



A revision of the genus *Metalepta* Baly, 1861, with the description of three new species from Peru (Coleoptera, Chrysomelidae, Galerucinae)

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Abstract. – Three new species in the Neotropical genus *Metalepta* Baly, 1861, are described: *Metalepta patricia* n. sp., *M. perezii* n. sp. and *M. rubra* n. sp., all collected in northern Peru (Amazonas, Bongará Province). The type specimens of the previously known species are restudied, and their photographs are provided. Lectotypes of *M. tuberculata* Baly, 1861, and *M. degandii* Baly, 1861, are designated. *Metalepta lojaensis* Beenen, 2013, described from southern Ecuador, occurs also in a close locality of north Peru (Piura, Abayaca Province), bringing to six the number of *Metalepta* occurring in Peru. Additional descriptions, notes on the abdominal extra-sclerotisation and description of the available male and female genitalia are presented. A key to the species of *Metalepta* and a map showing the distribution are given

Résumé. – Révision du genre *Metalepta* Baly, 1861, avec la description de trois nouvelles espèces du Pérou (Coleoptera, Chrysomelidae, Galerucinae). Trois nouvelles espèces du genre néotropical *Metalepta* Baly, 1861, sont décrites : *Metalepta patricia* n. sp., *M. perezii* n. sp. et *M. rubra* n. sp., toutes collectées dans le nord du Pérou (Amazonas, province de Bongará). Les spécimens-types des espèces précédemment connues sont réétudiés et photographiés. Des lectotypes sont désignés pour *M. tuberculata* Baly, 1861, et *M. degandii* Baly, 1861. *Metalepta lojaensis* Beenen, 2013, décrit du sud de l'Équateur, est également présent dans une localité proche du nord du Pérou (Piura, province d'Abayaca), ce qui porte à six le nombre de *Metalepta* présents au Pérou. Des descriptions supplémentaires, des notes sur l'extra-sclérotisation abdominale et une description des organes génitaux mâles et femelles disponibles sont présentées, ainsi qu'une clé des espèces de *Metalepta* et une carte montrant la répartition.

Keywords. – Northern Andean neotropical region, brachelytry, abdominal extra-sclerotisation, faunistics, taxonomy, morphology, identification key.

The genus *Metalepta* was erected by BALY (1861) for two species: *Metalepta tuberculata* Baly, 1861 and *M. degandii* Baly, 1861. The first was designated type species of the genus by BALY (1861). Both species have been collected in Peru, but without detailed indications of localities. No additional specimens of this genus have been cited since the original publication, until the description of *Metalepta lojaensis* Beenen, 2013, a species collected in 2010 and 2011 by Robert Constantin (RC) at an elevation of 2600 m in southern Ecuador, Loja Province, near the Peruvian border. Even more recently, four specimens of a striking, undescribed *Metalepta* species were found in

north Peru while two other unknown species were found in the Coleoptera collection of the Museo de Historia Natural, Lima. The three new species are described and compared herein. The discovery of the Ecuadorian species *M. lojaensis* in northern Peru by G. Juárez Noé is reported.

MATERIAL AND METHODS

Metalepta lojaensis Beenen, 2013, and *M. rubra* n. sp. were collected during several field studies by RC. *Metalepta patricia* n. sp. was first examined and photographed during a stay in the Museo de Historia Natural, Lima. Additional specimens were then provided, found among material collected during biological inventories realised by the staff of the MUSM. Comparison with the type material of the species described by Baly was made possible thanks to a loan from the Natural History Museum, London. This allowed re-checking of the original descriptions, and the observation of newly recognized morphological characters of the abdomen and of the male and female genitalia. It also allowed the confirmation of three species new to science.

The morphologic nomenclature of the abdomen and genital structures follows CROWSON (1981), KONSTANTINOV (1998) and MOURA (2009). Abdominal tergites are numbered from I to VII (“pygidium”). Abdominal sternites are numbered from III (first visible) to VII.

Most of the photographs were obtained with a digital hybrid camera Canon M50 remotely controlled by Canon EOS utilities software, either fitted with a macro lens Canon 65 mm mp-e, or adapted on a Leica stereomicroscope MZ12.5 and the focus stacks assembled with Helicon Focus; others were obtained through a compound microscope in transmitted light.

Specimens showed weakening of their abdomen and also extra-sclerotisation of several abdominal segments associated with different degree of flexibility between the abdominal segments. Ankylosis, connation and shortness of their connective membranes were tested by direct tractions with very thin tweezers on softened specimens.

Examination of the female genitalia was conducted according to classical methods and includes:

- incision of the last three left pleurites with micro scissors;
- incision between tVII-tVIII and sVII-sVIII followed by extraction of the abdominal parts;
- short maceration in caustic potash (KOH) solution and separation of the genitalia;
- light staining in a chlorazol black solution;
- inclusion in DMHF mounting medium.

The procoxal cavities were examined on softened specimens, where the promesothoracic junction was carefully slightly extended.

Abbreviations of the collections. – **BMNH**, The Natural History Museum, London, United Kingdom ; **CGJN**, Gino Norbil Juárez Noé collection, Piura district, post office 20001, Piura, Peru ; **MUSM**, Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Perú ; **RBCN**, Ron Beenen collection, Nieuwegein, The Netherlands ; **RCCS**, Robert Constantin collection, Saint-Lô, France.

Abbreviations for measurement indices. – **AL**, antennal length, fully extended; **EL**, length of elytron from humeral callus to apex; **EW**, combined width of elytra at the base; **HW**, head width including the eyes; **IAW**, width between the antennal sockets; **IOW**, interocular width; **OL**, greatest length of the eye in lateral view; **PL**, length of pronotum length; **PW**, width of pronotum; **TL**, total length between the clypeus and the elytral apex.

