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Revision of the subgenus *Anopachys* MOTSCHULSKY, 1860 of the  
genus *Chrysolina* MOTSCHULSKY, 1860  
(Coleoptera: Chrysomelidae: Chrysomelinae)

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ABSTRACT. Ten species, *Chrysolina aurichalcea* with three subspecies, *Ch. eurina*, *Ch. schatzmayri*, *Ch. gensanensis*, *Ch. quadrangulata*, *Ch. lineigera*, *Ch. lineella*, *Ch. relucens* and two new species: *Ch. neglecta* (Khabarovsk Terr. and Primorski Krai) and *Ch. pala* (Primorski Krai), are included in the subgenus *Anopachys* herewith. Type specimens of eleven taxa belonging to *Anopachys* are examined. Having examined the type of *Chrysomorpha quadrangulata*, which has been suppressed as a synonym of *Ch. aurichalcea*, I have concluded that *Ch. quadrangulata* is a good species. Intraspecific variation of *Ch. aurichalcea* is studied in detail on the basis of material from the whole area. Some biological data are given. Twelve taxa are excluded from the subgenus *Anopachys*.

Key words: Entomology, taxonomy, revision, new species, *Coleoptera*, *Chrysomelidae*, *Chrysolina*, *Anopachys*.

MATERIALS

I have examined the type specimens from the following museums (in brackets names of curators) and collections:

AC - Author's collection, Moscow, Russia;

FC - G. FREY's collection, now deposited in Weil am Rhein Museum, Germany;

KC - O.N. KABAKOV's collection, St.-Petersburg, Russia;

LC - I.K. LOPATIN's collection, Minsk, Byelorussia;

ZIN - Zoological Institute of Russian Academy of Sciences, St.-Petersburg, Russia (G.S. MEDVEDEV);

ZMMU - Zoological Museum of the Moscow State University, Moscow, Russia (N.B. NIKITSKIJ).

## ACKNOWLEDGEMENTS

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## METHODS

In order to separate *Ch. aurichalcea* and *Ch. quadrangulata* and to study the geographic variability of the former, 14 metric characters (Figs 106-109) were measured under stereomicroscope in all the specimens examined.

The names, which were firstly proposed as infrasubspecific ones and were not rised to the subspecific or specific rank, are unavailble (International Code of Zoological Nomenclature 1988, Art. 1b, 10c), therefore I did not include these names in the bibliography lists proposed below.

### Subgenus *Anopachys* MOTSCHULSKY, 1860

*Anopachys* MOTSCHULSKY 1860: 202.

*Chrysomela* (= *Anopachys*): WEISE in JUNK and SCHENKLING 1916: 56 (partim).

*Chrysolina* (*Anopachys*): BECHYNÉ 1950: 146, 1952: 360; BOURDONNÉ and DOGUET 1991: 54 (partim); WARCHAŁOWSKI 1993: 181.

*Oreina* (= *Anopachys*): GRESSITT and KIMOTO 1963: 307 (partim).

Type species: *Chrysomela asclepiadis* VILLA 1833, by the original designation.

Etymology. - The name is derived from the Greek words *anus* and *pachys*, meaning thick; these may refer to the shape of the last abdominal sternum in female.

Distribution: Palaearctic and Oriental regions.

## DIAGNOSIS

1. Above shining, dark metallic or black.
2. Last segment of maxillary palpus oval, truncate, or cylindrical, or slightly broadened apically, almost similar to the preceding segment, not sexually dimorphic (in *Ch. eurina* last segment broader in male).
3. Antenna inserted at middle between clypeus and eye, or 1.2-2.0 times closer to the former.
4. Pronotum with convex lateral calli on its entire length. Lateral impressions deep to shallow in basal 1/4-1/2, shallow to obsolete anteriorly, everywhere covered with large punctures.
5. Prothoracic epimerum longitudinally convex, weakly or moderately impressed and transversely rugose along outer margin, having short longitudinal fold near base.

6. Elytron with or without humeral callus in species having developed or vestigial hind wings respectively.
7. Elytron densely, moderately or coarsely punctate, having 4-5 smooth shining, somewhat convex or flat longitudinal bands, which are limited with more or less regular puncture rows, or wholly confusedly punctate.
8. Epipleura visible on the entire length in lateral view.
9. Tarsi wholly pubescent beneath in both sexes. Segment 1 of fore and mid (sometimes also hind) tarsus slightly or moderately enlarged in male.
10. Pygidium with longitudinal groove, at least in basal half.
11. Last abdominal sternum weakly convex, with or without median impression, or flattened in male, convex and mostly turned back at apex in female.
12. Aedeagus long, thin, oval in cross-section, moderately evenly curved, of almost equal width at the entire length; apex of different shape. Flagellum simple, slightly projects beyond apical orifice.

***Chrysolina (Anopachys) aurichalcea aurichalcea* (GEBLER, 1825)**

(Figs 13-18, 32-44, 87-95, 110-121, 125)

- Chrysomela aurichalcea* GEBLER in MANNERHEIM, 1825: 39 (Altai, type lost ?)
- Chrysomela aurichalcea*: GEBLER 1830: 212; LEWIS 1879: 28; KOLBE 1886: 228; WEISE 1887: 181; JACOBSON 1901: 127, 1902: 28; MÜLLER 1916: fig. 97; WEISE in JUNK and SCHENKLING 1916: 59; BREIT 1920: 88; SCHATZMAYR 1927: 151; PORTA 1934: 289; CHEN 1935a: 3; MÜLLER 1949-1953: 377.
- Chrysolina aurichalcea*: CHEN 1935b: 158, 1936a: 67, 1936b: 153; BECHYNÉ 1950: 146; BOURDONNÉ and DOGUET 1991: 54; MEDVEDEV 1992: 566.
- Oreina (Chrysolina) aurichalcea*: GRESSITT and KIMOTO 1963: 311, 314.
- Chrysomela gibbipennis* FALDERMANN, 1835: 105 (Eastern Siberia: Irkutsk, type lost ?).
- Chrysomela aurichalcea* var. *gibbipennis*: GEMMINGER and HAROLD 1874: 3414; JACOBSON 1901: 127, 1902: 28.
- Chrysomela aurichalcea* (= *gibbipennis*): WEISE 1887: 182, 186.
- Chrysomela aurichalcea* ab. *gibbipennis*: WEISE in JUNK and SCHENKLING 1916: 59.
- Chrysolina aurichalcea aurichalcea* ab. *gibbipennis*: BECHYNÉ, 1950: 146; WARCHAŁOWSKI 1993: 183.
- Chrysomela elevata* SUFFRIAN, 1851 (Great Britain: envir. of London, type deposition not indicated).
- Chrysomela aurichalcea* (= *elevata*): WEISE 1887: 182, 186.
- Chrysomela aurichalcea* var. *elevata*: JACOBSON 1901: 127.
- Chrysomela aurichalcea* ab. *elevata*: WEISE in JUNK and SCHENKLING 1916: 59.
- Chrysolina aurichalcea aurichalcea* ab. *elevata*: BECHYNÉ 1950: 146; WARCHAŁOWSKI 1993: 183.
- Anopachys violaceicollis* MOTSCHULSKY, 1861: 21 (Japan, ZMMU).
- Chrysomela aurichalcea* var. *violaceicollis*: GEMMINGER and HAROLD 1874: 3414.
- Chrysomela aurichalcea* (= *violaceicollis*): LEWIS 1879: 28; WEISE 1887: 182, 186.
- Chrysomela aurichalcea* ab. *violaceicollis*: WEISE in JUNK and SCHENKLING 1916: 59.
- Chrysolina aurichalcea aurichalcea* ab. *violaceicollis*: BECHYNÉ 1950: 146.
- Chrysomela wallacei* BALY, 1862b: 21 (China: Manchuria, type deposition not indicated).
- Chrysomela wallacei*: WEISE in JUNK and SCHENKLING 1916: 98.
- Chrysomela aurichalcea* (= *wallacei*): CHEN 1935a: 3.
- Chrysolina aurichalcea* (= *wallacei*): CHEN 1936a: 67, 1936b: 153.

- Chrysolina aurichalcea aurichalcea* (=wallacei): BECHYNÉ 1950: 146.  
*Oreina (Chrysolina) aurichalcea* (=wallacei): GRESSITT and KIMOTO 1963: 314.  
*Chrysomela amethystina* KOLBE, 1886: 228 (Korea: “zwischen Soul und Pingan”, type deposition not indicated).  
*Chrysomela aurichalcea* (=amethystina): CHEN 1935a: 3.  
*Chrysolina aurichalcea* (=amethystina): CHEN 1936a: 67, 1936b: 153.  
*Chrysolina aurichalcea amethystina*: BECHYNÉ 1950: 147.  
*Oreina (Chrysolina) aurichalcea* (=amethystina): GRESSITT and KIMOTO 1963: 314.  
*Chrysomela cupraria* KOLBE, 1886: 229 (Altai, type deposition not indicated).  
*Chrysolina aurichalcea* (=cupraria): WEISE in JUNK and SCHENKLING 1916: 59.  
*Chrysomela pekinensis* FAIRMAIRE, 1887: 331 (China: Peking, type in Narodni Muzeum, Prague).  
*Chrysomela pekinensis*: WEISE in JUNK and SCHENKLING 1916: 85.  
*Chrysolina aurichalcea* (=pekinensis): CHEN 1936a: 67, 1936b: 153.  
*Chrysolina aurichalcea pekinensis*: BECHYNÉ 1950: 147.  
*Oreina (Chrysolina) aurichalcea* (=pekinensis): GRESSITT and KIMOTO 1963: 314.  
*Chrysomela aurichalcea* var. *recticollis* WEISE, 1887: 182, 185 (“haufig in Japan, selten am Amur”, type deposition not indicated).  
*Chrysomela japana*: MARSEUL 1886: 41 nec BALY 1874: 171.  
*Chrysomela aurichalcea* var. *collaris* WEISE, in JUNK and SCHENKLING 1916: 59. Replacement name for *recticollis* WEISE 1887 nec MOTSCHULSKY 1860. **Syn. nov.**  
*Chrysomela aurichalcea collaris*: BREIT 1920: 88.  
*Chrysolina aurichalcea collaris*: BECHYNÉ 1950: 146, 147.  
*Chrysomela aurichalcea* var. *nigricans* JACOBSON 1902: 100 (Altai: Ongudaj, ZIN). **Syn. nov.**  
*Chrysomela aurichalcea* ab. *nigricans*: WEISE in JUNK and SCHENKLING 1916: 59.  
*Chrysolina aurichalcea aurichalcea* ab. *nigricans*: BECHYNÉ 1950: 146.  
*Chrysolina aurichalcea kwanghsiensis* BECHYNÉ, 1950: 147 (China: Szetschwan: Kwanghsien, FC).  
*Oreina (Chrysolina) aurichalcea* (=kwanghsiensis): GRESSITT and KIMOTO 1963: 314.  
*Chrysolina aurichalcea omisiensis* BECHYNÉ, 1950: 147 (China: Szetschwan: Omisien, FC).  
*Oreina (Chrysolina) aurichalcea* (=omisiensis): GRESSITT and KIMOTO 1963: 314.  
*Chrysolina aurichalcea fokiensis* BECHYNÉ, 1950: 147 (China: Fujian [=Fukien], type in Narodni Muzeum, Prague).  
*Oreina (Chrysolina) aurichalcea* (=fokiensis): GRESSITT and KIMOTO 1963: 314.  
*Chrysolina aurichalcea yunnanica* BECHYNÉ, 1950: 148 (Korea: Yunnan, type in Narodni Muzeum, Prague).  
*Oreina (Chrysolina) aurichalcea* (=yunnanica): GRESSITT and KIMOTO 1963: 314.  
*Chrysolina aurichalcea vagesplendens* BECHYNÉ, 1950: 148 (Vietnam: Annam, type in Narodni Muzeum, Prague). **Syn. nov.**

#### ETYMOLOGY

The name is derived from the Latin words *aurum*, meaning gold, and *chalceus*, meaning bronze or cooper; these may refer to the colour of type specimens (see MANNERHEIM 1825).

#### DESCRIPTION

Above more or less shining, black, bronze, cooper, violaceous, green, blue, or two-coloured: pronotum violaceous, elytrae bronze. Antennae, lower surface and legs dark metallic, shining. Antennal joints 1 and 2 rufous below.

Last segment of maxillary palpus as long as the previous one, as wide as the latter or slightly narrower.

Antennae inserted slightly closer to clypeus than to eye.

