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Description of three new subspecies of *Carabus* Linnaeus, 1758 (subgenus *Coptolabrus* Solier, 1848) and taxonomic changing on some *Carabus* from Far East of Russia (Coleoptera Carabidae Carabinae)

Ivan Rapuzzi

Via Cialla 47, 33040 Prepotto, Udine, Italy; email: info@ronchidicialla.it

ABSTRACT Three new *Carabus* Linnaeus, 1758 (subgenus *Coptolabrus* Solier, 1848) subspecies from Far East of Russia and Central China (Anhui Province, Chongqing Province) are described and figured: *C.* (*Coptolabrus*) *smaragdinus losevi* n. ssp., *C.* (*Coptolabrus*) *elysii wangguofeni* n. ssp. and *C.* (*Coptolabrus*) *ignigena tenuitarsatus* n. ssp. Comparative notes with the closest taxa are provided. *Carabus* (*Morphocarabus*) *hummeli vladobydovi* Obydov, 2007, *C.* (*Aulonocarabus*) *gossarei mareschii* Rapuzzi, 2010, *C.* (*Megodontus*) *vietinghoffii rugicolor* Rapuzzi, 2010 and *C.* (*Coptolabrus*) *smaragdinus robinzoni* Rapuzzi, 2010 recently considered as synonyms are resurrected as valid subspecies.

KEY WORDS *Carabus*; *Coptolabrus*; new subspecies; Far East Russia; China; taxonomic changing.

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INTRODUCTION

The study of some Coleoptera Carabidae of the genus *Carabus* Linnaeus, 1758 (subgenus *Coptolabrus* Solier, 1848 see Hauser, 1921, 1932a, 1932b; Deuve & Font, 1998; Deuve, 2004) preserved in the author's collection in part provided by Mr. Oleg Losev (Pavlovo, Russia) and Mr. Xi Huangshun (Shanghai, China) gives the opportunity to individuate three new subspecies: *C.* (*Coptolabrus*) *smaragdinus losevi* n. ssp. from South Primorye in the Far East of Russia, *C.* (*Coptolabrus*) *elysii wangguofeni* n. ssp. from Anhui province, Central China and and *C.* (*Coptolabrus*) *ignigena tenuitarsatus* n. ssp. from Chongqing province, Central China.

In the second part of this paper five *Carabus* taxa recentely considered as synonyms by Sundukov (2013) are resurrected as valid subspecies.

RESULTS

New taxa

Carabus* (*Coptolabrus*) *smaragdinus losevi n. ssp.

EXAMINED MATERIAL. Holotype: 1 male, Far East of Russia, South Primorye, Khasanskiy district, Furugelm Island, 11/13.VII.2013, O. Losev legit; preserved in the author's collection. Paratypes: 6 males and 3 females, Far East of Russia, South Primorye, Khasanskiy district, Furugelm Island, 11/13.VII.2013, O. Losev legit; 6 males and 3 females, Far East of Russia, South Primorye, Khasanskiy district, Krabbe peninsula, 30.VI/11.VII.2012, O. Losev legit; 25 males and 3 females, Far East of Russia, South Primorye, Khasanskiy district, Krabbe peninsula, 7/18.VII.2013, O. Losev legit; 24 males and 3 females, Far East of Russia, South-

west Primorskiy region, Khasanskiy district, Mramornyy cape env., 42°34'N; 130°48'E, 28.VII/12.VIII.2012, A. Plutenko legit.

The paratypes are preserved in the author's collection, O. Losev collection and A. Plutenko collection (Russia).