TAXONOMY

Family **Chrysomelidae** Latreille, 1802Subfamily **Galerucinae** Latreille, 1802Tribe **Galerucini** Latreille, 1802Genus *Metalepta* Baly, 1861

The galerucine genus *Metalepta* Baly, 1861, is classified in the tribe Galerucini of the subfamily Galerucinae (WILCOX, 1971-1975; VISWAJYOTHI & CLARK, 2020) and is characterized by the short metasternum, the short elytra (brachelytry), which leave a major part of the abdomen exposed, and the bifid claws (fig. 8). No other genus of Neotropical Galerucini shows this combination of characters. Among Palaearctic genera, this combination of characters occurs in combination with various claw structures. For example, the claws are pseudobifid in the subgenus *Galemira* Beenen, 2003, of the genus *Galeruca* Geoffroy, 1762, as well as the genera *Arima* Chapuis, 1875, *Apterogaleruca* Chûjô, 1962, *Belarima* Reitter, 1913, and *Swargia* Maulik, 1936; the claws are appendiculate in the genus *Geinella* Strand, 1935; and they are simple in *Nyctidromas* Semenov, 1895. In the Asian genus *Burudromas* Beenen, 2017, and in the Australian genera *Rupilia* Clark, 1864, and *Cydippa* Chapuis, 1875, which have a short metasternum and brachelytry, the claws are pseudobifid. VISWAJYOTHI & CLARK (2020) shortly mention that the genus *Metalepta* has open procoxal cavities. Closer examination of softened specimens, reveals the presence of a complete posterior wall behind the procoxae in the six species of the genus (fig. 16-17).

Metalepta patricia n. sp. (fig. 1, 15, 19, 25, 29, 34)

<https://zoobank.org/NomenclaturalActs/61B49FD4-48F4-4E0E-A8D9-E3A6D5044E6F>

Type material. – HOLOTYPE: ♂ (MUSM), Peru, Amazonas, province Bongará, Abra Patricia, 5°41'44"S - 77°48'36"W, alt. 2500 m, 25.V.2010, D. Silva y M. Alvarado leg.

PARATYPE: 1 ♀ (MUSM), Peru, Amazonas, province Bongará, Shipasbamba, 5°50'40.7"S - 78°04'10.46"W, alt. 2237 m, pitfall trap, 29.VI.2015, L. Perez leg.

The male specimen was found among the material collected by Dr Diana Silva Davila and Dr Mabel Alvarado during field works in the Abra Patricia Conservation Area and stored in the Coleoptera collection of the Natural History Museum of the University Mayor de San Marcos of Lima (MUSM). The female specimen was provided by L. Perez, retrieved from the material collected during a biological inventory of a mining zone.

Description of the holotype male. – Length 9 mm. Head, prothorax, elytra, legs and abdomen black with a feeble bronze lustre. Antennae brown, the basal half of antennomeres II–VI rufous (fig. 1).

Head slightly narrower than the front edge of pronotum. Eyes short, markedly convex, placed on slight hemispherical elevation. Labrum projecting, twice as wide as long. Frons rugulosely wrinkled. Vertex with a narrow median carina. Antennae very close at the base, slender. First antennomere club-shaped, the following five antennomeres with subparallel edges, markedly dilated and rounded in the apical quarter; the last five just feebly wider at the top.

Pronotum 1.9 times wider than long, the front border concave, bearing a series of small granulations, the rear border bisinuate, the side borders convex, shortly sinuous before preapical constriction. Front corners bearing two rounded protuberances. Rear corners bearing two minute granules. Disc shiny, rugose wrinkled. Scutellum shiny, thinly punctate.

Elytra 1.14 times longer than wide together at the base, abbreviated with tips overcrossing the apex of the third tergite, contiguous on the basal two thirds, beyond divergent with apical width of 4.4 mm. Humeral calli rounded and upturned; outer margin narrowly upturned,

basally straight and rounded in the apical half; apical margin rounded. Elytral tegument shiny, rugulose wrinkled, the sutural and lateral margins raised in a narrow, shiny bead. Epipleura vertical, shiny, sparsely punctured.

Abdomen. Tergites strongly sclerotised, transversally convex, shiny with rugose and microgranulate surface. Tergites II–VI fused together without trace of overlapping. Tergites IV–VI with two small, slightly protruding rounded paramedian elevations near the rear edge. Tergite VII (“pygidium”) as long as wide, triangularly narrowing till median wide lamellate tip, surface covered with transverse furrows. Sternites III–VII shiny with connate junctions. Last visible sternite triangular with apical edge medially emarginated in front of the median lamina of “pygidium”.

Aedeagus. Median lobe 3.4 mm long and 0.74 mm wide, strongly sclerotised and melanised, tubular in dorsal view, arcuate in lateral view, the tip regularly narrowed and ending in a sharp apex; apical opening two and half as long as wide. Internal sac with a long sclerite (fig. 19, 25).

Dimensions. TL: 9 mm; AL: 7.5 mm; HW: 2.4 mm; IOW: 1.6 mm; OL: 0.62 x 0.48 mm; IAW: 0.54 mm; PL: 1.8 mm; PW: 3.4 mm; EL: 3.3 mm; EW: 2.9 mm. Length and width of the antennomeres, in mm: *aI*: 0.90 – 0.33; *aII*: 0.42 – 0.22; *aIII*: 0.67 – 0.24; *aIV*: 0.59 – 0.23; *aV*: 0.66 – 0.23; *aVI*: 0.66 – 0.24; *aVII*: 0.67 – 0.25; *aVIII*: 0.7 – 0.23; *aIX*: 0.7 – 0.29; *aX*: 0.66 – 0.21; *aXI*: 1 – 0.21.

Paratype female. – Differs from the male by shorter antennae, less protruding eyes, and the wider abdomen. Last sternite short, its apical edge truncate and feebly bisinuate (fig. 15). Spermatheca with curved pump and globular receptacle (fig. 29).

Dimensions. TL: 8.6 mm; AL: 6.5 mm; HW: 2.15 mm; IOW: 1.64 mm; OL: 0.58 x 0.40 mm; IAW: 0.5 mm; PL: 1.65 mm; PW: 3.2 mm; EL: 2.9 mm; EW: 2.4 mm.

Differential diagnosis. – *Metalepta patricia* n. sp. is close to *M. degandii*, and differs from the latter in the black body colour, the shorter antennae with first six antennomeres apically dilated, the pronotum feebly constricted behind the front tubercles, the shorter and not curved elytra. Although the pronotum of *M. patricia* n. sp. is similar to that of *M. lojaensis*, it can easily be separated from the latter by the simple sides of the abdomen and the less robust antennae.

Etymology. – The specific name refers to the collecting place “Área de Conservación Privada Abra Patricia”, world famous as a birding observation place. It is adjacent to “Bosque de Protección Alto Mayo”, in the San Martin region.

Biology. – The reserve Abra Patricia is part of the Peruvian Yungas forest, on the eastern slopes of the Andes. The female specimen of Shipasbamba was collected on mountain slope in a “bofedal”, a high-altitude peat bog, with pitfall trapping.