Pronotum transversely depressed or more or less convex, broadest basally, in the middle of its length or before middle. Lateral sides rounded or almost straight. Anterior angles strongly produced. Disk shagreened or smooth, unevenly densely punctate; punctures small, moderate or large and rugose. Lateral callus finely punctate, with several large punctures on inner side. Lateral impression deep in basal part, shallow in apical part, covered with large numerous punctures, partly coalescent near base.

Elytron smooth, sparsely finely punctulated and largely densely evenly punctate. Large punctures partly arranged in rows or wholly confused. Lateral callus weakly convex or depressed, distinctly densely punctate, punctures tiny or large. Humeral callus convex, elytron behind it slightly impressed. Epipleura densely ciliate on apical part.

Wings developed.

Segment 1 of male fore tarsi weakly dilated, somewhat narrower than in subspecies *bohemica* and *asclepiadis* (Fig. 112).

Pygidium with longitudinal groove, which broad and deep basally, gradually tapers and nearly reaches the apex.

Last abdominal sternum depressed, or weakly convex in male, convex and more or less turned back at apex, rarely not turned back in female.

Aedeagus anchor-shaped at apex (Figs 13-18, 32-44). Apical triangle shorter than in *Ch. quadrangulata* (Fig. 110), as wide as aedeagus before orifice or narrower. Apical margin of different shape (triangular, rounded or bisinuate). Apical orifice longitudinal, covered by membrane only near base.

Spermatheca hook-shaped, without constriction; sclerotized duct usually long.

Length (mm): 5.3-8.3 (male), 6.5-9.6 (female). Width (mm): 3.1-5.3 (male), 3.9-6.4 (female).

#### DISTRIBUTION

Great Britain, European part of Russia, the Crimea, Eastern Kazakhstan, Kirghizia, Azerbaijan, middle and south of Western and Eastern Siberia, Yakutia, Magadan reg., the Far East, Sakhalin, Kuriles, Japan, Korea, Northern-Western, Northern-Eastern, Central, Eastern and Southern China, Vietnam, Northern and Central Mongolia (Fig. 125).

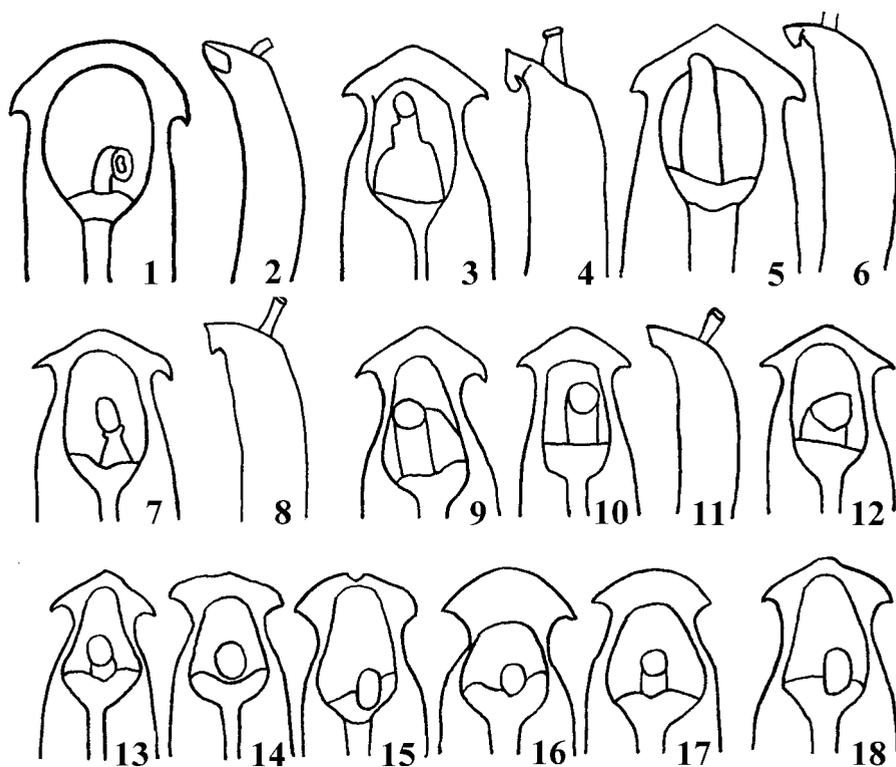
#### REMARKS

The original description of "*Chrysomela aurichalcea* GEBLERI" was prepared by GEBLER and included in the paper by MANNERHEIM (1825).

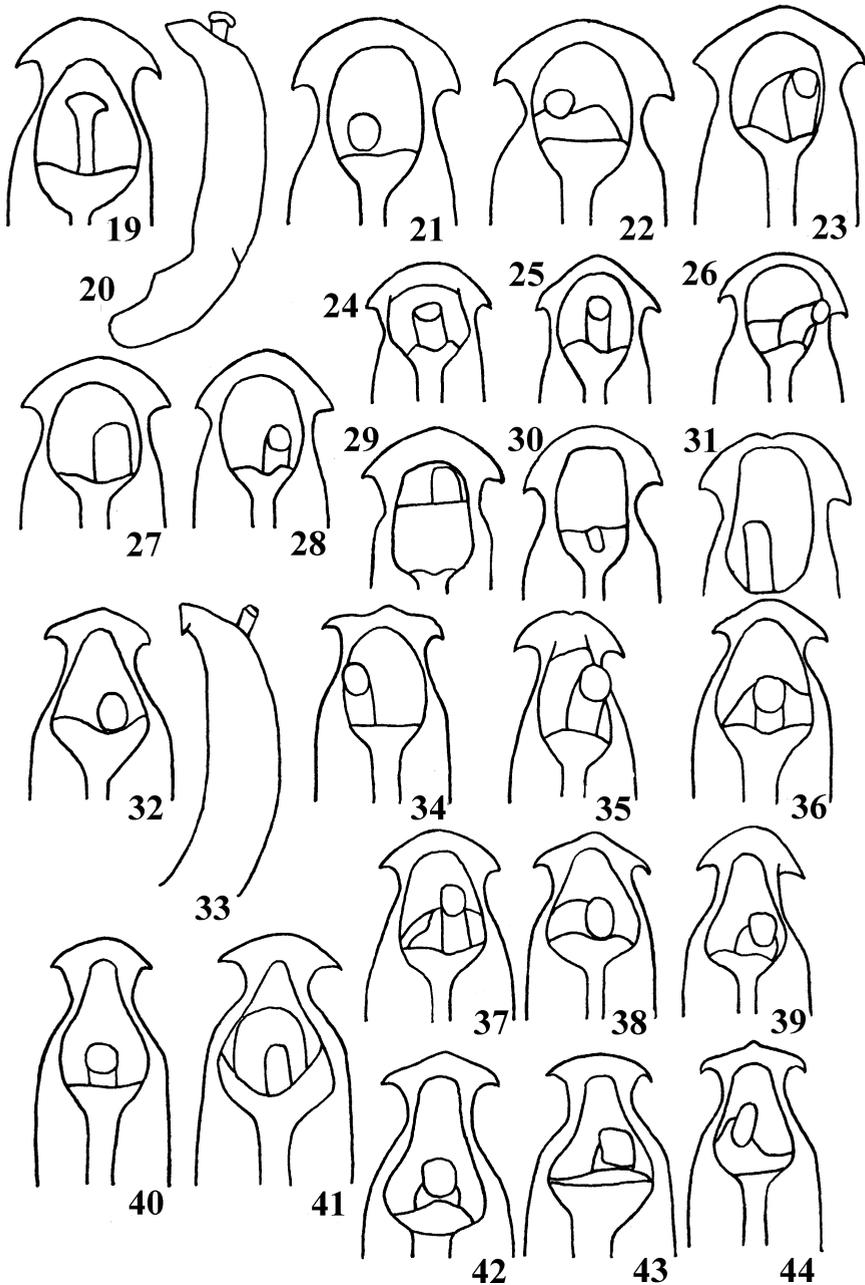
Then, GEBLER (1830) pointed out his authorship. However, all later authors attributed the authorship to MANNERHEIM. According to the International Code of Zoological Nomenclature (1988), Art. 50a (example), the author of *Ch. aurichalcea* is GEBLER.

*Ch. aurichalcea* is an extremely variable species with respect to the size and shape of body, colouration, sculpture of elytra, outline of pronotum and even the structure of aedeagus. Therefore a great number of species, subspecies and varieties were erroneously described by different authors.

The original description of *Chrysomela gibbipennis* is sufficiently detailed (FALDERMANN 1835), but it does not include the characters which allow to distinguish this species from *Ch. aurichalcea*. Type was deposited in FALDERMANN's Museum and, probably no longer exists. FALDERMANN (1835) said "Thorax ... lateribus ante medium parum dilatatis". Subsequent authors (WEISE 1887, BECHYNÉ 1950) considered *gibbipennis* as a colour variation ("*cyanea, subcupreo-nitens*") of nominotypical subspecies. Most of the available specimens from the environs of Irkutsk have pronotum which is broadest behind the middle, whereas this character greatly varies in specimens from the type area of nominotypical subspecies (Fig. 119). I agree with the opinion of WEISE (1887) that *Ch. gibbipennis* is an junior synonym of *Ch. aurichalcea aurichalcea*.



1-18. Aedeagus: 1, 2 - *Chrysolina schatzmayri* (Grado, lectotype), 3-6 - *Ch. aurichalcea asclepiadis* (3, 4 - Simplon, 5, 6 - Cevio), 7-12 - *Ch. aurichalcea bohemica* (7-9 - Bormio, 10-12 - Balta), 13-18 - *Ch. aurichalcea aurichalcea* (13-17 - Moscow, Matveevskoje, 18 - Sevastopol)



19-44. Aedeagus: 19-31 - *Chrysolina quadrangulata* (19, 20 - "Dauria m." (paralectotype), 21, 22 - Kosh-Agach, 23 - Irkutsk, 24-26 - Sugu-Nur riv., 27, 28 - Nyurba, 29 - Ajan (lectotype *Chrysomela omoka*), 30, 31 - Khilgant, 32-44 - *Ch. aurichalcea aurichalcea*: 32-35 - Ongudaj, 36 - Ongudaj (lectotype var. *nigricans*), 37, 38 - Irkutsk, 39, 44 - Undzhul, 40, 41 - Hokkaido, 42, 43 - Szechuan

The original description of *Chrysomela elevata* was based on the single specimen which was collected in the environs of London (SUFFRIAN 1851). The subsequent authors (WEISE 1887, BECHYNÉ 1950) disregarded the latter fact and treated *Ch. elevata* as a golden-green colour variation of the nominotypical subspecies which is distributed, according to them, in Siberia, the Far East, China and Mongolia. I have not examined any material from Great Britain. *Chrysomela elevata* differs from *Chrysolina aurichalcea asclepiadis* and *Ch. aurichalcea bohémica* distributed in Western Europe in the colour of dorsum (“licht goldgrün”) and puncturation of elytra (“grob und dicht”). Also, SUFFRIAN (1851) said: “Wenig kürzer als die vorhergehende Art [*Ch. aurichalcea*], aber bedeutend schmaler, ...” and adduced the measurements: 5.5 mm long and 3.5 mm wide. However, these values refer to males of *Ch. aurichalcea aurichalcea*. Characters mentioned in the original description of *elevata* quite correspond with those of *Ch. aurichalcea aurichalcea*. Therefore, *elevata* should be regarded as a junior synonym of *Ch. aurichalcea aurichalcea*.

According to the original description (MOTSCHULSKY 1861), *Anopachys violaceicollis* is larger than *A. aurichalcea* and *A. asclepiadis* and differs from them in its colour: “*supra aurichalceo-purpurata, subtus cum capite nigro sub-violaceo-iridescens; thorace violaceo*”, “*scutello violaceo*”. Later *A. violaceicollis* was reduced to a colour aberration (WEISE 1887, BECHYNÉ 1950). I designated the type specimen of *A. violaceicollis* as lectotype, because MOTSCHULSKY (1861) did not point to the number of specimens studied. The lectotype is a large female, 9.6 mm long, 6.4 mm wide, the largest of specimens examined and the single two-coloured specimen from Japan at my disposal (however SUZUKI et al., (1977) observed two-coloured *Ch. aurichalcea* in Japan). In other respects the type of *A. violaceicollis* does not differ from the additional specimens of *Ch. aurichalcea* from Japan and the Far East. Therefore, I believe *A. violaceicollis* to be a junior synonym of *Ch. aurichalcea*.

The original description (BALY 1862b) of *Chrysomela wallacei* does not include any differences from *Ch. aurichalcea*. All the specimens from N.-E. China being at my disposal belong to the nominotypical subspecies. Therefore, I agree with the authors which consider *Ch. wallacei* as a junior synonym of *Ch. aurichalcea*.