DESCRIPTION OF HOLOTYPE MALE. Length including mandibles: 31 mm, maximum width of elytra: 9.8 mm (Fig. 1). Head and pronotum cupper-red, elytra cupper-red with cupper-green sides, relatively shiny; primary and secondary relieved intervals of elytra black. Ventral side of pronotum and epipleura cupper-red, metallic, abdomen dark violet; palpi antennae and legs black. Head elongate; surface strongly and uniformly punctured; supra-antennary ridge bent upwards; clypeus relieved, lateral ridges very deep and punctured. Mandibles very long and thin, of "cychrisant" shape. Eyes emispheric and prominent. Labrum bilobate, multi-setulose. Very long and developed palpi, sub-apical segment of labial palpi bi-setose; apical segment of maxillary and labial palpi dilated. Antennae thin, extending with 4 antennomers beyond the base of pronotum and extending more or less the third of elytra. Disc of pronotum nearly flat; sides of pronotum narrow margined, slightly bent upwards at the base; hind angles rounded and very slightly protruding behind its base; surface of pronotum uniformly and very densely punctured, faintly roughly. Elytra quite elongate, oval, very convex, maximum width at the middle; shoulders narrow, slightly pronounced; sculpture triploid heterodyname type: primary intervals forming tubercles of oval shape, smooth; secondary smaller, rounded and very smooth; tertiary completely reduced. Legs very long and strong. Aedeagus: the median lobe in lateral view (Fig. 2) is regularly curved, apex long and curved; dorsal view in figure 3.

VARIABILITY. Paratypes have a small variability: the length of the body ranges from 27.5 mm to 32 mm for the males and from 27 mm to 34 mm for the females. The colour of the specimens from Krabbe peninsula is cupper green; the specimens from Furugelm island and Mramornyy cape have constantly the holotype colour.

ETIMOLOGY. This new interesting *Coptolabrus* subspecies is very cordially dedicated to Mr. Oleg Losev (Pavlovo, Nizhegorodskaya region, Russia) who collected part of the specimens.

REMARKS. The small size, the convex shape of elytra with smooth intervals, the quite transverse and of hexagonal shape pronotum, the very small and elongate head and the dominant cupper-red colour characterize the new subspecies.

From *C.* (*Coptolabrus*) *smaragdinus mandschuricus* Semenov, 1898 the new subspecies is distinguish for the smaller size and for the sculpture of elytra formed by larger and smoother intervals.

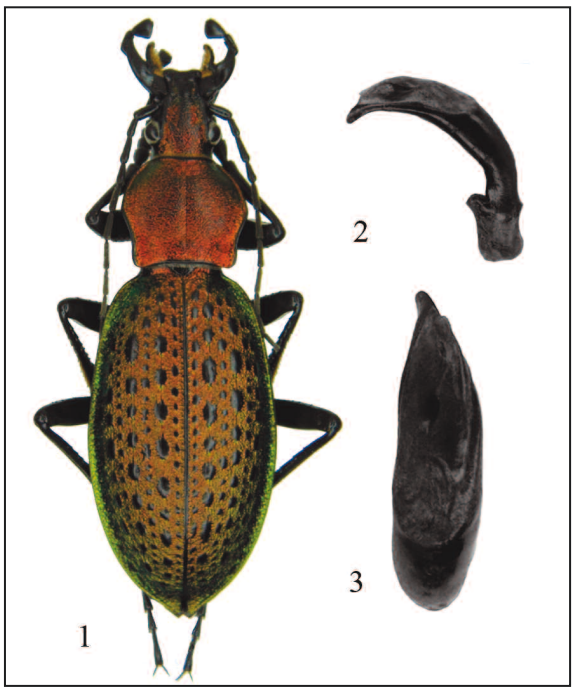
From *C. smaragdinus coreicus* Hauser, 1921 the new subspecies is geographically separate by the large Tumen Jiang river valley and differs for the smaller head, the smaller size, the longer mucrons of elytra, the larger pronotum and smoother sculpture of elytra.

The closest subspecies is *C. smaragdinus robinzoni* Rapuzzi, 2010 described from Reyneke Island near Vladivostok (Rapuzzi, 2010; 2012). With the new subspecies it shares the same small size but differs for the dominant red colour, the transverse pronotum of hexagonal shape, the very convex elytra, the less raised sculpture of elytra and for the shape of aedeagus more curved with longer apex.

