

THREE AMAZING NEW SPECIES OF THE GENUS *CHRYSOLINA* (COLEOPTERA: CHRYSOMELIDAE: CHRYSOMELINAE) FROM CHINA

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Three new species of the genus *Chrysolina* Motschulsky, 1860, namely *Ch. caspari* **sp. n.**, *Ch. melchiori* **sp. n.**, and *Ch. balthazari* **sp. n.** are described from Sichuan and Yunnan Provinces of China. These species have rare or unique features. In *Ch. caspari* **sp. n.** the shape of the last maxillary palpomere (it is shorter and narrower than the penultimate one) is a rare case in the genus *Chrysolina*. Among Chinese species, this shape of maxillary palpi is known only in one species, *Ch. pieli* Chen, 1936. In *Ch. melchiori* **sp. n.** the relief of elytral surface (strongly reticulated irregular funnels bearing a puncture at the bottom, separated by smooth intervals) is unique for the genus *Chrysolina*. In *Ch. balthazari* **sp. n.** the relief of elytra (alternation of wide convex intervals between pairs of rows and very narrow flat or slightly convex intervals between rows of one pair) is well distinguishable from most *Chrysolina* members. Due to this feature, the new species can only be close to *Ch. jinxiaoe* Ge in: Daccordi, Ge, Cui, Yang, 2011 from North Sichuan. Photographs of habitus, external characters, and male aedeagi are presented.

Key words: leaf-beetles, taxonomy, Sichuan, Yunnan

INTRODUCTION

The genus *Chrysolina* is rich and diverse in China with 117 species known, including 84 endemic ones (YANG *et al.* 2015, BIEŃKOWSKI 2019, MIKHAILOV 2021). YANG *et al.* (2015) compiled a key to subgenera and keys for species in some subgenera and also presented a list of 56 species *incertae sedis* without characters and position in the system of the genus. More recently, BIEŃKOWSKI (2019) made the first attempt to compile a key to all Chinese species of the genus *Chrysolina*.

This article presents descriptions of three new species of the genus *Chrysolina* from China. These species differ greatly both from each other and do not have close relatives in the fauna of China and beyond. I am not going to establish a monotypic subgenus for each of them, since the fauna of China, especially highlands of Sichuan and Yunnan Provinces, is still largely unknown, and the relationship of groups within the genus *Chrysolina* has not been elucidated yet.

MATERIAL AND METHODS

Exact label data are cited for all specimens. The examined materials are deposited in the following collections: ZIN: Zoological Institute of the Russian Academy of Sciences, St.-Petersburg, Russia (A. G. Moseyko); ABC: The author's collection, Zelenograd, Russia; MDC: M. Daccordi's collection, Verona, Italy; PRC: P. V. Romantsov's collection, St.-Petersburg, Russia. Holotypes of all new species are deposited in ZIN.

The holotypes of the new species were soaked, the aedeagus was dissected, and the characters of the underside of the thorax and abdomen, the soles of the tarsi, and the pygidium were studied. Then these specimens were placed (glued) on cardboard plates for photography and better preservation. Morphology description plan and terminology of structural details follow BIEŃKOWSKI (2019). Photographs were made by a Nikon D90 digital camera, combined with Tamron SP 70–300 mm F/4-5.6 and inverted Vega-12B 2.8–90 lenses, using Helicon Remote software. Images of the same objects at different focal planes were combined using Helicon Focus software.

TAXONOMY

Chrysomelidae Latreille, 1802

Chrysolina Motschulsky, 1860

Type species: Chrysomela staphylaea Linnaeus, 1758, by the original designation

***Chrysolina caspari* sp. n.**

<http://zoobank.org/59EB355E-C3F7-47C8-BEC3-92404C0A30BE>

(Figs 1A, D, E; 2A; 3A, D; 4)

Material examined – Holotype: China, Sichuan Province, NW of Mianning, 28°40'03" N / 102°00'56" E – 28°40'07" N / 102°00'49" E, H=4035–4300 m, 7.VI.2012, I. Belousov, G. Davidian, I. Kabak, A. Korolev leg.: male (ZIN); with red Holotype label; paratypes: China, Sichuan Province, NW of Mianning, 28°39'13" N / 101°58'34" E, H=2955 m, 9.VI.2012, I. Belousov, G. Davidian, I. Kabak, A. Korolev leg.: 3 females (ZIN, ABC); China, Sichuan Province, NW of Mianning, 28°39'46" N / 101°59'04" E, H=3325 m, 9.VI.2012, I. Belousov, G. Davidian, I. Kabak, A. Korolev leg.: 1 female (ABC); with red Paratype labels.