The principal features of *Chrysomela amethystina*, mentioned in the original description, are the following: “die kurzen und hochgewölbten Flügeldecken”, “3., 4. und 5. Glied [of antennae] lang, 3. ein wenig länger als die übrigen”, “Prothorax doppelt so breit als lang”, “Prothorax ... oberseits zerstreut und mittelmässig punktiert” (KOLBE 1886). Specimens from Korea being at my disposal do not differ from those from Altai and Tuva (nominotypical subspecies) in the proportions of body (Fig. 114), antennal segments (Fig. 120), shape (Fig. 118), and puncturation of pronotum. Therefore, I subscribe to the opinion of CHEN (1936a, b) and GRESSITT and KIMOTO (1963) that *Ch. amethystina* is a junior synonym of *Ch. aurichalcea*.

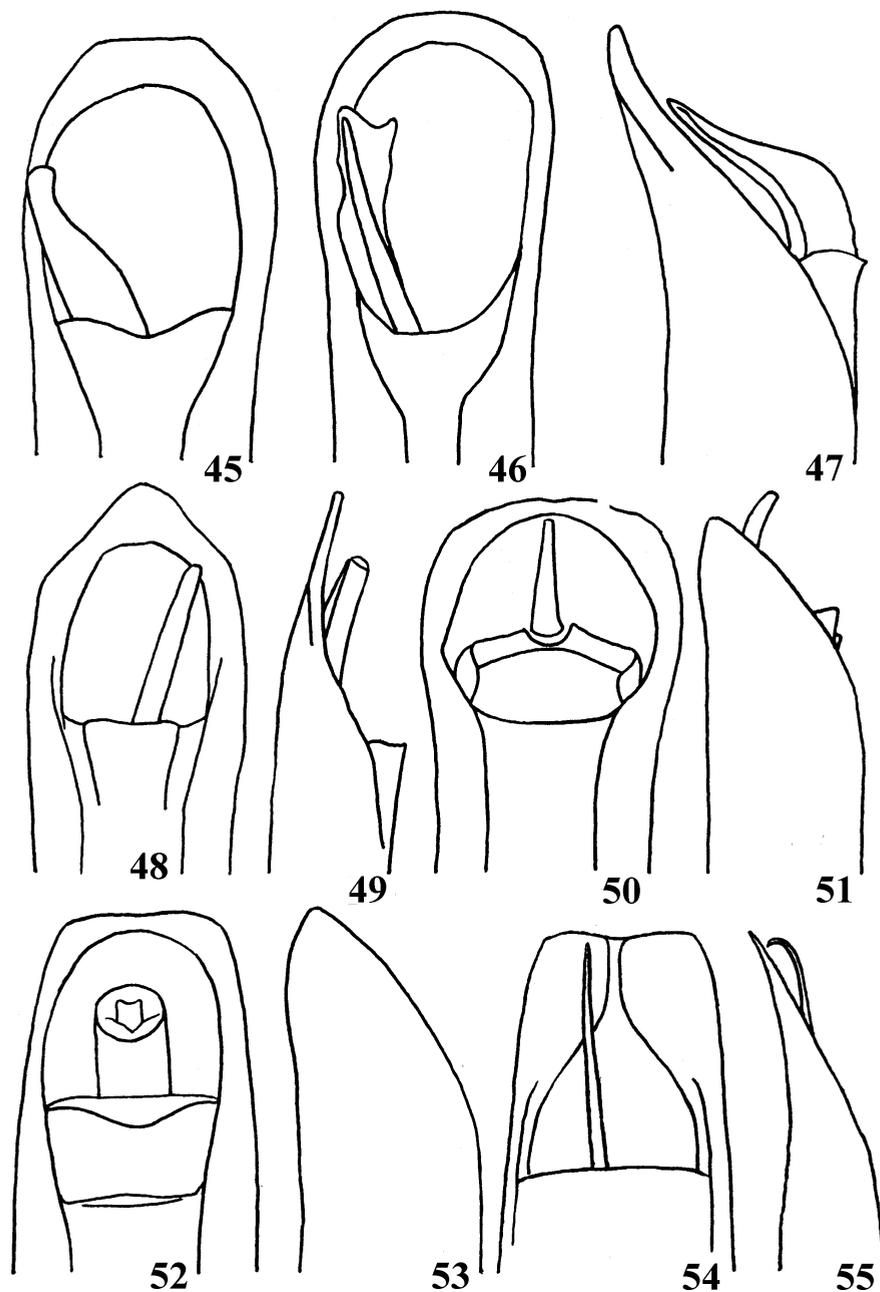
According to the original description (KOLBE 1886), *Chrysomela cupraria* differs from *Ch. aurichalcea* as follows: “Der Körper ... viel kürzer als bei *aurichalcea*, der Prothorax verhältnissmässig kleiner, die Seiten desselben weniger gerundet”, “Die Sculptur der Flügeldecken ist wie bei *aurichalcea*, die Doppelreihen von Punkten aber noch weniger regelmässig”. However, all the above listed characters should be attributed to individual variability. Therefore, I agree with WEISE (1916), who believed *Ch. cupraria* to be a junior synonym of *Ch. aurichalcea*.

BECHYNÉ (1950) examined types of *Chrysomela pekinensis*, deposited in the collection of J. ACHARD (Prague) and pointed at the following features of this form: “Prothorax beaucoup plus étroit que les élytres, sensiblement rétréci en avant, côtés peu arrondis. Taille plus petite, de 7 à 8 mm. Dessus ordinairement bleu.” I failed to borrow these materials. The shape of pronotum (Fig. 117), its relative width (Fig. 115) and body size do not practically differ in specimens from North-Eastern, Eastern and central China on the one hand and from Siberia (Altai, Tuva) on the other. Therefore, I agree with CHEN (1936a, b) and GRESSITT and KIMOTO (1963) who believed *Ch. pekinensis* to be a junior synonym of *Ch. aurichalcea*.

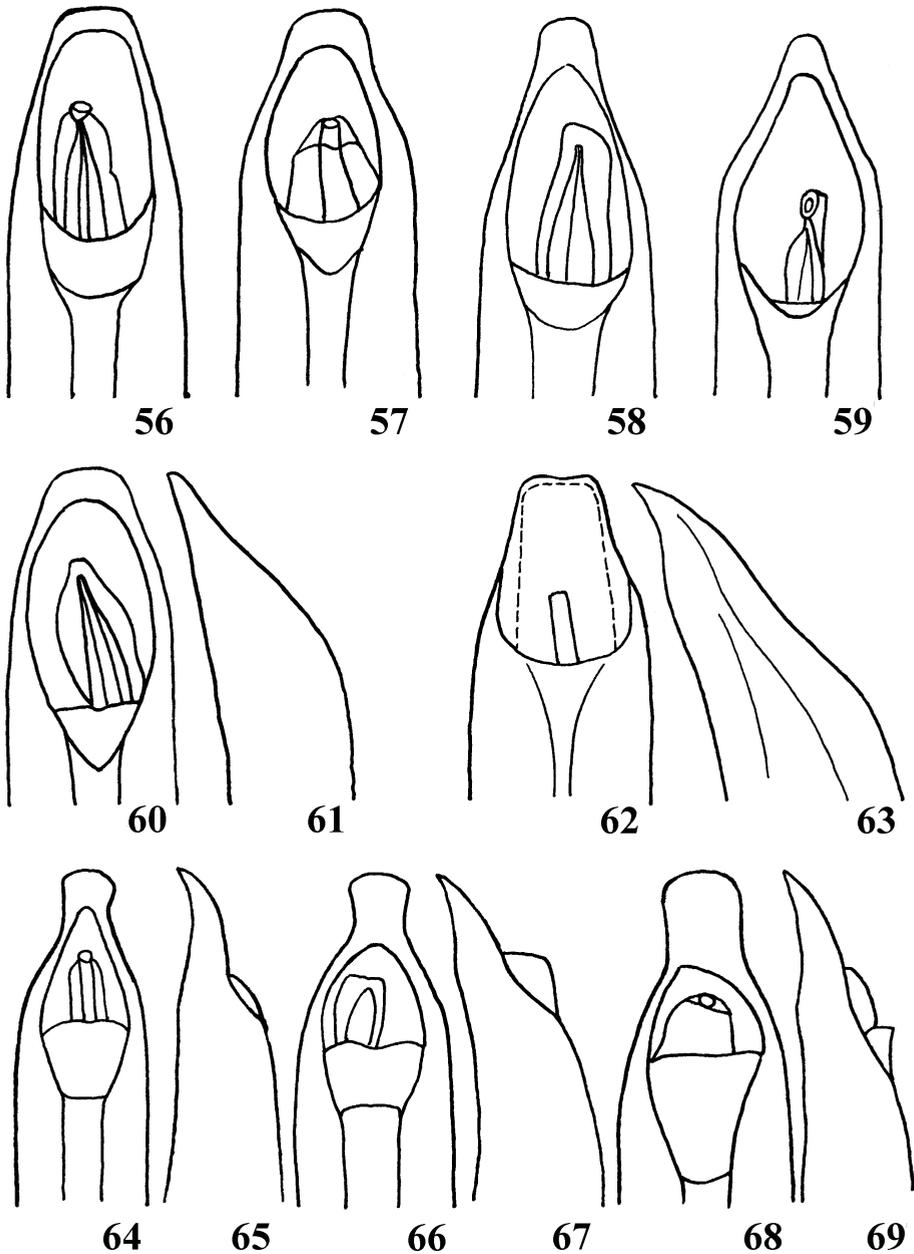
The original description of *Chrysomela recticollis* (= *collaris*) shows the following features of this form: “Das Halssch. ist schmal, ..., der Vorderrand ist viel tiefer und über den Augen mehr winklig-ausgebuchtet, die Vorderecken sind kaum hinabgedrückt, starker vorgezogen und weit spitzer als bei *aurichalcea*”, “*Prothorace ... lateribus fere rectis*” (WEISE 1887). WEISE described this form from Japan and Amur valley. BREIT (1920) pointed out that subspecies *collaris* are found in Mongolia, Korea, China and Japan and noted some additional characters: “Halsschild ... zur Basis fast immer deutlich eingezogen”. BECHYNÉ (1950) believed that subspecies *collaris* is distributed in Japan only and described it in the following way: “Plus étroit que le précédent [*Ch. aurichalcea aurichalcea*], côtés du prothorax plus ou moins droits. Ponctuation des élytres beaucoup plus forte et ordinairement alignée cà et là”. Specimens from Japan and from Altai and Tuva being at my disposal do not differ appreciably in the shape of pronotum (Fig. 115) and body proportions (Fig. 114), shape of anterior angles and lateral sides of pronotum and punctuation of elytra. Therefore I regard *Ch. collaris* as a new junior synonym of the nominotypical subspecies.

The original description of var. *nigricans* is very short: “*Nigra, nitidissima, vix perspicue aeneo-resplendens*” (JACOBSON 1902). I found the type specimens among the materials of G. JACOBSON’s collection (ZIN), and designated a lectotype (Fig. 36). Other specimens of *Ch. aurichalcea* which were collected in the same locality and on the same date differ from the lectotype only in the colour: coppery, bronze or violaceous. Therefore I reduce *nigricans* to the synonym of *Ch. aurichalcea aurichalcea*.

I examined the type specimens of both subspecies *omisiensis* and *kwanghsiensis* (Figs 87-95), and also topotypes and additional specimens from China. Comparison of the types with the respective original descriptions (BECHYNÉ



45-55. Aedeagus: 45-47 - *Chrysolina lineella* (45 - Krivoj Kluch, 46, 47 - Jakovlevka), 48, 49 - *Ch. pala* (Troitskoye, holotype), 50, 51 - *Ch. genganensis* (Gensan, lectotype), 52, 53 - *Ch. relucens* (B. Irkut), 54, 55 - *Ch. eurina* (after KIPPENBERG, DÖBERL, 1994)



56-69. Aedeagus: 56-63 - *Chrysolina lineigera* (56, 58 - Tordoki-Jani Mount., 57 - Manchuria, Vetka, 59 - Mount. Mjao-Chan, 60, 61 - Gornyj Serentuj (lectotype), 62, 63 - type of *Ch. watanabei* (after TAKIZAWA, 1970), 64-69 - *Ch. neglecta* (64, 65 - Ridge Khekhtsy, holotype, 66, 67 - Vladivostok, paratype, 68, 69 - Ridge Khekhtsy, paratype)

1950) and with each other shows that both names belong to the same form despite the superficial difference between the lectotypes. The lectotype of subspecies *kwanghsiensis* is an aberrant male (very oblong, but corresponding to the original description as much as possible) (Figs 87, 88). However, another male from the same locality is less elongated, broadened behind, with lateral sides of pronotum straight in basal half, but not “assez régulièrement arrondis”. All other characters, mentioned by the author of both subspecies, are variable and do not allow me to separate the specimens from Omisien and Kwanghsien. On the whole, these specimens represent the form, which is typical for China and belongs to the nominotypical subspecies, as shown above.