***Metalepta perezii* n. sp.** (fig. 2, 13, 17, 20, 24, 27, 34)

<https://zoobank.org/NomenclaturalActs/60942186-111f-4166-b7bc-874e01769eb8>

Type material. – HOLOTYPE: ♂ (MUSM), Peru, Amazonas, Bongara, Shipasbamba, 5°51'38.94"S - 78°04'22.04"W, 2317 m, 24.IX.2020, L. Ramirez leg.

PARATYPES: 2 ♀, same location, date and collector; 4 ♀, Peru, Amazonas, province Bongará, Shipasbamba, 5°50'40.7"S - 78°04'10.46"W, alt. 2237 m, pitfall trap, 29.VI.2015, L. Perez leg. (5 in MUSM, 1 in BMNH).

Description of holotype male. – Length 12 mm. Head, pronotum, scutellum and elytra. Antennae brown, the first two joints rufous. Legs rufous, the tarsi brown. Abdomen brown, the hind margin of “pygidium” and last visible sternite rufous red (fig. 2).

Head narrower than the pronotum. Eyes small, feebly convex. Labrum projecting, twice as wide as long. Frons depressed with a narrow median furrow and two bumps next to the antennal sockets. Tegument shiny with irregular granulation. Antennae slender, exceeding the elytra. First antennomere club-shaped, the following ones with subparallel edges, slightly dilated at their apex.

Pronotum 1.38 times as wide as long, the front border feebly concave, side borders convex, rear border bisinuate with median emargination. The two front and two rear corners bearing each a subsphaerical vesicle, 0.7 mm in diameter. Disc shiny, with shallow transverse wrinkles. Scutellum convex, punctate.

Elytra 1.27 times longer than wide together at the humeral angle, abbreviated with tip reaching the apex of the third tergite, contiguous only on the basal half, beyond divergent. Outer



Fig. 1-4. – *Metalepta* spp., habitus. – 1, *M. patricia* n. sp., length 9 mm. – 2, *M. perezii* n. sp., length 12 mm. – 3, *M. rubra* n. sp., length 9.3 mm. – 4, *M. lojaensis* Beenen, length 10.5 mm.

elytral margins subparallel, apical edge regularly rounded. Tegument dull, microreticulate, with sparse shallow punctuation, the outer margin upturned, shiny, without bumps. Epipleura vertical and smooth. Claws bifid.

Abdomen. Tergites strongly sclerotised, shiny, with raised lateral edges. Tergites II-VI apparently ankylosed, linked by connective membranes, surface smooth. Tergites IV-VI with a smooth surface. Tergite VII (“pygidium”) flexible, triangular with lateral edges basally bordered and apically rounded. Sternites III-VII shiny, with flexible junctions. Sternite VII with rear edge with a wide, rounded emargination. Aedeagus basally thick, curved, the apical part thin, flattened dorso-ventrally with the tip truncate and asymmetrical (fig. 20, 24).

Dimensions. TL: 12 mm; AL: 10.5 mm; HW: 2.7 mm; IOW: 1.7 mm; OL: 0.85 x 0.68 mm; IAW: 0.46 mm; PL: 2.9 mm; PW: 4.0 mm; EL: 4.7 mm; EW: 3.7 mm. Length and width of the antennomeres, in mm: *al*: 1.14 – 0.5; *all*: 0.7 – 0.33; *alIII*: 1.01 – 0.32; *alV*: 1.02 – 0.31; *aV*: 1.3 – 0.29; *aVI*: 1 – 0.3; *aVII*: 1.06 – 0.3; *aVIII*: 0.98 – 0.27; *aIX*: 1.02 – 0.27; *aX*: 1.06 – 0.26; *aXI*: 1.3 – 0.27.

Paratypes females. – Differ from the male holotype in the shorter antennae not reaching the apex of tergite III, the pronotum 1.8-1.85 times as wide as long. Procoxal cavities completely closed by a continuous posterior wall (fig. 17). Sternite VII (last visible) with rear edge widely emarginated and projecting a median rectangular lamina facing the median emargination of tergite VII (fig. 13). Spermatheca with curved pump and apically elongate receptacle (fig. 27).

Dimensions of a paratype female. TL: 12 mm; AL: 9.5 mm; HW: 2.8 mm; IOW: 2.0 mm; OL: 0.72 x 0.58 mm; IAW: 0.56 mm; PL: 2.25 mm; PW: 4.1 mm; EL: 3.9 mm; EW: 3.9 mm. Length and width of the antennomeres, in mm: *al*: 1.16 – 0.44; *all*: 0.62 – 0.28; *alIII*: 0.88 – 0.3; *alV*: 0.92 – 0.29; *aV*: 0.8 – 0.27; *aVI*: 0.8 – 0.25; *aVII*: 0.8 – 0.26; *aVIII*: 0.8 – 0.27; *aIX*: 0.9 – 0.25; *aX*: 0.9 – 0.25; *aXI*: 1.16 – 0.26. Other paratypes ♀: length 10-13 mm.

Differential diagnosis. – *Metalepta perezii* n. sp. is close to *M. tuberculata* and differs from the latter by the smaller pronotal vesicles, the subparallel elytra, not apically outward projected, the elytral inner and outer margins narrow and smooth, the tergites IV-VI flexible, the sternite VII with a median projecting lamina in female.

Etymology. – Respectfully dedicated to Luis Daniel Perez, biologist and entomologist at the MUSM, specialist of Coleoptera Staphylinidae, who discovered the type series of specimens during field works of entomological inventories.

Biology. – The specimens of *Metalepta perezii* n. sp. were collected, together with *M. patricia* n. sp., by pitfall trapping in a bofedal station, a high-altitude peat bog that acts like a giant natural sponge, sucking up the limited water from snow-falls, glacier-melt and rain squalls in the high peaks and storing it in rich black soils. In the high altitude, low rainfall conditions of the dry montane grassland biome (“dry puna”), bofedales play important ecological roles in damping the fluctuations in humidity.

***Metalepta rubra* n. sp.** (fig. 3, 9, 14, 16, 18, 23, 28, 30, 32, 34)

<https://zoobank.org/NomenclaturalActs/be6b05ce-96bd-4183-9d08-dfd5e112d7b5>

Type material. – HOLOTYPE: ♂ (MUSM), Perú, region Amazonas, province of Bongará, Shipasbamba 6 km NW, 5°52'32"S - 78°00'00"W, alt. 2370 m, 10.V.2018, leg. R. Constantin.

PARATYPES: 3 ex., same data as the holotype (1 ♀ in MUSM, 1 ♂ in CCo, 1 ♂ in RBCN); 1 ♀, Peru, Amazonas, Bongara, Shipasbamba, 5°50'17.84"S - 78°04'01.55"W, 2805 m, 28.IX.2020, L. Ramirez leg. (MUSM).