Specimen not included in the type series: China, Sichuan Province, N of Luding city, N of Lanau, 30°05'26" N / 102°14'34" E, H=3885 m, 21.V.2014, I. Belousov, I. Kabak leg.: 1 female (ABC).

Description. Male (holotype). Body oval, 1.5× as long as wide, convex. Dorsal side bright metallic, head and pronotum brassy, elytra grass green. Antennae piceous with antennomeres 1 and 2 rufous apically. Maxillary palpi and tarsi piceous. Femora and tibiae brassy. Underside black with brassy reflection. Head sericeous, distinctly reticulate; pronotum and elytra shining, obsoletely reticulate; besides that, dorsal side micropunctulate (punctures about 0.005 mm wide).

Last maxillary palpomere short and narrow, as long as wide, 1.5× shorter and 1.4× narrower than penultimate one.

Antennal insertion 1.5× closer to clypeus than to eye.

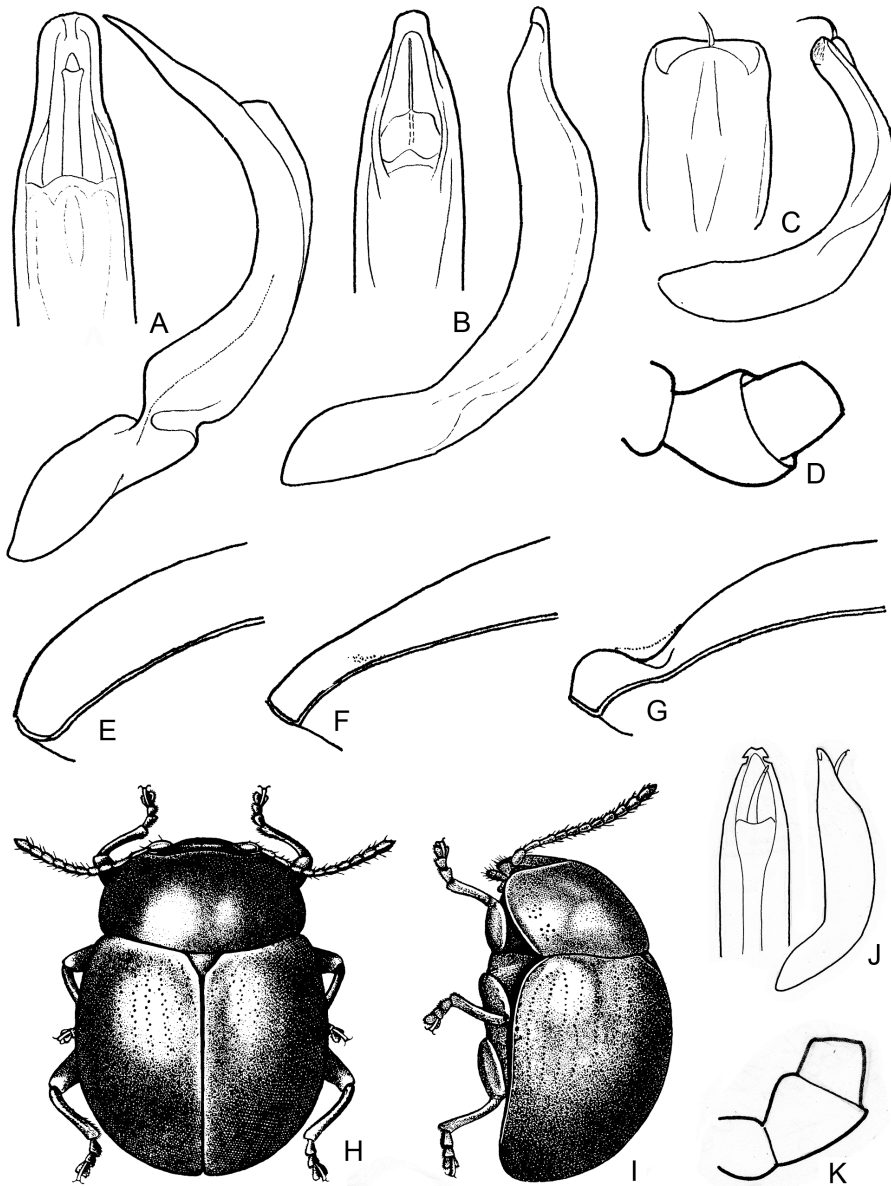


Fig. 1. *Chrysolina* species. A–C = male aedeagus, dorsal and lateral view: A = *Ch. caspari* sp. n., holotype; B = *Ch. balthazari* sp. n., holotype; C = *Ch. melchiori* sp. n., holotype. D = *Ch. caspari* sp. n., holotype, male, maxillary palpus. E–G = left side of pronotum, view from behind: E = *Ch. caspari* sp. n., holotype; F = *Ch. melchiori* sp. n., holotype; G = *Ch. balthazari* sp. n., holotype. H–K = *Ch. pieli*: H = female, total dorsal view; I = female, total lateral view; J = male aedeagus, dorsal and lateral view; K = female maxillary palpus. After CHEN (1936): H, I, others original

Pronotum broadest at mid-length, with lateral sides rounded, more convergent anteriorly than posteriorly. Lateral callus convex, but not separated from disc, lateral impression absent. Pronotum covered by dense, fine punctures (0.02–0.03 mm wide). Pronotum anteriorly margined, without setae. Setiferous pores at anterior angles absent.