The characters of subspecies *fokiensis*, mentioned in the original description, are: “Calus latéral du prothorax très large et fortement convexe en toute sa longueur, .... Elytres finement et assez éparsément ponctués” (BECHYNÉ 1950). I had no possibility to borrow the type materials. Specimens from China being at my disposal scarcely differ from those from Siberia (Altai and Tuva) in the width of lateral calli of pronotum. Moreover, calli of prothorax are slightly narrower in the Chinese specimens than in the Siberian ones (Fig. 116). Puncturation of elytra is a fairly variable character in *Ch. aurichalcea*. Therefore, I agree with GRESSITT and KIMOTO (1963), who believed subspecies *fokiensis* to be a synonym of *Ch. aurichalcea aurichalcea*.

According to the original description of subspecies *yunnanica* (BECHYNÉ 1950), this form: “Diffère ... par la taille allongée et très faiblement dilatée en arrière, même chez les femelles”. Unfortunately, I had no possibility to study the type. Specimens from Korea being at my disposal do not differ from those from Altai and Tuva in the body outline (Figs 113, 114). Lateral calli of pronotum, which were described for subspecies *yunnanica* as: “relativement étroit”, are rather narrower in the Korean specimens than in the Siberian ones on the average (Fig. 116). However, this difference is an unjustification for considering the Korean form as a separate subspecies. Therefore I agree with GRESSITT and KIMOTO (1963), who regarded *yunnanica* as a junior synonym of *Ch. aurichalcea aurichalcea*.

According to the original description, subspecies *vagesplendens* is: “presque entièrement noir dorsally, plus petite et plus courtement ovulaire (de 7 à 7.5 mm)” than *yunnanica* and “ponctuation des élytres diminuant fortement vers l’extrémité” (BECHYNÉ 1950). However, puncturation and colouration are very variable characters in *Ch. aurichalcea*. Specimens from Vietnam being at my disposal belong to the nominotypical subspecies (Fig. 114). Therefore in my opinion subspecies *vagesplendens* is a new junior synonym of *Ch. aurichalcea aurichalcea*.

#### HOST PLANTS

*Artemisia feddei*, *A. vulgaris*, *Aster ageratoides*, *Arctium lappa*, *Kalimeris yamana*, *Petasites japonicus* in Asia (JOLIVET and PETITPIERRE 1976); *Artemisia vulgaris* in Moscow reg. (personal observations).

## BIOLOGY

This widely distributed and very common species inhabits different localities from lowlands to mountains up to an altitude of 4000 m. All the specimens were collected from the middle of June to the end of September in Europe, and from the beginning of May to the middle of October (mostly from the middle of June to the end of September) in Asia, except one specimen, which was collected in China (Szechwan) on 5 December, 1954. Hibernation takes place in egg stage (DOLGIN 1974). Larva develops during spring, pupates in soil. In Moscow reg. beetles emerge in the middle of July, 1.5-2 months later than other *Chrysolina* species, which hibernate as adults; they copulate from July till September (personal observations). In Japan the two chromosome forms have some biological differences (FUJIYAMA 1996). Larva has been described sufficiently (TAKIZAWA 1971a, OGLOBLIN and MEDVEDEV 1971).

## MATERIAL EXAMINED

Lectotype *Anopachys violaceicollis* (female) (is designated here) with labels: "type", "*Anopachys violaceicollis* MOTSCH. Japan" [yellow], "lectotype *Anopachys violaceicollis* MOTSCHULSKY, 1861. design. BIENKOWSKI, 1992" [red], "*Chrysolina (Anopachys) aurichalcea aurichalcea* (Gehl.) det. BIENKOWSKI, 1996. ZMMU (coll. MOTSCHULSKY).

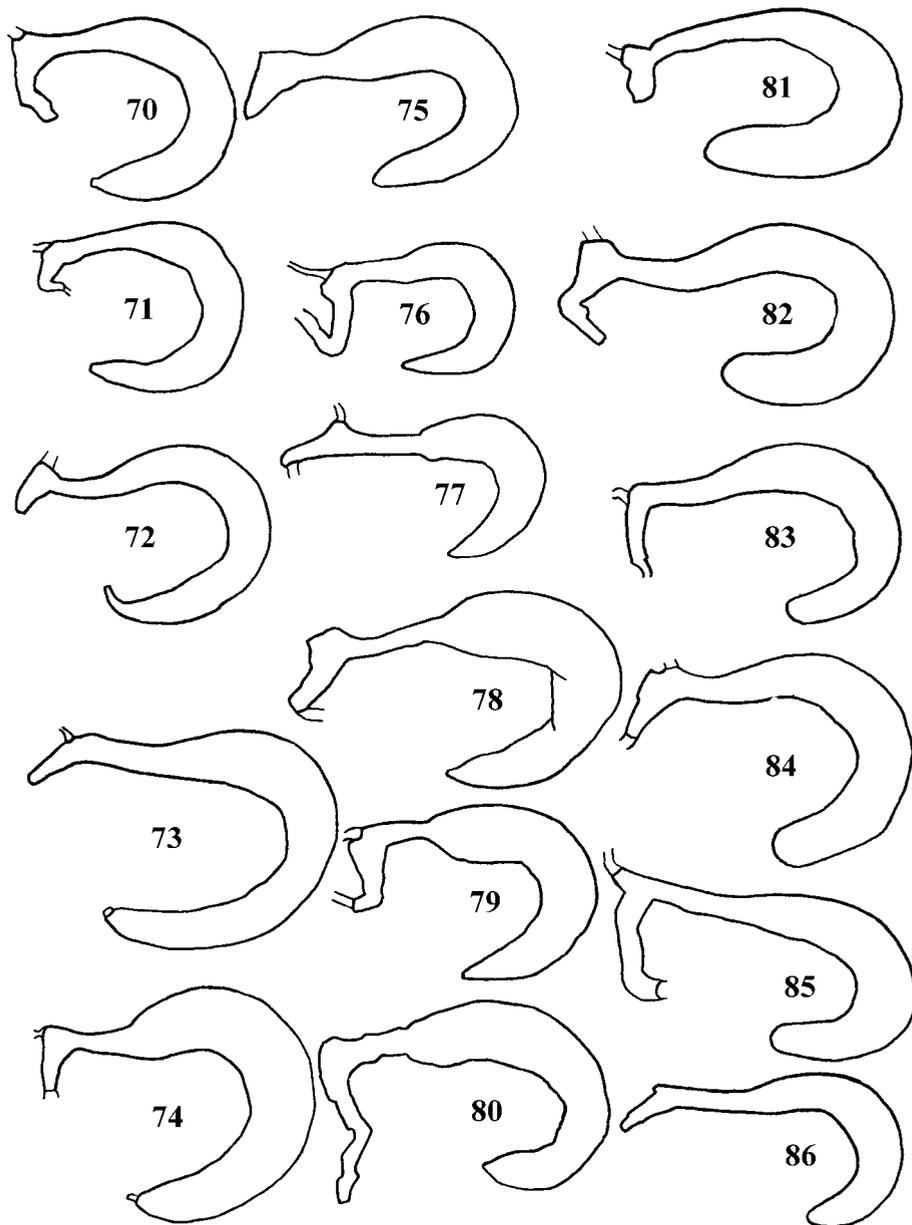
Lectotype *Chrysolina aurichalcea kwanghsiensis* (male) (is designated here) with labels: "Szetschwan Kwanhsien Exp. STOTZNER", "Type" [red], "TIPE [male sign] *Chr. aurichalcea* ssp. *kwanghsiensis* det. J. BECHYNÉ 1950", "Sammlung G. FREY", "lectotype *Chrysolina aurichalcea kwanghsiensis* BECHYNÉ, 1950. design. BIENKOWSKI, 1994" [red] FC; paralectotype (female) with labels: "Szetschwan Kwanhsien Exp. STOTZNER", "*Chr. aurichalcea* ssp. *kwanghsiensis* det. J. BECHYNÉ 1950", "Sammlung G. FREY", "Paralectotype *Chrysolina aurichalcea kwanghsiensis* BECHYNÉ, 1950. design. BIENKOWSKI, 1994" [red] FC.

Lectotype *Chrysolina aurichalcea omisiensis* (male) (is designated here) with labels: "Szetschwan Omisien Exp. STOTZNER", "Type" [red], "TIPE *Chr. aurichalcea* ssp. *omisiensis* m. det. J. BECHYNÉ 1950", "Sammlung G. FREY", "Lectotype *Chrysolina aurichalcea omisiensis* BECHYNÉ, 1950. design. BIENKOWSKI, 1994" [red] FC; 4 paralectotypes (2 males, 2 females) with the same geographical labels, "COTYPE" [red], "COTIPE *Chr. aurichalcea* ssp. *omisiensis* m. det. J. BECHYNÉ 1950", "Sammlung G. FREY", red "paralectotype" labels (similar to "lectotype"), FC.

Lectotype *Chrysomela aurichalcea* var. *nigricans* (male) (is designated here) with labels: "Ongudaj, Biysk envir., Tomsk reg. A. JACOBSON 30.VII.98", "30.VII", "v. *nigricans*", "lectotype *Chrysomela aurichalcea* var. *nigricans* JACOBSON, 1902. design. BIENKOWSKI, 1994" [red], "*Chrysolina (Anopachys) aurichalcea aurichalcea* (GEBL.) det. BIENKOWSKI, 1996"; 2 paralectotypes (males) with the same geographic labels (date - 25.VII.98), red "paralectotype" labels and my determination labels (similar to lectotype) ZIN.

## ADDITIONAL MATERIALS

European part of Russia (Kursk reg., Moscow town and reg., Nizhni Novgorod reg., Vyatka reg., St. Petersburg, Kazan, Yaroslavl, Perm reg., Orenburg reg., Bashkortostan): 88 specimens.



70-86. Spermatheca: 70-74 - *Chrysolina lineella*, 75-80 - *Ch. neglecta*, 81-86 - *Ch. lineigera*

- Western Siberia (Ekaterinburg, Tobolsk, Kurgan reg.): 5 specimens.  
 Eastern Siberia (Tomsk reg., Altai, Tuva, Krasnoyarsk Terr., Irkutsk reg., Chita reg., Buryat): 126 specimens.  
 Russian Far East (Yakutia, Magadan reg., Amur reg., Khabarovsk Terr., Primorskij Krai): 153 specimens.  
 Sakhalin + Maneron Is.: 31 specimens.  
 Kuriles (Shikotan Is., Kunashiri Is.): 23 specimens.  
 The Crimea (Sevastopol): 1 male.  
 Azerbaijan (Talysh): 2 females.  
 Eastern Kazakhstan: 14 specimens.  
 Kirghizia: 12 specimens.  
 Mongolia (Ara-Khangai a., Central a., Khentei a., Kobdo a.): 51 specimens.  
 China (Manchuria, Szechwan, Gansu, Kwangsi, Chuang, Jiangsu, Zhejiang, Xinjiang Uygur Autonomous Reg.): 127 specimens.  
 Korea: 13 specimens.  
 Japan (Hokkaido, Honshu, Kyushu, Tsushima): 38 specimens.  
 Vietnam (Lai Chau, Sha Pa, Ha Giang): 1 male, 2 females.

***Chrysolina (Anopachys) aurichalcea asclepiadis* (VILLA, 1833)**

(Figs 3-6, 111, 112, 122, 124, 125).

- Chrysomela asclepiadis* VILLA, 1833: 43 (Italy: Lombardy, types in Narodni Muzeum, Prague and ZMMU).  
*Chrysomela aurichalcea* var. *asclepiadis*: WEISE 1887: 182, 184; WEISE in JUNK and SCHENKLING 1916: 59; PORTA 1934: 289.  
*Chrysomela aurichalcea asclepiadis*: BREIT 1920: 88.  
*Chrysolina aurichalcea asclepiadis*: BECHYNÉ 1952: 378; WARCHAŁOWSKI 1993: 183.  
*Chrysolina asclepiadis*: BOURDONNÉ and DOGUET 1991: 55.  
*Chrysomela aurichalcea Thurn-Taxisi* SCHATZMAYR, 1927: 151, 152 (Istria: Planik Mountain, type in Frey's Collection).  
*Chrysomela aurichalcea* var. *Thurn-Taxisi*: PORTA 1934: 289.  
*Chrysomela asclepiadis* (=Thurn-Taxisi): MÜLLER 1948: 95.  
*Chrysolina aurichalcea thurntaxisi*: BECHYNÉ 1950: 148; BOURDONNÉ and DOGUET 1991: 55; WARCHAŁOWSKI 1993: 183.  
*Chrysolina aurichalcea asclepiadis* (=thurntaxisi): BECHYNÉ 1952: 378.

