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Taxonomic and nomenclatorial revision within the Neotropical genera of the subtribe Odontocheilina W. Horn in a new sense – 12. *Odontocheila angelsolisi* sp.nov., *O. mirekskrabali* sp.nov. and related species of a newly proposed *Odontocheila cajennensis* species-group (Coleoptera: Cicindelidae)

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Moravec J. & Brzoska D. 2015: Taxonomic and nomenclatorial revision within the Neotropical genera of the subtribe Odontocheilina W. Horn in a new sense – 12. *Odontocheila angelsolisi* sp.nov., *O. mirekskrabali* sp.nov. and related species of a newly-proposed *Odontocheila cajennensis* species-group (Coleoptera: Cicindelidae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **100(1):** 23–66. – *Odontocheila angelsolisi* sp.nov. and *O. mirekskrabali* sp.nov. are described as new to science, from Costa Rica and Panama, and detailed redescriptions of the related species *O. molesta* Nidek, 1957 and *O. nicaraguensis* Bates, 1874, as well as their biology and distribution, are presented. They are compared to two other related species, *O. chiriquina* Bates, 1881 and *O. excisipenis* W. Horn, 1932 (= *O. chiriquina sensu* Rivalier 1969). *Odontocheila oseryi* (Lucas, 1857) stat restit., often previously considered a subspecies of *O. cajennensis* (Fabricius, 1787), is here reinstated to its original species status with a redescription, a lectotype designation and a demonstration of variability. All these species are here accommodated into a newly-proposed *Odontocheila cajennensis* species-group, represented by *O. cajennensis* and a complex of other closely related taxa often previously considered its "subspecies", despite the sympatric or even syntopic occurrences of some of the taxa. A key to the species of *Odontocheila cajennensis* species-group (except for the "subspecies" of *O. cajennensis*) and colour photographs of the habitus, diagnostic characters and variability are presented. The common spelling of the species name "*cayennensis*" is considered here an incorrect subsequent spelling.

Key words. Coleoptera, Cicindelidae, Odontocheilina, *Odontocheila*, taxonomy, nomenclature, species-group, new species, Neotropical region.

Introduction

This contribution is a continuation of the ongoing taxonomic revision of ten Neotropical genera of the subtribe Odontocheilina W. Horn, 1899 (originally spelled "Odontochilina") by the first author. The aim of this series of papers (see Moravec 2012a,b,c, 2013, 2014 and 2015, Duran & Moravec 2013, Moravec & Duran 2013 and Moravec & Brzoska 2013, 2014a,b,c) is to publish significant taxonomic and nomenclatorial changes or descriptions of new taxa that will be available before the completion of the final comprehensive publication.

In this series of papers, the subtribe Odontocheilina W. Horn, 1910, is defined exclusively in terms of the Neotropical genera, as previously discussed in Moravec (2012a,c), and in the present sense separated from the subtribe Prothymina W. Horn, 1910 sensu Rivalier (1969,1971). The reason for this classification (as discussed by

Moravec (2012a, 2012b and other papers in this series) is that, in contrast to the characters given by Rivalier (1969, 1971) for his wide concept of the subtribe Prothymina, many species of the Neotropical Odontocheilina placed within Prothymina by Rivalier (1971) possess a setal vesture, developed to various degrees.

The genus *Odontocheila* Laporte de Castelnau, 1834 presently comprises more than 80 taxa, currently under review by the first author. Many of the type specimens, particularly of the taxa described by Walther Horn, were not examined by Rivalier (1969), and these were not included in his brief and incomplete revision. Further, he overlooked some important diagnostic characters, and some species were confused (see Moravec 2012a and here under *O. chiriquina* Bates, 1881 and *O. excisipenis* W. Horn, 1932). Rivalier (1969) subdivided the genus into five species-groups, but some of these require more precise definition. An *Odontocheila castelnaui* species-group for species previously partly accommodated by Rivalier (1969) within his much wider "*groupe* V", was recently proposed by Moravec & Brzoska (2014c).

Two new species, *Odontocheila angelsolisi* sp.nov. and *O. mirekskrabali* sp.nov., are described in this paper, together with detailed redescriptions of other related species, *O. molesta* Nidek, 1957 and *O. nicaraguensis* Bates, 1874. They are also compared to *O. chiriquina* Bates, 1881 and *O. excisipenis* W. Horn, 1932 (= *O. chiriquina sensu* Rivalier 1969), which have already been presented in detail by Moravec (2012a). All these species are here accommodated in a new, naturally delimited *Odontocheila cajennensis* species-group, proposed for species partly accommodated by Rivalier (1969) in his wide "*groupe* I". Apart from the large body size of all species in the *O. cajennensis* species-group as defined here, they are immediately distinguishable from all other species of the genus by the significantly reduced number of inner teeth in the mandibles, a character entirely overlooked by Rivalier. This species-group is represented by *O. cajennensis* (Fabricius, 1787), a very variable species which was previously subdivided by Horn (1896) into several "varieties", later inconsistently treated as subspecies or "aberrations" by Horn (1905), then as subspecies by Horn (1910), and more exactly as subspecies but with some confusions by Horn (1923), followed by Rivalier (1969) who subdivided *O. cajennensis* into seven subspecies. The species-complex of *O. cajennensis* is one of the most complicated taxonomic problems within the subtribe, since most of the "subspecies" are based merely upon differences in the coloration of appendages and abdomen. After a further, more complete revision based on a large number of specimens from various localities, the coloration in most of the taxa of the "subspecies" of *O. cajennensis* proved to be mutually variable, particularly in the coloration of leg segments, ventrites and metasternum, combined with the coloration of the labrum, and in several cases with the coloration of the scape, pedicel and antennomeres 3–4 as well. These characters are not correlated, and therefore cannot be reliably diagnostic for classification of some of the taxa within the "*O. cajennensis* complex". Due to the enormous variability, the key and brief synopsis presented by Rivalier (1969) appear to be misleading for identification of some of the "subspecies", and such disharmony resulted in a great number of many different identifications within individual collections and inconsistent interpretations of these taxa by various authors. For example, some

specimens with oscillating characters were arranged by Walther Horn in his collection (now SDEI) under the label "*O. cayennesis* / *bipunctata* X *oseryi* X *femoralis*".

In fact, *O. cajennensis* has appeared to be a complex of species. Most of the "subspecies" are of sympatric or even syntopic occurrence, and their classification as geographical subspecies is untenable. Alternatively, some of the "subspecies" in which the variability occurs within syntopic adults may be considered only "aberrant populations" of no taxonomic value. However, considering the great overall biodiversity of the Amazon Basin, it is possible that vicariant populations exist under differential environmental conditions. Evolutionary forces could enhance allopatric or parapatric speciation because of adaptations to these different biotopes.

It should be noted that some authors including Wiesner (1992) have mentioned in fact a homonymous name "*O. cayennensis* Dejean, 1825" as a synonym of *O. cajennensis bipunctata* (Fabricius, 1792). However, no such name by Dejean exists, nor does such confusion, because the treatment of this species by Dejean (1825) was only a redescription of *Cicindela cajennensis* Fabricius, 1787 (under the incorrect subsequent spelling "*cayennensis*"). Dejean (1825) explicitly refers to Fabricius (1801: 243, no. 59) where *C. cajennensis* is re-described by Fabricius with reference to his paper Fabricius (1792: 177, no. 36) with the same delineation of *C. cajennensis* repeated from his original description as: "*36. C. supra fusca, subtus cyanea, ano tibiisque posticis testaceis – cajennensis. Habitat Cajennae, Dom. von Rohr.*". Dejean (1825) in his redescription of *Cicindela cayennensis* Fabricius, clearly mentioned metallic coloration of the abdomen: "*Le dessous du corps est d'unbleu foncé un peu verdâtre*", and also the genuine type specimen of *Cicindela cajennensis* Fabricius, 1787 from the Fabricius collection (now in ZMKC) has its abdomen metallic-black. The metallic coloration of the abdomen occurs in most adults of *O. c. cajennensis*, and corresponds both with the original description and with the redescription by Dejean (1825), as well as with the concept of this species by Rivalier (1969), although this character is rather variable. Moreover, the specimens from the Dejean-Chaudoir collection possess the same characters and variability both in *O. c. cajennensis* and *O. c. bipunctata* and no reliable difference in the concept of these two taxa by Dejean (1825) has emerged in the course of the revision of the historical specimens from the Dejean-Chaudoir collection (MNHN) by the first author.

The results of the revision of the complex of *O. cajennensis* taxa are being prepared by the first author for his concluding publication as part of the complete revision of the subtribe Odontocheilina.

An exception is *Odontocheila oseryi* (Lucas, 1857) stat. restit., hitherto commonly considered a subspecies of *O. cajennensis*, which is here reinstated to its original species status and its redescription, lectotype designation and variability are presented.

Material and Methods

Body length is measured without labrum and is the distance from the anterior margin of the clypeus to the elytral apex (including the sutural spine). The width of the pronotum includes the lateral margins of the proepisterna (as both the proepisterna and the

notopleural sutures are visible from above). The width of the head is measured across the eyes, between their outer margins. The term "aedeagus" here refers to the median lobe of the organ (without parameres). All dimensions of aedeagi are measured (and primarily figured) in their left lateral position where the basal portion (with basal orifice) points to the right and the left lateral outline (with dorsoapical orifice) faces dorsally, provided that the ventral outline of the median portion is settled in a vertical position, and the apex of the aedeagus is perfectly settled in its horizontal position. The treatment and mounting of the aedeagi, in order to observe the structure of the internal sac, followed the usual procedure as modified and in the terms that appear in Moravec (2002, 2010). The position of the aedeagus is also very important for establishing the real shape of the sclerites that make up the structure of the internal sac.

The colour photographs of the habitus and diagnostic characters, including aedeagi, were taken with a Nikon Coolpix 990 digital camera through an MBS-10 stereo microscope.

The morphological terminology largely follows the Torre-Bueno dictionary (Nichols 1989), those describing the surface macro-sculpture are partly after Harris (1979), but with many terms proposed by Moravec (2002, 2007, 2010).

Labels are cited in the following manner: lines on the same label are separated by a slash /, separate labels are indicated by a double-slash //; each specimen or series of specimens is separated by a full stop. The colour of the label and mode of writing appear in square brackets (in type specimens only, while in other specimens the citation is mostly restricted to locality labels). Words printed on labels in full capital letters are transcribed as normal letters (capitals are used in abbreviations only). It should be noted that the date on certain labels with the name of a museum collection denotes the year in which the specimen became part of the recent collection (e.g. MNHN, BMNH), and not necessarily the year in which it was collected.

The list (catalogue) under the species name in the descriptive part is selective. This means that it gives the original name combination, as well as the first publication of all subsequent taxonomic or nomenclatorial acts concerning the taxon, and of available names only.

The following abbreviations for type status are used in the descriptions and captions below the illustrations: HT = holotype; PT = paratype, AT = allotype; LT = lectotype, PLT = paralectotype.

Abbreviations for the collections:

AMNH . . . . . American Museum of Natural History, New York, U.S.A.
ASUT . . . . . Arizona State University, Tempe, U.S.A.
BMNH . . . . . Natural History Museum London, U.K.
CCJM . . . . . Collection Cicindelidae, Adamov, Czech Republic
CJVB . . . . . Collection Jan Vybíral, Židlochovice (u Brna), Czech Republic
CMKP . . . . . Collection Miroslav Klícha, Prague, Czech Republic
CMNH . . . . . Carnegie Museum of Natural History, Pittsburgh, U.S.A.
DBCN . . . . . Insect Collection of David W. Brzoska, Naples, Florida, U.S.A.
DPDC . . . . . Daniel P. Duran Collection, Philadelphia, Pennsylvania, U.S.A.

FSCA . . . . . Florida State Collection of Arthropods, Department of Agriculture, Gainesville, Florida, U.S.A.
INBIO . . . . . Instituto Nacional de Biodiversidad, Costa Rica
IRSNB . . . . . Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
JPPW . . . . . Collection Johann Probst (now in NHMW), Vienna, Austria
MFNB . . . . . Museum für Naturkunde der Humboldt-Universität, Berlin, Germany
MNHN . . . . . Muséum national d'Histoire naturelle, Paris, France
MZMB . . . . . Entomology Department of the Moravian Museum, Brno, Czech Republic
NHMK . . . . . Natural History Museum, University of Kansas, Lawrence, Kansas U.S.A.
NHMW . . . . . Naturhistorisches Museum Wien, Vienna, Austria
NMPC . . . . . National Museum (Entomological Department), Prague, Czech Republic
RLHC . . . . . Collection Ronald L. Huber, Bloomington, Minnesota, U.S.A.
SDEI . . . . . Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
STRI . . . . . Smithsonian Tropical Research Institute, Panama
USNM . . . . . Smithsonian Institution, Entomology, Washington DC, U.S.A.
ZMAN . . . . . Zoological Museum Amsterdam (now RNMH, Naturalist Biodiversity Centre, Leiden), Netherlands
ZMKC . . . . . Zoological Museum, University of Copenhagen, Denmark.

T a x o n o m y

Odontocheila cajennensis species-group

Nomenclatorial note. The widespread spelling of the species name as "*cayennensis*" is here considered an incorrect subsequent spelling by DEJEAN (1825) that has been followed by many subsequent authors. As the species name *cajennensis* used by FABRICIUS (1787) was used in the original description, there was no reason to change the original name spelling. Although the epithet *cayennensis* was in prevailing (but not consistent) usage, the original spelling is retained here, as used and argued by CASSOLA (2011), as well as by MORAVEC (2012a). Moreover, a large number of other insect taxa described by Fabricius also use the epithet *cajennensis* that is in accordance with geographic or personal names latinized by some historical authors.

A similar case is the emendation of the genus-group name *Odontochila* by AGASSIZ (1846), which is generally considered unavailable, although the name *Odontochila* was in prevailing usage for more than a century and even used by RIVALIER (1969) in the first revision of the genus, until HUBER (1986) reinstated the original spelling as *Odontocheila*, followed by other authors including BOUSQUET (2002), as well as in our papers and also here.

Identification. The species group is represented by *O. cajennensis* (Fabricius, 1787) and a number of closely related species commonly treated in literature (including in RIVALIER 1969) as subspecies despite their sympatric occurrence. In the classification presented herein, this large and well-delimited species-group is principally characterized by mandibles with only three prominent teeth (apart from the basal molar): the left mandible usually with only three teeth, or with a small rudiment of fourth tooth usually indicated by a raised edge; the right mandible consistently with only three teeth (exceptionally a rudiment of fourth tooth present at the base of the third tooth); body large to very large

with black-cupreous dorsal body surface, often head and pronotum and lateral areas of elytra with bronze, greenish or violaceous blue lustre, elytral surface almost even with only indistinct impressions, punctate on whole elytral length; white elytral maculation usually very reduced, to the extent that the elytra may appear immaculate, only rarely (each of them) having three maculae; humeral macula small, or most commonly entirely absent and the elytron possesses only lateral-median macula and a small anteapical spot that may be merely indicated or absent altogether; all ventral and lateral sterna and abdominal ventrites entirely glabrous; palpi normally shaped with terminal palpomeres of both maxillary and labial palpi only moderately and evenly dilated; labrum in both sexes notably long; aedeagus large and voluminous in middle, its apical portion attenuating to a narrow apex which is either simply cylindrical and blunt or dorsally emarginated, excised, or somewhat elongated with small sharpened hook, rarely arcuate-hooked; internal sac with sclerites characteristic of the genus, with long, multicoiled flagellum protruding from the dorsolateral orifice, but the large voluminous (reniform) central piece possesses more distinct, strongly chitinized thin lower appendage, and the bulbous base of the flagellum is smaller, thus notably distant from the voluminous ventral piece; legs variously coloured, metallic black, brownish or testaceous with metallic black tarsi, and black ventral body portions, but *O. cajennensis* and the complex of taxa hitherto commonly considered to be its subspecies are immediately distinguishable by their yellow to ochre-testaceous metatibiae and metatarsi (except for *O. oseryi* (Lucas, 1857) stat restit., which has the metatarsi partly or entirely metallic black). Some of the taxa of the "*O. cajennensis* complex" have abdomen testaceous, and in some this coloration includes the metasternum.

Several species of other species-groups within this genus also possess testaceous tibiae and metatarsi, such as *Odontocheila luridipes* (Dejean, 1825), as well as four of the seven species of the genus *Cenothyla* Rivalier, 1969, but they are immediately distinguished by their mandibles, which have four well-developed teeth (and basal molar) in each mandible, and in addition, all species of *Cenothyla* possess punctate-setose lateral areas of the metasternum (see Moravec 2015).

Biology and distribution. Occurring in Nicaragua, Costa Rica, Panama, Amazon areas of Colombia, Venezuela, Ecuador and Peru, and the taxa commonly considered to be "subspecies" of *O. cajennensis* Fabricius also occur in British Guyana, Surinam, French Guiana and Trinidad, and are spread throughout the Amazon Basin in Colombia, Venezuela, Ecuador, Peru, Bolivia and Brazil.

Key to species of the *Odontocheila cajennensis* species-group

(without the taxa commonly considered "subspecies" of *O. cajennensis* Fabricius)

1 metatibiae entirely metallic black or with brownish-testaceous basal third or half; metatarsi constantly entirely metallic black; fourth tooth in left mandible absent or with a rudiment of tooth usually in the form of a raised edge; right mandible consistently with only three teeth (and basal molar) ... . 2.

– metatibiae entirely yellow to ochre-testaceous ..... 7.

2 labrum bicolored (except for variably coloured labrum in Costa Rican populations of *O. chiriquina*); the labrum distinctly sexually dimorphic in shape ..... 3.
– labrum ochre to reddish-testaceous (or with indistinct dark patches); basal third to half of tibiae ochre to brownish-testaceous ..... 5.

3 body generally large; all tibiae entirely metallic black; scape and pedicel metallic black-blue; both penultimate and terminal palpomeres of maxillary palpi metallic black ..... 4.
– body generally smaller, up to 13.5 mm long; pro- and mesotibiae (rarely also metatibiae) with brownish-testaceous basal third; elytral apices in male subacute; apex of aedeagus short, simply cylindrical and obtuse or indistinctly dorsally emarginated (never distinctly excised) .... ***O. chiriquina*** **Bates**

4 apex of aedeagus short and excised; elytral apices rounded in both sexes ... . ***O. nicaraguensis*** **Bates**
– apex of aedeagus thinner and longer, with small sharpened hook; elytral apices variably rounded or subacute independent of sex .... ***O. angelsolisi*** **sp.nov.**

5 apex of aedeagus short, dorsally distinctly excised; elytral apices rounded in both sexes; labrum sexually dimorphic but notably long in both sexes, with wrinkled surface ..... ***O. excisipenis*** **W. Horn**
– apex of aedeagus longer, with small hook, or arcuate-hooked; labrum almost smooth; scape ventrally paler, basal half of pedicel testaceous ..... 6.

6 apex of aedeagus shortly but distinctly arcuate-hooked; elytral apices towards sutural spine notably acute in both sexes; basal half of penultimate palpomere of maxillary palpus testaceous ..... ***O. molesta*** **Nidek**
– apex of aedeagus with small, sharpened hook; elytral apex towards sutural spine moderately rounded in both sexes; shape of labrum almost uniform in both sexes; both penultimate and terminal palpomeres of maxillary palpi metallic black ..... ***O. mirekskrabali*** **sp.nov.**

7 metatarsi variably coloured, entirely metallic black or with tarsomeres 1–2 testaceous, 3–5 gradually black-darkened (exceptionally only last two tarsomeres black); labrum bicolored, black with reddish-testaceous margins ..... ***O. oseryi*** **(Lucas)**
– metatarsi concolorous with metatibiae, entirely yellow to ochre-testaceous (rarely last two tarsomeres blackened) .... ***O. cajennensis*** **(Fabricius)** [and rest of its "subspecies"]

Odontocheila nicaraguensis Bates, 1874 (Figs 6–8, 26–36)

Odontocheila nicaraguensis Bates, 1874: 269.