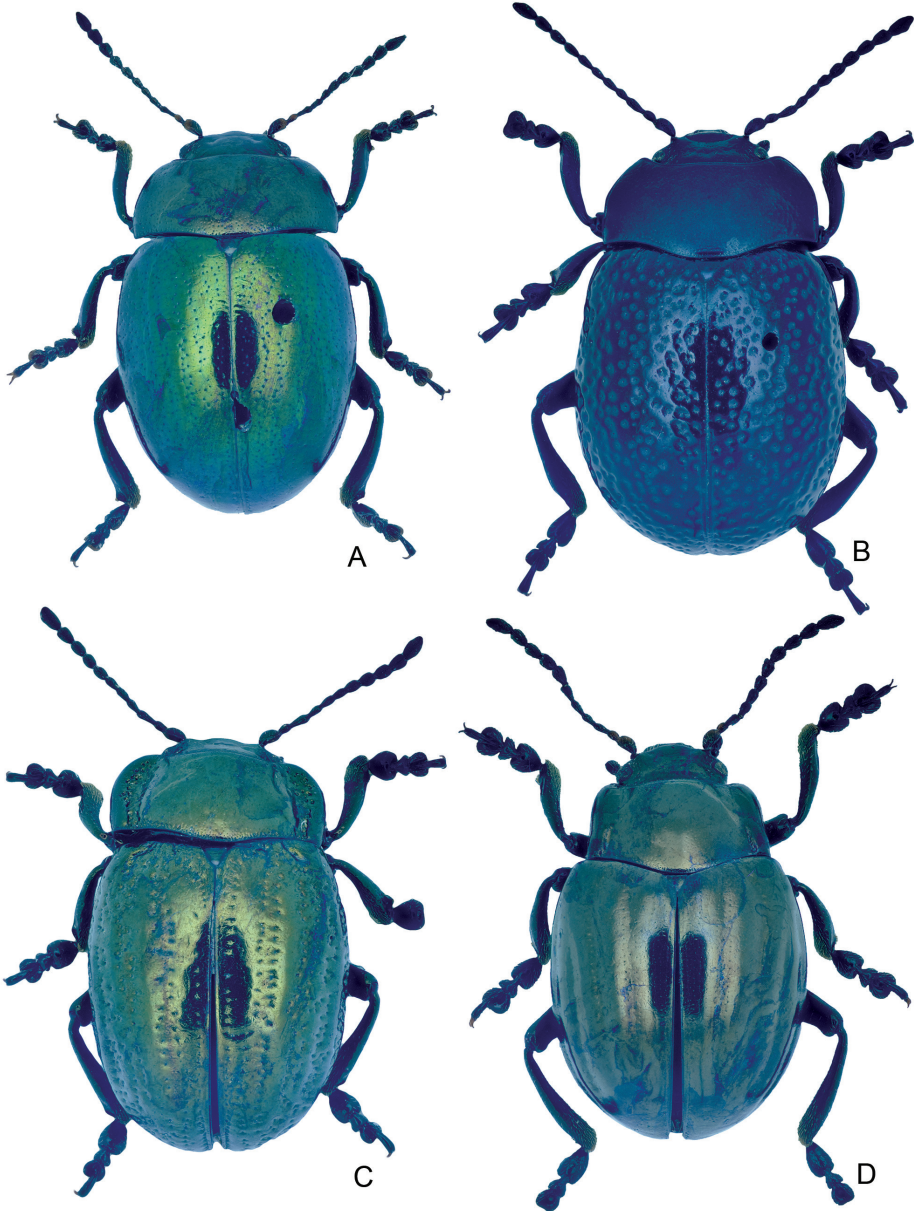


Fig. 2. *Chrysolina* species, total dorsal view. A = *Ch. casparyi* sp. n., holotype; B = *Ch. melchiori* sp. n., holotype; C = *Ch. balthazari* sp. n., holotype; D = *Ch. jinxiaoeae*, paratype, male



Fig. 3. *Chrysolina* species. A–C = head and pronotum, dorsal view: A = *Ch. casparsi* sp. n., holotype; B = *Ch. melchiori* sp. n., holotype; C = *Ch. balthazari* sp. n., holotype; D–F = male aedeagus, dorsal and lateral view: D = *Ch. casparsi* sp. n., holotype; E = *Ch. balthazari* sp. n., holotype; F = *Ch. melchiori* sp. n., holotype

Prothoracic hypomeron weakly convex, laterally with obsolete impression, without wrinkles. Basal fold of prothoracic hypomeron absent.

Metasternum marginated anteriorly.

Elytron without humeral callus. Elytral punctures 0.03 mm wide, arranged in abbreviated scutellar row and 10 dense entire rows. Puncture rows equidistant, irregular, partly double. Rows 6–8 mostly irregular, hardly traced. Intervals flat, covered by fine punctures (0.015 mm wide). Sutural stria absent at apical slope. Elytral epipleuron inclined outside, visible along entire length in lateral view, without setae.

Hind wings absent.

Tarsomeres 1–3 with entire sole, narrow, slightly broadened in fore- and mid-tarsi. Claw tarsomere without denticles beneath.

Pygidium without longitudinal impression.

Last abdominal sternite convex, slightly depressed medially, with apical margin bisinuate.