ETYMOLOGY

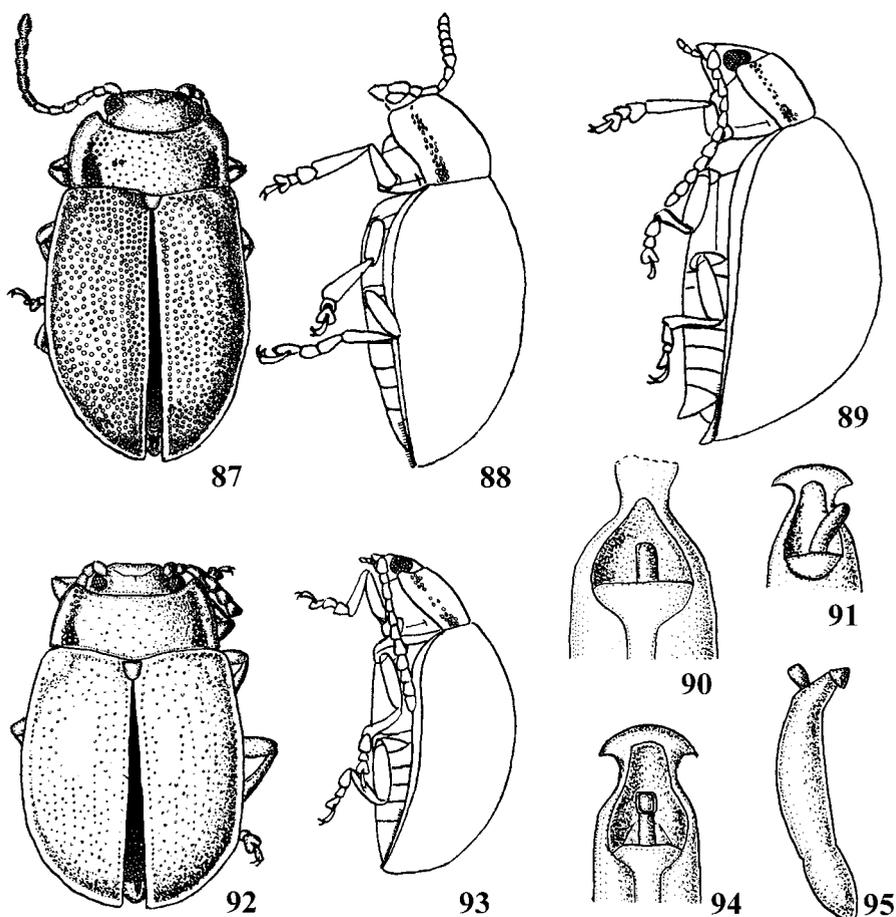
The name derivation was not explained in the original description (VILLA 1833). It may refer to the probable host plant, *Vincetoxicum officinale* (*Asclepiadaceae*).

DESCRIPTION

Subspecies *asclepiadis* differs from the nominotypical subspecies in the following characters: above always blue, elytra sometimes violaceous, legs and lower surface bluish-black, antennae black with segments 1-2 rufous below, or

brown with 2-5 basal segments rufous; pronotum with lateral impressions anteriorly deeper, lateral calli very convex, disk finely punctate; epipleura very sparsely ciliate near apex, hairs short, hardly visible; segment 1 of male fore tarsi mostly broader (Fig. 112); apical margin of aedeagus triangular; spermatheca hook-shaped, constricted in basal part. It differs from subspecies *bohémica* in a larger body, proportions of apical triangle (Fig. 111) and stronger apical denticles (in lateral view) of aedeagus (cf. Figs 3-6 and 7-12).

Length (mm) 7.5-8.0 (male), 8.6-9.4 (female). Width (mm) 4.5-5.1 (male), 5.8-6.2 (female).



87-91. *Chrysolina aurichalcea kwanghsiensis* (synonym of *Ch. aurichalcea*) (China, Kwansien: 87-88 - lectotype, male, 89 - paralectotype, female, 90 - aedeagus of lectotype, apex destroyed, 91 - aedeagus of topotype). 92-95. *Ch. aurichalcea omisiensis* (synonym of *Ch. aurichalcea*) (China, Omisien: lectotype, male: 92, 93 - general view, 94, 95 - aedeagus)

## DISTRIBUTION

Western Alps, Lombardy, Adriatic coast (Fig. 125).

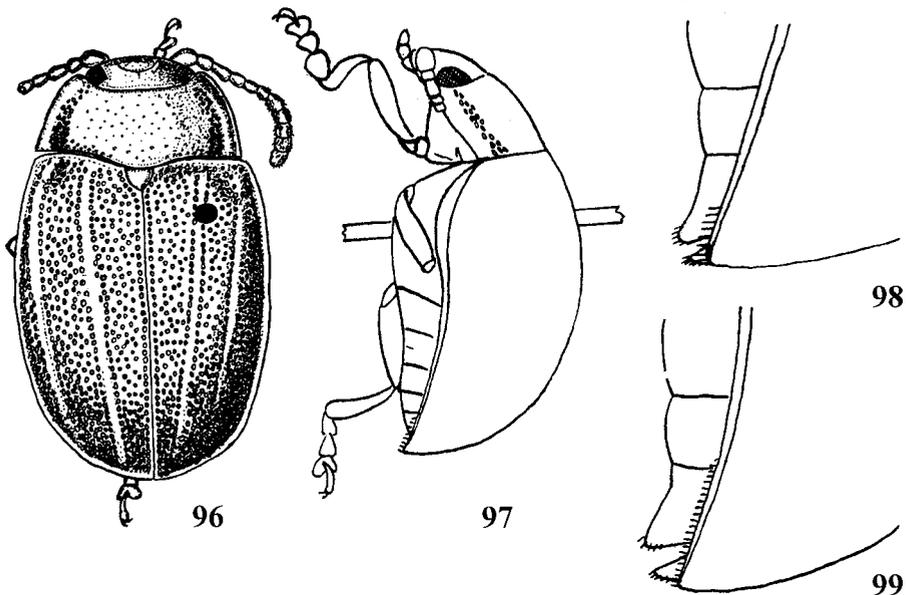
## REMARKS

See also remarks under *Ch. aurichalcea bohemica*. BECHYNÉ (1950) examined the type specimen, which is deposited in Narodni Muzeum, Prague. This specimen should be designated as a lectotype because VILLA (1833) did not indicate the number of specimens examined. I found one more type specimen in the collection by V. MOTSCHULSKY in ZMMU and designate it as paralectotype below.

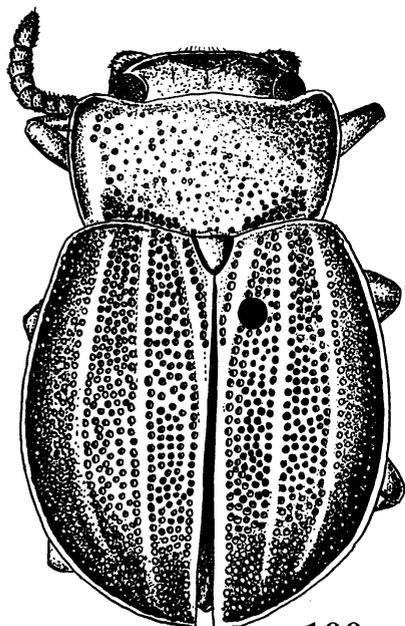
On the basis of aedeagus proportions *Ch. aurichalcea asclepiadis* can be formally considered as a separate species. However, I believe it to be a subspecies because *Ch. aurichalcea bohemica* and *Ch. aurichalcea asclepiadis* have very similar habitus and allopatric adjoining distribution ranges.

## MATERIAL EXAMINED

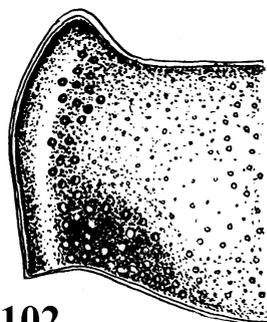
Paralectotype *Chrysomela asclepiadis* (female) (is designated here) with labels: "*Chrys. Asclepiadis* VILLA - Alps", "Type", "*Anopachys asclepiadis* VILLA Alp. Ital.", "Paralectotype *Chrysomela asclepiadis* VILLA, 1833. design. BIENKOWSKI, 1994" [red] ZMMU (MOTSCHULSKY coll.). Switzerland: Alps, Simplon, 1899: 2 males, 1 female, PUTON leg.; envir. of Cevio, riverside Maggia, VII. 1993, 13.VIII.1996: 10 males, 6 females, S. DOBLER leg.



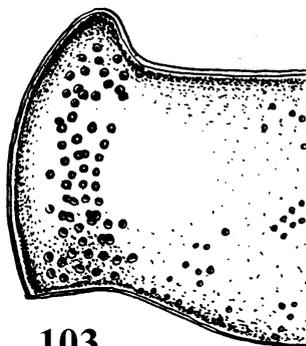
96-99. *Chrysolina schatzmayri* (Grado: 96, 97 - lectotype, male, general view, 98, 99 - paralectotypes, females, apex of abdomen, lateral view)



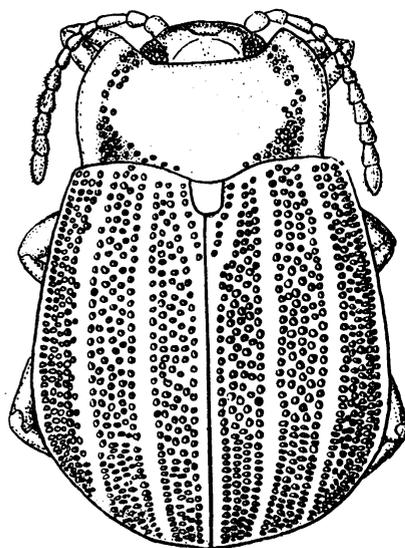
100



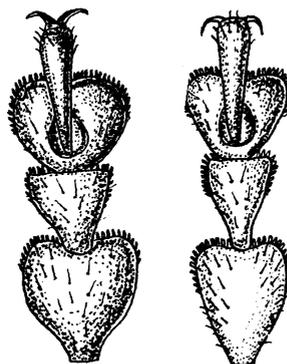
102



103



101



104

105

100. *Chrysolina neglecta* (Ridge Khekhtsy, holotype, male, general view). 101. *Ch. relucens* (female, general view). 102, 103. Pronotum: 102 - *Ch. lineigera* (Gornyj Serentuj, lectotype, male), 103 - *Ch. gensanensis* (Gensan, lectotype, male). 104, 105. *Ch. neglecta*, fore tarsus: 104 - holotype, male, 105 - paratype, female

***Chrysolina (Anopachys) aurichalcea bohémica* (MÜLLER, 1948)**

(Figs 7-12, 111, 112, 122, 124, 125)

- Chrysomela aurichalcea asclepiadis*: SCHATZMAYR 1927: 152.  
*Chrysomela aurichalcea* var. *asclepiadis*: PORTA 1934: 289.  
*Chrysolina aurichalcea asclepiadis*: MÜLLER 1916: 97 (fig.); BECHYNÉ 1950: 148.  
*Chrysomela asclepiadis bohémica* MÜLLER, 1948: 95 (Bohemia).  
*Chrysomela aurichalcea bohémica*: KASZAB 1962: 55.  
*Chrysolina aurichalcea bohémica*: BECHYNÉ 1952: 378; BOURDONNÉ and DOGUET 1991: 55.  
*Chrysolina aurichalcea asclepiadis* ab. *viridisplendens* BECHYNÉ, 1950: 148.  
*Oreina (Anopachys) aurichalcea viridisplendens* BECHYNÉ, 1958: 91. nom. nov. for *bohémica* MÜLLER 1948 nec *Oreina cacaliae bohémica* WEISE, 1889.  
*Chrysolina aurichalcea eurina*: BECHYNÉ 1952: 378.  
*Chrysomela aurichalcea problematica* KASZAB, 1962: 54 (Hungary: Torda, type deposition not indicated). **Syn. nov.**  
*Chrysolina asclepiadis problematica*: BOURDONNÉ and DOGUET 1991: 55.  
*Chrysolina aurichalcea problematica*: BROVDIJ 1977: 146; WARCHAŁOWSKI 1993: 183.  
*Chrysolina aurichalcea thurntaxisi* (=bohémica): WARCHAŁOWSKI 1993: 183.