Description of holotype male. – Length: 9.3 mm (total); 5.4 mm (from the anterior border of the eyes to the tip of the elytra). Greatest width across both elytra: 4.0 mm. Body elongate oval, elytra abbreviated covering the abdomen partly. Without metathoracic wings (apterous). General colour red. Underside, except the epipleura of the pronotum, black. Visible tergites black except their lateral margins which are red as is the pygidium. Femora are black except for their apex. Tarsi of all legs are dark brown. The apical antennal segments are red brown. After death the bright red turns to brown-red (fig. 3). Live habitus and coloration as in figure 35.

Head. Maximal width of head across the eyes: 1.9 mm. Vertex with two large bulges separated by a groove that is an elongation of the groove separating the frontal tubercles. Space between eyes and bulges coarsely wrinkled; bulges with a few large punctures and fine wrinkles; shining and without hairs. Frontal tubercles flat, triangular; impunctate with fine wrinkles; delimited by sharp grooves. Antennae strong. Antennomeres II-XI with subparallel edges, slightly wider apically; the first five antennomeres shiny, superficially microreticulate, sparsely pubescent; the next six dull, alutaceous, densely pubescent. Labrum with six bristles standing in punctures on the upper surface and three large bristles emerging from the sides at about a quarter from the apex; apical margin bilobed. Maxillary palps with apical segment conical shaped, only slightly narrowing near base.

Pronotum. Maximal width: 2.55 mm. (near the basal border). Length in the middle: 1.36 mm. Front border not margined. Lateral and basal borders margined. Surface uneven with few strong punctures and wrinkles; a pair of bulges near the front margin separated by a groove and at the lateral margins with two bulges at each side. Basal border excavated near lateral angles and in the middle.

Scutellum broadly triangular. Surface smooth, with reticulate base.

Elytra abbreviated; tip of the elytra reaching to the end of the second abdominal segment. The inner (sutural) margin of the elytra diverges; slightly in the first quarter from the scutellum, strongly in the subsiding half (angle $\sim 90^\circ$), and ending almost straight in the apical quarter. Outer margin of the elytra straight and slightly diverging. Elytra with confluent coarse impressions ("hammer scale pattern") on a reticulate surface, hence dull. The elytral margins have smooth, shining ridges, which are the dorsal margins of the vertical and smooth and shining elytral epipleura.

Abdomen. Tergites bulging to the sides, partly dull and with coarse punctures at the sides near the bulges. Bulges impunctate and shining. Lateral margins folded leaving a space between these folds and the lateral margins of the sternites. This space is complete from the first to the last visible abdominal segment.

Underside. Front coxal cavities completely closed (fig. 16). Fore coxae adjacent; mid coxae close to one another; hind coxae separated widely. Claws bifid (fig. 9).

Aedeagus tubiform, seen from aside arched in basal half and almost straight in apical half except for the tip which is bent backwards. Ventrally sides almost parallel, gradually narrowing towards apex and asymmetrical, due to the torqued (twisted) morphology (fig. 19, 23).

Dimensions. TL: 9.3 mm; AL: 6.8 mm; HW: 1.9 mm; IOW: 1.32 mm; OL: 0.55mm; IAW: 0.44 mm; PL: 1.36 mm; PW: 2.55 mm; EL: 3.3 mm; EW: 2.5 mm. Length and width of the antennomeres, in mm: *aI*: 0.75 - 0.34; *aII*: 0.42 - 0.22; *aIII*: 0.76 - 0.25; *aIV*: 0.62 - 0.23; *aV*: 0.61 - 0.23; *aVI*: 0.58 - 0.23; *aVII*: 0.61 - 0.25; *aVIII*: 0.60 - 0.22; *aIX*: 0.60 - 0.23; *aX*: 0.63 - 0.22; *aXI*: 0.83 - 0.25. Male paratypes: total length 9-9.3 mm.

Sexual differences. - Only small sexual differences have been noted. The last abdominal sternite is slightly emarginate in the male and the first protarsomere of the male is feebly wider (0.35 mm) than in the female (0.3 mm). Last sternite in the female is twice as broad as long, its apical edge widely and evenly rounded (fig. 14). Spermatheca with basally bent pump and globular receptacle (fig. 28).

Dimensions of one female paratype. TL: 11.8 mm; AL: 6.9 mm; HW: 2 mm; IOW: 1.46 mm; OL: 0.59 mm; IAW: 0.47 mm; PL: 1.55 mm; PW: 2.65 mm; EL: 3.6 mm; EW: 2.6 mm.

Differential diagnosis. - *Metalepta rubra* n. sp. is the only predominately red species in the genus. It can be separated from *M. tuberculata* and *M. degandii* by the straight outer margin of the elytra. In *M. tuberculata* the outer margin is bisinuate and in *M. degandii* feebly concave. *Metalepta lojaensis* also has straight outer margins of the elytra, but in this species the inner margins of the elytra are not divergent as is the case in *M. rubra*. Besides, the pronotum of *M. lojaensis* has a smooth surface without bulges as in the other species.

Etymology. - The species name refers to the red colour of this beetle species, which is especially apparent in living specimens (fig. 35).