Aedeagus strongly arcuate, thick basally and flattened apically, with apex narrowly drawn out, bottle-shaped. Flagellum simple, cylindrical, not very narrow, exposed.

Body length: 6.4 mm.

Variability. Females (paratypes) 7.0 mm long, coppery dorsally, with last abdominal sternite evenly convex and rounded apically, tarsomeres 1–3 narrow, with entire sole.

Differential diagnosis. The shape of the last maxillary palpomere is of great importance in the taxonomy of the genus *Chrysolina*. This character allows distinguishing the subgenera (BIENKOWSKI 2019). The shape of the last maxillary palpomere in the new species (it is shorter and narrower than the penultimate one) is a rare case in the genus *Chrysolina*. Among Chinese species, this shape of maxillary palpi is known only in one species, *Ch. pيلي* Chen, 1936 (not assigned to any subgenus) from SE China (Fig. 1K). *Ch. pيلي* differs from the



Fig. 4. Type locality of *Chrysolina caspari* sp. n. (Photo: I. A. Belousov)

new species in its larger size (7.1–7.6 mm long), broad, almost hemispherical body (Fig. 1H, I), the presence of large punctures on the lateral sides of the pronotum, simple posterior margin of the last abdominal sternite in the male, and the shape of the aedeagus: apex bearing small appendix separated by constriction (CHEN 1936, and material examined) (Fig. 1J). It is interesting that *Ch. pieli*, like the new species, has one more rare feature: the sutural stria of elytron is absent. However, I do not include the two species in question into new subgenus due to the differences described above.