Type locality. Nicaragua: Chontales.

Odontochila nicaraguensis: Fleutiaux 1892: 121. Rivalier 1969: 197, 201, 202, fig. 2.
Odontocheila nicaraguensis: Wiesner 1992: 77.

Type material. Holotype (by monotypy) ♀ in MNHN, labelled: "Chontales / Nicaragua" [ochre-tarnished, handwritten] // "Nicaraguensis / Bates" [by the same hand] // "H.W.Bates / Biol.Cent.Amer" [with thin black frame, printed] // "Type" [partly with black frame, printed] // "Muséum Paris / 1952 / Coll. R. Oberthür" [greenish with black frame, printed] // "Type" [red, printed] // "Revision Jiří Moravec 2011: / Holotype / Odontochila / nicaraguensis Bates, 1874" [red, printed].
Other material examined. Historical data. 1 ♀ in BMNH: "Chontales / Nicaragua / Janson" [printed] // "B.C.A.col., I (1.) / Odontochila / nicaraguensis, Bates" [handwritten] // "Odontochila / nicaraguensis / "Bates" [handwritten] // "132" [greyish, handwritten] // "Type" [round with red round border, printed] // "Holotype ♀ / Odontocheila / nicaraguensis Bates / By Erwin '76" [partly red print/handwritten] // "Revision Jiří Moravec / This specimen was eroneously labelled / it is not a type" [handwritten/printed]". Other data. 1 ♂ in BMNH: "Costa Rica / P.Nevemann". 1 ♀ in BMNH, 1 ♀ in CMNH: "Guapiles C. Rica / 5.VI.1909 / P. Calvert" // "Odontochila / chiriquina Bates" [sic!]. 1 ♀ in MNHN: "Costa Rica". 1 ♂ in MNHN: "Collection / Schild Barsdorf / Costa Rica / San Carlos". 6 ♂♂, 3 ♀♀ in MNHN, 1 ♀ in NMPC: "Costa Rica / San Carlos". 1 ♂ in USNM: "Costa Rica: Prov. Heredia: / 11km ESE La Virgen, 250– / 350 m, 10°21′N 84°03′W / 06 Abr. 2004 / INBio-OET-ALAS transect" // "06 Abril 2004 / Malaise/ 03/M/10/070" // "Project Alas / INB0003646440". 4 ♂♂, 2 ♀♀ in USNM: ibid., except for different coll. date. 4 ♂♂, 1 ♀ in USNM: "Costa Rica: Prov. Heredia: / Est Biol. La Selva, 50– / 150m, 10°26′N 84°01′W / 06, 21.III.2004 / INBio-OET-ALAS transect". 4 ♂♂, 1 ♀ in USNM, 4 ♂♂ in CMNH: "Costa Rica: Heredia Prov. / Finca La Selva, near Pto. / Viejo, 17-19-III-1973 / D.C. Rentz" // "in arboretum / day time". 1 ♀ in CMNH: "Costa Rica, Hered[ia]. / 5mi Puerto / Viejo, 14-15.VII.1966 (J.B. Karryn). 1 ♂ in CMNH: "Costa Rica / Heredia Prov. / Rio Frio / 11-IX-1969 / M.J. Corn". 2 ♂♂ in DBCN: "Costa Rica – Heredia / 15 km. S & E- La Virgen / Rd to El Ceibo / D. Brzoska 20-V-1996". 40 ♂♂, 5 ♀♀ in DBCN, 3 ♂♂, 3 ♀♀ in CCJM (ex DBCN): "Costa Rica: Heredia / La Selva B.S. (O.T.S) / D. Brzoska 18-19-V-1993". 22 ♂♂, 7 ♀♀ in DBCN: ibid., except for: "19-20-V-1989". 15 ♂♂, 5 ♀♀ in DBCN: ibid., except for: "15-16- VI-1990". 15 ♂♂, 1 ♀ in DBCN: ibid., except for: "7-VIII-1992". 2 ♂♂, 2 ♀♀ in DBCN: "Costa Rica: Heredia / P.N. Braulio Carrilo / El Ceibo, Peje R. / D. Brzoska 8-VIII-1992". 1 ♂, 1 ♀ in USNM: "Costa Rica / Turrialba / 25:V.1951 / O.L. Cartwright". 1 ♀ in CMNH: "Costa Rica / Turrialba / 22.VIII.1966, D.F. Veirs". 1 ♀ in CMNH: "Costa Rica / Reventazon Valley / J.B. Reark Coll.". 1 ♂ in MNHN: "Tuis, Cartago / V. Fussel[leg.], Costa Rica, 1000m.". 1 ♂ in CCJM: "Costa Rica, Cartago Prov. / Las Brisas Res. n. Turrialba / 10°04′N;83°37.8′W, 915m / 23.V.2013, leg. Jiří Moravec. 1 ♂ in CCJM, 1 ♂ in CCJM: ibid., except for "leg. M. Mýlek". 1 ♂ in NHMW, 1 ♂ in MNHN: Costa Rica / Turrialba / VII.1965 / leg. Ötuös". ". 1 ♂, 1 ♀ in INBIO: "Costa Rica, Prov. San Jose / Puriscal P.N. La Cangreja Cerro". 1 ♂ in CCJM, 1 ♂ in NHMW (ex Coll. JPPW): "Costa Rica / Cariari vic. / Finca La Suerte / V.2001 / Leg. van den Berghe". 1 ♂ in NHMW 1 ♀ in CCJM: (ex Coll. JPPW): "Costa Rica, PN Guanacaste / Umgeb. Maritza, 600 m / Feuchtwald, Waldved mit / krautiger Vegetation / 04.VIII-20.IX.1993, M. Franzen leg.". 8 ♂♂, 2 ♀♀ in DBCN, 2 ♂♂, 1 ♀ in CCJM (ex DBCN), 1 ♂ in INBIO: "Costa / Rica: Guanacaste / PN Guanacaste / Maritza Bio St. / D. Brzoska 10-VIII-1992". 7 ♂♂, 2 ♀♀ in DBCD, 1 ♂ in CCJM: ibid., except for: "21-22-V-1993". 2 ♂♂, 1 ♀ in DBCN: "Costa Rica – Alejuela / Arenal Observatory Lodge / Old Lava Trail / D. Brzoska 20-V-1999". 1 ♂ in DBCN: "Costa Rica – Alejuela / NE shore of Lake Atenal, / D. Brzoska 20-V-1993". 1 ♀ in DBCN: "Costa Rica – Alejuela / Valle Escondidio Lodge / San Ramon-Fortuna Rd / 16-V-1999".

Redescription. Body (Figs 6–7) large, but of very variable size (sometimes independent of sex) (12.6–) 13.0–15.0 (HT 13.6) mm long, (4.00–) 4.20–4.80 (HT 4.30) mm wide; dorsal surface of head, pronotum and elytra dark copper (body generally darker in female) with brighter cupreous lustre on sublateral areas and greenish iridescence on lateral areas.

Head (Fig. 26) narrower than body, 3.65–4.40 mm wide, all parts of head glabrous.

Frons steeply sloping towards clypeus, obtuse triangular (convex in middle), clearly delimited from clypeus and merging with vertex over frons-vertex fold, which is blunt in middle and shortly edged laterally, surface metallic black or black-blue, usually with greenish, golden-bronze or violaceous iridescence, almost smooth, except for finely asperate-rugulose posteromedian area (the sculpture passing to vertex over vertex fold); supra-antennal plates flat, vaguely triangular, smooth, laterally barely delimited, their apices forming the short frons-vertex lateral edges, usually with metallic green, blue or gold-bronze lustre.

Vertex with the usual juxtaorbital sensory setae (two on each side, indistinct and often abraded), surface almost flat, metallic copper, variably with iridescent greenish, reddish-cupreous or bronze areas; anteromedian area almost black, or iridescent cupreous or green, finely and irregularly rugulose, rugae short, wavy to vermicular, usually forming arcuate-parallel ornamentation on median area while sublateral areas are finely to more distinctly longitudinally striate-rugulose or comparatively distinctly parallel-striate, striae divergent posteriad when passing onto temples; large juxtaorbital areas are rather distinctly parallel striate; rugae on posteromedian and occipital areas becoming irregular and short, forming fine, irregularly rugulose to asperate sculpture.

Clypeus cupreous or dark copper, usually with bright reddish and greenish lustre, rather distinctly wrinkled.

Genae almost smooth, shiny metallic black, usually with strong blue or violaceous lustre.

Labrum 4-setose, with seven teeth in both sexes, but shape sexually dimorphic, surface smooth; male labrum (Fig. 27) rather long, length 1.30–1.40 mm, width 1.65–1.80 mm, bicolored, with large, testaceous lateral areas, and large metallic black area of basomedian convexity and narrow anterior border, acute basolateral teeth, acute or right-angled anterolateral teeth and prominent median lobe of three anterior teeth that are either at the same level, or the median tooth is variably shorter, very small, or entirely effaced; female labrum (Fig. 28) similar shape to that of male, but much longer, almost as long as wide, length 1.60–2.00 mm, width 1.70–2.00 mm with prominent, protruding, subacute median tooth, usually much darker, also with blackened teeth.

Mandibles (Fig. 26) black-brown except for more or less distinctly ochre-testaceous, narrow, lateral stripe, with arcuate lateral margins, subsymmetrical, lateral margins arcuate, each mandible with only three teeth (and basal molar); third tooth smaller than second (left mandible sometimes with a small rudiment of fourth tooth, indicated by a raised edge).

Palpi (Fig. 26) normally shaped with only moderately dilated terminal palpomeres; maxillary palpi with longest palpomere ochre to brownish-testaceous, penultimate and terminal palpomeres metallic black, the apex of terminal palpomere in male variably obtuse or indistinctly constricted and with bleached top stripe, in female rounded; labial palpi with penultimate (longest) palpomere ochre-to-brownish-testaceous in male, while in female usually blackened on the glabrous side, or partly or entirely black, rather narrow, only moderately dilated towards apex, which is up to 0.30 mm wide; terminal palpomere comparatively short and narrow, metallic black.

Antennae rather long, in male reaching elytral half, notably shorter in female; scape and pedicel metallic black or black-blue (faded to black-brown in older specimens) with violaceous, mahogany or rarely greenish iridescence, the scape with one apical seta; antennomeres 3–4 metallic black-blue with mahogany or violaceous lustre, black-blue or cobalt-blue apices and usually purple-mahogany or ochre-testaceous subapical macula; antennomeres 5–11 smoky black-brown to smoky black.

Thorax. Pronotum (Fig. 29) glabrous, as long as wide or very slightly longer, length 2.30–2.95 mm, width 2.30–2.90 mm; sulci pronounced (anterior sulcus deep only laterally, posterior sulcus deeper); anterior lobe wider than the posterior, of the same width as the disc (including dorsally visible proepisternal margins), its anterior margin in middle often prolonged anteriad, mostly cupreous, densely and irregularly vermicular-rugulose; disc dorsally moderately convex in middle, lateral margins (of proepisterna) variably subparallel or moderately convex, usually (mostly in female) moderately attenuated towards posterior sulcus; notopleural sutures indistinctly visible from above; medial line indistinct, partly merging with surface sculpture; median area dark copper to more vividly cupreous, sublateral areas usually with greenish and gold-bronze lustre; sculpture consisting of irregularly parallel-wavy to zigzag-wavy striae, which are mostly coarser on posterior discal area and obliquely converging towards the median line; lateral areas towards the notopleural sutures covered with much thicker, elongate-transverse rugae; posterior lobe with rather distinct posterior rim, rather coarsely and irregularly sculptured with wavy to vermicular rugae except for nearly smooth, moderately raised and usually iridescent green dorsolateral bulges; prosternum, mesosternum and metasternum glabrous, metallic black, black-copper or black-blue, usually with greenish or cobalt-blue to violaceous lustre, smooth except for shallow transverse rugae on prosternum; proepisterna and mesepisterna glabrous, shiny metallic black, smooth; female mesepisternal coupling sulci indistinct, the longitudinal median furrow differing only slightly from somewhat shallower and almost uniform furrow in male mesepisternum; metepisterna shiny metallic black, usually finely wrinkled, impressed at the border adjacent to metepimeron; anterodorsal metepisternal suture adjacent to elytral epipleuron with very indistinct one or two white microsetae.

Elytra (Figs 30–31) elongate, length 7.80–9.50 mm, with well-pronounced, rounded to subangular humeri, lateral margins subparallel, slightly dilated in middle in both sexes, anteapical angles arcuate, then running obliquely towards apices, which are rounded in both sexes, towards a very small sutural spine; microserrulation indistinct and very irregular; elytral dorsal surface moderately convex, humeral impressions shallow but, together with mostly shallow discal impression clearly delimiting moderate basodiscal convexity; apical impressions moderate; elytral coloration usually almost uniformly dark cupreous on elytral disc, sublateral areas more vividly and more or less lustrously reddish-cupreous, passing to iridescent green to green-blue on narrow longitudinal lateral area, while juxta-epipleural area in lateral view is black-blue or black-violaceous; whole elytral surface rather finely punctate, punctures mostly isolated and of equal size, larger on anterior and subhumeral areas, largest within shallow discal impression, more irregular and anastomosing on juxtasutural area, becoming smaller posteriad and more

anastomosing in chains, smallest and most irregular on posterior elytral third; he sculpture changes appearance, depending on the angle of illumination: in front illumination the punctures on the posterior elytral half appear sharply asperate and very irregular, forming denser and seemingly asperate sculpture of indefinite pattern on apical area; elytral surface glabrous except for the usual, few long, often indistinct, hair-like sensory setae as in all species of the genus; whitish elytral maculation consisting of small, or longitudinal-elongate lateral-median macula, and often also small, barely visible or only indicated, white to rust-darkened anteapical spot is present; humeral macula is absent in adults of most populations, very rarely indicated in males as dark ochre or cinnamon coloured spot invisible from above.

Abdomen. Ventrites metallic black with faint, chatoyant greenish, bronze, blue or violaceous lustre, their surface smooth and glabrous, except for the usual (easily abraded) hair-like sensory setae at posterior margins on each side of the ventrites.

Legs. Coxae metallic black-blue with greenish or bronze lustre, pro- and mesocoxae rather densely white-setose, metacoxae with one apical and one discal seta, lateral margin fringed with dense setae; trochanters almost black, protrochanters often with brownish-testaceous apical area; femora notably longitudinally bicolored, whole dorsal (anterior) longitudinal half of profemora and whole ventral (posterior) longitudinal half of meso- and metafemora metallic black with blue, greenish, purple, mahogany or violaceous lustre (depending on angle of illumination), opposite longitudinal area brownish with mahogany lustre to reddish-testaceous; profemora rather densely covered with rows of white, mostly erect setae which are moderately long but sparser on mesofemora and very sparse on metafemora, which may be almost glabrous; all tibiae metallic black, often with bluish or violaceous lustre, particularly on their apical half, covered with scattered, stiff, white setae and sparser, darkened thorn-like setae, apical half of pro- and mesotibiae with dense pad of white to greyish setae; tarsi black with metallic blue, greenish and violaceous lustre; first three protarsomeres in male distinctly dilated, with usual dense greyish-white pad of short setae; claws reddish to dark testaceous.

Aedeagus (Figs 32–36) large, length 4.20–4.50 mm, width 1.00–1.20 mm, voluminous in middle, apical portion conically attenuated towards small apex, which is dorsally distinctly excised; structure of internal sac (Fig. 35) characteristic of the species-group, with large, reniform central-ventral piece with thin lower appendage, and long, convoluted flagellum with only moderately bulbous base and multicoiled flagelliform part usually visible as protruding from the dorsoapical orifice.

Variability. *O. nicaraguensis* is less variable than others in the species-group. The labrum, particularly in the female, may be almost entirely black. The apex of the aedeagus is sometimes less sharply excised, but the excision is always distinct. As in other species, it is very important that the apex of the aedeagus is perfectly settled in its horizontal position to establish its actual form.

Differential diagnosis. *Odontocheila nicaraguensis* shares its dark, metallic black metatibiae and metallic black metatarsi with others in the species-group treated in this contribution (except for *O. oseryi* which has yellow-testaceous metatibiae). It may be distinguished from the externally similar *O. chiriquina* by its generally larger body with

all tibiae entirely metallic black, generally coarser surface sculpture of the pronotum and rounded elytral apices in both sexes. The bicolored labrum of *O. nicaraguensis* is very similar in shape to that in *O. angelsolisi* sp.nov. and most adults of *O. chiriquina*, but the aedeagus of *O. nicaraguensis* has a dorsally excised apex, while *O. chiriquina* has the apex simply cylindrical and only indistinctly emarginated (never excised), and in *O. angelsolisi* the apex is elongated, with a small hook (similar to the apex in otherwise very different *O. mirekskrabali* sp.nov.). The bicolored, smooth labrum of *O. nicaraguensis* and entirely metallic black tibiae immediately differentiate it from *O. excisipenis* in which the labrum is much longer, testaceous and with a clearly wrinkled surface, and the tibiae have a brownish-testaceous basal half, although the aedeagi in these two species have a similarly excised apex. *O. molesta* is externally immediately distinguished by its notably acute elytral apices in both sexes, by its testaceous labrum and the shortly, but distinctly arcuate-hooked, apex of its aedeagus.

Biology and distribution. The original forest in the type locality of Chontales in Nicaragua, where the holotype (MNHN) and the other female (BMNH) of *O. nicaraguensis* were, according to Bates (1874), caught by Thos Belt, no longer exists and according to Van den Berghe (pers. com.), there is no suitable habitat remaining in the mining area of Chontales. Except for the holotype (MNHN) and the false syntype (BMNH), no other specimen of *O. nicaraguensis* caught in Nicaragua exists in collections; we therefore believe that this species, which was obviously extremely rare in Nicaragua, may be extinct in this country.

Fortunately, *O. nicaraguensis* is still quite common in western and central Costa Rica, in the provinces of Alejuela, Guanacaste, Heredia, San Jose and Cartago. The closest known locality to the Nicaraguan border is San Carlos in the province of Alajuela. Most of the localities cited in "Other material examined" were also mentioned by Johnson (1996). The occurrence of *O. nicaraguensis* in Panama stated by Rivalier (1969) was based on his confusion with *O. chiriquina* (see "Remarks" below); further, the records from Panama from Boyd (1982), Wiesner, 1992, Erwin & Pearson (2008) and others obviously represent *O. chiriquina*, or other species of this species-group occurring in Panama.

Specimens from Corcovado National Park, the southernmost in Costa Rica, and other localities in the province of Puntarenas, have proved to be *O. chiriquina* (see below).

Adults are active from March to October, mostly at higher altitudes of up to 1000 m (in Cartago Province). They are diurnal. In the Las Brisas private reserve near Turrialba, the adults inhabited a forest path on the top of a mountainous ridge at an altitude of 512 m; no one was observed in any lower position of the mountainous rain forest. They were hunting on the path and flew up quickly, landing on surrounding vegetation when disturbed. Our field experience thus corresponds with the behaviour of adults described by Franzen (2004) in his comprehensive paper on the assemblages of tiger beetles in the climatically transitional area of north-western Costa Rica and the Guanacaste National Park, as well as that mentioned by Erwin & Pearson (2008).