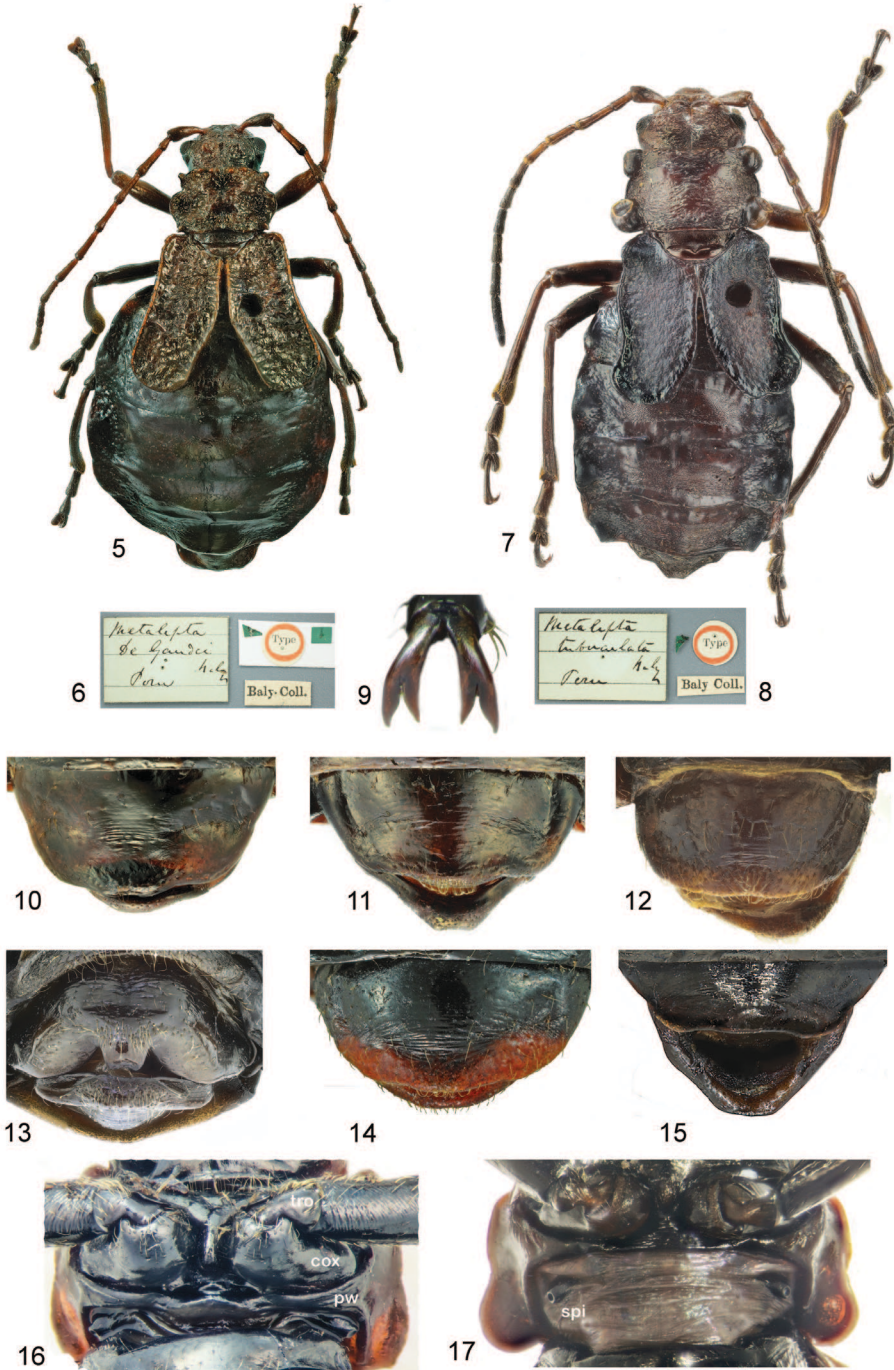


Fig. 5-17. – *Metalepta* spp. – 5-6, *M. degandii* Baly, ♀, length 11.5 mm: 5, habitus; 6, labels. – 7-8, *M. tuberculata* Baly, ♀, length 13 mm: 7, habitus; 8, labels. – 9, *M. rubra* n. sp., claws of right metatarsus. – 10-15, Last visible sternite (S VII) of female: 10., *M. degandii* Baly; 11, *M. tuberculata* Baly; 12, *M. lojaensis* Beenen; 13, *M. perezii* n. sp.; 14, *M. rubra* n. sp.; 15, *M. patricia* n. sp. – 16-17, Prothorax, showing the closed procoxal cavities, ventral view: 16, *M. rubra* n. sp. ♂; 17, *M. perezii* n. sp., ♀, immersed in water. Abbreviations: *cox*, procoxa; *spi*, spiracle; *tro*, prothrochanter; *pw*, posterior wall of coxal cavities.



Fig. 18-33. – *Metalepta* spp. – 18-25, Aedeagus: 18-21, dorsal view (18, *M. rubra* n. sp.; 19, *M. patricia* n. sp.; 20, *M. perezi* n. sp.; 21, *M. lojaensis* Beenen); 22-25, lateral view (22, *M. rubra* n. sp.; 23, *M. patricia* n. sp.; 24, *M. perezi* n. sp.; 25, *M. lojaensis* Beenen). – 26-29, spermatheca: 26, *M. lojaensis* Beenen; 27, *M. perezi* n. sp.; 28, *M. rubra* n. sp.; 29, *M. patricia* n. sp. – 30-31, Female tergite VIII: 30, *M. rubra* n. sp.; 31, *M. lojaensis* Beenen. – 32-33, Female sternite VIII: 32, *M. rubra* n. sp.; 33, *M. lojaensis* Beenen. Scale a: fig. 26-29; scale b: 30-31; scale c: 32-33.

Biology. – The specimens of *Metalepta rubra* n. sp. were collected by beating the herbaceous vegetation between the woody hedges of mountain meadow and an earth path conducting to an ancient mine.

Metalepta tuberculata Baly, 1861 (fig. 7-8, 11)

Type material examined. – The original description does not mention the number of specimens, which may be plural as the body length is given as 5-6 lines (10.5-12.6 mm). The BMNH preserves a single female specimen, presently designated as LECTOTYPE. It is pinned and labelled “triangle of green paper//type//*Metalepta tuberculata* Baly Peru//Baly Coll.” (fig. 8).

Additional description of the female lectotype. – Length 13 mm. Head, pronotum and scutellum reddish brown. Elytra darker reddish brown, chocolate coloured. Antennae brown, the first five joints rufous. Legs rufous, the tarsi brown. Abdomen reddish brown, laterally brown (fig. 7).

Head narrower than pronotum. Eyes small, feebly convex. Labrum projecting, twice as wide as long, the front edge emarginate. Frons with a median line and two bumps next to the antennal sockets. Tegument shiny with transverse wrinkles. Antennae slender, slightly exceeding the elytra. antennomeres, the following ones with subparallel edges, barely wider at the top, the first five antennomeres smooth, sparsely pubescent, the next six dull, covered with a dense pubescence of shorter setae.

Pronotum twice as wide as long, the front border feebly concave, rear and side borders feebly convex. Front corners bearing two large subspherical vesicles, smooth, empty (dead), 0.8 mm in greatest diameter. Rear corners bearing two larger similar vesicles, 0.96 mm in greatest diameter. Disc shiny, with marked transverse wrinkles. Scutellum convex, smooth.

Elytra 1.1 times longer than wide together at the base, abbreviated with tip reaching the middle of the fourth tergite, contiguous only on the basal sixth, beyond divergent with apical third of elytra curved outwards. Humeral calli with a triangular projection, the outer elytral margin bisinuate, the apical edge rounded with a narrow notch. Tegument dull, microreticulate, with sparse shallow punctuation, more rugose near the apex, the inner and outer margins upturned, shiny, with coarse bumps. Epipleura vertical and smooth.