## ETYMOLOGY

The name is derived from the type locality, Bohemia (=Czech Republic).

## DESCRIPTION

Subspecies *bohémica* differs from the nominotypical subspecies in the following characters: body always violaceous or blue, sometimes with greenish tint above; lateral impressions of pronotum anteriorly deeper and lateral calli more convex; pronotum and elytra finely punctate; elytra epipleura sparsely ciliate, hairs short, hardly visible; segment 1 of fore tarsi in male somewhat broader (Fig. 112); apical margin of aedeagus usually triangular, rarely rounded or bisinuate (Figs 7-12); spermatheca hook-shaped, weakly constricted in basal part. It differs from subspecies *asclepiadis* in a smaller size of body, proportions of apical triangle (Fig. 111) and weak apical denticles (in lateral view) of aedeagus.

Length (mm): 6.0-7.3 (male), 7.1-8.6 (female). Width (mm): 3.7-4.5 (male), 4.5-5.8 (female).

## DISTRIBUTION

Eastern Alps, Germany, Czech Republic, Slovakia, Ukraine (Fig. 125). Specimens from Mountain Generoso (Southern Switzerland) mentioned by ALLENSPACH (1945) probably belong to the subspecies *bohémica* too. The Dnepr river apparently separates the distribution areas of subspecies *aurichalcea* and *bohémica*. *Ch. aurichalcea* on the one hand ascends mountains up to an altitude of 4000m, and on the other hand hardly ever flies (only a few flying females were observed in Japan by SUZUKI 1978). Therefore large rivers appear to have a great importance in the geographic isolation and microevolution in *Ch. aurichalcea*.

## REMARKS

SCHATZMAYR (1927) compared specimens collected on the Istria Peninsula with those from Central Europe (Czechia) and pointed to their differences in the punctuation of lateral impressions and shape of pronotum and shape of lateral denticles of aedeagus. He believed the specimens from Czechia to represent a subspecies *asclepiadis* and described a new subspecies *thurntaxisi* from Istria. However, *Chrysomela asclepiadis* was described from Southern Alps (Lombardy) (VILLA 1833) and is found in Istria too (MÜLLER 1948). Therefore, MÜLLER (1948) proposed a new name *bohemica* for the form which is distributed in Czechia and Switzerland. According to the International Code of Zoological Nomenclature (1988) Art. 72b (II), type specimens of *bohemica* are those which were determined by SCHATZMAYR (1927) as *asclepiadis*. ALLENSPACH (1945) noted the differences between specimens of *Chrysomela asclepiadis* from two localities in Southern Switzerland. I assume that he had at his disposal specimens of the subspecies *asclepiadis* from Mesocco and *bohemica* from Mountain Generoso.

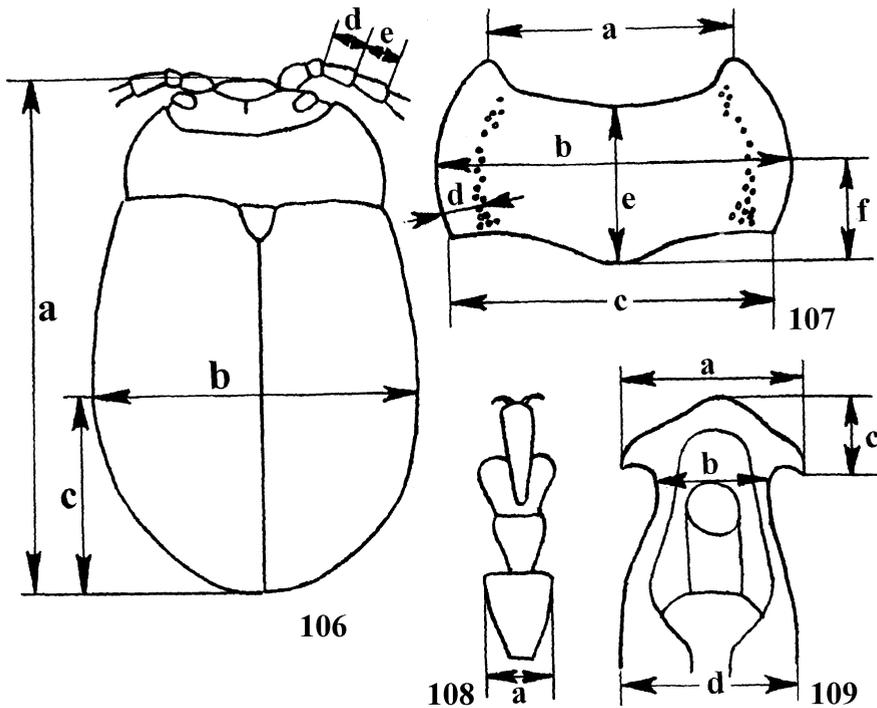
On the basis of material examined I found a clear difference of aedeagus structure between the specimens from Western Alps on the one hand and those from Eastern Alps, Czechia, Germany and Western Ukraine on the other. Besides the form of lateral denticles (in lateral view) *asclepiadis* and *bohemica* differ in the proportions of the apical triangle of aedeagus (Figs 3-12, 111). The shape of anterior margin of pronotum between the anterior angles slightly differs in *asclepiadis* and *bohemica*. Paralectotype of *asclepiadis* has pronotum broadest basally. However, this character varies in the additional specimens and does not permit a separation of these two forms (Table 1). The punctuation of lateral impression of pronotum and body shape in female do not differ in *asclepiadis* and *bohemica*. The colour of dorsal surface of body somewhat differs in both subspecies: violaceous form dominates in *bohemica* whereas blue form prevails in *asclepiadis*.

BECHYNÉ (1958) raised the rank of ab. *viridisplendens*. According to the International Code of Zoological Nomenclature (1988) Art. 23j, this name is available with the author and date: BECHYNÉ 1958 but not 1950.

KASZAB (1962) distinguished subspecies *problematica* from *bohemica* as follows: "Halsschild an der Basis am breitesten, nach vorn gerade und leicht verengt, an den Vorderecken plötzlich abgerundet. Flügeldeckenende am Nahtwinkel einzeln breit abgerundet". However, the above described shape of pronotum and apex of elytra is present in some specimens of subspecies *bohemica* (Table 1). Therefore, I consider subspecies *problematica* to be a new junior synonym of *bohemica*. Moreover, the name *problematica* KASZAB 1962 is a junior primary homonym of *Chrysomela problematica* VOGEL, 1871. According to the International Code of Zoological Nomenclature (1988) Art 60a, the name *problematica* KASZAB should not be replaced because this name is a junior synonym.

Table 1. Shape of pronotum in subspecies *asclepiadis* and *bohémica*.

Maximal width	Number of specimens		
	<i>asclepiadis</i>	<i>bohémica</i> WEurope	Ukraine
in front of the middle and at the middle	8	9	-
between the middle and base	7	9	-
at base	5	7	9



106-109. Measurements: 106 - body in dorsal view (a - length, b - maximal width, c - distance between hind end and point of maximal width, d,e - length of antennal segments 3 and 4 respectively), 107 - pronotum (a - width between anterior angles, b - maximal width, c - width between posterior angles, d - width of lateral callus, e - length, f - distance between hind margin and point of maximal width), 108 - fore tarsus of male (a - width of segment 1), 109 - aedeagus (a - width of apical triangle, b - width of apical constriction, c - length of apical triangle, d - width before apical constriction)

DACCORDI (1994) believes *Oreina* to be a synonym of *Chrysolina*. According to him the name *Ch. aurichalcea bohémica* (MÜLLER) should be replaced because of the homonymy with *O. cacaliae bohémica* WEISE. However, other authors (KIPPENBERG and DOBERL 1994; WARCHAŁOWSKI 1993) regard *Oreina* and *Chrysolina* as separate genera.

#### HOST PLANTS

*Vincetoxicum officinale* in Central Europe, *Artemisia absinthium* in the Alps (BARABÁS and BEŽO 1978; KIPPENBERG and DÖBERL 1994).

#### MATERIAL EXAMINED

Italy: 1 male, 2 females; Italy: Bormio, 5-17.IX.1890: 9 males, 7 females; Austria: Tyrol: 1 female; Czechia: Vltava, 30.VIII.1941: 1 male; Germany: Erlangen: 2 males, 3 females; Ukraine: Carpathians, V. Gora, 26.VI.1959: 1 female; Kiev reg., Belaya Tserkov, 11.VII.1905, 4.VII.1907: 2 males; Podolia, envir. of Balta, VII.1916: 3 males, 3 females, V. PIATAKOVA leg.

#### GEOGRAPHIC VARIABILITY OF *Chrysolina aurichalcea*

1. Body size. Females are mostly larger than males. Both males and females from the Far East (116 specimens from 16 localities were measured) are considerably larger than those from European part of Russia (81 specimens from 13 localities). Fig. 124 shows a clinal variation of the average body length at least in Russia from the Far East to the European part. The average body length is larger in subspecies *bohémica* and *asclepiadis* than in subspecies *aurichalcea*.

The correlation between body length of males and females varies between territories. A considerable intersection of individual variability of males and females (50 % or more) takes place in most of the area of subspecies *aurichalcea*. Alternatively, almost all females are larger than males in the subspecies *aurichalcea* from Kirghizia, Kazakhstan, Northern-Eastern China, Amur reg., Magadan reg., Yakutia and in the subspecies *bohémica* and *asclepiadis*.

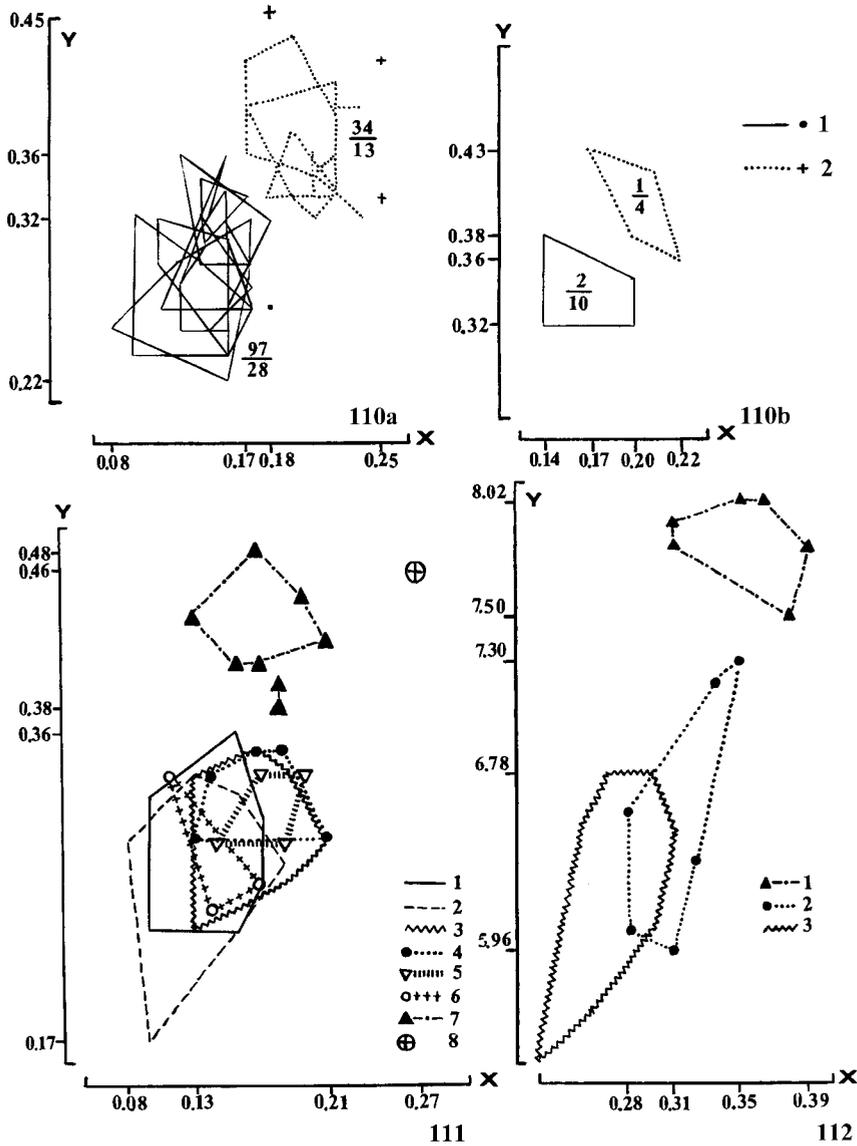
2. Colour of body and sculpture of elytra. SUZUKI et. al. (1977) studied in detail the geographic distribution of colour forms of *Ch. aurichalcea* in Japan.