The last maxillary palpomere, which is much shorter and narrower than penultimate, is atypical for the native Chinese fauna of subtribe Chrysolinina. In addition to the two above-mentioned species, it is present only in the invasive *Leptinotarsa decemlineata* (Say, 1824) (YANG *et al.* 2015). However, it is found in neotropical genera of the same subtribe, namely in *Eugonycha* Chevrolat, 1843, *Proseicela* Chevrolat, 1837, *Platyphora* Gistel, 1857, *Labidomera* Chevrolat, 1837, *Leptinotarsa* Stål, 1858, *Strichosa* Chevrolat, 1843, *Stilodes* Chevrolat, 1843, *Deuterocampta* Chevrolat, 1837, *Cryptostetha* Baly, 1858, *Doryphora* Illiger, 1807, *Trichomela* Chapuis, 1874, *Elytrosphaera* Chevrolat, 1843 (STÅL 1862–1865, BECHYNÉ 1946, 1947, 1954, DACCORDI 1994, DACCORDI & LESAGE 1999, FLOWERS 2004, DACCORDI & ZOIA 2017, specimens examined).

Landscape in type locality: *Rhododendron* bushes, meadows, rock outcrops (I. I. Kabak, pers. comm.) (Fig. 4).

Etymology. The new species is named in honor of biblical Magian Caspar, is due to the fact that the article was being prepared before Christmas and New Year.

Chrysolina pieli Chen, 1936
(Figs 1H–K)

Material examined: China, Zhejiang Province, Tienmushan, 14.VII.1937: 1 female (MDC); China, W Henan Province, Funiu Shan, Baotianman, 33°31'N / 111°56' E, H=1500–1750 m, 15.V–5.VI.2009, J. Turna leg.: 1 male (MDC).

***Chrysolina melchiori* sp. n.**

<http://zoobank.org/248B4A44-1C1D-4EF6-83AA-DD1C5EF60C90>
(Figs 1C, F; 2B; 3B, F, 5)

Material examined: Holotype: China, Yunnan Province, Laojunshan, watershed Yushi & Chongjiang rivers, 26°39'22" N / 99°41'03" E, H=4020 m, 22.VI.2014, I. Belousov, I. Kabak leg.: male (ZIN); with red holotype label. Paratypes: the same label as holotype: 1 female (ZIN), 2 males (PRC); China, Yunnan Province, Laojunshan, lake, sources river near Xishiyang, 26°39'15" N / 99°41'60" E, H=3935 m, 23.VI.2014, I. Belousov, I. Kabak leg.: 1 male (ABC); with red paratype labels.

Description. Male (holotype). Body oval, 1.5× as long as wide, convex. Dorsal side black with weak violet reflection, with narrow anterior, lateral and basal borders of pronotum and lateral border of elytra dark blue. Antennae blue with antennomeres 1 and 2 rufous below apically. Maxillary palpi, underside, and legs dark blue. Head and pronotum dull, strongly reticulate and obsoletely micropunctulate (punctures about 0.015 mm wide); elytra smooth with strongly reticulated large funnels bearing puncture at the bottom.

Last maxillary palpomere barrel-shaped, broader apically than basally, 1.2× as long as wide, 1.3× longer and 1.1× wider than penultimate one.

Antennal insertion 3.0× closer to clypeus than to eye.

Pronotum broadest before base, with lateral sides rounded, much more convergent anteriorly than posteriorly. Lateral callus hardly convex, almost absent, not separated from disc, lateral impression absent. Pronotum covered by dense, fine punctures (about 0.02 mm wide). Pronotum margined and ciliate anteriorly. Setiferous pores at anterior angles absent.

Prothoracic hypomeron weakly convex, laterally with weak impression covered with obsolete wrinkles, without lateral border. Basal fold of prothoracic hypomeron absent.

Metasternum margined anteriorly.

Elytron without humeral callus. Elytral punctures entirely irregular. Punctures fine (0.03 mm wide), numerous, each placed at the bottom of large strongly reticulated funnel (0.2–0.3 mm wide). Due to the presence of dense funnels and slightly convex intervals, elytral surface appears slightly wrinkled. Distinct sutural stria developed at apical slope. Elytral epipleuron inclined outside, visible along entire length in lateral view, with setae at apex.