Remarks. Rivalier (1969) partially confused *O. nicaraguensis* with *O. chiriquina*, and entirely confused *O. chiriquina* with *O. excisipenis* W. Horn, 1932, because he never

examined the type specimens of the two latter species, and *O. excisipenis* was entirely unknown to him. Consequently, RIVALIER (1969) mistakenly distinguished *O. chiriquina* from *O. nicaraguensis* on the basis of different shape and coloration of the labrum; in fact, the type specimens of *O. chiriquina* possess the same bicoloured labrum as *O. nicaraguensis*. (see also MORAVEC (2012a) and "Remarks" under *O. chiriquina* and *O. excisipenis* below).

The shape of the aedeagus of *O. nicaraguensis* was quite accurately illustrated by HORN (1932, fig 6).

As mentioned by MORAVEC (2012a), the original description of *O. nicaraguensis* by BATES (1874) was based on only the female holotype (Fig. 8) deposited in MNHN (donated there in 1954 by Oberthür, who obtained it from Bates). Consequently, the other female of *O. nicaraguensis* from the type locality, deposited in BMNH and evidently additionally labelled as "Type", is not a type specimen (see holotype labels, Fig. 8).

***Odontocheila chiriquina* Bates, 1881** (Figs 62–69)

Odontocheila chiriquina Bates, 1881: 17.

Type locality. Panama: Chiriqui province, Volcan de Chiriqui (now named Volcán Barú, 3, 474 m, in the Volcán Barú National Park).

Odontochila chiriquina: FLEUTIAUX 1892: 122.
Odontocheila chiriquina: WIESNER 1992: 77 (partim).
Odontochila nicaraguensis sensu RIVALIER 1969: 201 (partim).
Misapplications. Non *Odontochila chiriquina* sensu RIVALIER 1969: 201, nec PEARSON, BUESTÁN & NAVARRETE 1999: 241, nec VÍTOLO (2004), which is *O. excisipenis* W. Horn, 1932.

Type material. Lectotype ♂ (designated by MORAVEC 2012a) in BMNH, labelled: "V. de Chiriqui / 2–3000 ft., Champion" // "B.C.A., Col., I(1), Odontocheila chiriquina" [printed] // "F.Bates Coll., 1911-248" [printed] // "Lectotype / Odontocheila / chiriquina Bates, 1881 / design. Jiří Moravec 2012" [red, printed]. Paralectotypes. 5 ♂♂, 3 ♀♀ in BMNH with same first two labels. 2 ♂♂, 2 ♀♀ in BMNH with same first two labels and: "Odontocheila nicaraguensis Bates [sic!] / det. R. R. Murray'79". 1 ♀ in BMNH with same first label and: "Odontocheila / chiriquina Bates" [handwritten]. 1♂, 1 ♀ in BMNH: "V. de Chiriqui / 25–4000 ft. / Champion"// "B.C.A., Col., I(1) / Odontocheila / chiriquina" [printed]. 4♂♂, 2 ♀♀ in MNHN (filed as "*O. nicaraguensis*" by Rivalier): "V. de Chiriqui / 2–3000 ft. / Champion"// "H.W.Bates Biol. Coll. Amer." // "Muséum Paris / 1952 / Coll. R. Oberthür" [greenish, printed]. 1 ♂ in MNHN: with same first label and: "ex Museo / H.W. Bates / 1892" // "Muséum Paris / F. Fleutiaux" [greenish, printed] // "1487 / Rivalier" [handwritten, referring to separately mounted aedeagus]. 1 ♂ in MNHN: with same first two labels and: "Muséum Paris / Amerique Centrale / Coll. du Biol. Central Amer. / Godman, 1908" [greenish, printed] // "Odontocheila / chiriquina Bates" [handwritten] // "1520, Rivalier" [handwritten, referring to separately mounted aedeagus]. 2 ♀♀ in MNHN: "V. de Chiriqui / 2–3000 ft. / Champion" [printed (ex coll. Fleutiaux)]. 1 ♀ in IRSNB: "Coll. R.I.Sc. N.B. / Panama:" // "v. d. Chiriqui / 25–4200ft / Champion" [dark violet, printed label and small locality label glued on the large label] // "Od. chiriquina / Bts./ det. H.W. Bates" [greenish, handwritten/printed] // Para- / type" [orange-red with thin black frame]. 1 ♂ in IRSNB with same labels except for: "2–3500 ft". 2 ♂♂, 1 ♀ in MFNB: "V. d. Chiriqui / 25–4000 ft. / Champion". All paralectotypes labelled: "Revision Jiří Moravec 2011: / Paralectotype / Odontocheila / chiriquina Bates, 1881" [red, printed].
Other material examined. Historical data. 1 ♂ in BMNH, 1 ♀ in IRSNB: "Bugaba / Panama / Champion" [printed] // "Type" [with black frame, printed] // "Type" [circular with red margin, printed] // "B.C.A., Col., I(1) // "Odontocheila / chiriquina Bates" [handwritten] // "Lectotype ♂, Odontocheila chiriquina Bts. / by Erwin 96" [sic!, printed/handwritten] // "The lectotype label by Erwin is invalid (unpublished)" [printed] // "This specimen / was erroneously labelled – / it is not a type" [printed]. 1 ♂ in MFNB, 1 ♀ in SDEI: "Bugaba /800–1500 ft. /

Champion". 1 ♂ in MNHN: "Bugaba /800–1600 ft. / Champion" // H.W. Bates / Biol. Lat. Amer." "Muséum Paris / 1952 / Coll. R. Oberthür". 1 ♂ in BMNH with same label and: "Co-type" [sic!] // "Odontocheila /chiriquina Bates"// "Named by / Dr. W. Horn / in Nat. Mus. Brit."; "This specimen / was erroneously labelled – / it is not a type" [printed]. 4 ♂♂, 3 ♀♀ in BMNH: "Bugaba / Panama / Champion" // "B.C.A., Col., I(1) / Odontocheila / chiriquina" [printed]. 1 ♀ in BMNH with same labels and: "Odontocheila / chiriquina Bates". 1 ♂, 1 ♀ in MFNB, 1 ♀ in NHMW: "Bugaba / Panama / Champion". Other data. 3 ♀♀ in MFNB, 1 ♀ in NMPC: "Chiriqui, Panama". 1 ♀ in MFNB: "Costarica [sic!] / Chiriqui". 1 ♀ in SDEI: "Staudinger / Chiriqui". 1 ♂ in SDEI: "Lino, 900 m / Panama". 1 ♂ in MNHN "Lino, 800 m / Panama". 1 ♀ in MNHN: "Canoas". Recent data. 1 ♂ in INBIO: "Costa Rica, Prov. Puntarenas, P.N. / Corcovado, Sector La Leona, Cerro / Puma, 100–300m, 19.VI–8.VII. / 2003, A. Azofeifa, Libre / L_S 267700 518900 #74487". 2 ♂♂, 2 ♀♀ in INBIO: ibid., differently numbered. 1 ♂ in INBIO: "Costa Rica, Prov. Puntarenas, R.V.S. / Rio Piro, Golfie, Finca Catalino, 200m / 18-IX.2004, B. Gamboa, Libre / L_S 264550_535590 #78217" // "INB0003881060 / INBIOCRI Costa Rica". 15 ♂♂, 11 ♀♀ in DBCN: "Costa Rica – Puntarenas / Osa Peninsula / Moreno Bio. Station / D. Brzoska 22-23-VI-1990". 19 ♂♂, 5 ♀♀ in DBCN: "Costa Rica – Puntarenas / Piedras Blancas / Esquinas Lodge (NW Golfito) / D. Brzoska, 15-16-V-1996". 17 ♂♂, 16 ♀♀ in DBCN: ibid., except for: "17-VI-1997". 8 ♂♂, 3 ♀♀ in DBCN: "Costa Rica – Puntarenas / 7 km. NE – Potrero Grande / (between San Vito and Buenos Aires), D. Brzoska 13-VIII-1992". 4 ♂♂, 3 ♀♀ in DBCN: "Costa Rica – Puntarenas / Refugio Nac. de Fauna / Silvestre Golfito / D. Brzoska 28-V-1993".

Redescription. For a detailed redescription, see Moravec (2012a).

Differential diagnosis. *O. chiriquina* is externally very similar to *O. nicaraguensis*. Apart from its generally smaller body, not exceeding 13.5 mm, and generally finer surface sculpture on the pronotal disc, *O. chiriquina* is principally distinguished by the simpler and blunter apex of its aedeagus. Moreover, its pro- and mesotibiae, and sometimes also metatibiae, have their basal third brownish-testaceous, and the elytral apices in both sexes are subacute. Adults of *O. chiriquina* from the type locality and all Panamanian localities have a distinctly bicoloured labrum; only the Costa Rican populations from the province of Puntarenas have the labrum variably either distinctly bicolored, or partly testaceous, very rarely entirely testaceous. The bicolored labrum is shared with *O. nicaraguensis* and *O. angelsolisi* sp.nov., but the aedeagus of *O. chiriquina* has a short, simply cylindrical, narrow apex which is dorsally indistinctly emarginated (never excised), while the apex in *O. nicaraguensis* is dorsally moderately to distinctly excised (resembling the aedeagus in *O. exisipenis*), and in *O. angelsolisi* the apex is somewhat elongate with a small, sharpened hook. It is very important that the apex of the aedeagus is perfectly settled in its horizontal position in order to establish its actual shape.

The bicoloured, smooth and comparatively short labrum immediately differentiates *O. chiriquina* from *O. excisipenis,* in which the labrum is testaceous, much longer and with finely but clearly wrinkled surface, and the apex of the aedeagus is markedly dorsally excised. Those Costa Rican adults of *O. chiriquina* that exceptionally exhibit a testaceous labrum may be immediately distinguished from *O. excisipenis* not only by the simpler apex of their aedeagi, but also by the shape of the labrum which is, in both sexes of *O. excisipenis*, much longer and with a notably wrinkled surface.

O. mirekskrabali sp.nov. and *O. molesta* are immediately distinguished by their differently shaped aedeagi, combined with the testaceous coloration of their labra; moreover, the labrum in *O. mirekskrabali* sp.nov. is almost uniformly shaped in both sexes, and the elytral apices in *O. molesta* are distinctly elongate-acute.

Biology and distribution. Known from the type locality in the province of Chiriqui in western Panama near the Chiriqui volcano (now the Volcán Barú National Park) and other nearby places, Bugaba and Alto Lino in the same province, but surprisingly in the eastern Costa Rican province of Puntarenas as well. The occurrence in Costa Rica mentioned by Erwin & Pearson (2008) was considered doubtful by Moravec (2012a), but it was confirmed after we examined a considerable quantity of material (DBCN, INBIO, CMNH) from coastal localities in the Costa Rican province of Puntarenas. The province lies near the Panamanian border, and the eastern localities are not far from the type locality in real terms. The Canoas locality lies just between the provinces of Puntarenas in Costa Rica and Chiriqui in Panama. However, the province of Puntarenas is very long, extending along the Costa Rican Pacific coast up to the province of Guanacaste near the border with Nicaragua. The coastal biotopes differ from those of the Panamanian areas of the type locality in their much higher altitudes (up to 900 m). Therefore, due to adaptations under different environmental conditions, the Costa Rican adults inhabiting the province of Puntarenas may represent vicariant populations under particular evolutionary pressure, resulting in allopatric speciation (see "Differential diagnosis" above).

Records of *O. chiriquina* from other countries, e.g. by Pearson, Buestán & Navarrete (1999) from Ecuador, and Vítolo (2004) from Colombia, cited also by Wiesner (1992) and other authors, are based on confusion with *O. excisipenis* by Rivalier (1969) and subsequent authors (see "Remarks" below). The record from Bolivia by Horn (1926), also cited by Wiesner (1992), was completely erroneous (see Moravec 2012a).

According to Erwin & Pearson (2008), the behaviour of adults is similar to that of adults of *O. nicaraguensis*.

Remarks. Rivalier (1969), who did not examine the type specimens of this species, confused *O. chiriquina* with *O. excisipenis*, which was entirely unknown to him. Moreover, Rivalier mistakenly distinguished *O. chiriquina* from *O. nicaraguensis* on the basis of differences in the shape and coloration of the labrum, which he considered longer and entirely testaceous in *O. chiriquina*. In fact, the type specimens of *O. chiriquina* possess the same bicoloured labrum as the type and other specimens of *O. nicaraguensis*. Despite the fact that a number of specimens of *O. chiriquina* with identical labels giving type locality as Chiriqui and collector as Champion (mentioned in the original description by Bates (1881), are deposited in MNHN and are in fact syntypes of this taxon by Bates, Rivalier (1969) erroneously considered these specimens to be *O. nicaraguensis*, while the specimens from Colombia with a much longer and entirely testaceous labrum (in fact *O. excisipenis*) he misidentified as *O. chiriquina*. Moreover, Rivalier (1969) quite inappropriately and oddly noted that it was Horn who confused *O. chiriquina* with *O. nicaraguensis*. Not only did Rivalier not examine the type specimens, he evidently failed to read the original descriptions and protologues of *O. chiriquina* by Bates (1881), and of *O. excisipenis* by Horn (1932) – see also Moravec (2012a) and "Remarks" under *O. excisipenis* below.

Only the differential diagnosis and main differentiating characters of *O. chiriquina* are mentioned and illustrated h ere. For a detailed redescription and other illustrations see Moravec (2012a).

Odontocheila excisipenis W. Horn, 1932 (Figs 70–77)

Odontochila chiriquina excisipenis W. Horn, 1932: 408, 405 fig. 10.

Type locality. Western Columbia: Rio Dagua, Juntas, 400 m a.s.l.

Odontocheila chiriquina excisipenis: Wiesner 1992: 77.
Odontocheila excisipenis: Moravec: 2012a : 20, figs 2–3, 21–31.
Misinterpretation. *Odontochila chiriquina* sensu Rivalier 1969: 201.

Type material. Lectotype ♂ (designated by Moravec 2012a) in SDEI, labelled: "Fassl[leg.], Juntas, Rio Dagua / W. Columbia, 400 m. / aus Blättern fliegend"[handwritten] // "Type / W. Horn" [printed] // "Syntypus" [red, printed] // "Para–Lectotype [sic!] ♂, Odontochila / excisipenis Horn / By Erwin 96" [handwritten/printed/handwritten] // "The paralectotype label / by Erwin is invalid / (unpublished)" [printed] // "Lectotype / Odontochila chiriquina / excisipenis W. Horn, 1932 / design. Jiří Moravec 2012" [red, printed]. Paralectotypes. 1 ♀ in SDEI with same locality label as lectotype and with additional, folded, illegible labels. 1 ♂ in SDEI: "Cachabé 96 / Rosenberg" [handwritten] // "ssp / excisipenis / m" [green with black frame, handwritten] // "Lectotype [sic!] ♂ / Odontochila / excisipenis Horn / By Erwin 96" // "Odontocheila chiriquina excisipennis [sic! incorrectly spelled] / W. Horn type (DEI-Eberswalde) / borrowed by D. L. Pearson / 23.Oct.1996 (drawer #57)" [printed] // 2 ♂♂, 1 ♀ in SDEI with same locality label. 1 ♂ in SDEI: "Queredo Ecd[Ecuador] / occ. Campos 100 m." [handwritten] // "6" [handwritten] // "chiriquina" [handwritten]. 1 ♀ in SDEI: "Cachabé / low c. XII.96 / (Rosenberg)" [printed] // "Tving Mus." [printed]. 1 ♀ in SDEI: "Rio Dagua / Columbien / Rosenberg" [handwritten]. 1 ♀ in SDEI: with illegible label and: "Coll. Baden Ruge, 2000 m" [handwritten]. The paralectotypes bear invalid Paralectotype labels by Erwin and following labels: "Type, W. Horn" [printed]; "Syntypus" [red, printed]; "Revision Jiří Moravec 2012: / Paralectotype / Odontochila chiriquina / excisipenis W. Horn, 1932" [red, printed] // "The para [lectotype respectively] label / by Erwin is invalid / (unpublished)" [printed] // "Odontocheila excisipenis W. Horn, 1932, stat.nov., det Jiří Moravec 2012" [printed].
Other material examined. Historical data. 2 ♂♂ in BMNH, 2 ♂♂ in MNHN, 2 ♂♂ in SDEI: "Cachabé / low c. XII.96 / (Rosenberg)". 2 ♂♂ in BMNH: ibid., except for: "I.97". 3 ♂♂, 1 ♀ in BMNH: ibid., except for: "XI.96". 1 ♂, 2 ♀♀ in BMNH: "R. Dagua / Colombia / (Rosenberg)". 1 ♂ in BMNH with same labels and: "chiriquina / var. W. Horn". 2 ♂♂, 2 ♀♀ in SDEI: "Rio Dagua / Columbien / I-VIII.1895" [standing as *O. chiriquina*]. 28 ♂♂, 10 ♀♀ in MNHN: "Colombie / Valleé de Cauca / M. de Mathian / 1898" [standing as *O. chiriquina*]. Other data. 1 ♀ in BMNH: "Colombia". 1 ♂ in BMNH: "Cali" [standing as *O. chiriquina*, in BMNH with additional label: "F. Bates, 1911 – 248". 1 ♂ in BMNH: "Brazil" // Bowring / 63-47*" // "Named by / Dr. W. Horn / G.J.A." // "Odont. / chiriquina / or sp. n." // "the locality evidently / confused by Browring!!! / Rev. Jiří Moravec 2012". 1 ♂ in MFNB: "West Ecuador / Santa Carlos" [standing as *O. chiriquina*]. 1 ♂ in MFNB: "West Ecuador / St. Domingo" [standing as *O. chiriquina*]. 1 ♀ in NHMW: "Ecuador / Rio Palenque / 47 km S St. Domingo". Recent data. 23 ♂♂, 10 ♀♀ in DBCN, 8 ♂♂, 4 ♀♀ in CCJM (ex DBCN): "Panama: Darien / PN Darien – Cana / Cerro Pirre Trail / 0.7°45.3'N, 77°40.1'W / D. Brzoska 15-22-VI-2004". 11 ♂♂, 3 ♀♀ in DPDC (later in STRI): "Panama: Darien Prov. / Estacion Cana – 500m / 77°41′W, 07°44′N / 15-24-VI-2004 / D. Windsor & D. Duran lgt."

Redescription. For a detailed redescription, see Moravec (2012a)

Differential diagnosis. *O. excisipenis* is externally distinguished from *O. chiriquina* by its markedly longer labrum (also in male), which is entirely ochre-testaceous to reddish-testaceous (only occasionally slightly darkened) and with shallowly but clearly wrinkled surface. The shape of the labrum in both sexes and distinctly excised apex of the aedeagus also differentiate *O. excisipenis* from the populations of *O. chiriquina* from the coastal Puntarenas area of Costa Rica, some adults of which have a variably testaceous labrum. Moreover, the body of *O. excisipenis* is generally larger (up to 15.2 mm long), and the elytral apices in both sexes are subacute (but less markedly so than the elongate-acute elytral apices in *O. molesta* that is also clearly distinguished by its hooked

aedeagus). The testaceous labrum and basal half of tibiae also differentiate *O. excisipenis* from *O. nicaraguensis* and *O. angelsolisi* sp.nov. The further related species, *O. mirekskrabali* sp.nov., which also has testaceous labrum, differs in having the labrum uniformly shaped in both sexes, as well as in the shape of its aedeagus.

Biology and distribution. The type specimens of *O. excisipenis* come from western Colombia and central and western Ecuador. Moravec (2012a) noted that this species appeared geographically separated from *O. chiriquina*, as at the time of writing all other specimens examined were from the same areas in Colombia and Ecuador. However, a recently-examined series of specimens caught in Panama by the second author extends the distribution of *O. excisipenis* to Panama. Nevertheless, the locality lies in Darien, Panama's southernmost province, less than 10 km from the Colombian border, and a long way from the localities of *O. chiriquina*.