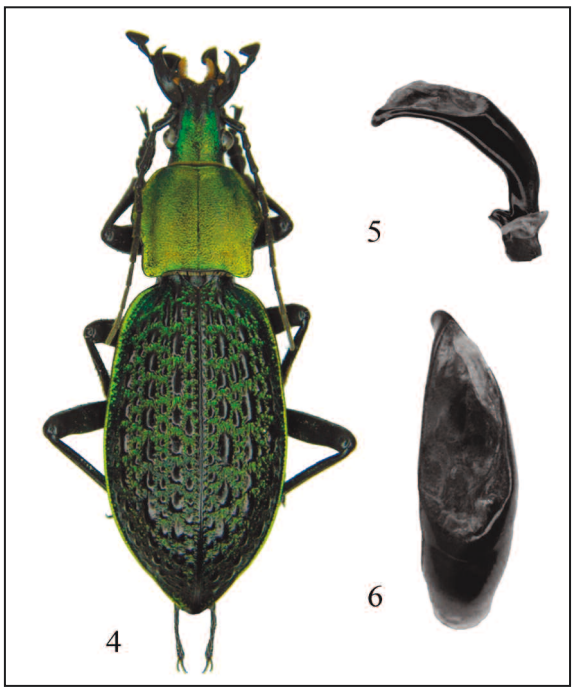
Carabus* (*Coptolabrus*) *elysii wangguofeni Rapuzzi et Huangshun n. ssp.

EXAMINED MATERIAL. Holotype: male, China, Anhui province, Taihu, Wangling vill., South slope of Mt. Dabieshan, 400 m, 10/30.IV.2015, (30º31'18" N; 116º16'39" E), Xihuangshun legit; preserved in Ivan Rapuzzi collection. Paratypes: 9 males and 11 females, China, Anhui province, Taihu, Wangling vill., North slope of Mt. Dabieshan, 400 m, 10/30.IV.2015, Xihuangshun legit; 3 females, idem, except V.2014; the paratypes are preserved in Ivan Rapuzzi collection.

DESCRIPTION OF HOLOTYPE MALE. Length including mandibles: 41 mm, maximum width of elytra: 13 mm (Fig. 4). Upper surface metallic, dull; head green; pronotum and side of elytra gold-green; disc of elytra olive green; primary and secondary intervals of elytra black. Ventral side of pronotum and epipleura green, metallic, abdomen dark violet; appendix black. Head elongate; surface strongly punctured, frons convex and punctured; clypeus very sparsely punctured; clypeus fovea deep and punctured. Mandible long, sickled shape. Palps long with the apical segment strongly dilated;



Figures 1–3. *Carabus* (*Coptolabrus*) *smaragdinus losevi* n. ssp. holotype male. Fig. 1: holotype. Fig. 2: holotype male aedeagus: median lobe in lateral view. Fig. 3: idem, apex in dorsal view.



Figures 4–6. *Carabus* (*Coptolabrus*) *elysii wangguofeni* n. ssp. holotype male. Fig. 4: holotype. Fig. 5: holotype male aedeagus: median lobe in lateral view. Fig. 6: idem, apex in dorsal view.

penultimate segment of labial palps bi-setose. Pronotum of hexagonal shape, transverse (1.21 times as long as broad); base of pronotum large; sides quite rounded, marginated, bent upwards; basal lobes large and rounded, protruding its base; surface of pronotum densely and shallow punctured. Elytra oval; disc convex; mucrones short; sculpture triploid heterodyname type: primary tubercles rounded and close; secondary smaller and rounded; tertiary forming grains strongly rough; ground roughly sculptured. Legs quite short. Male aedeagus (Figs. 5, 6).