Abdomen. Tergites strongly sclerotised, shiny, with raised lateral edges bearing each a small dark bump. Tergites II-VI fused together without trace of overlapping. Tergites IV-VI with a smooth surface, except a narrow transverse punctate area. Tergite VII mobile, triangular with lateral edges basally bordered and apically sinuate. Ventrally: front coxal cavities closed behind, the posterior wall continuous but slightly shorter in the median part. Fore coxae adjacent; mid coxae close to one another; hind coxae separated widely. Sternites III-VII shiny, with flexible junctions. Sternite VII with lateral bead and apical edge truncate, protruding medially (fig. 11). Claws bifid.

Dimensions. TL: 13 mm; AL: 9 mm; HW: 3 mm; IOW: 2.35 mm; OL: 0.66 mm; IAW: 0.93 mm; PL: 2.2 mm; PW: 4.4 mm; EL: 4.6 mm; EW: 4.0 mm. Length and width of the antennomeres, in mm: *aI*: 1.1 – 0.47; *aII*: 0.56 – 0.31; *aIII*: 1.12 – 0.33; *aIV*: 0.96 – 0.32; *aV*: 0.8 – 0.29; *aVI*: 0.88 – 0.29; *aVII*: 0.78 – 0.28; *aVIII*: 0.80 – 0.26; *aIX*: 0.80 – 0.25; *aX*: 0.88 – 0.24; *aXI*: 1.40 – 0.25.

Male. – Unknown.

Biology and distribution. – Unknown. Baly (1861) mentions that the specimen was received from Alexander Fry, of whom no visit to Peru was cited. A possible origin would be in the vicinity of Jaen, in the department of Cajamarca, which was once a stopover on a route linking Ecuador to northern Peru, already used by A. de Humboldt and A. Bonpland.

Metalepta degandii Baly, 1861 (fig. 5-6, 10)

Type material examined. – The BMNH preserves a single female specimen, presently designated as LECTOTYPE. It is pinned and labelled “triangular green paper//type//square green paper//*Metalepta De Gandii* Baly Peru//Baly Coll.” (fig. 6).

Additional description of the female lectotype. – Length 11.5 mm. Head, pronotum, scutellum and elytra rufous brown. Antennae brown, the first seven joints rufous. Legs rufous, the tarsi brown. Abdomen reddish brown, the apical margin of tergites II-V and sternites III-VII black (fig. 5).

Head narrower than the pronotum. Eyes short, markedly convex, disposed on a hemispherical slight elevation. Labrum projecting, twice as wide as long, shallowly microreticulate, the front edge emarginate. Frons with a median line and two pointed bumps on the vertex behind the antennal sockets. Tegument shiny with transverse wrinkles. Antennae very close at the base, slender, slightly exceeding the fourth tergite. First antennomere club-shaped, the following ones with subparallel edges, wider and rounded at the top, the first five antennomeres shallowly microreticulate, sparsely pubescent, the next six alutaceous, covered with a dense pubescence of shorter setae.

Pronotum 1.66 times as wide as long, the front border straight bearing four granules, the rear border bisinuate and medially emarginate, the lateral borders convex behind the strong preapical constriction. Front corners bearing two conical protuberances. Rear corners bearing two much smaller similar protuberances. Disc shiny, transversally wrinkled, with four depressions: a wide preapical, a deeper prebasal and two wider lateral. Scutellum with two basal bumps, apically wrinkled.

Elytra 1.3 times longer than wide together at the base, abbreviated with tip reaching the apex of the third tergite, contiguous only on the basal third, beyond divergent with apical half of elytra curved outwards. Humeral calli obtusely angulose and feebly raised, the outer elytral margin raised, concave, the apical margin broadly rounded. Tegument shiny, with coarse-rough punctures of hammered aspect, the inner and outer margins raised, shiny, irregularly incised. Epipleura vertical, shiny, hammered.

Abdomen. Tergites strongly sclerotised, shiny, transversally convex with the lateral margins horizontally straightened. Tergites II-VI fused together without trace of overlapping. Tergites III-V with a smooth surface, with a distinct narrow mirror-like transverse area. Tergite VI with apical edge medially raised. Tergite VII flexible, triangular with the lateral edges raised at mid-length and the apex curved down. Ventrally: front coxal cavities closed behind, though narrowly in median part. Procoxae adjacent; mesocoxae close to one another; metacoxae widely (1.1 mm) separated. Sternites III-VII shiny, with connate junctions, but the overlapping remains visible. Last visible sternite subrectangular, the hind margin bisinuate (fig. 10).

Dimensions. TL: 11.5 mm; AL: 9.6 mm; HW: 2.16 mm; IOW: 1.56 mm; OL: 0.54 mm; IAW: 0.44 mm; PL: 1.66 mm; PW: 2.65 mm; EL: 3.95 mm; EW: 2.95 mm. Length and width of the antennomeres, in mm: *aI*: 0.9 – 0.35; *aII*: 0.35 – 0.22; *aIII*: 0.83 – 0.26; *aIV*: 0.88 – 0.23; *aV*: 0.86 – 0.23; *aVI*: 0.85 – 0.23; *aVII*: 0.75 – 0.20; *aVIII*: 0.75 – 0.20; *aIX*: 0.81 – 0.20; *aX*: 0.87 – 0.16; *aXI*: 1.07 – 0.15.

Biology and distribution. – Unknown. The original label mentions only “Peru”.

Metalepta lojaensis Beenen, 2013 (fig. 4, 12, 21, 22, 26, 31, 33, 34, 36)

New data. – Besides the type locality in Ecuador (Utuana, south of Loja province), where all the collected specimens have red margins of the elytra and the abdomen, a single specimen was observed and photographed (fig. 36) in north Peru, Piura region, Provincia de Ayabaca, Bosque de Cuyas, Bosque húmedo de montaña, 4°36'S - 79°42'W, alt. 2715 m, 23.VI.2014, hand collecting, 1 ♀, leg. G. Juárez, preserved in collection Gino Juárez Noé (CGJN).

This first Peruvian specimen, possibly an immature female, is strictly identical in body shape and coloration to the Ecuadorian series: pronotum, elytra and abdomen black with tergites fitted with vivid red lateral callosities. It can be distinguished by the absence of red coloration on the elytral margins.