Horn (1932) mentioned four different localities for the syntypes of his new taxon: two in western Colombia: Rio Dagua, and Rio Dagua, Juntas, altitude 400 m, two in Ecuador: Cachabe and Queredo, altitude 100 m, and one allegedly in Bolivia: "Santos Marcos" (also cited by Wiesner 1992), but as explained by Moravec (2012a), this may be San Marcos, which lies just on the Costa Rica-Panama border; occurrence in Bolivia is highly improbable. The numerous specimens (MNHN) from Valleé de Cauca also come from the area of the type locality, since the Rio Dagua is a stream in the Valle de Cauca in western Colombia. For the specification of the historical places, such as Cachabé and other localities, see Moravec (2012a).

The record of *O. chiriquina* from Colombia by Vítolo (2004) certainly belongs to *O. excisipenis*, although the aedeagus, only schematically illustrated (Vítolo 2004, fig. 10.1b) features an inappropriately acute apex. The female in BMNH labelled "Brazil" was evidently mislabelled by Bowring.

The behaviour of adults was described by Horn (1932), who mentioned that the collector of the type specimens observed adults flying onto shaded low foliage in the afternoon (this is also partly written on the label of the lectotype and on the large, partially illegible label of one of the paralectotypes). Adults at the Cana Field Station, in Darien Province, were caught by the second author at altitudes of 525 – 1330 m. They were found along partially illuminated forest trails around the main lodge and along the Boca de Cupe and Serrania de Pirre trails. Adults were active from 7 a.m. until just before sunset. They were also active during periods of light rain.

Remarks. Originally described by Horn (1932) as a subspecies of *O. chiriquina*, but because of clear differences in both external and internal characters, *O. excisipenis* was raised by Moravec (2012a) to separate species status. Besides pointing out the notable differences in shape and testaceous coloration of the labrum, its wrinkled surface and other external characters, Horn (1932 fig. 10) also properly illustrated the excised shape of the apex of the aedeagus.

Pearson, Buestán & Navarrete (1999), obviously influenced by the confusion generated by Rivalier (1969), treated this species generally as *O. chiriquina*, but they mentioned for the first time that "form *excisipenis*" might be a separate species. Rivalier (1969), despite the differentiating characters pointed out by Horn (1932), misidentified

this Horn taxon as *O. chiriquina* (see above, under *O. chiriquina*). As discussed by Moravec (2012a), this was evident not only in the specimens which Rivalier arranged in the MNHN collection under *O. chiriquina* (in fact *O. excisipenis*), but also from the differentiating characters that he stated and illustrated (Rivalier 1969: 201–202, fig. 2ch) in which he incorrectly distinguished *O. chiriquina* from *O. nicaraguensis* on the basis of the long, testaceous labrum, which in fact is characteristic of *O. excisipenis*. Consequently, as he did not examine the syntypes of *O. chiriquina excisipenis* W. Horn and could not recognize those of *O. chiriquina* Bates, he misidentified the Horn taxon as *O. chiriquina*, and the genuine *O. chiriquina* Bates as *O. nicaraguensis* Bates, and such confusion was partly or entirely followed by subsequent authors.

Only the differential diagnosis and main differentiating characters of *O. excisipenis* are mentioned and illustrated here. For a detailed redescription and other illustrations see Moravec (2012a).

Odontocheila angelsolisi **sp.nov.** (Figs 9–25)

Type locality. Costa Rica: province of Limon, Veragua Rain Forest Biological Reserve, 440 m. a. s. l.

Type material. Holotype ♂ in INBIO, labelled: "Costa Rica, Limon Prov. / Veragua Rain Forest Res. / 9°55.5′N; 83°11.5′W, 440m / 24.V.2013, leg. J. Moravec". Allotype ♀ in CCJM with same label data. Paratypes. 4 ♂♂, 3 ♀♀ in CCJM, 1 ♂ in CJVB, 1 ♂ in MZMB: ditto. 8 ♂♂, 2 ♀♀ in DBCN, 1 ♂ in CMNH, 1 ♂ in FSCA, 1 ♂ in NHMK: ibid., except for "leg. D. Brzoska". 1 ♂ in INBIO: "Costa Rica, Prov. Limon, Veragua / Rainforest, Rio Victoria (Return Station) / 200–300m, 10 Oct 2008 R. Villalobos / Collecta Libre, L_N 21200_625500 / #94993" // "INBI0004172728 / INBIOCRI Costa Rica" [photo-print]. 1 ♀ in INBIO: ibid., except for: "#94994". 1 ♂ in INBIO: "Costa Rica, Prov. Limon, R.B. / Hitoy Cerere, Valle de la Estrella, Send. / Espavel, 560m, 18.Sep–5. Oct 2003 / B. Gamboa, E. Rojas, W. Arana, Malaise / # 6, L_S 401200_569800 #75488" // "INBI0003772413 / INBIOCRI Costa Rica" [photo-print]. 1 ♂ in INBIO: ibid., except for: "22 Sep 2003 / B. Gamboa Libre / L_S 401200_569800 #75647" // "INBI0003784287 / INBIOCRI Costa Rica" [photo-print]. 1 ♂ in MNHN (ex INBIO): "Costa Rica, Prov. Limon, R.B. / Hitoy Cerere, Send. Espavel, 560m, 25 / Jun 2003, B. Gamboa Libre / L_S 401200_569800 #74448" // "INBI0003733683 / INBIOCRI Costa Rica" [photo-print]. Other paratypes from Costa Rica, Prov. Limon (only locality labels): 1 ♂ in INBIO: / Est. Hitoy Cerere, 100m / R. Cerere, Res. Biol. Hitoy Cerere / Río Cerere, G. Garballo, 5–19.Mar.1992 / L_N 184200_643300". 1 ♂ in INBIO: ditto, "Jun.1991". 1 ♂ in INBIO: ditto, Jun.1992". 1 ♀ in INBIO: ditto, "Jul 1992". 1 ♀ in INBIO: ditto, "6–16.May 1992". 1 ♂, 2 ♀♀ in INBIO: ditto, "Abr 1993". 2 ♂♂ in INBIO: ditto, "27 jun a 22 jul 1992, K. Taylor". 1 ♂ in INBIO: ditto, "Jul.1992, A. Moreno". 1 ♀ in INBIO: ditto, "Jun.1991, A. Moreno". 1 ♂ in INBIO: ditto, "19–29.Abr.1992, R. Guzman". 1 ♂, 2 ♀♀ in INBIO: ibid., except for: "13–27.Abr.1992, G. Garbalo" and: "L_N 184600_643400 #1136". 1 ♂, 1 ♀ in INBIO: ibid., except for: "R. Guzman, 12–28.Abr 1992" and "#1137". 1 ♂, 1 ♀ in INBIO: ibid., except for: "12–28.Abr 1992, E. Lopez" and: "#1138". 2 ♂♂, 2 ♀♀ in INBIO: ibid., except for: "20 Mar–7 Abr 1998, E. Rojas" and "#49935".1 ♂ in INBIO: "Est Miramar, 500m / Res. Biol. Hitoy Cerere / 21 a 30 ago 1992, G. Garballo / L_N 184200_572800". 1 ♂ in INBIO: "R.B. / Hitoy Cerere, Valle de la Estrella, 100–140m / 20 jun–30 jul 1992, F.A. Quesada, Manual / L_N 184200_643300 #1313". 1 ♀ in INBIO: ibid., except for: "Valle de la Estrella / R.B. Hitoy Cerere,100–200m, 4–20 Abr 1994, G. Garballo / L_N 643300_184600 #2855". 1 ♂ in INBIO: ibid., except for: "S. Tepezcuintle – Espavel, 160m, 2–15 Nov. 1999, W. Arana Manual / L_N 184120_643471 #57421". 1 ♂ in INBIO: ibid., except for: "Sendero Espavel, 300m, 29 May 2000, A. López Manual / L_S 401500_570200 #57658". 1 ♂ in INBIO: "R.B. / Hitoy Cerere, Sendero Espavel, 220m, 11–25 May 1998, E. Rojas / L_S 401558 570460 # 0799". 1 ♂ in INBIO: ibid., except for: "Camino hacia el cerro, 560m / Jul 1998, E. Rojas, Tp. Mantillo, L_S 400742 570120 #51617". 1 ♂ in INBIO: "A.C.L.A.C. /Central Reserva Biol Hitoy Cerere, 160m / 22–29 Abr 1999, W. Arana, Manual (red, libre) / L_N 184120_643471 #53778". 1 ♀ in INBIO: ibid., except for: " Río Cerere 200m, G. Garballo Set 1990 / L_N 184200_643300

#350". 1 ♂ in INBIO: ibid., except for: "R. Cerere, M. Barrelier, Set 1990 / L_N 184200_643300". 1 ♂ in INBIO: ibid, except for: "Send. Espavel, 220m, 25–29 Abr 1999, W. Arana Intersección / L_S 401558 2_570460 #53781". 1 ♂ in INBIO: ibid., except for: "300m, 23–30 Jun 2000" / L_S 401500 2_570200 #57105". 1 ♀ in INBIO: iditto., except for: "Send. Espavel, 560 m, 17 May al 17 Jun 2000, W. Arana, Malaise" and: " #57107". 1 ♂ in INBIO: ibid. except for: "Send. Toma de Aqua, 140m, 17 Jul a 17 Ago 2000 / L_N 184600_643400 #56425".1 ♂ in INBIO: ibid., excepr for: "Send Toma de Agua, 100–140m, 27 May 2000 W. Arana, Manual (red, libre) / L_N_643400_184600 #58671". 1 ♂ in INBIO: ibid., except for: "Sendero Espavel, 300m, 17 Jun 2000, W. Arana, Malaise / L_N 184400_643300 #62662".

Description. Body (Figs 9, 11) large, of very variable size, but females usually larger, 12.8–15.2 (HT 13.6, AT 13.8) mm long, 4.00–4.80 (HT 4.20, AT 4.30) mm wide, dorsal surface of head, pronotum and elytra dark copper (darker in female) with reddish-cupreous lustre on sublateral areas and iridescent green to green-blue longitudinal narrow lateral area which is less distinct in female.

Head (Fig. 10) slightly narrower than body, 3.80–4.40 mm wide, all parts of head glabrous.

Frons shaped and coloured as in *O. nicaraguensis*, almost smooth except for finely asperate to vermicular rugulose posteromedian area passing to vertex over blunt vertex fold, and indistinctly edged lateral areas.

Vertex as in *O. nicaraguensis* with surface almost flat, metallic cupreous in middle, variably with iridescent greenish, bluish, reddish-cupreous or bronze sublateral areas; surface sculpture as in *O. nicaraguensis*, with rugae forming similar ornament in middle, the same striation on sublateral and juxtaorbital areas on posteromedian and occipital areas and fine, irregularly rugulose to asperate sculpture on occipital area.

Clypeus coloration and wrinkled surface, as in *O. nicaraguensis*.

Genae shiny, metallic black, usually with strong blue or violaceous lustre, smooth or with indistinct, very shallow striae on juxtaorbital-postgenal area.

Labrum 4-setose, with seven teeth in both sexes, shape sexually dimorphic, surface smooth, bicolored, metallic black with testaceous lateral areas that may be only narrow, sometimes with black coloration prevailing; male labrum (Figs 13–14) rather long, length 1.40–1.50 mm, width 1.75–1.80 mm, with small, acute or blunt basolateral teeth, acute or right-angled anterolateral teeth and rather short median lobe of three anterior teeth, of which the outer teeth are acute and the median tooth usually very small, or almost entirely effaced; female labrum (Figs 15–16) much longer, length 1.80–1.90 mm, width 1.90–2.05 mm, of similar shape, but with prominent, protruding subacute median tooth.

Mandibles (Fig. 10) shiny black except for narrow, ochre-testaceous, lateral stripe, subsymmetrical, lateral margins arcuate, each mandible with only three teeth (and basal molar), but left mandible sometimes with small rudiment of fourth tooth, or it is indicated by raised edge; third tooth in both mandibles smaller than the second.

Palpi (Fig. 10) shaped as in *O. nicaraguensis*, with elongate, moderately dilated terminal palpomeres; maxillary palpi with longest palpomere ochre to brownish-testaceous with usually black apex and darkened on its glabrous side, penultimate and terminal palpomeres metallic black, apex of black terminal palpomere in male variably constricted to triangular or obtuse, with bleached top stripe; labial palpi with penultimate (longest) palpomere rather narrow, only moderately dilated towards apex, which is up to

0.23 mm wide, ochre- to brownish-testaceous but in female sometimes black-darkened on its glabrous side. which may be partly or entirely black; terminal palpomere of the labial palpi rather short and narrow, metallic black.

Antennae shaped as in *O. nicaraguensis*, scape, pedicel and antennomeres 3–4 metallic black or black-blue with strong violaceous or purple lustre, apices of the antennomeres 3–4 often cobalt blue or shiny purple, or the antennomeres are entirely violaceous-blue with purple subapical macula; antennomeres 5–11 smoky black.

Thorax. Pronotum (Fig. 12) as long as wide or very slightly wider, length 2.40–2.80 mm, width 2.50–2.90 mm, glabrous, dark copper to more vividly cupreous in middle, sublateral areas usually with faint or more intense greenish and golden-bronze lustre; sulci well pronounced (anterior sulcus in middle shallow, almost merging with surface sculpture, posterior sulcus deeper); anterior lobe wider than the posterior and almost as wide as the pronotal disc (including dorsally visible outer margins of proepisterna), surface densely and irregularly vermicular-rugulose; disc mostly uniform in both sexes, dorsally moderately to more distinctly convex in middle, lateral margins of proepisterna moderately or more distinctly convex, usually moderately attenuated towards posterior sulcus; notopleural sutures thin, indistinctly visible from above; medial line distinct, partly merging with surface sculpture which consists of irregularly parallel-wavy to zigzag-wavy striae, mostly coarser and deeper on posterior discal area as they converge obliquely towards the median line; lateral areas covered with much thicker, elongate-transverse rugae running towards the notopleural sutures (not going past them); posterior lobe with distinct posterior rim, somewhat coarsely and irregularly sculptured with wavy to vermicular rugae except for nearly smooth, moderately raised and usually iridescent-green dorsolateral bulges; ventral and lateral sterna glabrous, shiny metallic black with variable metallic lustre and shaped as in *O. nicaraguensis*.

Elytra (Figs 17–18) elongate, length 8.00–9.60 mm, with rounded to somewhat subangular humeri, lateral margins subparallel, in female slightly more dilated in middle, anteapical angles arcuate, then running obliquely towards apices that are clearly or less markedly rounded towards the indistinct sutural spine (independent of sex); microserrulation indistinct and very irregular; elytral dorsal surface nearly even, slightly convex on posterior half of elytral disc, humeral impressions mostly shallow, but together with shallow or moderately deep discal impression clearly delimiting moderately raised basodiscal convexity; apical impressions moderate; elytral coloration usually almost uniform dark cupreous on elytral disc (as in *O. nicaraguensis*), but iridescent reddish-cupreous sublateral areas wider (particularly in males), and the iridescent-green to green-blue longitudinal lateral area is usually more extended; juxta-epipleural area black-blue or black-violaceous (obvious in lateral view); whole elytral surface rather densely punctate, punctures mostly isolated and of equal size, forming similar sculpture as in *O. nicaraguensis* (their shape depending on the angle of illumination); elytral surface glabrous except for the usual few, hair-like sensory setae scattered mostly on basal area and others adjacent to elytral epipleura; whitish elytral maculation generally more distinct than in *O. nicaraguensis*, consisting of mostly distinct, triangular to longitudinal-elongate lateral-median macula, and smaller, but always clear anteapical macula; humeral macula is always absent.

Abdomen. Ventrites metallic black with varying lustre and glabrous surface, with only hair-like sensory seta at posterior margins on each side of the ventrites.

Legs. Coxae metallic black-blue with greenish or bronze lustre, pro- and mesocoxae densely white-setose, metacoxae with one apical and one discal seta, their lateral margins fringed with dense setae; trochanters in male brownish-testaceous, metatrochanters dark brown or black, in female all trochanters often nearly black; femora as in *O. nicaraguensis* notably longitudinally bicolored with dorsal (anterior, when profemora are stretched forwards) longitudinal half of profemora and ventral (posterior) longitudinal half of meso-and metafemora metallic black with blue, greenish, purple, mahogany or violaceous lustre, while the opposite longitudinal area is brownish with purple lustre or reddish-testaceous; all tibiae and tarsi entirely metallic black, often with blue, purple or violaceous lustre; setal vesture of all leg segments as in *O. nicaraguensis*.

Aedeagus (Figs 19–25) large, length 4.50–4.60 mm, width 1.15–1.25 mm, notably voluminous in middle, apical portion conically attenuated towards thin and somewhat elongated apex with small sharpened hook (detail, Fig.21), provided that the apex of the aedeagus is perfectly settled in its horizontal position; structure of internal sac (Fig. 25) characteristic of the species-group, with large, reniform central-ventral piece with strongly chitinized lower appendage, long, thin arciform piece (which becomes less obvious after clearing procedure), and long, convoluted flagellum with moderately bulbous base and multicoiled flagelliform part protruding from the dorsoapical orifice.

Variability. Adults from Hitoy Cerere are notably smaller than those from the type locality.

Differential diagnosis. *Odontocheila angelsolisi* sp.nov. shares bicolored labrum and entirely metallic black coloration of all tibiae with *O. nicaraguensis*, but is principally distinguished from it by the apex of its aedeagus which is thinner, somewhat elongate and with a small hook. Females of this new species may be distinguished from *O. nicaraguensis* by their somewhat subacute elytral apices and from *O. chiriquina* by their metallic black tibiae; males are clearly differentiated by their aedeagi. The shape of the apex of the aedeagus distinguishes this new species from all other species with black metatibiae treated here, except for *O. mirekskrabali* sp.nov. which immediately differs in having testaceous labrum of uniform shape in both sexes.

Biology and distribution. Known only from the limited coastal hilly area in the Costa Rican province of Limon. The type locality in the Veragua Rain Forest Biological Reserve, altitude 440 m., is just south-west of Puerto Limon, while the Hitoy Cerere Biological Reserve in the Valle de la Estrella, a part of the Cordillera de Talamanca, lies some 60 km south of Puerto Limon. The adults in the type locality inhabit a path through primary forest, which is partly widened and with small, opened sandy places. The adults fly well, hunting small insects on the ground in the path. When disturbed, they fly up and land again on the ground at a distance of up to eight meters. Only very rarely do they fly up and disappear among the surrounding vegetation.

Etymology. Named after Costa Rican entomologist Ángel Solís, a member of the Instituto Nacional de Biodiversidad of Costa Rica, with our deep respect and thanks for his kind arrangement of collecting permits during our trip to Costa Rica.

Odontocheila molesta Nidek, 1957 (Figs 1–3, 49–61)

Odontochila molesta Nidek, 1957: 139, fig., 140.

Type locality. Panama: Barro Colorado Island, Canal Zone.

Odontocheila molesta: Wiesner 1992: 77.