Variability. Very variable in colour: green, bluish-green, blue, golden-green; the margins often differ from the discs of pronotum and elytra; colour of head and pronotum often contrasting with that of elytra. The colour always has cold tints. The length of the body ranges from 37 mm to 41 mm for the males and from 40 mm to 44 mm for the females. One female specimens has the sculpture of elytra with tubercles more elongate.

Etimology. The beautiful new *Coptolabrus* taxa is very cordially dedicated to Mrs. Wang Guofen (Shanghai, China) wife of Mr. Xi Huangshun. The co-author of this new subspecies is Huangshun Xi from Shanghai, China

Remarks. From Southern Anhui several *Coptolabrus* taxa are known:

Carabus (*Coptolabrus*) *elysii elysii* Thomson, 1846: Ngang-Wei, Anking (= Anhui, Anqing) (Hauser, 1921);

Carabus (*Coptolabrus*) *elysii connectens* Hauser, 1912: Ngang-Wei, südlicher Teil (= Anhui, Southern part) (Hauser, 1921);

Carabus (*Coptolabrus*) *elysii anhweiensis* Hauser, 1932: Anking (= Anqing) (Hauser, 1932a loc. typ.; 1932b). Very close to *C. elysii connectens* it is considered as a synonym by Brezina (2003);

Carabus (*Coptolabrus*) *lafossei tungchengensis* Li, 1993: Tongcheng Xian, Longming, Shanling, locus typicus (Li, 1993);

Carabus (*Coptolabrus*) *lafossei dabieshanus* Imura, 1996: Anhui: Dabie Shan, Yuexi, Mt. Miaodaoshan, locus typicus (Imura, 1996); Hetupu (Deuve, 1997); Qianshan Xian, Tianzhu Mt. (Imura, 1996); Qian Shan; Jiuhua Shan; Baima Jian

(Kleinfeld, 1997). Very close to *C.* (*Coptolabrus*) *lafossei tungchengensis* it is considered as a synonym by Brezina (2003)

Carabus (*Coptolabrus*) *lafossei jingdensis* Deuve et Li, 2006: Anhui, Jingde Xian, Junle, 30º20'N; 118º30'E, locus typicus (Deuve et Li, 2006).

From the adjacent area were described:

Carabus (*Coptolabrus*) *lafossei tiantai* Kleinfeld, 1997: NE-Hubei: Hong'an, Mt.Tiantai, 31:23N/114:37E, locus typicus (Kleinfeld, 1997);

Carabus (*Coptolabrus*) *lafossei pseudocoelestis* Kleinfeld, 1999: N-Hubei, Shuizhou, Dahong Mt., 31:29N/112:58E, 1200 m, locus typicus (Kleinfeld, 1999);

Carabus (*Coptolabrus*) *elysii pulcher* Kleinfeld, 1997: S-Henan, S of Xinyang, Jigong Shan, 31:49N/114:06E, locus typicus (Kleinfeld, 1997).

The closest form is *C. elysii pulcher* from which the new subspecies is easily distinguished by the following characters: smaller size, very different colour with domination of cold tints; larger pronotum with smoother sides (less angulate); more convex elytra; shorter elytral mucrones; primary intervals forming smaller and nearly perfect rounded tubercles.

From *C. elysii elysii* and *C. elysii anhweiensis* the new subspecies differs by: larger size; more elongate and slender body shape; hexagonal pronotum; rounded and raised primary tubercles (smoother in *C. elysii elysii* and *C. elysii anhweiensis*); longer elytral mucrones.

The range of the new subspecies is geographically very close to that of *C. lafossei dabiesanus* but very easily distinguishable by several strong characters: different colour (in *C. lafossei dabiesanus* constantly with black elytra and dark blue elytra margins, head and pronotum); more transverse and less angulate pronotum; upper surface of head and pronotum strongly punctured (smooth in *C. lafossei lafossei*); different sculpture of elytra and shorter mucrons of elytra.