Hind wings absent.

Tarsomeres 1–3 with entire sole, distinctly broadened, especially fore- and mid-tarsomeres 1 and 3 and hind-tarsomere 1. Claw tarsomere without denticles beneath.



Fig. 5. *Chrysolina melchiori* sp. n., holotype, relief of elytron

Pygidium with longitudinal impression in basal $\frac{1}{2}$ and convex, without impression in apical $\frac{1}{2}$.

Last abdominal sternite evenly convex, broadly truncate apically.

Aedeagus strongly arcuate, flattened, with apical margin truncate and slightly emarginate. Flagellum simple, narrow, whip-shaped, exposed.

Body length 7.9 mm.

Variability. Paratypes: male 8.2 mm, female 9.3 mm long; female with tarsomeres 1–3 narrow, with entire sole, with last maxillary palpomere $1.4\times$ as long as wide, as long as penultimate one, $1.1\times$ broader than latter.

Differential diagnosis. Relief of elytral surface (strongly reticulated irregular funnels bearing a puncture at the bottom, separated by smooth intervals) makes this species unique in the genus *Chrysolina*. Without taking it into account, a combination of the following features is nearly unique in the genus *Chrysolina*: dorsum entirely black with metallic reflection, last maxillary palpomere $1.2\text{--}1.4\times$ as long as wide, pronotal lateral callus hardly convex, pronotal lateral impression and large punctures absent, setiferous pore at pronotal anterior angles absent, prothoracic basal fold absent, prothoracic hypomeron without deep lateral impression and without lateral border, elytral puncturation entirely irregular, hind wings absent, tarsomeres 1–3 with entire sole in both sexes, broadened in male, pygidium without impression in apical part, male last abdominal sternite simple.

Only representatives of the subgenus *Ch. (Medvedevlevna)* Özdikmen, 2008, inhabiting Sichuan and Gansu Provinces, share most of these characters, except for the following: elytral punctures some larger and much denser, without funnels. Besides that, *Ch. (Medvedevlevna)* members have aedeagus much larger (about 4 mm long and $0.5\times$ as long as total body length, while the new species has aedeagus 1.7 mm long and $0.2\times$ as long as total body length) and bearing large spoon-shaped apical lobe (BIEŃKOWSKI 2019). Due to these differences, I do not include the new species in the subgenus *Ch. (Medvedevlevna)*.

Landscape in type locality: upper forest with patches of meadows and screes (I. I. Kabak, personal communication).

Etymology. The new species is named in honor of biblical Magian Melchior, is due to the fact that the article was being prepared before Christmas and New Year.

***Chrysolina balthazari* sp. n.**

<http://zoobank.org/E920AEE7-64CB-4D27-93EB-1F890B0053DF>

(Figs 1B, G; 2C; 3C, E)

Material examined: Holotype: China, Yunnan Province, Lijiang – Shangrila, 214 Ntn. Road WSW of Edi Village, $27^{\circ}19'31''$ N / $99^{\circ}51'27''$ E, H=3960 m, 01.VI.2013, I. Belousov, I. Kabak, G. Davidian leg.: male (ZIN); with red holotype label. Paratypes: the same label as holotype: 1 male, 3 females (ZIN, ABC); with red Paratype labels.

Description. Male (holotype). Body elongate oval, 1.7× as long as wide, convex, with constriction between pronotum and elytra. Dorsal and ventral sides of body, femora, and tibiae metallic brassy, tarsi and maxillary palpi black, antennae black with antennomeres 1 and 2 rufous below. Dorsal side shining, micropunctulate (punctures about 0.01 mm wide) and reticulate (more distinctly on head and elytron).

Last maxillary palpomere barrel-shaped, 1.2× as long as wide, 1.5× longer and 1.2× wider than penultimate one.

Antennal insertion 2.4× closer to clypeus than to eye.

Pronotum broadest at mid-length, with lateral sides rounded, more convergent anteriorly than posteriorly. Lateral callus narrow, convex, separated from disc by wide deep impression along almost entire length except near anterior margin. Lateral impression filled with large (0.09–0.1 mm wide) numerous, partly coalescent punctures. Pronotal disc covered by sparse fine punctures (0.015 mm wide). Pronotum marginated and ciliate anteriorly. Setiferous pores at anterior angles absent.