Type material. Holotype ♂ in AMNH, labelled: "Barro Colo Isld. / Canal Zone / 1. 4. 1929" [printed] // "collector / C. H. Curran" [printed] // "Holotype ♂ / det C. v. Nidek / Odontochila / molesta m." [orange-reddish, printed/handwritten]. Paratypes. 1 ♂ in ZMAN: "paratype ♂ / det C. v. Nidek / Odontochila / molesta m" [ochre-orange, printed/handwritten] // "Barro Colorado C.Z. / Nov. 1930" [printed] // "F. / H. F. Schwarz" [printed] // "Odontochila / molesta / van Nidek, 1957 / ZMAN type 2425. 2" [red, printed]. 1 ♀ in ZMAN: "Barro Colo Isld. / Canal Zone / 1. 2. 1924" // "paratype ♀ / det C. v. Nidek / Odontochila / molesta m" [orange-reddish, printed/handwritten] // "Odontochila / molesta / van Nidek, 1957 / ZMAN type 2425. 1" [red, printed] // "collector / C. H. Curran" // [printed] // "ex coll. / C. v. Nidek [printed]. Allotype ♀ deposited in AMNH not examined.
Other material examined. 1 ♂ in SDEI: "Barro / Colorado / Island"// "Canal Zone / II.1930 / Huntington" // "Coll. W. Horn / DEI Eberswalde". 1 ♂ in SDEI: "Barro Colorado / Canal Zone / May 1929 / Darlington" // "Coll. W. Horn / DEI Eberswalde" [standing as "*O. nicaraguensis*"]. Recent data. 3 ♂♂, 1 ♀ in DBCN: "Panama – Colon / P.N. Soberania / Pipeline Rd. Km 9–12 / D. Brzoska 26-VI-2004". 1 ♂, 1 ♀ in CCJM (ex DBCN): ibid, except for: "26-V-1995". 3 ♂♂, 1 ♀ in DBCN: "Panama – Panama / Res Forest Cerro Jefe / D. Brzoska 25-V-1996". 7 ♂♂ in DBCN, 1 ♂ in CCJM (ex DBCN): "Panama: Panama / Cerro Jefe, 950m / 09°14.3′N, 79; 24.3′W / D. Brzoska 23-VI-2004". 38 ♂♂, 8 ♀♀ in DBCN, 5 ♂♂, 2 ♀♀ in CCJM (ex DBCN): "Panama – Panama / PN Altos de Campana / D. Brzoska 18-V-1995". 2 ♂♂ in DPDC: "Panama, Panama Prov. / "Cerro Campana / 14-VI-2004 D. Duran lgt.". 5 ♂♂, 1 ♀ in DBCN: ibid., except for: "14-VI-2004". 1 ♂, 1 ♀ in CCJM: "Panama, Panama Prov. / SE edge of Chagres NP / Cerro Jefe, 700–900m / lon. 79°21′W; lat. 9°15'N / VII.2002, Čížek & Hauck lgt.". 5 ♂♂, 3 ♀ in DPDC (later in STRI): "Panama, Panama Prov. / Cerro Azul – Cerro Jefe / 23-V-2004 leg. D. Duran". 1 ♂, 1 ♀ in DBCN: "Panama – Coclé / 7.2km NNE – El Copé / P.N. Omar Torrijos / D. Brzoska 20-V-1995".

Redescription. Body (Figs 1–3) large, of rather variable size, females mostly larger than males, 13.0–15.1 (HT 13.1) mm long, 3.90–4.80 (HT 4.10) mm wide, dorsal surface of head, pronotum and elytra variably dark copper, large sublateral areas of elytra, or almost the entire elytra, with reddish-cupreous lustre, sublateral areas on head and pronotum, and usually narrow greenish-blue longitudinal iridescence, on elytral lateral areas, sometimes more extended.

Head (Fig. 49) slightly narrower than body, 3.80–4.70 mm wide; frons, vertex, genae and clypeus shaped and with surface sculpture as in *O. nicaraguensis*, with the same pattern of striation on vertex; striae in some adults variably finer in middle, but their coloration is generally brighter, more vividly greenish-blue, particularly on sublateral areas of vertex.

Labrum 4-setose, with seven teeth in both sexes, shape sexually dimorphic (but sometimes less markedly than in *O. nicaraguensis*), surface smooth, entirely testaceous (only rarely with indistinct black patches); male labrum (Fig. 50) comparatively short, length 1.30–1.45 mm, width 1.70–1.95 mm, with rather distinct, mostly acute, basolateral teeth, acute or blunt anterolateral teeth, and short median lobe of three anterior teeth of which the median tooth is usually smaller, but wider, or almost entirely effaced (as in HT); female labrum (Fig. 51) of similar shape to that of male, but notably longer, length 1.70–1.80 mm, width 1.80–1.95 mm, median lobe with three acute anterior teeth, the median tooth usually notably longer (also in the paratypes).

Mandibles (Fig. 49) as in *O. nicaraguensis*, but teeth generally slightly narrower, and the black coloration may vary to brownish.

Palpi. Maxillary palpi of similar shape to those of *O. nicaraguensis* and preceding species, with elongate, moderately dilated terminal palpomeres but differently coloured: the longest palpomere ochre-testaceous; penultimate palpomere with basal half black-brown and apical half ochre or pale reddish-testaceous, but in some females darkened; terminal palpomere metallic black (with rounded apex and the usual bleached top stripe); labial palpi with penultimate (longest) palpomere rather narrow, only moderately dilated towards the apex, which is up to 0.24 mm wide, in male ochre-testaceous, in female often mahogany to mahogany-brown-darkened on its glabrous side; terminal palpomere of the labial palpi rather short and narrow, metallic black.

Antennae shaped as in *O. nicaraguensis*, but rather differently coloured: scape reddish-brown, usually with purple or mahogany lustre, pedicel bicolored, its basal half testaceous or reddish-testaceous, while its apical half is almost black; antennomeres 3–4 metallic blue, with strong violaceous or purple lustre, their apices often with testaceous or purple subapical macula or the whole apical area shiny purple, rarely with ochre tint; antennomeres 5–11 smoky black.

Thorax. Pronotum (Fig. 52) as long as wide or (mostly) very slightly wider, length 2.30–2.80 mm, width 2.40–2.80 mm, glabrous, sublateral areas usually with faint or more intense greenish and gold-bronze lustre; shape as in *O. nicaraguensis*, but dorsal surface of disc moderately to more distinctly convex in middle and lateral margins (including those of proepisterna) usually distinctly convex and only moderately attenuated towards posterior sulcus, rarely (independent of sex) subparallel; surface as in *O. nicaraguensis* and preceding species with almost the same pattern of sculpture consisting of irregularly parallel-wavy to zigzag-wavy striae, but the sculpture on sublateral areas is usually irregularly vermicular; lateral areas, as in other species, covered with much thicker, elongate-transverse rugae running towards the notopleural sutures (not going past them); posterior lobe with distinct posterior rim, more coarsely and irregularly sculptured with wavy to vermicular rugae; dorsolateral bulges moderate to more distinct, usually iridescent green; ventral and lateral sterna glabrous, shiny metallic black with various, mostly bluish, iridescence.

Elytra (Figs 53–54) elongate, length 8.00–9.20 mm, with rounded to subangular humeri (particularly in female), lateral margins in both sexes slightly dilated in middle; anteapical angles arcuate then running abruptly and obliquely, but in an almost straight line, towards apices which are thus markedly elongate-acute and usually slightly raised upwards, together with small but distinct sutural spine forming a beak-like horn; elytral dorsal surface slightly or more distinctly convex on posterior half of elytral disc, humeral impressions moderate to rather deep, together with moderately deep discal impression clearly delimiting moderately or more distinctly raised basodiscal convexity; subapical impressions moderate, but apical impression distinct, forming the upward elevation of the apex; elytral coloration as in *O. nicaraguensis*, but generally more vividly coloured, sometimes with prevailing reddish-cupreous lustre passing to chatoyant golden-bronze iridescence on sublateral areas, and with wider iridescent green or green-blue

longitudinal lateral areas; juxtaepipleural area, as in other species, black-blue or black-violaceous (obvious only in lateral view); whole elytral surface punctate, punctures mostly isolated on basal area, but also anastomosing and of very unequal size, particularly largest and commonly anastomosing punctures with uneven intervals are on anterior-sublateral areas and within humeral and basodiscal impressions, while punctures along sutures are much smaller and irregularly anastomosing; punctures on posterior elytral half towards apices again become irregularly anastomosing, of inconsistent shape of very irregular intervals (but their shape is optically changeable depending on angle of illumination); elytral surface glabrous except for the usual few, hair-like sensory setae (as in other species of the genus); whitish elytral maculation more distinct than in *O. nicaraguensis*, more similar to that in *O. angelsolisi* sp.nov. and *O. mirekskrabali* sp.nov., consisting of mostly distinct, triangular to longitudinal-elongate lateral-median macula, and elongate anteapical macula; humeral macula always absent.

Legs. Coxae and trochanters as in *O. nicaraguensis*, but pro- and mesotrochanters generally dark-brown-darkened on their apices, metatrochanters black-brown or black; femora as in *O. nicaraguensis* notably longitudinally bicolored, but the mahogany-testaceous longitudinal area is wider; all tibiae black with ochre to mahogany-testaceous basal half; tarsi entirely metallic black, often with blue, purple, mahogany or violaceous lustre; setal vesture of all leg segments as in *O. nicaraguensis* and preceding species.

Abdomen. Ventrites metallic black, mostly with violaceous-blue, greenish or golden-bronze lustre and with glabrous surface (with only long, hair-like sensory seta at posterior margins on each side of the ventrites); the last and/or first visible ventrite is very indistinctly pale brownish in a few adults.

Aedeagus (Figs 55–61) large and very long, length 4.95–5.10 mm, width 1.00–1.20 mm, moderately voluminous in middle, apical portion narrowed and conically attenuated towards shortly, but distinctly arcuate-hooked apex (detail, Fig.60); structure of internal sac (Fig. 61) characteristic of the species-group, with large, reniform ventral piece with strongly-chitinized thin lower appendage, long, thin arciform piece, and convoluted flagellum with moderately bulbous base and long, multicoiled flagelliform part protruding from dorsoapical orifice.

Variability. In addition to the variability included in the redescription above, several males independent of the locality have brownish mandibles, as well as paler antennal scape. Adults from the area of the Soberania are mostly more vividly coloured, elytra with prevailing reddish-cupreous lustre passing to chatoyant gold-bronze iridescence on sublateral areas, and the iridescent green longitudinal lateral areas are also more distinct. Females from Altos de Campana and Omar Torrijos have a somewhat shorter (but always protruding) median tooth of the labrum, darker penultimate palpomere of maxillary palpi, and somewhat less distinctly elongate-acute elytral apex; the lateral margins of the pronotum are variably either distinctly convex, or subparallel. The shape of the apex of the aedeagus proved to be consistent in all specimens examined (provided that the apex of the aedeagus is perfectly settled in a horizontal position).

Differential diagnosis. *Odontochila molesta* is immediately distinguished from all species of this species-group by its acute to elongate-acute elytral apices (in both sexes),

which are slightly or more distinctly upwards-raised, and principally by the shortly, but distinctly arcuate-hooked apex of the aedeagus. In addition, the penultimate palpomere of maxillary palpus in male is partly testaceous.

Biology and distribution. Known from Panama only**.** The type specimens and most others of the records that we have available, from Barro Colorado Island and the Cerro Jefé, Soberania Colon and Altos de Campana national parks, are from the province of Panamá on both sides of the Canal. Only two specimens come from the area of the Omar Torrijos National Park near Copé in the province of Coclé, quite a long way from the type locality. Like most species of larger *Odontocheila*, adults of *O. molesta* are found along trails and in open areas in the forest.

Remarks. The holotype (AMNH) male (Fig. 1) has its abdomen and aedeagus extracted and separately mounted on papered board. Also the female allotype is in a rather bad shape (see photo by WERNER (1993, fig. 25), but all its characters correspond with the female paratype (ZMAN). The illustration of the aedeagus in line drawing by NIDEK (1957) is rather skewed, inappropriately narrow as evidently drawn when turned to its sublateral position.

Odontocheila mirekskrabali **sp.nov.** (Figs 4–5, 37–48)

Type locality. Panama: Comarca de Guna Yala (formerly San Blas), Nusagandi, 350 m.a.s.l.

Type material. Holotype ♂ in USNM, labelled: "Panama– San Blas / Nusagandi Reserve 350m / D. Brzoska, 16-V-1995" [printed]. Allotype ♀ in NHMK with same label data. Paratypes. 5 ♂♂, 1 ♀ in CCJM, 3 ♂♂, 5 ♀♀ in DBCN, 1 ♂ in NHMK, 1 ♂, 1 ♀ in CMNH, 1 ♂, 1 ♀ FSCA with same label data. 3 ♂♂ in DBCN: ditto, except for: "17-V-1995". 1 ♂ in CCJM: "Panama 78°58'W; 9°18'N / 10km N El Llano / Serrania de San Blas / 200–400m, 18–20.VI.2002 / Čížek & Hauck lgt." [printed]. 1 ♂ in CMNH: "Panama: Pan. Prov. / Altos de Majé / D.S.Chandler UV lt / X-6/15-1975" [printed]. 1 ♂ in CMNH: ibid., except for "D.S.Chandler / beating". 1 ♀ in RLHC: "Panama / Cerro Campana / 6-VI-1974 / McManaway". 1 ♀ in RLHC: "Panama, Canal Zone / Limbo Hunt Club / 20-V-1977 / L.R. Davis, Jr.". 1 ♀ in RLHC: "Panama: C.A. / Cerro Azul / 13-V-1985 / A.J. Gilbert". All type specimens labelled: "Holotype (Allotype or Paratype respectively) / Odontocheila / mirekskrabali sp.nov. / det. Moravec & Brzoska 2015" [red, printed].

Description. Body (Figs 4–5) large to very large, of variable size, females usually larger, 13.7–16.0 (HT 14.3, AT 15.0) mm long, 4.30–5.00 (HT 4.40, AT 4.50) mm wide, dorsal surface of head, pronotum and elytra dark copper with faint or more vividly reddish-cupreous lustre on sublateral areas or also on apices, and iridescent green to green-blue, usually very narrow longitudinal lateral area.

Head (Fig. 37) slightly narrower than body, 3.80–4.70 mm wide, all parts of head glabrous.

Frons shaped and coloured as in *O. nicaraguensis* and other species treated here, almost smooth except for finely asperate to vermicular-rugulose posteromedian area passing to vertex over the vertex fold, which is blunt in middle and indistinctly edged laterally.

Vertex as in *O. nicaraguensis* and other preceding species, almost flat, metallic-cupreous in middle, variably with iridescent greenish, bluish, reddish-cupreous or bronze sublateral areas; surface sculpture as in *O. nicaraguensis*, vermicular-rugulose on narrow

anterior area and with rugae forming arcuate ornamentation in middle, and with the same pattern of parallel striation on sublateral and juxtaorbital areas; large posterior and occipital areas with much finer sculpture, extremely finely vermicular-rugulose to irregularly asperate.

Clypeus reddish-cupreous with faint or more extended greenish lustre and rather distinctly wrinkled surface.

Genae shiny metallic black, usually with strong blue or violaceous lustre, smooth or with indistinct, very shallow striae on juxtaorbital-postgenal area.

Labrum 4-setose, with seven teeth, of almost the same shape in both sexes, surface smooth, entirely testaceous (only rarely with indistinct blackened patches); male labrum (Fig. 38) rather long, length 1.45–1.60 mm, width 1.75–1.80 mm, with rather distinct, mostly acute basolateral teeth, acute or subacute anterolateral teeth and prominent median lobe of three anterior teeth, of which the median tooth is usually smaller but mostly wider and always distinct; female labrum (Fig. 39) of a similar shape and length/width ratio, 1.70–1.85 mm long, 2.00–2.15 mm wide, median lobe with three acute anterior teeth which may be of the same size. or the median tooth is slightly longer.

Mandibles (Fig. 37) shiny black-brown except for rather distinct ochre-testaceous, narrow lateral area, subsymmetrical, lateral margins arcuate, each mandible with only three teeth (and basal molar), but left mandible often with a rudiment of fourth tooth; third tooth in both mandibles smaller than the second.

Palpi (Fig. 37) shaped as in *O. nicaraguensis*, with only moderately dilated terminal palpomeres; maxillary palpi with longest palpomere ochre to brownish-testaceous, penultimate and terminal palpomeres metallic black, or with mahogany tint; apex of black terminal palpomere blunt or rounded with bleached top stripe; labial palpi with penultimate (longest) palpomere narrow, only moderately dilated towards apex, which is up to 0.28 mm wide, ochre to brownish-testaceous in male, in female often mahogany brown darkened on its glabrous side; terminal palpomere of labial palpi rather short and narrow, metallic black.

Antennae in male reaching elytral half, in female shorter; scape much paler than in *O. nicaraguensis* and preceding species, metallic reddish-mahogany with paler ventral area, pedicel predominantly ochre-testaceous; antennomeres 3–4 metallic black-blue, with testaceous subapical spot and mahogany-to-purple apical area; antennomeres 5–11 smoky black.

Thorax. Pronotum (Fig. 40) as long as wide or very slightly longer or wider, length 2.50–3.00 mm, width 2.60–2.90 mm; shape as in *O. nicaraguensis* with moderately convex lateral margins of disc, but uniformly so in both sexes, dark copper in middle, sublateral areas usually with faint or more intense greenish and golden-bronze lustre; surface as in *O. nicaraguensis* with the same densely and vermicular-rugulose sculpture on the anterior lobe and the sculpture on discal surface consisting of irregularly parallel, wavy to zigzag-wavy striae, but the striae are generally more irregular and become intertwined, particularly on sublateral areas; posterior lobe with distinct posterior rim, coarsely and irregularly sculptured with wavy to vermicular rugae; dorsolateral bulges moderately to distinctly raised, almost smooth or with finer rugae; ventral and lateral

sterna glabrous, shiny metallic black with varying metallic lustre, shaped as in *O. nicaraguensis* and preceding species.

Elytra (Figs 41–42) elongate, length 8.70–9.90 mm, with rounded to somewhat subangular humeri (particularly in female), lateral margins almost parallel in male, in female slightly more dilated in middle, anteapical angles arcuate, then running obliquely towards apices which are towards the indistinct sutural spine indistinctly rounded; microserrulation very indistinct and irregular; elytral dorsal surface slightly or more distinctly convex on posterior half of elytral disc, humeral impressions moderate to more distinct, together with moderately deep discal impression clearly delimiting moderately or more distinctly raised basodiscal convexity; subapical and apical impressions moderate to distinct; elytral coloration dark cupreous on elytral disc (as in *O. nicaraguensis*), with iridescent reddish-cupreous sublateral areas of various extent, as well as iridescent green to green-blue longitudinal lateral areas which are either intense or very narrow and indistinct, independent of sex (sometimes barely visible in dorsal view); juxta-epipleural area black-blue or black-violaceous (obvious only in lateral view); whole elytral surface punctate, punctation similar to that in *O. molesta*: punctures mostly isolated on basal area, but also of unequal size, particularly the largest of them within basodiscal impressions, but also the far smaller punctures along the sutures; punctures on posterior elytral half towards apices often becoming irregularly anastomosing, of inconsistent shape with irregular intervals (appearance of their shape depending on angle of illumination); elytral surface glabrous except for the usual few, hair-like sensory setae (as in other species of the genus); whitish elytral maculation generally more distinct than in *O. nicaraguensis*, more similar to that in *O. angelsolisi* and *O. molesta*, consisting of mostly distinct, triangular to longitudinal-elongate lateral-median macula, and smaller, but always distinct anteapical macula; humeral macula always absent.

Abdomen. Ventrites metallic black, mostly with violaceous-blue lustre and with glabrous surface (except for hair-like sensory seta at posterior margins on each side of the ventrites).

Legs. Coxae metallic black-blue with greenish or bronze lustre, pro- and mesocoxae densely white-setose, metacoxae with only one apical and one discal seta, their lateral margin fringed with dense setae; pro- and mesotrochanters brownish-testaceous, metatrochanters black-brown or black; femora notably bicolored with whole dorsal (anterior if the femora are stretched forwards) longitudinal half of profemora, and whole ventral (posterior) longitudinal area of meso-and metafemora, metallic black with blue or violaceous lustre while the opposite longitudinal area is mahogany-testaceous; all tibiae black with mahogany-testaceous basal third to half; tarsi entirely metallic black, often with blue, purple or violaceous lustre; setal vesture of all leg segments as in *O. nicaraguensis* and preceding species.