From *C. lafossei tiantai*, *C. lafossei pseudocelestis* and *C. lafossei jingdensis* the new taxon has all the distinctive characters of the species that permit to separate *C. elysii elysii* from *C. lafossei lafossei*. *Carabus lafossei tiantai* and the new subspecies show, in part, the same colour.

Carabus* (*Coptolabrus*) *ignigena tenuitarsatus n. ssp.

EXAMINED MATERIAL. Holotype: male, China, Chongqing province, Pengshui county, Mt. Heimending, local collector legit; preserved in the author's collection. Paratype: 1 male, China, Chongqing province, Pengshui county, Mt. Heimending, local collector legit; the paratype is preserved in the author's collection.

DESCRIPTION OF HOLOTYPE MALE. Small size and very thin shape for the species, length including mandibles 38.5 mm; maximum width of elytra 11.8 mm (Fig. 7). Upper surface metallic, rather mat; head with supra antennary ridges green; pronotum with sides gold green, disk darker; elytra uniformly green, sides very shine, brilliant; primary and secondary intervals black. Ventral face of head black; ventral face of pronotum and epipleura dark green, metallic; abdomen black with violet shades, metallic; appendix black. Head long and very slender; surface of head densely punctured, frons very convex. Mandibles elongate. Eyes quite small and slightly salient. Palpi long with the apical segment strongly dilated; penultimate segment of labial palpi bisetose. Pronotum long and very narrow for the species, as broad as long. sides of pronotum very sinuate, rounded; hind angles salient and very few protruding behind the base; upper surface flat; surface of pronotum densely punctured, median sulcus very superficial. Elytra narrow and very elongate for the species, ovals; disc convex. Primary intervals perfectly rounded or slightly elongate, very prominent; secondary forming aligned grains; tertiary reduced. Long mucrones. Legs quite short. First and second protarsal segments of male slightly dilated with complete adhesive soles; the third male protarsal segment not dilated and with very rudimental adhesive soles.

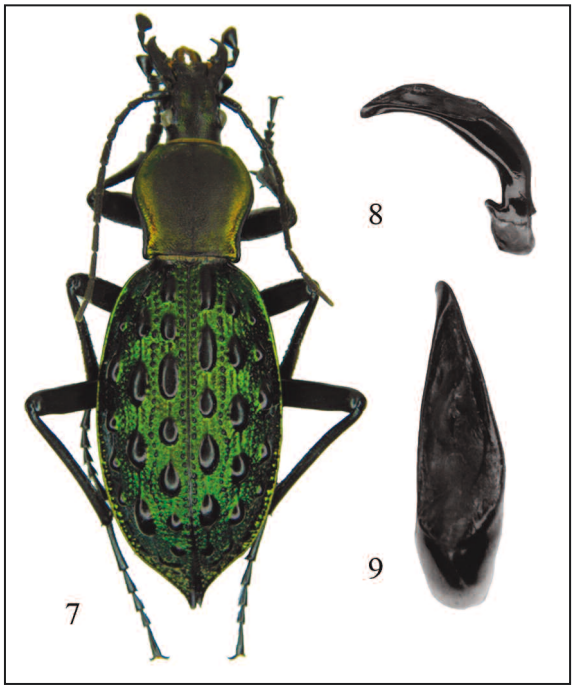
Male aedeagus (Figs. 8, 9) is characteristic for the species but quite slender and of narrower shape.

VARIABILITY. No significant variability of the paratypes

ETIMOLOGY. The new subspecies is named after the slightly dilated male protarsal segments.

REMARKS. As expected the new taxa is morphologically close to the northern most subspecies of *C. ignigena*: *C.* (*Coptolabrus*) *ignigena cristianofonti* Deuve et Font, 2008 and *C.* (*Coptolabrus*) *ignigena tongrenensis* Deuve et Li, 2006.