On the basis of the material being at my disposal, seven colour forms: black, bronze, coppery, green, blue, violaceous and two-coloured (pronotum bronze, elytra violaceous) have been distinguished. In some cases intermediate colour forms between "black" and "bronze", "bronze" and "green", "bronze" and "coppery", "blue" and "violaceous" occur. Fig. 121 represents the interrelation of six unicolour forms.

Concerning the elytra, four sculpture forms have been distinguished.

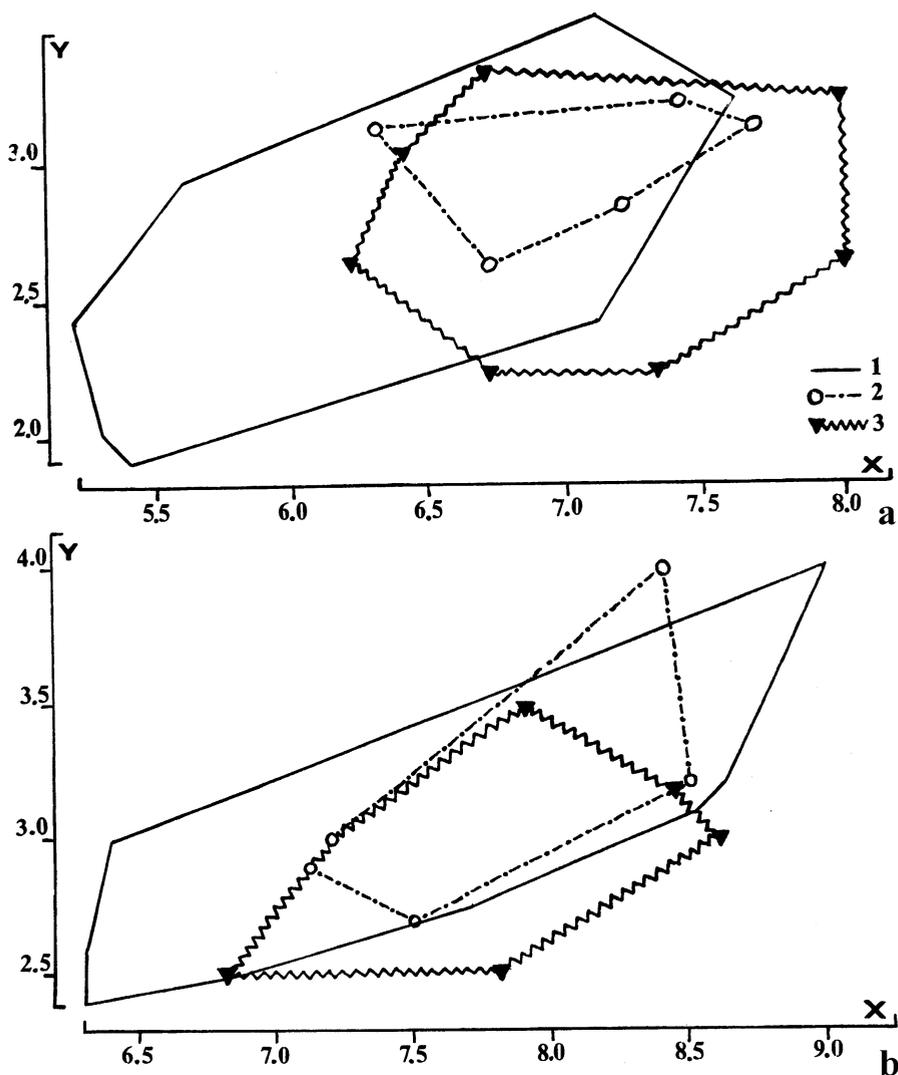
Elytra are wholly confusedly punctate, or bearing punctures partly arranged in rows and longitudinal smooth bands flat, somewhat convex or very convex.

The results are presented in Figs 122, 123. Violaceous form dominates (76 %) in the subspecies *bohémica*, blue form occurs in a considerably lesser propor-



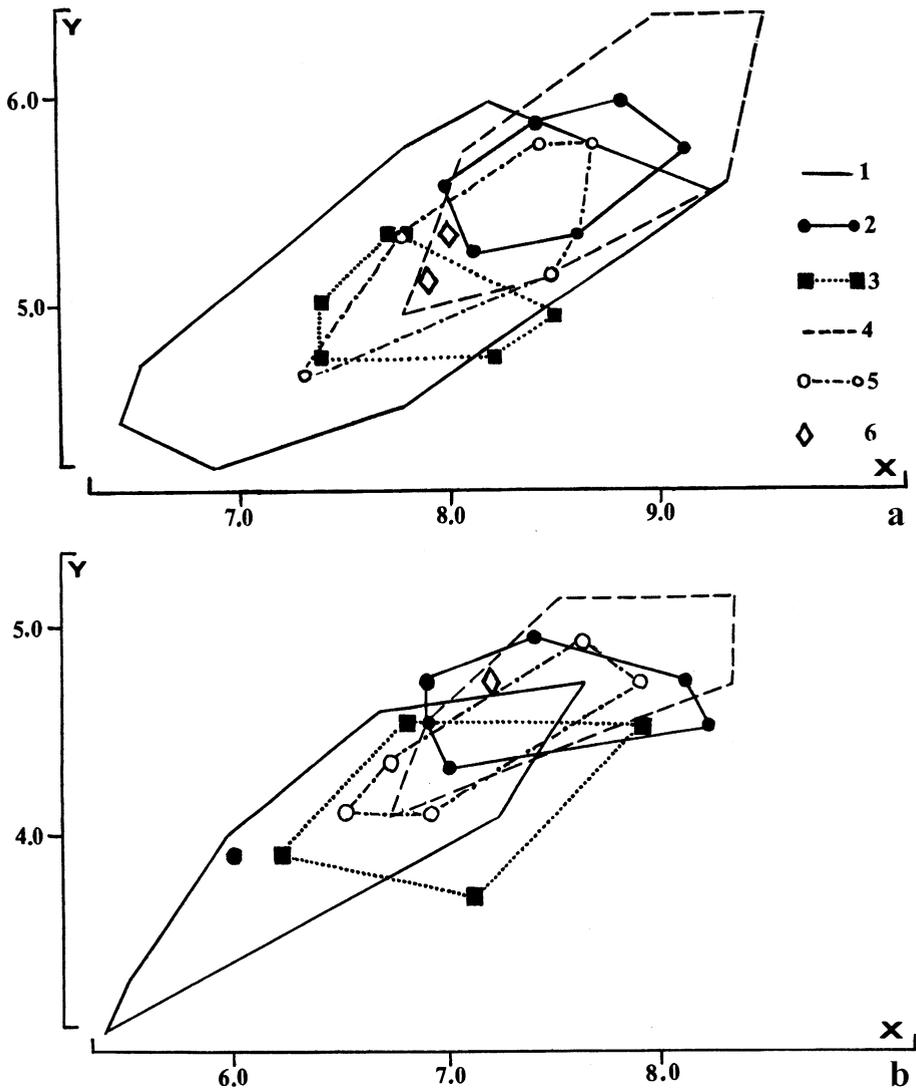
110. Aedeagus proportions: x (mm) - length of apical triangle, y (mm) - width of apical constriction, 1 - *Chrysolina aurichalcea aurichalcea*, 2 - *Ch. quadrangulata*, a - Altai, Tuva, Sayans, Dauria, Mongolia, b - Yakutia, in fractions: numerator - number of specimens, denominator - number of localities. 111. Aedeagus proportions: x (mm) - length of apical triangle, y (mm) - width of apical constriction, 1-3 - *Ch. aurichalcea aurichalcea* (1 - Altai, Tuva, 2 - Japan, 3 - European part of Russia), 4-6 - *Ch. aurichalcea bohémica* (4 - Alps: Bormio, 5 - Ukraine, 6 - Czechia, Germany), 7 - *Ch. aurichalcea asclepiadis*, 8 - *Ch. schatzmayri*. 112. Correlation of width of segment 1 of fore tarsus (x, mm) and body length (y, mm) in male: 1 - *Ch. aurichalcea asclepiadis*, 2 - *Ch. aurichalcea bohémica*, 3 - *Ch. aurichalcea aurichalcea* from European part of Russia

tion (24 %) and other forms are absent there. Blue form dominates (75 %) in subspecies *asclepiadis*, violaceous form is present too (25 %), others absent. The colour composition is different in the European part of Russia: bronze form dominates (61 %), coppery and green forms constitute 34 and 5 % respectively, others are absent. Coppery form dominates (40 %) in Western Siberia, bronze,



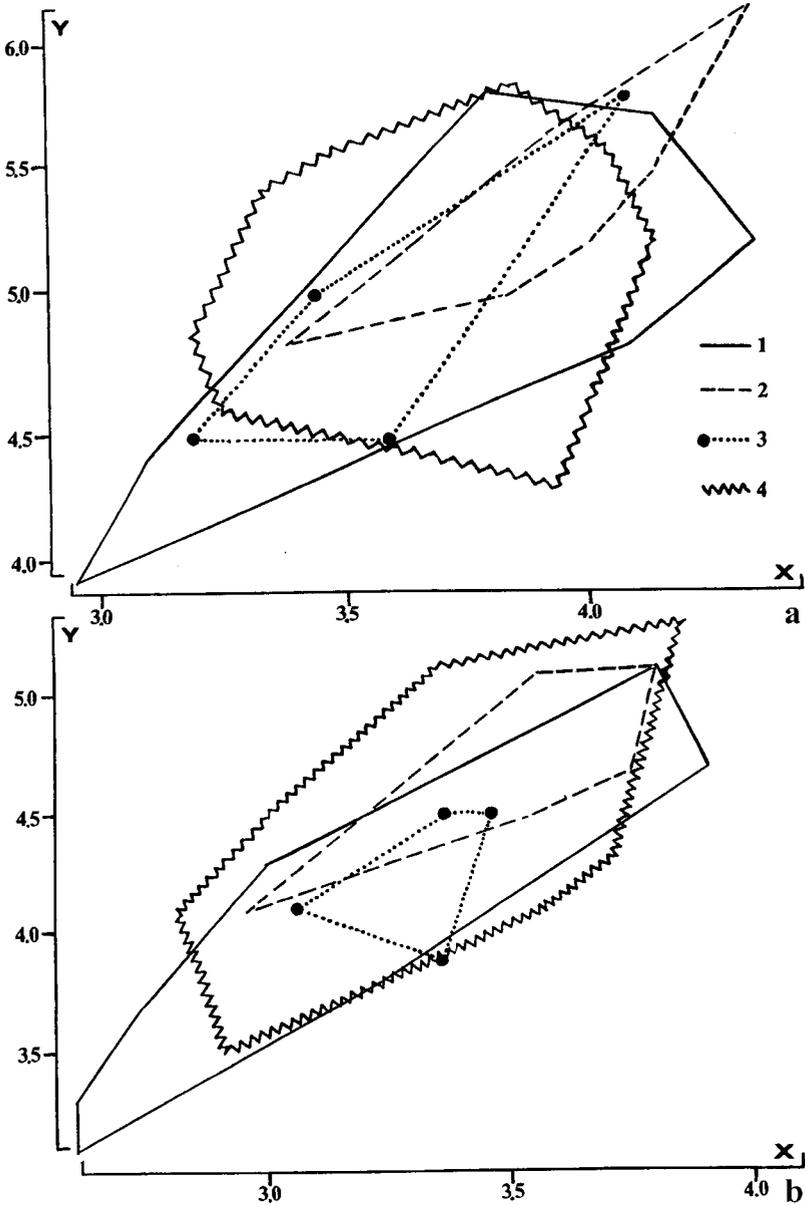
113. Correlation of body length (x, mm) and distance between hind end of body and point of maximal width (y, mm) in *Chrysolina aurichalcea aurichalcea*: a - males, b - females, 1 - Altai, Tuva, 2 - Korea, 3 Central China

blue and violaceous forms being also present there. Violaceous form dominates (42 %) in Altai and Tuva. Black, blue, violaceous and bronze forms are present in almost equal proportion in Sayans and Dauria. Kuriles and Sakhalin seem to be similar in the proportion of body colour and elytra sculpture: violaceous form dominates (57 and 65 %), the proportion of bronze one is considerably lower (26