Aedeagus (Figs 43–48) large, length 4.55–4.70 mm, width 1.15–1.20 mm, moderately voluminous in middle, apical portion conically attenuated towards thin an somewhat elongated apex (similar to that in *O. angelsolisi* sp.nov.) with small sharpened hook (detail, Fig.48), provided that the apex of the aedeagus is perfectly settled in its

horizontal position; structure of internal sac (Fig. 47) characteristic of the species-group, with large, reniform central-ventral piece with strongly chitinized, thin lower appendage, long, thin arciform piece (which becomes less obvious after clearing procedure), and convoluted flagellum with moderately bulbous base and long multicoiled flagelliform part protruding from the dorsoapical orifice.

Differential diagnosis. *Odontocheila mirekskrabali* sp.nov. has a very similar aedeagus apex to that of *O. angelsolisi* sp.nov., but immediately differs from it in its entirely testaceous labrum, almost uniformly shaped in both sexes (median tooth of female labrum only slightly longer than in male), basal third to half of tibiae ochre-testaceous, antennae with scape much paler and pedicel almost testaceous. In addition, the whitish anteapical macula is always present and more distinct. The shape of the labrum and its smooth surface, as well as the shape of the aedeagus, also differentiate this new species from *O. excisipenis*. *O. molesta* differs immediately in its elongate-acute elytral apices in both sexes, as well as in its arcuate-hooked aedeagus. Although the body size is rather variable, *O. mirekskrabali* sp.nov. has a much larger body than all these species.

Biology and distribution. Known from Panama only. The type locality of *O. mirekskrabali* sp.nov. is near the Nusagandi Indian Reserve in the region of San Blas (Kuna Yala), Chepo District, Province of Comarca de San Blas. The holotype, allotype and most other paratypes were taken along forest trails at Nusagandi Nature Lodge, run by the local indigenous people. One paratype (CCJM) labelled El Llano, Serrania de San Blas comes in fact from the same mountainous area. The two paratypes (CMNH) labelled "Altos de Majé" (Serrania de Maje) come from a lower altitude of an area of the river and lake Lago Bayano, caught there before the dam was built on the river (D. Chandler, pers. com.). Nevertheless, the locality is a part of the El Llano area of the province of Panamá. However, there are few roads or access points into these areas and determining the exact range will be difficult. Adults of this new species were found along forest trails.

Etymology. Dedicated to Czech entomologist Ing. Miroslav Škrabal (Nový Hrozenkov, Czech Republic), for his generous support, especially for the publication of books by the first author.

Odontocheila oseryi (Lucas, 1857) stat. restit. (Figs 78–99)

Cicindela oseryi Lucas, 1857: 36.

Type locality. Peru: Mission de Sarayacu on the Ucayali (= Oucayale) River (6°47′S, 75°07′W).

Odontocheila Oseryi: Bates 1869: 289.
Odontochila Oseryi: Fleutiaux 1892: 121.
Odontochila cayennensis Oseryi: Horn 1896: 356.
Odontochila cayennensis oseryi: Rivalier 1969: 198, 200.
Odontocheila cayennensis oseryi: Wiesner 1992: 77.

Type material. Lectotype (designated here) ♂ in MNHN, labelled: "10 / 47" [rounded, handwritten, on its dorsal side plain-green] // Cicindela / ozeryi, Lucas [handwritten, with "z" instead of "s"] // "Muséum Paris / Amerique du Sud / De Castelnau 1847" [greenish with black border, handwritten] // "Type " [red, printed] // "Lectotype / Cicindela / oseryi Lucas, 1857 / design. Jiří Moravec 2012" [red, printed]. Paralectotypes. 1 ♀ in

MNHN with same labels as lectotype. 2 ♂♂ in MNHN with same first three labels. The paralectotypes are labelled: "Revision Jiří Moravec 2012: / "Paralectotype / Cicindela / oseryi Lucas" [red, printed].

Other material examined. Historical data. 12 ♂♂, 2 ♀♀ in MNHN: "Muséum Paris / Pérou / Pampas del Sacramento / De Castelnau 1847 // "10 / 47" [only two spms.). 1 ♀ in MNHN: "oseryi Lucas in Casteln. p. 36 / Figura erronea" // ex Museo / H.W. Bates / 1862". 1 ♂, 1 ♀ in MFNB: "3617" // "Columbia / Karsten" // "Hist. Coll. (Coleoptera) / Nr. 3617 / Odontocheila bipunctata Fabr. [sic!] / Columbia Karsten / Zool. Mus. Berlin". Other data. 1 ♂, 1 ♀ in MNHN, 1 ♂ in SDEI, 1 ♂ in IRSNB: "Pebas / Amazon". 1 ♂, 1 ♀ in SDEI: "Amazon". 1 ♂ in SDEI, 1 ♀ in BMNH: "Peru". 1 ♀ in SDEI: "Pará / Itaituba". 4 ♂♂, 3 ♀♀ in SDEI: "Itaituba / Tapajoz". 86 specimens [standing as "*O. c. femoralis*"] in IRSNB: "Itaituba / Rio Tapajoz" // "Amazonas". 2 ♂♂, 1 ♀ in SDEI: "Est de Pará / Itaituba / (Tapajoz)". 1 ♀ in SDEI: "21 ♂♂, 12 ♀♀ in MNHN: "Pérou / Pebas /De Mathan 1907". 1 ♀ in MFNB: "Peru / Pebas". 2 ♂♂ in MFNB: "Amazones / Pebas". 1 ♀ in MFNB: "Amazonas". 1 ♀ in NHMW: "Manaos / Amazonas". 3 ♂♂, 3 ♀♀ in MNHN: "S. E. Columbia / Florida / Putumayo sup. / G. Klug 1931". 1 ♂ in BMNH, 2 ♂♂, 2 ♀♀ in NMPC: "Brasilia". 1 ♂ in BMNH: "Matto Grosso". 1 ♂ in BMNH: "Odont. / oseryi Lucas" [no locality]. 1 ♂ in BMNH: "Amaz[on]" // "Od. ochreata Rch. / t Horn" [sic!] // "Od. bipunctata / st. Fab." [sic!]. 1 ♀ in CMNH: "Peru: Loreto, Napa R. / 3°14′S, 72°38′W / X-1-1981" // S.J. Rockey & / C.P. Withrow Coll.". 2 ♂♂, 1 ♀ in CMNH: "Leticia, Amazonas / Colombia / 23.II.–2.III.1974 / J.D. Glaser". 1 ♀ in CMNH: "Colombia, / Amazonas: Leticia, / SE corner of Dept. / Amazonas, 200m. / IV-10-1967". Recent data. 1 ♂, 1 ♀ in CCJM: "Colombia: Leticia / Rio Amazonas / 30.X.1995, leg. Mráček". 1 ♂ in BMNH: "Peru Amazon, Iquitos / XII.1997 lowland forest / Rio Napo – Rio Sucusari / 1°96′46″S:73°15′49″W / Coll MVL. Barclay BMNH {E} 2003-49". 40 ♂♂, 13 ♀♀ in DBCN: "Peru – Loreto / Exploronapo Camp / Aceer, Rio Sucusari / D. Brzoska 17-19-IV-1995". 16 ♂♂, 1 ♀ in DBCN: with same data except for: "03°15.50′S, 72°55.06′W / D. Brzoska 3-4-I-1997". 1 ♀ in CMKP: "Peru: Loreto / Pevas, Rio Amazonas / 1-30-VIII-2011 / J. R. Ramirez leg."

Redescription. Body (Figs 78–79) very large, 15.0–17.0 (LT 15.6) mm long, 4.50–5.20 (LT 4.90) mm wide, almost black (faded to brown in old specimens), matt or diffusely shiny, or black-copper; sublateral areas of pronotum and elytra faintly or more vividly iridescent cupreous passing to iridescent greenish or green-blue on lateral margins (very faint on elytra of some females).

Head (Fig. 80) slightly narrower than body, 4.20–4.90 mm wide, all parts of head glabrous.

Mandibles (Fig. 80) rather short but robust, subsymmetrical, each mandible with three prominent teeth (and basal molar), but left mandible with also small rudiment of a fourth tooth, while the right mandible has only three teeth and very indistinct, barely visible rudiment of fourth tooth just at the base of the third tooth; coloration of both mandibles shiny black, basolateral portion in lateral view with strong metallic violaceous-blue lustre and with whitish to testaceous narrow dorsal stripe, also clear in dorsal view.

Palpi (Figs 80–81). Maxillary palpi with normally shaped, only moderately dilated terminal palpomeres, longest palpomere of maxillary palpus brownish-testaceous, often with margins and ventral surface black, both penultimate and terminal palpomeres metallic black; labial palpi entirely black, their penultimate (longest) palpomeres elongate-cylindrical, only slightly dilated towards apex, which is up to 0.30 mm wide.

Labrum 4-setose, with seven teeth, sexually dimorphic, surface almost smooth, bicolored; male labrum (Figs 83–84) comparatively long, length 1.50–1.60 mm, width 1.90–2.00 mm, with distinct, mostly acute basolateral teeth, acute or subacute anterolateral teeth and prominent median lobe of three acute anterior teeth, of which the median tooth is usually smaller but rather distinct; female labrum (Fig. 85) much longer,

3.30–2.50 mm long, 2.00–2.35 mm wide, median lobe with three acute anterior teeth, of which the median tooth is much longer and wider.

Antennae rather long, in male reaching elytral half, in female only elytral third; scape with one apical seta, together with pedicel shiny metallic black, often with violaceous or cobalt-blue lustre (faded to black-brown in older specimens), sometimes with reddish tint; antennomeres 3–4 black, usually with strong metallic green or cobalt-blue lustre, mostly on their apices; antennomeres 5–11 smoky black, or dark brown (in old specimens).

Thorax. Pronotum (Fig. 82) glabrous, usually slightly longer than wide, 2.80–3.30 mm long, 2.60–3.10 mm wide, metallic black-copper in middle, sublateral areas more vividly cupreous, often with strong green or greenish-blue lustre, juxta-notopleural areas with cobalt-blue to violaceous lustre; sulci well pronounced (anterior sulcus deep only laterally, posterior sulcus deeper); anterior lobe wider than the posterior, of the same width as the disc (including dorsally visible proepisternal margins), or slightly wider, its anterior margin in middle often prolonged forwards, densely and irregularly vermicular-rugulose; disc dorsally moderately convex in middle, lateral margins of proepisterna variably subparallel or moderately convex, only slightly attenuated towards posterior sulcus; notopleural sutures barely visible from above; medial line mostly indistinct, in anterior area often almost merging with discal surface sculpture; this discal surface sculpture is fine and dense on the median area, consisting of short, irregularly vermicular rugae, which are coarser on sublateral areas, irregularly wavy, subparallel zigzag-wavy on posterior area, very irregularly and often indistinctly converging towards the median line; rugae on lateral areas become thicker and elongate-transverse, but become very shallow on limited juxta-notopleural areas; posterior lobe with distinct posterior rim, coarsely and irregularly wavy to vermicular-rugulose except for distinct, nearly smooth, usually shiny, green dorsolateral bulges; lateral and ventral thoracic sterna entirely glabrous, shiny metallic black; metepisterna with the usual impression at metepimeron; female mesepisternal coupling sulci negligible (female mesepisterna not markedly differentiated from those in male).

Elytra (Figs 87–89) elongate, length 9.20–10.3 mm, with well-pronounced, rounded to subangular humeri, lateral margins subparallel, faintly dilated in middle, somewhat more distinctly in female; anteapical angles widely arcuate, then running obliquely towards apices which are in both sexes rounded towards indistinct sutural spine, more distinctly so in female; microserrulation extremely fine and irregular, barely visible, usually partly effaced; elytral dorsal surface moderately and almost evenly convex on elytral disc, humeral impressions shallow but together with shallow discal impression clearly delimiting moderate basodiscal convexity; apical impressions shallow but mostly distinct; elytral coloration almost black or black-copper with faint, diffuse cupreous iridescence, sublateral areas mostly indistinctly or more vividly ridescent reddish-cupreous, on lateral margins iridescent green or green-blue (in female mostly very faint); juxta-epipleural area (in lateral view) shiny black-violaceous or violaceous-blue; whole elytral surface rather coarsely punctate, often with very large punctures on anterior half of elytral disc, mostly isolated but often anastomosing in chains on basodiscal convexity, the largest punctures within discal impression often with irregular intervals and

irregularly anastomosing; punctures become smaller and commonly anastomosing on posterior declivity and still finer on apical areas; their shape, with sharp intervals, appears to form asperate sculpture, but the appearance depends on angle of illumination; elytral surface glabrous except for a few, long, often indistinct, and easily abraded hair-like sensory setae scattered mostly on basal area and others adjacent to epipleura; whitish elytral maculation very indistinct, consisting of only one, usually very small lateral-median macula, which is sometimes barely visible, or the spot is present on one elytron only, very rarely the elytra are entirely immaculate (Figs 79, 88); anteapical and humeral spot always absent, humeral area in frontal view appears shiny cupreous or green.

Abdomen. Ventrites shiny black except for apical pleurite in male which is often brownish-testaceous, surface of the ventrites glabrous, except for the usual (easily abraded) hair-like sensory setae at their posterior margins.

Legs. Coxae metallic black with strong green, bronze and blue lustre, pro- and mesocoxae sometimes with brown ventral area, rather densely setose, metacoxae with one central sensory seta and setose lateral margin; trochanters glabrous (except for the usual, easily abraded apical seta on pro- and mesotrochanters); pro-and mesotrochanters often black-brown; femora metallic black, laterally with more or less intense blue, greenish, or violaceous lustre, basal area usually mahogany-testaceous, profemora rather densely covered with rows of white, mostly erect setae, moderately long and sparser on mesofemora and much sparser on metafemora; protibiae metallic black with more or less extended mahogany-testaceous basal area, covered with scattered, stiff, whitish to rusty brown setae, apical half ventrally covered with dense pad of rusty brown setae; mesotibiae with testaceous area usually more extended on tibial basal third, more densely covered with ochre to rusty brown setae and with dense pad of rusty brownish setae on apical half; metatibiae (Figs 90, 94) always yellow-to-ochre-testaceous, with sparse, short, stiff to thorn-like rusty brown setae; pro- and mesotarsi black with strong metallic blue, greenish and violaceous lustre, metatarsi either entirely metallic black, or the first tarsomere yellow-testaceous, the second brownish-testaceous, and last three tarsomeres metallic black (very exceptionally only two last tarsomeres are black); claws black-brown.

Aedeagus (Figs 95–99) long and robust, but short in comparison to length of the body, shape similar to all species of the *O. cajennensis* species-group, length 4.90–5.10 mm, width 1.40–1.50 mm, basal portion short, median portion notably voluminous, apical portion conically attenuated towards small, narrow, blunt and dorsally emarginate to indistinctly excised apex; small convex protrusion of apical orifice with penetrating flagellum; structure of internal sac (Fig. 98) with large, reniform central-ventral piece with strongly chitinized, thin lower appendage, long, thin arciform piece, and long, convoluted flagellum with moderately bulbous base and multicoiled flagelliform part protruding from the dorsoapical orifice.

Variability. As pointed out in the redescription, the very small lateral-median macula is absent in some adults. The remarkable variability in the coloration of the metatarsi appears in the "Redescription" and "Differential diagnosis" and is illustrated in Figs 90–94).

Differential diagnosis. The yellow-testaceous coloration of the metatibiae immediately differentiates *O. oseryi* from all other species of this species-group treated in this paper. It shares yellow-testaceous metatibiae with *O. cajennensis* and all its "subspecies", but differs from them by its partly or entirely metallic black metatarsi. Most of the adults of *O. oseryi* from Peru have entirely metallic black metatarsi, but others, including the lectotype (Fig. 90) and most adults from Leticia in Colombia and Itaituba in Brazil have the metatarsi gradually darkened also in syntopic adults: first tarsomere yellow-testaceous, second brownish-testaceous, and only the last three tarsomeres metallic black. Such variability (demonstrated in Figs 90–94) may give rise to difficulties in identification, because a number of adults of the taxa which form the "*O. cajennensis* complex", including a number of adults of *O. cajennensis* from the type locality Cayenne, also have their metatarsi with the last one or two tarsomeres blackened. As one of the syntopic males (USNM) of *O. oseryi* from Leticia has its metatarsi ochre-testaceous, except for the only last two tarsomeres blackened (Fig.91), such specimens are difficult to distinguish from *O. cajennensis*. Notwithstanding, the elytral sculpture, consisting of much larger punctures (Fig. 86) particularly within the basodiscal impression, and the entirely black metatarsi, or at least their last three tarsomeres black, as well as the rudiment of fourth tooth also in right mandible, differentiate *O. oseryi* from all other taxa of the "*O. cajennensis* complex" (of which a number of taxa have, in addition, all tibiae and/or femora and/or abdomen testaceous).

Biology and distribution. The type locality of *O. oseryi*, mentioned in the original description by Lucas (1857) as "Mission Sarayacu", is a Franciscan mission in the department of Loreto, north-eastern Peru (6°47′S, 75°07′W). It is situated on the river Ucayali (= Oucayale), one of the Amazon tributaries. The historical specimens (MNHN) labelled "Pérou / Pampas del Sacramento" come from the area of the type locality. The specimens labelled "Pebas / Amazon" also come from the same Upper Amazon rainforest in the Peruvian province of Loreto. In Peruvian Amazonia, this species also occurs in Iquitos. A number of the specimens examined come from Leticia in the Colombian Department of Amazonas lying in the border of the Brazilian state of Amazonas, and from nearby Tabatinga on the Brazilian side it was reported by Horn (1910). It penetrates throughout the Amazon Basin to Brazil as well. According to specimens in collections, *O. oseryi* was obviously common in the area of Itaituba on the River Tapájos (written on the labels as "Tapajoz"), one of the major tributaries of the Amazon River in the Brazilian state of Pará. Only one of the specimens examined comes from the area of Manaus. A large number of adults were caught by the second author in the area of the Exploronapo Camp, Aceer on Rio Sucusari in the Peruvian province of Loreto.

Horn (1910) reported *O. oseryi* from Ecuador as well (as a subspecies of *O. cajennensis*). Although no Ecuadorian specimen was found in collections, occurrence in Ecuadorian Amazonia is quite possible.

Remarks. *Odontocheila oseryi* stat. restit., hitherto commonly treated as a subspecies of *O. cajennensis*, was included to this paper partly in order to demonstrate the great variability of at least one taxon of the "*O. cajennensis* complex".

Horn (1910), also cited by Wiesner (1992), argued that the figure by Lucas (1857, pl. 1a, fig. 7) for *Cicindela oseryi* Lucas, 1857, actually shows "*O. cajennensis cajennensis*", not the true "subspecies" *oseryi*. This appears from the illustrated testaceous metatarsi, which do not correspond with the original description by Lucas (1857) and with the present concept of this taxon. Nevertheless, this matter is not entirely clear, because the male lectotype (MNHN) which was probably used for the figure by the painter of the aquarelle, has the metatarsi partly testaceous, only its three last tarsomeres are metallic black (Fig. 90). This coloration was overlooked by Rivalier (1969), because the type specimen (pinned) had an immediately obvious the black mesotarsus, protruding backwards and downwards, while the partly testaceous metatarsus was almost entirely hidden under the body; thus the black mesotarsus was evidently considered by Rivalier to be the metatarsus. As mentioned in "Differential diagnosis" above, the coloration of the metatarsi in *O. oseryi* is very variable, also in syntopic adults, as Figs 90–94 demonstrate.