From *C.* (*C.*) *ignigena cristianofonti*, that it is the closest form, it is easily distinguished by the following characters: slender shape of head and pronotum; sides of pronotum sinuate but not angled; much elongate elytra with primary intervals more relieved; protarsal segments of male slightly dilated, the third segment not dilated and with very rudimental adhesive soles. From *C.* (*C.*) *ignigena tongrenensis* the new subspecies is distinguished by the following characters: smaller size; slender shape of head and pronotum; primary intervals of elytral sculpture more prominent; shorter legs; protarsal segments of male slightly dilated, the third segment not dilated and with very rudimental adhesive soles. Up to now the new subspecies is the northernmost population of the whole range of *C. ignigena* and it is the first record of the species for the Chongqing province.



Figures 7–9. *Carabus* (*Coptolabrus*) *ignigena tenuitarsatus* n. ssp. holotype male. Fig. 7: holotype. Fig. 8: holotype male aedeagus: median lobe in lateral view. Fig. 9: idem, apex in dorsal view.

Taxonomic notes

Recently Sundukov (2013) established as synonyms four *Carabus* subspecies described from the Peter the Great Gulf Islands, Vladivostok area, Far East of Russia: *C.* (*Morphocarabus) hummeli smaragdulus* Kraatz, 1878 = *C.* (*M.*) *hummeli vladobydovi* Obydov, 2007); *Carabus* (*Aulonocarabus*) *gossarei gossarei* Haury, 1879 = *C.* (*A.*) *gossarei mareschii* Rapuzzi, 2010; *Carabus* (*Megodontus*) *vietinghoffi bowringi* Chaudoir, 1863 = *C.* (*M.*) *vietinghoffi rugicolor* Rapuzzi, 2010 and *C.* (*Coptolabrus*) *smaragdinus mandschuricus* Semenov, 1898 = *C.* (*C.*) *smaragdinus robinzoni* Rapuzzi, 2010. For the significant morphological characters and the perfect isolation under insular conditions all these taxa will be resurrect:

- *Carabus* (*Morphocarabus*) *hummeli vladobydovi* Obydov, 2007 stat. resurr. Described from Popov Island (Obydov, 2007) *C. hummeli vladobydovi* has good morphological characters that permit to separate it from the populations from the mainland as well as from *C. hummeli putyatini* Rapuzzi (2012) from Putyatin island. *Carabus hummeli vladobydovi* differs from all the other known *hummeli* subspecies for its very peculiar coloration: violet-pink or red-pink pronotum, pink with gold or green shades elytra and purple margins.

- *Carabus* (*Aulonocarabus*) *gossarei mareschii* Rapuzzi, 2010 stat. resurr. Described and known only from the Askol'd Island *C. gossarei mareschii* is easily separable from *C. gossarei gossarei* by several characters: larger size and more developed elytra of ovate-elongate shape. The pronotum is less punctate with larger and dipper basal impressions. Elytral sculpture with less interrupted and less prominent primary intervals. Male aedeagus longer and larger with the median lobe more developed.

- *Carabus* (*Megodontus*) *vietinghoffii rugicolor* Rapuzzi, 2010 stat. resurr. Described from Reyneke Island it is one of the most distinctive subspecies of *C. vietinghoffii*. It is easily distinguished from *C. vietinghoffii bowringi* by significant and constant characters: in general bigger and stronger shape; very different colour: upper surface dark red to black-violet, rather mat, margins of elytra of the same colour. Male aedeagus differs for: in lateral view the median lobe is more developed and the apical lobe is longer; apex in frontal view curved on the left.

- *Carabus* (*Coptolabrus*) *smaragdinus robinzoni* Rapuzzi, 2010 stat. resurr. Described from Reyneke Island it differs from *C. smaragdinus mandschuricus* by the following characters: smaller size; slender and flatter shape; pronotum as broad as long, not transverse; stronger elytral sculpture; apical lobe of male aedeagus longer and slender. It is interesting to note that *C. smaragdinus robinzoni* is very constant in his type locality.

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