From our experience with the type specimens of *Metalepta lojaensis*, we know that the red colour fringe is fragile and labile after death. Perhaps the remarkable red signal is not present on newly emerged adults and acquired during (sexual) maturation. This can only be solved with more material or extensive field observations.

Taxonomic remarks. – *Metalepta lojaensis* differs strongly from the other species in:

- the shorter and thicker antennae;
- the wider space between the metacoxae which makes the median part of the first two sternites visible; they are not completely sclerotised or melanised, but each with a small fulvous setose area;
- the inflated pleurites, exposing the spiracles upwards, while the other species have the pleurites folded downwards;
- the weakly sclerotised abdominal sternites;
- the median lobe of aedeagus long and thin, its apical part dorsoventrally compressed with tip slightly recurved ventrally; sclerite of the internal sac long and thin with a narrow ostium (fig. 21-22);
- the female last sternite subrectangular with straight apical edge (fig. 12);
- the spermatheca with elongate pump and globular receptacle (fig. 26).

This makes it plausible that *M. lojaensis* forms a different lineage and that the other species are more related. However, we judge the different character states not that important to erect a separate genus or subgenus for this species.

KEY TO THE ADULTS OF *METALEPTA*

1. Front and rear corners of pronotum with projecting vesicles or minute cones 2
 - Front and rear corners of pronotum not projecting 5
2. Front and rear corners of pronotum with prominent vesicles. Elytral surface dull, micro-reticulate, with sparse shallow punctation 3
 - Front and rear corners with minute conical projections bearing apical setiferous pores 4
3. Apical half of elytra curved outwards. Apical edge of female last visible sternite simple. Male unknown. Peru (without precision) *Metalepta tuberculata* Baly
 - Elytra not curved. Apical edge of female last visible sternite projecting a median lamina. Peru (Amazonas) *M. perezi* n. sp.
4. Head, pronotum and elytra reddish brown. Elytra 2.4 times longer than wide, of equal width from base to apex, with apical half bent outwards and concave external margin. Antennomeres feebly expanded from the base to the top. Male unknown. Peru (without precision) *M. degandii* Baly
 - Head, pronotum and elytra black. Elytra 1.5 times longer than wide, not bent outwards, the external margin convex. Antennomeres I-V dilated on the apical quarter. Peru (Amazonas) *M. patricia* n. sp.
5. Head, pronotum black. Elytra black with red apical and external margins. Pronotum finely wrinkled. Elytra densely punctate, contiguous along the first two thirds, with outer margin convex and broadly rounded apex. Ecuador (Loja), Peru (Piura) .. *M. lojaensis* Beenen
 - Head, pronotum and elytra red (alive) or brownish red (dead). Pronotum strongly wrinkled, the edges with shallow callosities. Elytra hammered, contiguous along the first third, narrowing beyond with straight outer margin and narrow apex. Peru (Amazonas) *M. rubra* n. sp.

ABDOMINAL EXTRA-SCLEROTISATION AND ABDOMINAL FLEXIBILITY IN THE GENUS *METALEPTA*

Brachelytry among Chrysomelidae was discussed in recent publications by JOLIVET (2005, 2008) and BEENEN (2013). It appears as not rare in the subfamily Galerucinae, mainly the tribe Galerucini where it is correlated to the loss of metathoracic wings.

This fact makes the exposed abdomen of these species more vulnerable to predators and to parasitism.

The thickening of the abdominal cuticle was analysed by CROWSON (1981) who illustrated the grades of concomitant loss of mobility (connation) of the junction between

adjacent segments: a) simple junction with shortened connective membrane; b) flexible junction without membrane; c) partial connation with visible overlapping; d) complete fusion of adjacent segments without overlapping.

In the genus *Metalepta*, an extra-sclerotisation of the abdomen was developed, at a different degree according to the species (table I).

Metalepta perezi has conserved the greatest degree of abdominal mobility.

Metalepta lojaensis keeps the abdomen feebly thickened, with tergites III, IV and V fused, tergite VI connate and tergite VII ("pygidium") mobile.

Metalepta tuberculata, *M. degandii* and *M. patricia* have intermediate connation degree with tergites III to VI fused and first four visible sternites mobile or connate.

Metalepta rubra has the highest degree of extra-sclerotisation which includes the fusion of first three visible sternites.

GENITALIA OF *METALEPTA LOJAENSIS* AND *M. RUBRA*

Male genitalia. – Presently, only the aedeagus of four species were available for examination. Aedeagus of *Metalepta lojaensis* was first illustrated in BEENEN (2013) and is slender, regularly curved in a sagittal plane (fig. 21-22). The apical ostium of the median lobe is relatively narrow, ovate. A long sclerotisation, visible when examined in a water-soluble mounting medium (DMHF, dimethyl hydantoin formaldehyde), is attached to the evertible internal sac. This sclerite (flagellum) is 0.75 mm long, 0.14 mm basally wide and bears five apical denticles on a lateral face.

Aedeagus of *Metalepta rubra* (fig. 19, 23) is thicker, asymmetrical, the tip curved in a sagittal plane. Tegmen is reduced to a very thin Y-shaped sclerotised filament, close

Table I. – Different states of extra-sclerotisation among *Metalepta* species.

	<i>M. lojaensis</i>	<i>M. tuberculata</i>	<i>M. perezi</i>	<i>M. degandii</i>	<i>M. patricia</i>	<i>M. rubra</i>
T III to VII (extra-sclerotised)	S	S	S	S	S	S
junctions T III-IV and T IV-V (fused)	F	F	M	F	F	F
junction T V-VI (connate or fused)	C	F	M	F	F	F
junction T VI-VII (mobile)	M	M	M	M	M	M
sternites I-II visible between metacoxae	yes	no	no	no	no	no
sternites III-VI (extra-sclerotised)	no	S	S	S	S	S
sternite VII (extra-sclerotised)	S	S	S	S	S	S
junction sternites III-IV (mobile/fused)	M	M	M	C	C	F
junction sternites IV-V	M	M	M	C	C	F
junction sternites V-VI	M	M	M	C	C	M
junction sternites VI-VII	M	M	M	M	M	M

Abbreviations: C, connation with immobile overlapping; F, fusion with indistinct segmentation; M, mobile; S, thick extra-sclerotisation; T, tergite.

to the base of the median lobe. Apical ostium of the median lobe is larger, 1.4 mm long and 0.4 mm wide, extended till the tip. The sclerite of the internal sac is much thicker, 1.08 mm long and 0.27 mm basally wide and is articulated according to a lateral plane.