The spelling of the species-name in the original description and in the reference for illustrations by Lucas (1857: 36) is "*oseryi*", while on the original handwritten label of the lectotype and in the caption under fig. 7 of the paper by Lucas, the epithet is written as "*ozeryi*".

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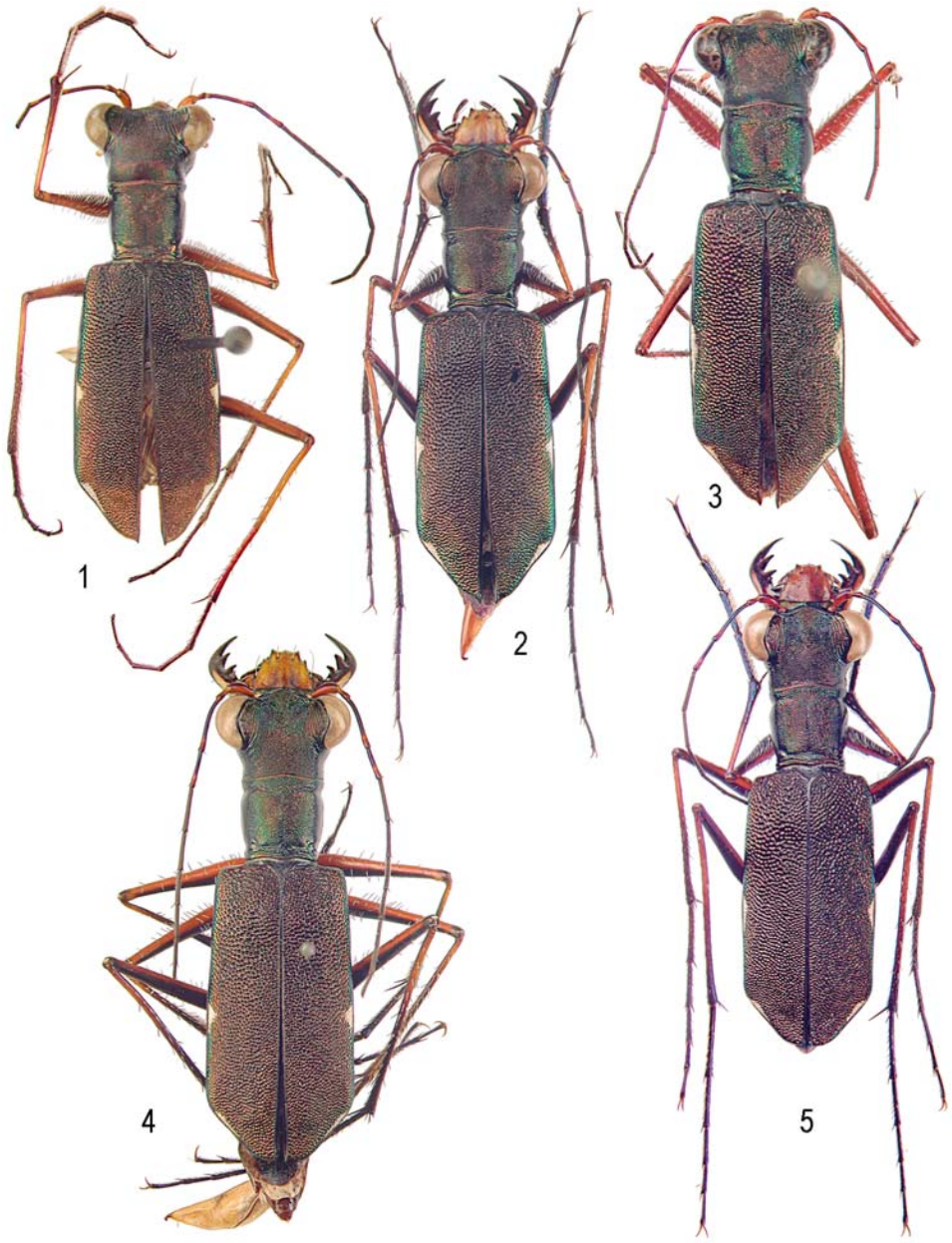
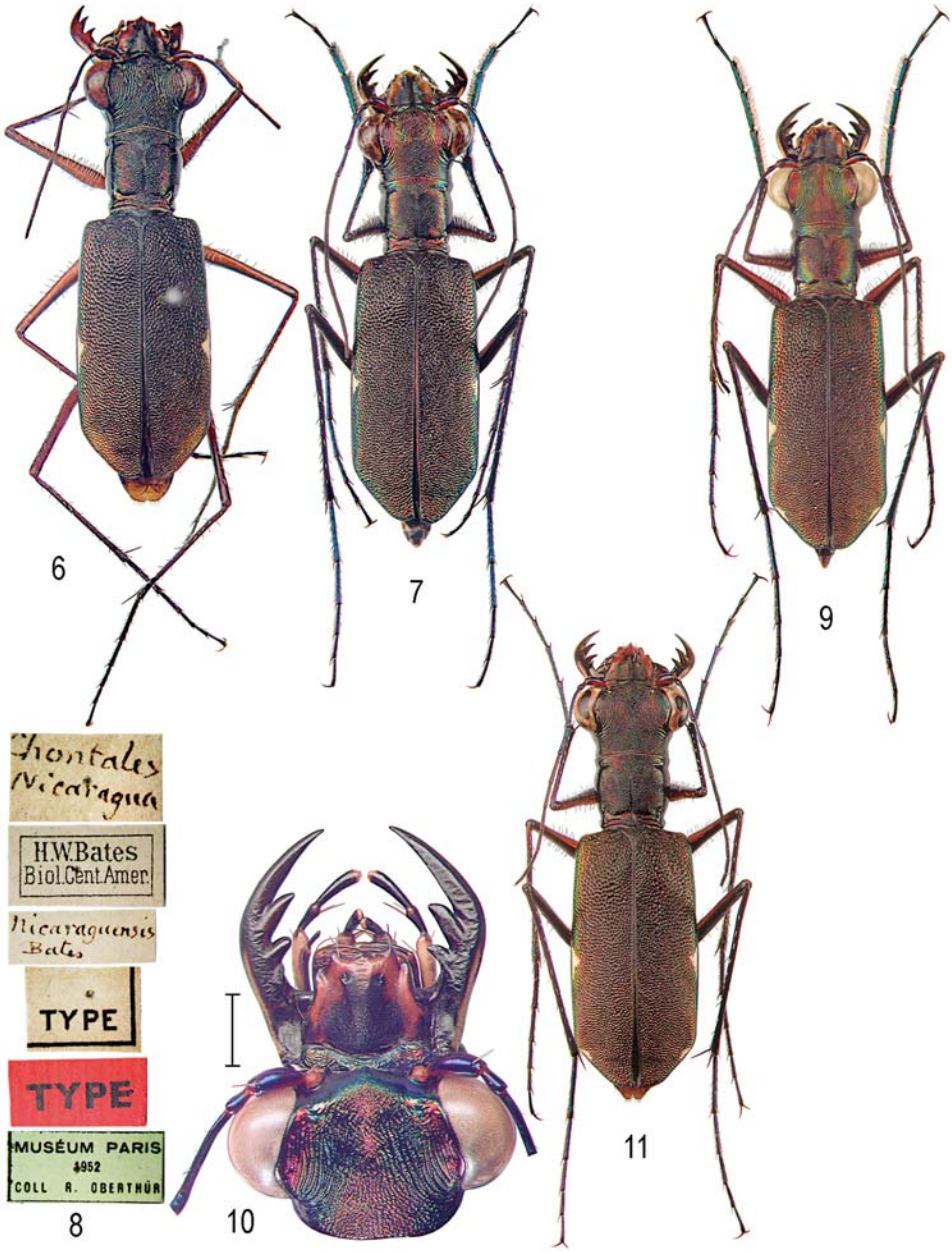
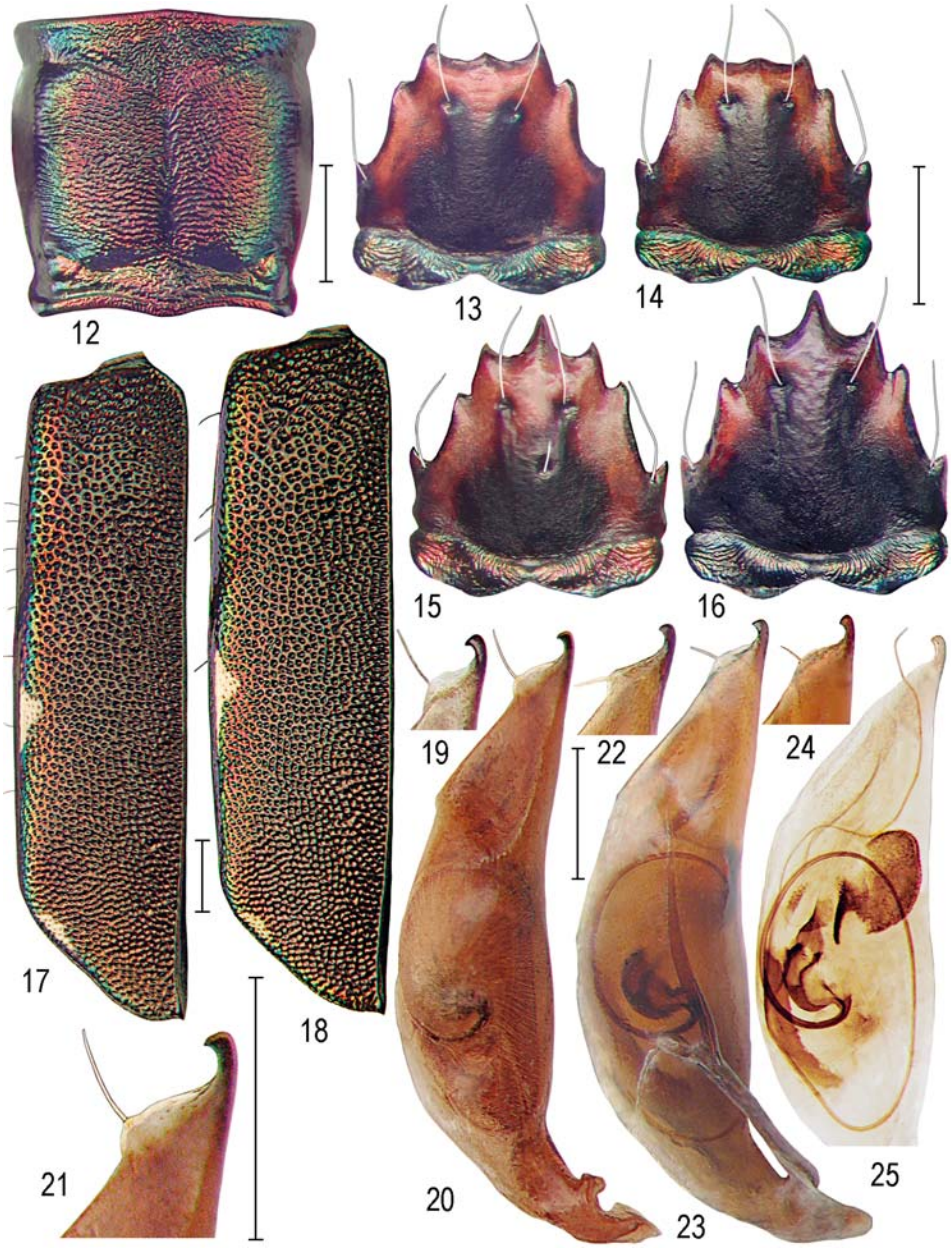


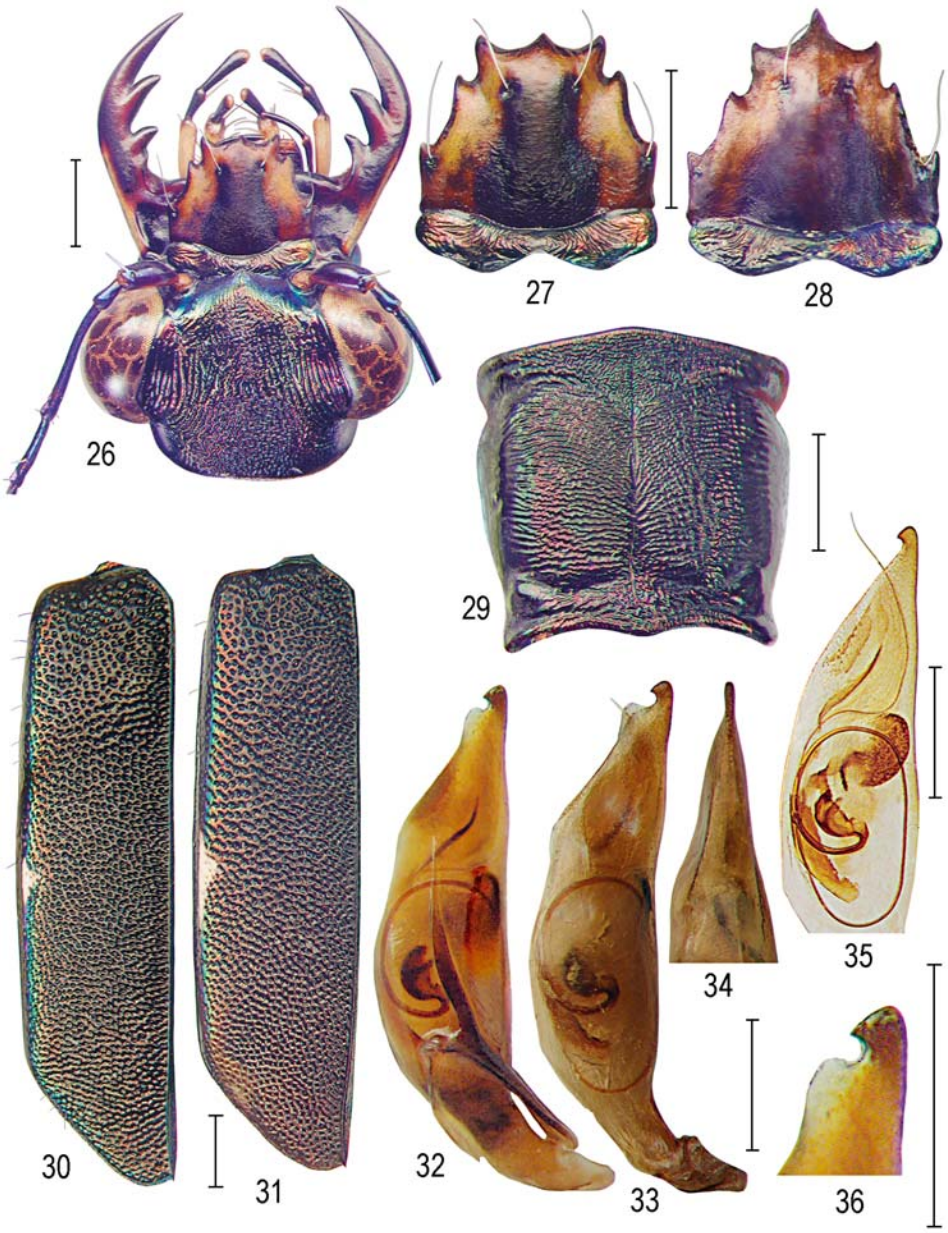
Figs 1–5. Two species of *Odontocheila*. 1–3: *O. molesta* Nidek. 1 – ♂, 13.1 mm, Barro Colorado Island, HT (AMNH); 2 – ♂, Soberania (CCJM); 3 – ♂, Barro Colorado Island, PT (ZMAN); 4–5: *O. mirekskrabali* sp.nov. 4 – ♂, 14.2 mm, Nusagandi HT (USNM); 5 – ♂, 14 mm, El Llano, PT (CCJM).



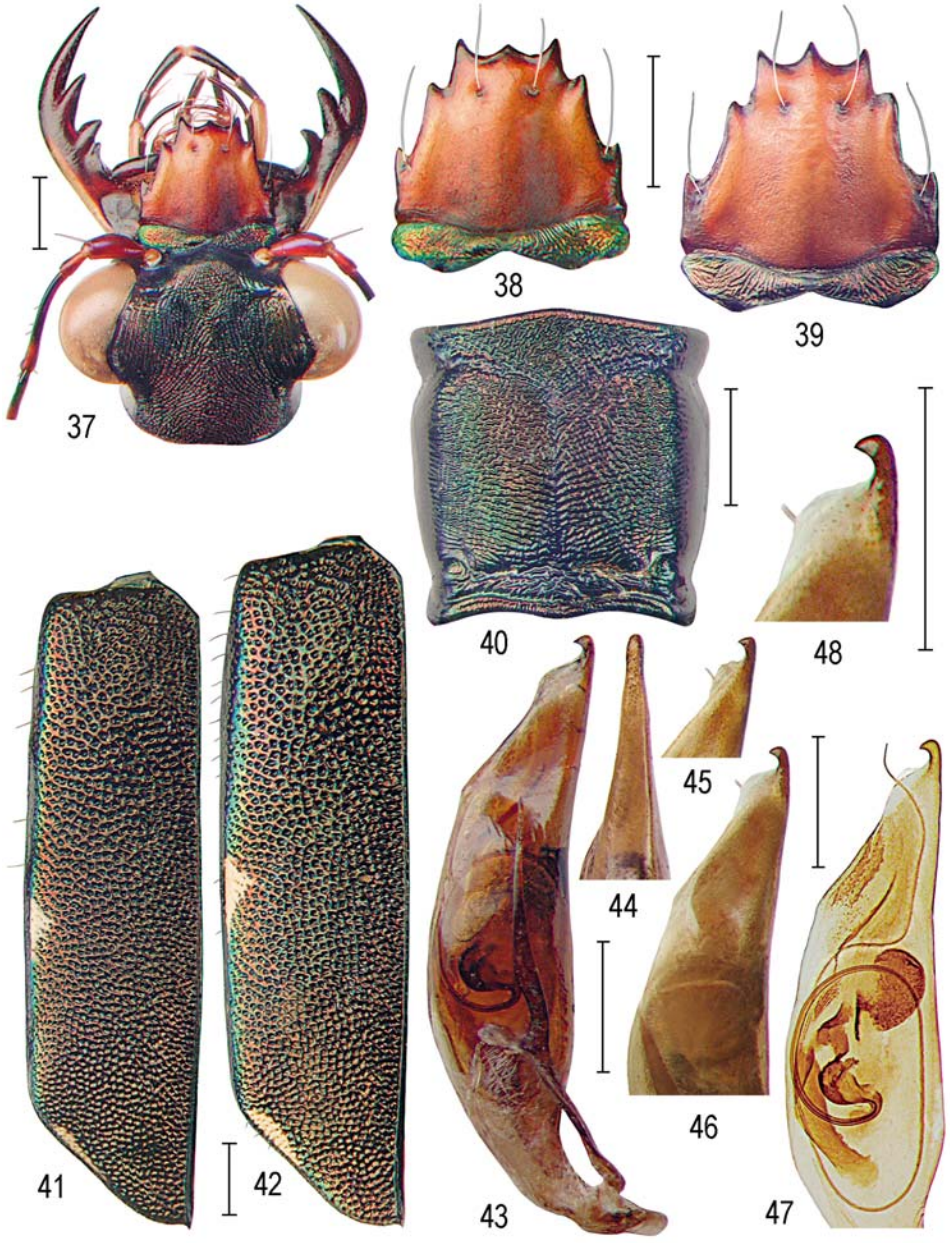
Figs 6–11. Two species of *Odontocheila*. 6–8: *O. nicaraguensis* Bates. 6 – ♀, 13.6 mm, Chontales HT (MNHN); 7 – ♂, 13.5 mm, Las Brisas (CCJM); 8 – labels, HT; 9–11: *O. angelsolisi* sp.nov. 9 – ♂, 13.7 mm, Veragua, HT (INBIO); 10 – head, ♂, HT; 11 – ♀, 13.8 mm, Veragua, AT (CCJM). Bar = 1 mm.



