominal segment very shortened in the middle part. Aedeagus according to fig. 11.

**Female.** – Anterior tibial spur thin and acute. Tibia slightly wider and teeth a little less narrow than in male. Pygidium remarkably shortened; a gibbosity interrupting the carina which separates it from propygidium on its base; gibbosity continues in a longitudinal carina poorly marked, which does not reach apex of pygidium.

**Comments.** – The former diagnosis follows the guide of the sub-specific descriptions of *Geocanthon femoralis*, which purpose is to point out the characters in which these taxa differ. For this reason we do not indicate the many aspects in which *G. columbianus* and *G. femoralis* agree.

The principal characters in which they differ are the following: 1) Presence or absence of lateral teeth in clypeus. This difference is not really as marked as in other cases, because in *G. f. femoralis* lateral teeth are obtuse and in *G. columbianus* an indication of lateral teeth may be seen, although very rounded; 2) Shape of anterior tibia. It is really different in both species, wider, with triangular teeth and slightly oblique apex in *G. femoralis*; poorly widened, with narrow teeth and markedly oblique apex in *columbianus*; 3) Carina separating proepisternae from proepimerae reaches the lateral border in *femoralis*, it is diluted before reaching this border in *columbianus*; 4) The more remarkable differences are in the secondary sexual characters: male anterior tibial spur bifurcated in *femoralis*, in sector of circle shape, with sharp apex in *columbianus*. Female pygidium in *columbianus* with a well marked gibbosity, in the center of the base, prolonged in a longitudinal carina, which although not very accentuated is well defined; either gibbosity as carina are scarcely marked or are obsolete in *femoralis*; 5) Aedeagus somewhat different though of the same kind.

In conclusion, *G. columbianus* is a different species, but with undoubtedly relations with *G. femoralis*, specially with subspecies *G. f. femoralis*.

We would like to point out that in *G. columbianus* as well as in *G. femoralis*, the base of pygidium is not angulous, as can be deduced from Balthasar's key (1939). What gives a sensation of angle is the way the elytrae finish.

**Examined material.** – COLOMBIA. – Manizales, 1 specimen;

Bogota, 3 specimens (ex Musaeo H. W. Bates, 1892); La Mesa (ex Musaeo E. Steinheil) 1 specimen; Fusagasuga, 4 specimens, (ex Musaeo E. Steinheil); La Vega, 1 specimen (ex Musaeo E. Steinheil). In the collections of Museum of Paris, Halfpter and Martínez.

The localities we have been able to precise correspond to the Andes of Colombia; Manizales in the slopes of the Cordillera Central; Bogotá (2600 m height) altitude and Fusagasuga in the Cordillera Oriental. Pereira and Martínez (1960: 47) examined the types, coming also from Colombia.

### Geographic distribution of the *G. femoralis* and related species

The evolutionary center of this group of species seems to be clearly established on the Northwest area of Southamerica. In Colombia, *G. f. femoralis* and the relative species *G. columbianus* are found, as well as other close species, *G. politus* (Harold), which distribution reaches South to Ecuador and East to Venezuela and Guianas. Besides Harold (1868) mentions the species from South of Mexico. The greatest richness of *Geocanthon* species is found in Colombia.

*G. femoralis femoralis* ranges from Colombia to the North following the distribution that Halfpter (1964) names as "Typical Neotropical Dispersion Pattern". It exists in Centroamerican and South of Mexico tropical forests, reaching the ecologic-geographic barrier of the High plateau, following northwards by both coastal plains: by the Gulf of Mexico to San Luis Potosí State and by the Pacific to Nayarit. Its limits of septentrional invasion agree approximately to those of the tropical jungle.

*G. femoralis*, as many other elements of Southamerican origin, forms part of the depression of the Balsas fauna, a great hidrographical basin located close to the South of the Transversal Volcanic System, which is the Austral limit of the Mexican High plateau. The Balsas fauna is a mixture of Neotropical elements (dominant on those areas below 1600–1700 m) and Septentrional originated elements (Paleoamerican distribution pattern, old elements of a wide distribution, and Nearctic, more recent elements, restricted to mountain ranges; for a more detailed analysis and description of the patterns see Halfpter, 1964 and 1965).

*G. f. balsensis* is a typical example of neotropical element, in this case an endemic subspecies (the most common phenomen); in other cases, endemism is represented by a very closely related species, derived from typical neotropicals. *G. f. balsensis* is known from only one locality: Cacahuamilpa, 1000 m altitude and tropical deciduous forest.



Going back to the evolutionary center of the group, Colombia, *G. columbianus* seems to be clearly restricted to median altitudes on the Colombian Andes. Farther down into the enormous amazonic basin, the subspecies *G. f. bimaculatus* is found on the Upper Amazons and northern part, towards Venezuela and Colombia.

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