Prothoracic hypomeron convex, laterally with deep impression covered with wrinkles, without lateral border. Distinct basal fold of prothoracic hypomeron absent and replaced by short impression.

Metasternum marginated anteriorly.

Elytron with obsolete humeral callus. Elytral punctures arranged in abbreviated scutellar row and 10 regular entire rows. Puncture rows 2–3, 4–5, 6–7, and 8–9 paired. Rows consist of dense, moderate (0.05 mm wide), funnel-shaped punctures. Narrow intervals between rows of each pair slightly wrinkled. Broad intervals between pairs of rows convex, with intervals between rows 5 and 6, 7 and 8 more convex than others. Distinct sutural stria developed at apical slope.

Elytral epipleuron inclined outside, visible along entire length in lateral view, with sparse setae at apex.

Hind wings absent.

Tarsomeres 1–3 with entire sole. Fore-, mid-, and hind-tarsomeres 1 very broad, fore- and mid-tarsomeres 3 moderately broadened. Fore-tarsomere 1 1.2× as wide as fore-tarsomere 3. Claw tarsomere without denticles beneath.

Pygidium with narrow longitudinal impression in basal ½, and convex, without impression in apical ½.

Last abdominal sternite evenly convex, broadly truncate apically.

Aedeagus strongly arcuate, with apex recurved dorsally, some flattened, with dorsal side broadly impressed before apical orifice, with apex elongate triangular, slightly drawn out, with 2 fine apical denticles ventrally. Flagellum simple, narrow, exposed.

Body length: 7.7 mm.

Variability. Paratypes: male 6.8 mm, females 8.4–9.0 mm long. In some specimens, broad intervals between rows 3 and 4, 5 and 6, 7 and 8 very convex, nearly ridge-shaped. Female with tarsomeres 1–3 narrow, with entire sole, with last maxillary palpomere narrower than those in male, 1.5× as long as wide, similar to penultimate one in length and width, last abdominal sternite rounded apically.

Differential diagnosis. Peculiar relief of elytra (alternation of wide convex intervals between pairs of rows and very narrow flat or slightly convex intervals between rows of one pair) makes this new species well distinguishable from most *Chrysolina* members. Partly similar relief is found in unrelated *Ch. (Timarchoptera) soiota khakassa* Mikhailov, 2002 and *Ch. (Timarcholina) carinata*

(Jacoby, 1903) (BIEŃKOWSKI 2019). It is interesting, that other unrelated species have very convex intervals of each pair of rows (2–3, 4–5, 6–7, 8–9), as in *Ch. (Arctolina) magniceps* (J. Sahlberg, 1887), *Ch. (Rhyssoloma) fragariae* (Wollaston, 1854), and *Ch. (Timarchomela) costulata* (Achard, 1922), but not the intervals between pairs of rows (BIEŃKOWSKI 2019).

Due to this feature, the new species can only be close to *Ch. jinxiaoe* Ge in: DACCORDI, GE, CUI et YANG (2011) (not assigned to any subgenus) from N Sichuan (Fig. 2D). The latter differs from the new species in the following features: pronotum broadest basally, with lateral sides almost straight, convergent forward, pronotal lateral impression smooth, without large punctures, paired elytral rows consist of fine punctures (0.02 mm wide), with narrow intervals impressed; fore- and mid-tarsomeres 1 and 3 of equal width; aedeagus broadly truncate, without narrow apical projection (BIEŃKOWSKI 2019, and material examined). Owing to these differences, I do not include these two species in one new subgenus.

Landscape in type locality: forest, bamboo thickets, fragments of meadows (I. I. Kabak, personal communication).

Etymology. The new species is named in honor of biblical Magian Balthazar, is due to the fact that the article was being prepared before Christmas and New Year.

Chrysolina jinxiaoe Ge in: Daccordi, Ge, Cui, Yang, 2011

Material examined: PARATYPES: China, N Sichuan Province, environs of Nanping, H=3500m, 10–19.VI.1997, S. Murzin leg.: 1 male, 1 female (ABC).

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