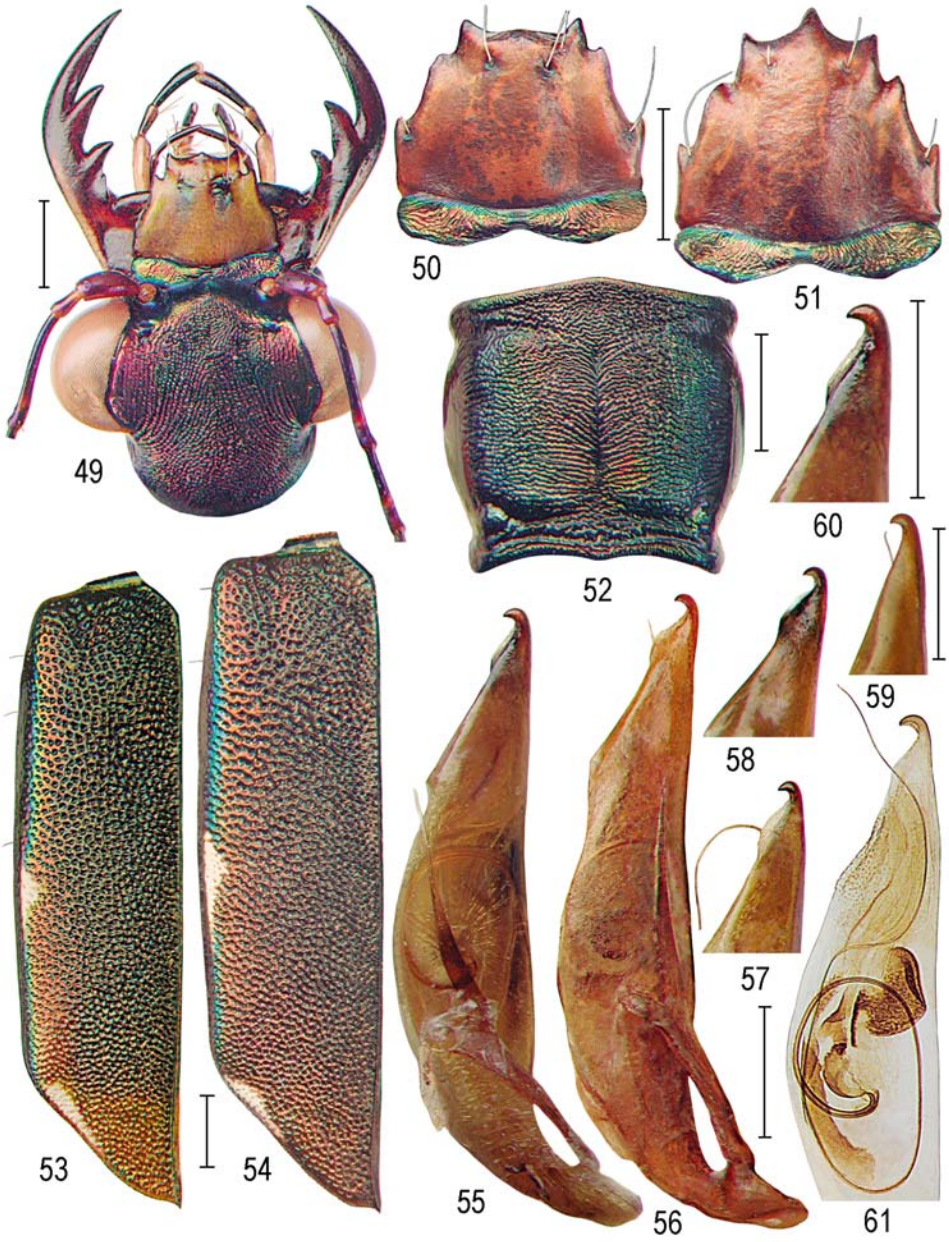
Figs 12–25. *Odontocheila angelsolisi* sp.nov. 12 – pronotum, ♂, Veragua. HT (INBIO); 13–16 – labrum: 13 – ♂, HT; 14 – ♂, Veragua, PT (CCJM); 15 ♀, Veragua, AT (CCJM); 16 ♀, Veragua, PT (CCJM); 17–18 – elytron: 17 – ♂, HT; 18 ♀, AT; 19–25 – aedeagus or its apex: 19 – Hitoy Cerere, PT (INBIO; 20 – HT; 21 – HT, detail of apex; 22–24 – Veragua, PT (CCJM); 25 – ibid., internal sac. Bars = 1 mm.



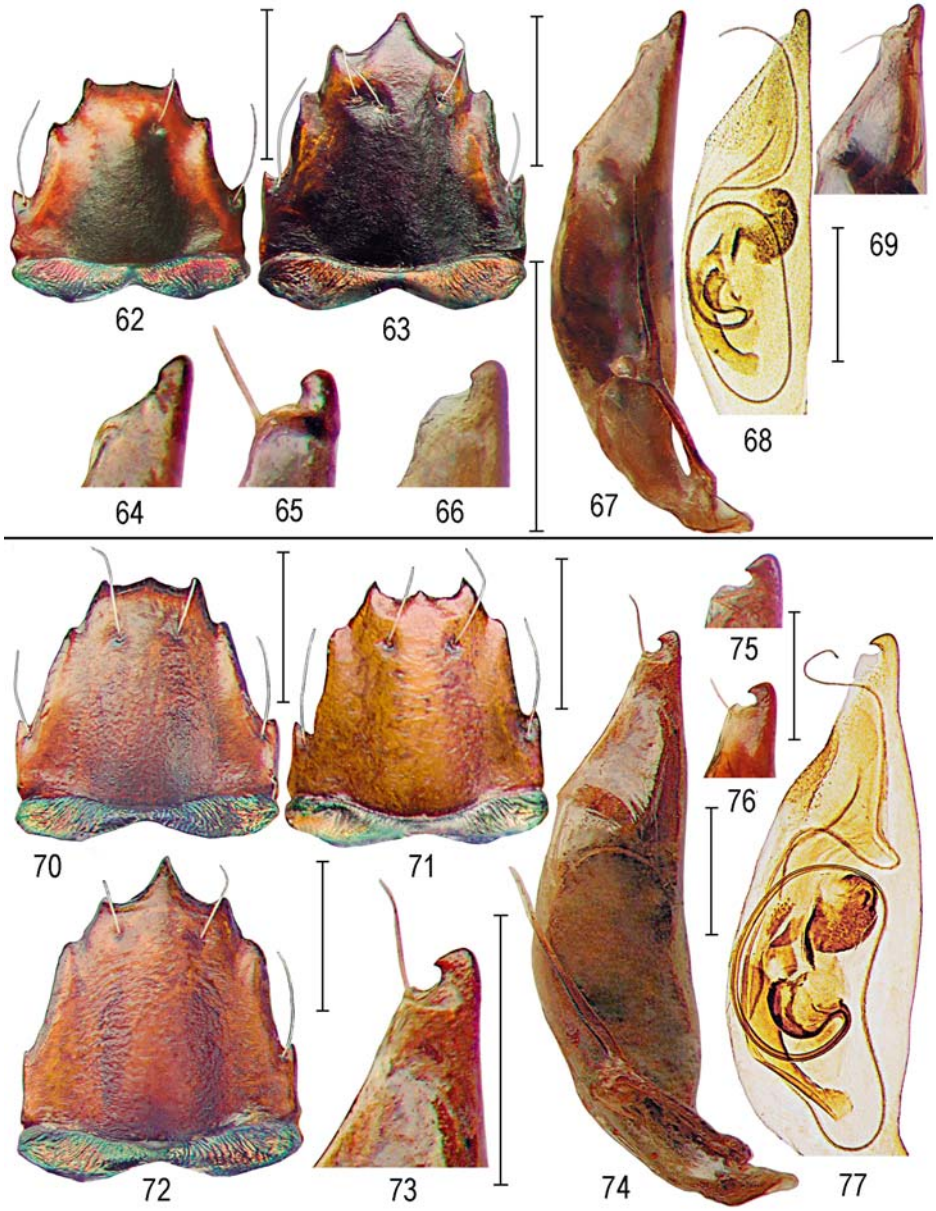
Figs 26–36. *Odontocheila nicaraguensis* Bates. 26 – head, ♂, Las Brisas (CCJM); 27–28 – labrum: 27 – ♂, Las Brisas (CCJM); 28 – ♀, Chontales, HT (MNHN); 29 – pronotum, ♀, Chontales (BMNH); 30–31 – elytron: 30 – ♂, Las Brisas (CCJM); 31 – ♀, HT; 32–36 – aedeagus: 32 – Las Brisas (CCJM); 33 – La Selva (CCJM); 34 – ditto, ventral view; 35 – ditto, internal sac; 36 – detail of apex, Las Brisas (CCJM). Bars = 1 mm.



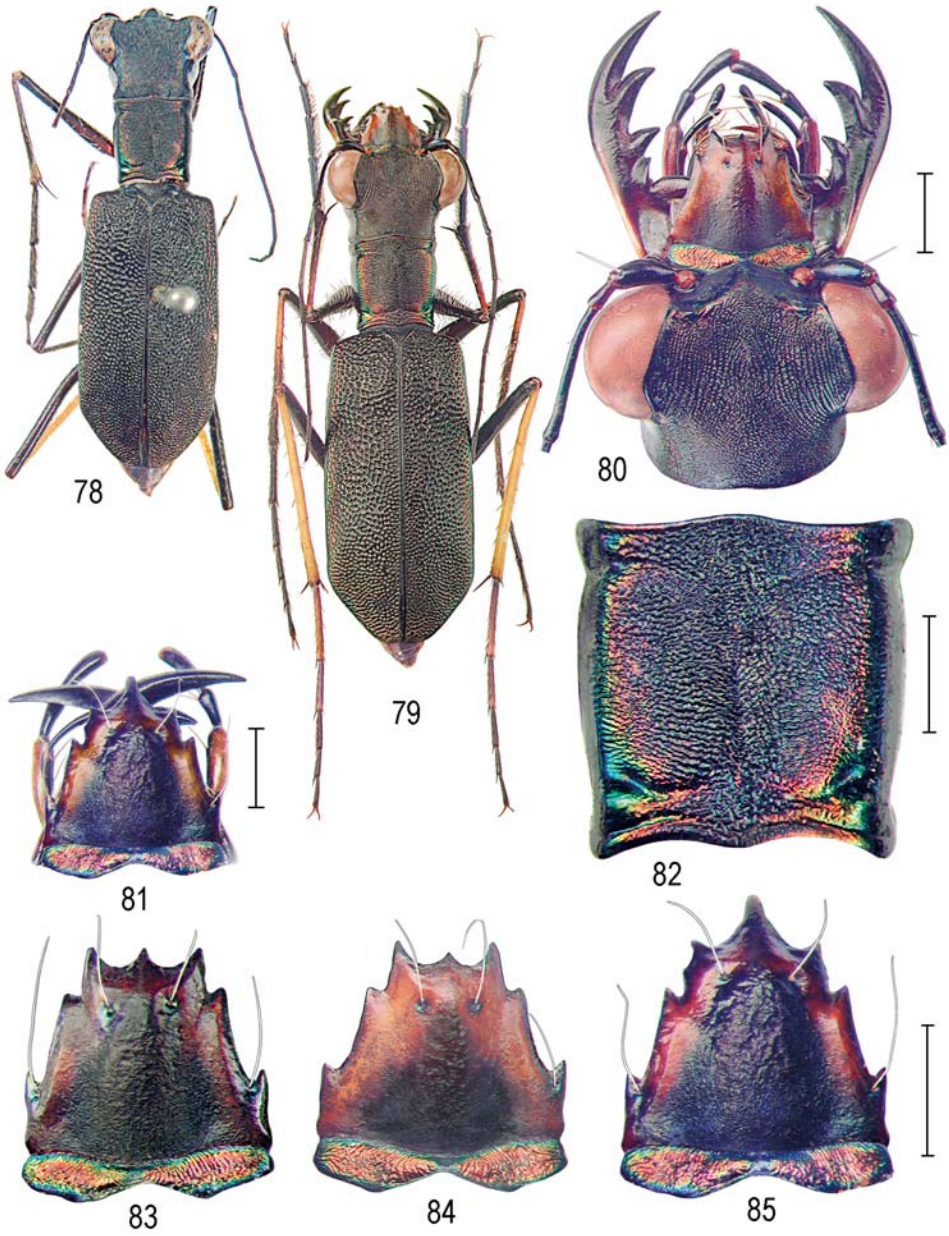
Figs 37–48. *Odontocheila mirekskrabali* sp.nov. 37 – head, ♂, Nusagandi, HT (USNM); 38–39 – labrum: 38 – ♂, HT; 39 – ♀, Nusagandi, AT (DBCN); 40 – pronotum, ♂, HT; 41–42 – elytron: 41 – ♂, HT; 42 – ♀, AT; 43–48 – aedeagus or its apex: 43 – El Llano, PT (CCJM); 44 – ditto, ventral view; 45 – Nusagandi, PT (CCJM); 46 – HT; 47 – internal sac, El Llano, PT (CCJM); 48 – HT, detail of apex. Bars = 1 mm.



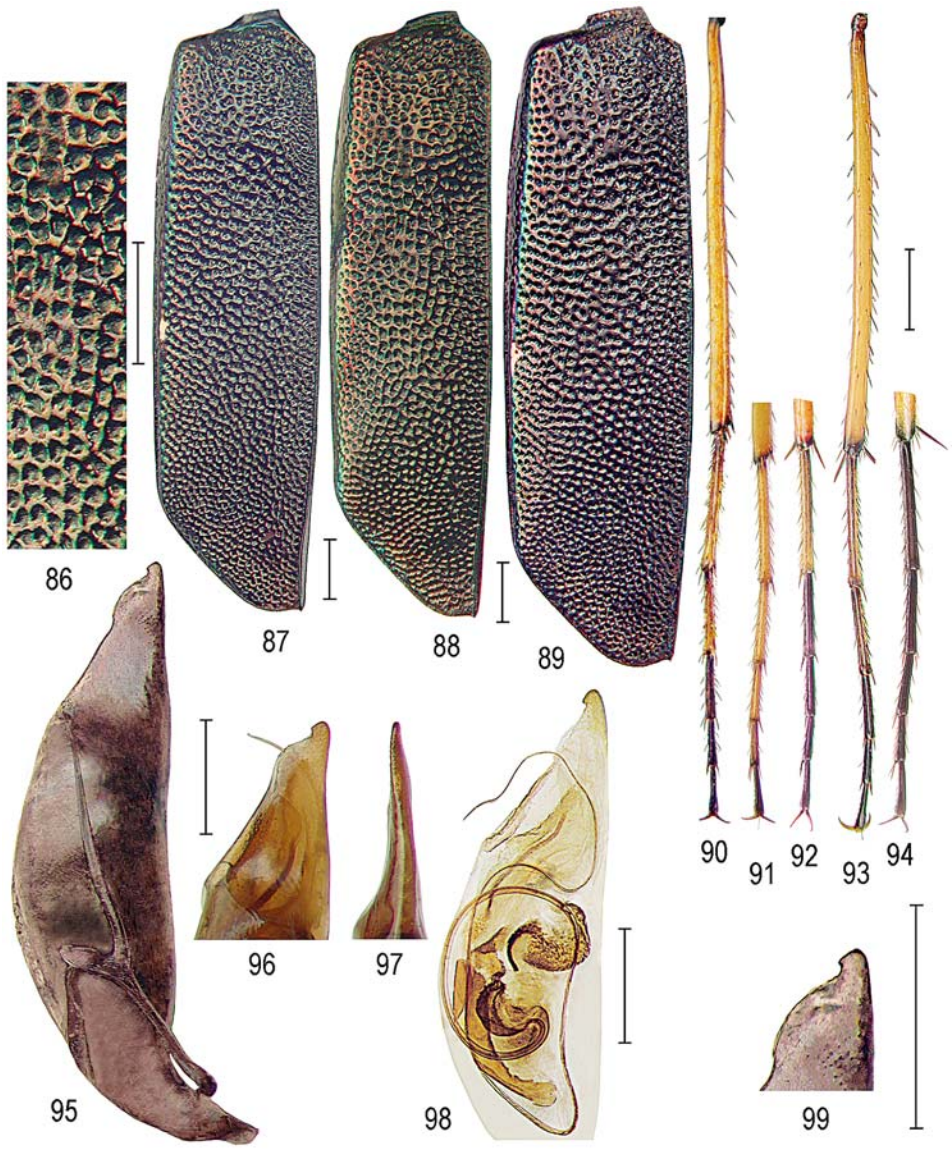
Figs 49–61. *Odontocheila molesta* Nidek. 49 – head, ♂, Cerro Jefe (CCJM); 50–51 – labrum: 50 – Barro Colorado Island, HT (AMNH); 51 – ♀, ibid., PT (ZMAN); 52 – pronotum, ♂, ibid., PT (ZMAN); 53–54 – elytron: 53 ♂, HT; 54 ♀, PT; 55–61 – aedeagus or its apex: 55 – HT; 56 – PT; 57 – Cerro Jefe; 58 – Altos de Campana (DBCN); 59 – ibid. (DBCN); 60 – detail of apex, HT; 61 – internal sac, Cerro Jefe. Bars = 1 mm.



Figs 62–77. Two species of *Odontocheila*. 62–69 – *O. chiriquina* Bates. 62–63 – labrum: 62 – ♂, V. de Chiriqui, LT (BMNH); 63 – ♀, ibid., PLT (BMNH); 64–66 – aedeagus, detail of apex: 64 – LT; 65 – Bugaba (BMNH); 66 – Puntarenas (INBIO); 67–69 – aedeagus: 67 – LT; 68 – internal sac, V. de Chiriqui, PLT (MNHN); 69 – apex, ibid., PLT (MNHN). Figs 70–77. *O. excisipenis* W. Horn. 70–72 – labrum: 70 – ♂, Juntas, Rio Dagua, LT (SDEI); 71 – ♂, Cachabe, PLT (SDEI); 72 – ♀, ibid., PLT (SDEI); 73–77 – aedeagus: 73 – detail of apex LT; 74 – LT; 75 – apex, Valle de Cauca (MNHN); 76 – apex, Cachabe (MNHN); 77 – ibid., internal sac. Bars = 1 mm.



Figs 78–85. *Odontocheila oseryi* Lucas. 78–79 – habitus: 78 – ♂, 15.6 mm, Mission de Sarayacu, LT (MNHN); 79 – ♂, 14.9 mm, Leticia (CCJM); 80 – ♂, head: ibid (CCJM); 81 – buccal appendages, ♀, type locality, PLT (MNHN); 82 – pronotum, ♂, LT; 83–85 – labrum: 83 – ♂, LT; 84 – ♂, Leticia (CCJM); 85 – ♀, type locality, PLT (MNHN). Bars = 1 mm.



Figs 86–99. *Odontocheila oseryi* Lucas. 86 – detail of elytral sculpture, ♂, Leticia (CCJM); 87–89 – elytron: 87 – ♂, Mission de Sarayacu, LT (MNHN); 88 – ♂, Leticia (CCJM); 89 – ♀, type locality, PLT (MNHN); 90–94 – metatibiae and metatarsi: 90 – ♂, LT; 91–94 – syntopic adults, Leticia: 91 – ♀, –(CMNH); 92 – ♂ (CCJM); 93 – ♀ (CMNH); 94 – ♀ (CCJM); 95–99 – aedeagi or their apices: 95 – LT; 96 – Leticia (CCJM); 97 – ditto, ventral view; 98 – ditto, internal sac; 99 – detail of apex, LT. Bars = 1 mm.