Female genitalia. – Both *Metalepta lojaensis* and *M. rubra* were at disposal.

Metalepta lojaensis. Tergite VIII has two wide triangular basal parts with fringed lateral edges and rounded apical edge with a wide fold; sternite VIII trapezoidal with apical edge rounded, more sclerotised, setose, medially emarginate; coxites conical, sclerotised and melanised, just longer than wide; bursa copulatrix sacciform; spermatheca with apical part regularly curved, attached to the dorsal face of the proximal edge of the bursa copulatrix by a short spermathecal duct (fig. 12, 26, 31, 33)

Metalepta rubra. Tergite VIII crescent-shaped, without lateral fringes, apically rounded with a narrow fold; sternite VIII trapezoidal, the apical edge feebly rounded, sclerotised, setose, weakly emarginate in the middle, the discal part with a longitudinal brown macula; coxites oval, sclerotised and melanised, 1.5 times longer than wide; bursa copulatrix sacciform; spermatheca angled at base with enlarged apical part, with short spermathecal duct (fig. 14, 28, 30, 32).

Remarks. – Compared to the illustrations provided by MOURA (1998, 2005) considering other Galerucini such as *Caraguata circumcincta* (Clark, 1865) and *Neolochmaea dilatipennis* (Jacoby, 1886), the male genitalia are peculiar in the developed single internal sclerite. The female genitalia of *Metalepta* are very close to *Neolochmaea dilatipennis* in the general arrangement of bursa copulatrix, oviduct and spermatheca but differ in the shape of the coxites, the absence of a basal apodema on sternite VIII, the development of the receptaculum of the spermatheca. Tergite VIII and sternite VIII offer valuable taxonomic characters to distinguish the females.

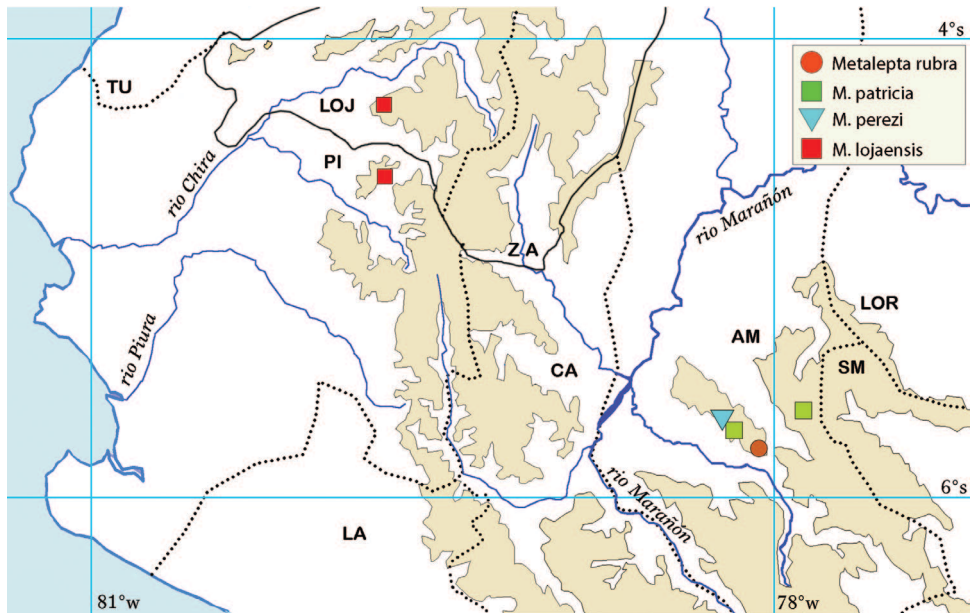


Fig. 34. – Distribution of *Metalepta* species in south Ecuador (Loja province) and north Peru (Amazonas, with tracing limits of Cajamarca, Lambayeque, Loreto, Piura, San Martín and Tumbes departments). Other zones: mountain areas over 2000 m.

BIOLOGICAL NOTES

Little is known. *Metalepta lojaensis* was collected in south Ecuador at a mountain pass at an elevation of 2600 m. The collecting place was cultivated with meadow, some small wood letting a narrow space of some meters between an earth road and a pine wood, with various weeds, including *Calceolaria* sp. on which the adult specimens of both sexes were climbing at twilight.

Metalepta rubra was collected in north Peru at the elevation of 2370 m, walking along an earth road in late morning. The mountain slopes were equally in agropastoral usage with thick wooded hedges, protecting from wind and drought a strip of grass between the hedges and the road.

Metalepta patricia was found at the elevation of 2500 m, in a station belonging to the wet tropical montane cloud forest.

All three were found by manual collecting in May in region "Yunga" as defined in PULGAR VIDAL (1979). According to BEENEN & JOLIVET (2008), brachelytry can take place in *selva* habitats, i. e. tropical forests at altitudes below the alpine habitats, without indications of harsh environment.

Metalepta perezii was collected with pitfall in altitude bofedal.

DISCUSSION

After BALLY (1861) published the description of two species of *Metalepta*, it lasted almost 140 years until 2010 new species of this genus have been collected. It is likely that this genus has been under-collected and that more species will be discovered. Because of the peculiar morphology of these brachelytrous leaf beetles, specimens might also be available in collections, not recognized as Galerucinae.

The *Metalepta* species described here, show some details that might reflect different lineages. These details need to be studied in all species before taxonomical consequences can be ascertained. More specimens are needed and thus more collecting in these regions is encouraged.

Metalepta rubra n. sp. shows similarity to Heteroptera of the family Coreidae. Because these bugs are also phytophagous and we do know nothing about the palatability of *Metalepta rubra* n. sp., it is impossible to conclude if it is a case of Batesian or Mullerian mimicry. It is one of the challenges to explore this in collaboration with



Fig. 35-36. – *Metalepta* spp., live specimens. – 35, *M. rubra* n. sp., at Shipasbamba (Amazonas, Bongara, Peru) (Photo: R. Constantin). – 36, *M. lojaensis* Beenen at Bosque de Cuyas (Piura, Ayabaca, Peru) (Photo: G. Juárez Noé).

experts on the insect fauna of Amazonia. BEENEN & HAWKESWOOD (2004) suggested a case of mimicry between the Australian brachelytrous galerucine beetle *Cydippa balyi* Chapuis, 1875, and certain Australian bug species; they did not exclude aggressive mimicry. BALSBAUGH (1988) reviewed mimicry in Chrysomelidae, but did not mention any cases of mimicry related to brachelytry. In mimicry relationships, there seems to be much more to be investigated.

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