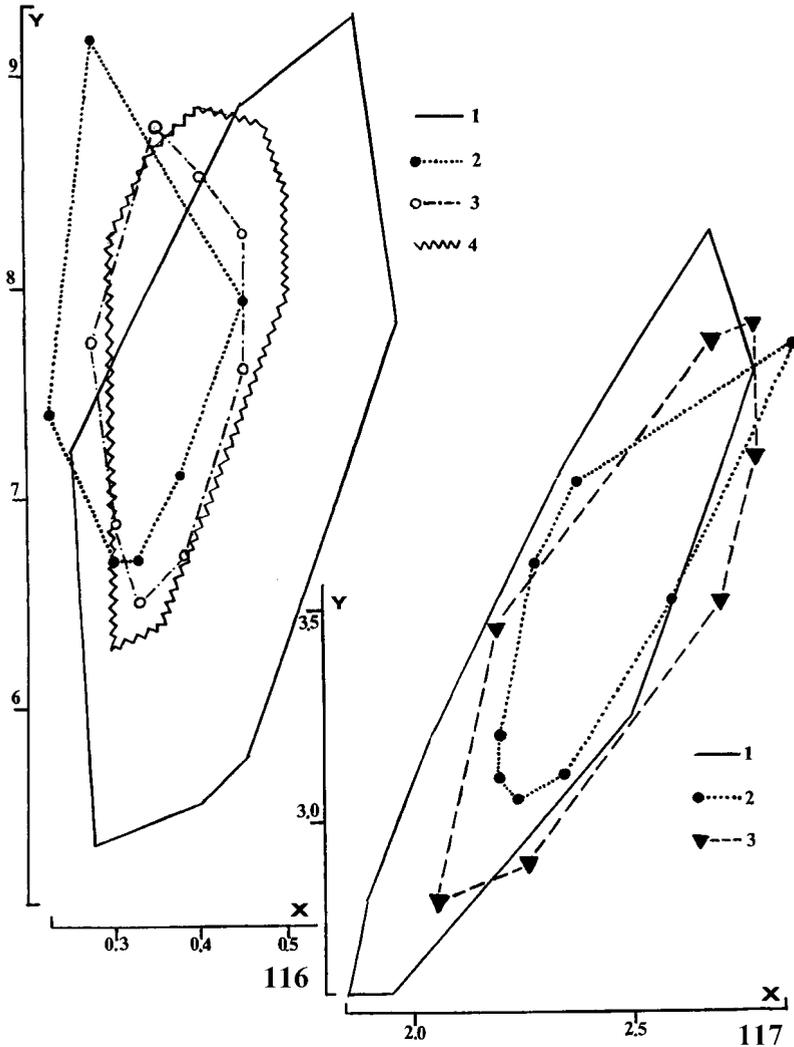
114. Correlation of body length (x, mm) and width (y, mm) in *Chrysolina aurichalcea aurichalcea*: a - females, b - males, 1 - Altai, Tuva, 2 - Kuriles, 3 - Sakhalin, Maneron Is., 4 - Japan, 5 - Korea, Tsushima Is., 6 - Vietnam

and 23 %); most specimens (70 and 74 %) have confused puncturation of elytra. A considerably different proportion of colour and sculpture forms is observed in Japan: blue form dominates (63 %), almost half of specimens (43 %) having

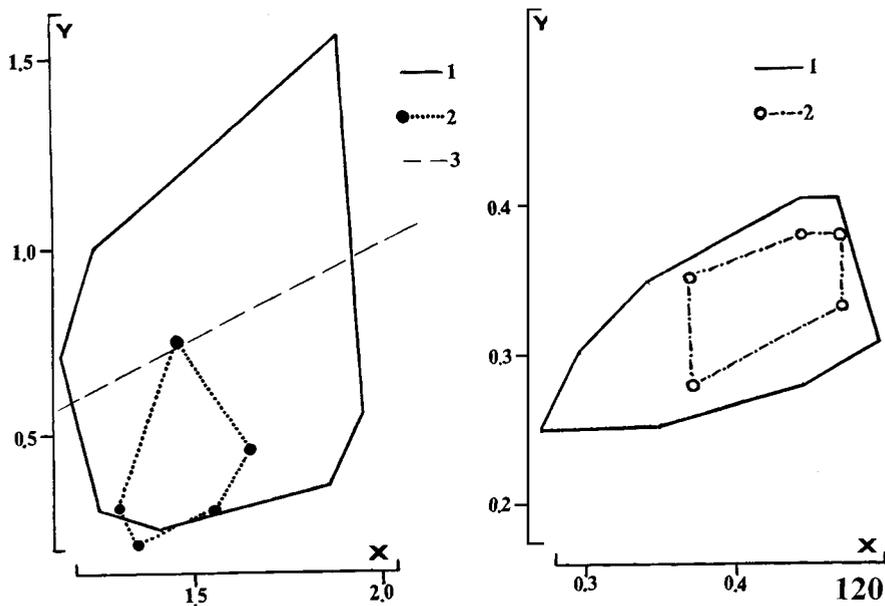
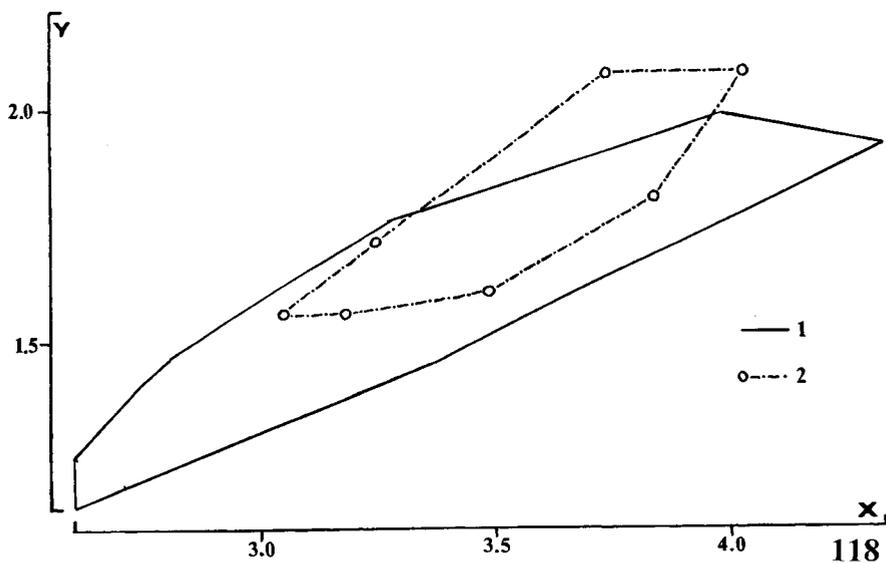


115. Correlation of maximal width of pronotum (x, mm) and body width (y, mm) in *Chrysolina aurichalcea aurichalcea*: a - females, b - males, 1 - Altai, Tuva, 2 - Japan, 3 - N.-E. China, 4 - Central and E. China

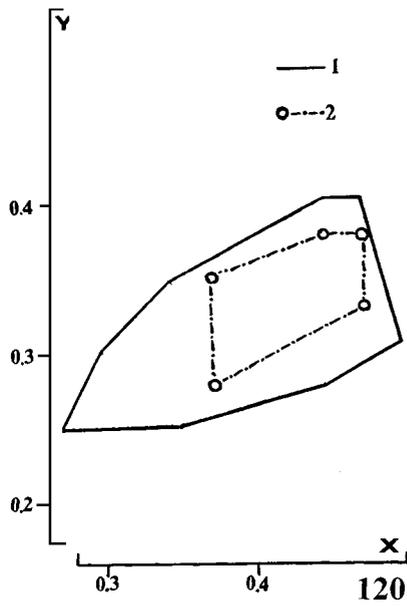
smooth bands on elytra. The proportion of colour forms is rather similar in Amur reg., North-Eastern China and Korea. However, the ratio of elytral sculpture forms in Amur reg. is closer to those in Sajans and Dauria than in China and Korea. Two-coloured form occurs in North-Eastern, Central, Southern and South-Eastern China, Korea, Amur reg. and Japan, however, its percentage is the highest (14 %) in the Russian Far East.



116. Correlation of width of lateral callus of pronotum (x, mm) and body length (y, mm) in *Chrysolina aurichalcea aurichalcea*: 1 - Altai, Tuva, 2 - N.-E. China, 3 - Korea, Tsushima, 4 - Central China. 117. Correlation of width of pronotum between anterior angles (x, mm) and its maximal width (y, mm) in *Ch. aurichalcea aurichalcea*: 1 - Altai, Tuva, 2 - N.-E. China, 3 - Central and E. China



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118. Correlation of maximal width (x, mm) and length (y, mm) of pronotum in *Chrysolina aurichalcea aurichalcea*: 1 - Altai, Tuva, 2 - Korea. 119. Correlation of length of pronotum (x, mm) and distance between posterior margin and point of maximal width of pronotum (y, mm) in *Ch. aurichalcea aurichalcea*: 1 - Altai, Tuva, 2 - Irkutsk (n=15), 3 - line showing the maximal width at 1/2 of pronotum length. 120. Correlation of length of antennal segment 3 (x, mm) and 4 (y, mm) in *Ch. aurichalcea aurichalcea*: 1 - Altai, Tuva, 2 - Korea, Tsushima

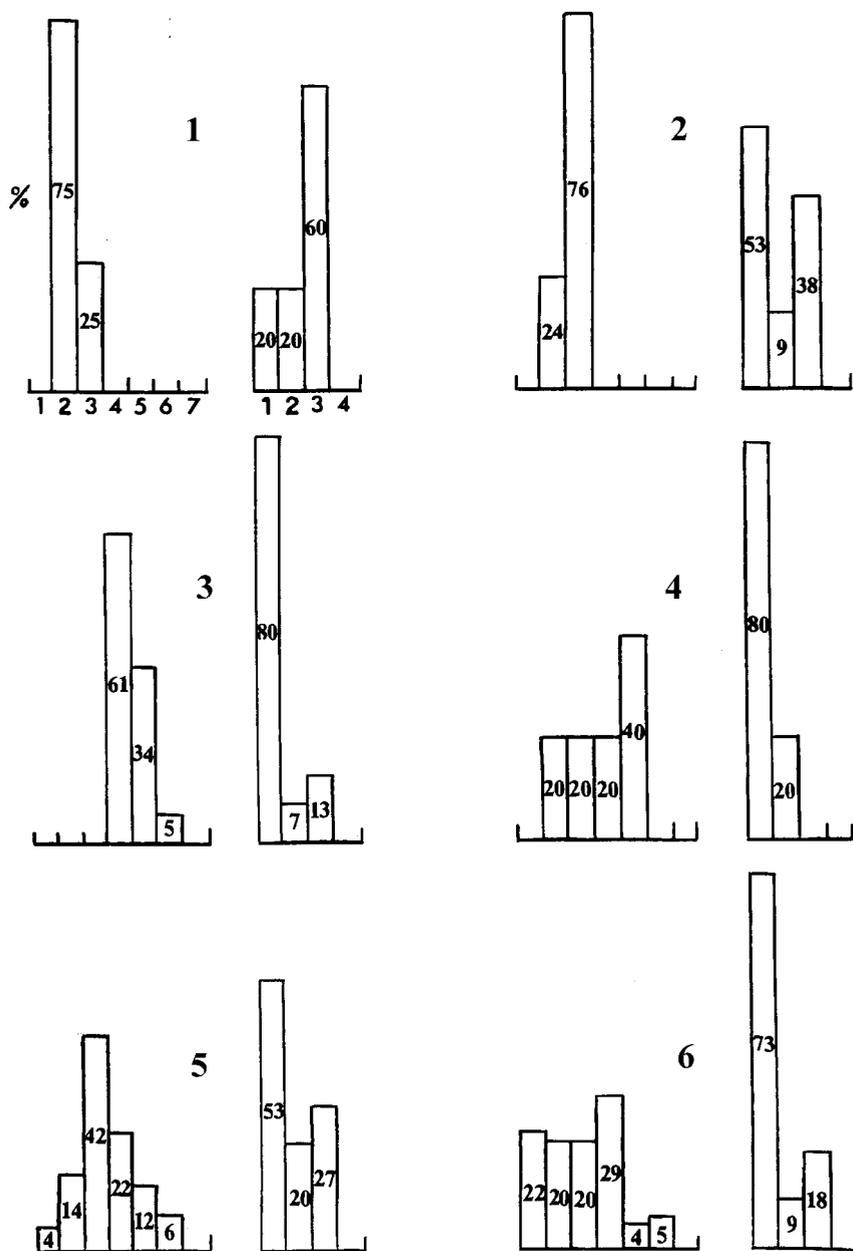
3. Aedeagus. The shape of aedeagus apex shows more or less stable difference between subspecies *aurichalcea*, *bohemica* and *asclepiadis* (cf. Figs 13-18, 32-44, 7-12 and 3-6). In some cases a considerable intrapopulational variation occurs in the subspecies *aurichalcea* (Figs 13-17).

#### GENETIC PROBLEMS IN *Ch. aurichalcea*

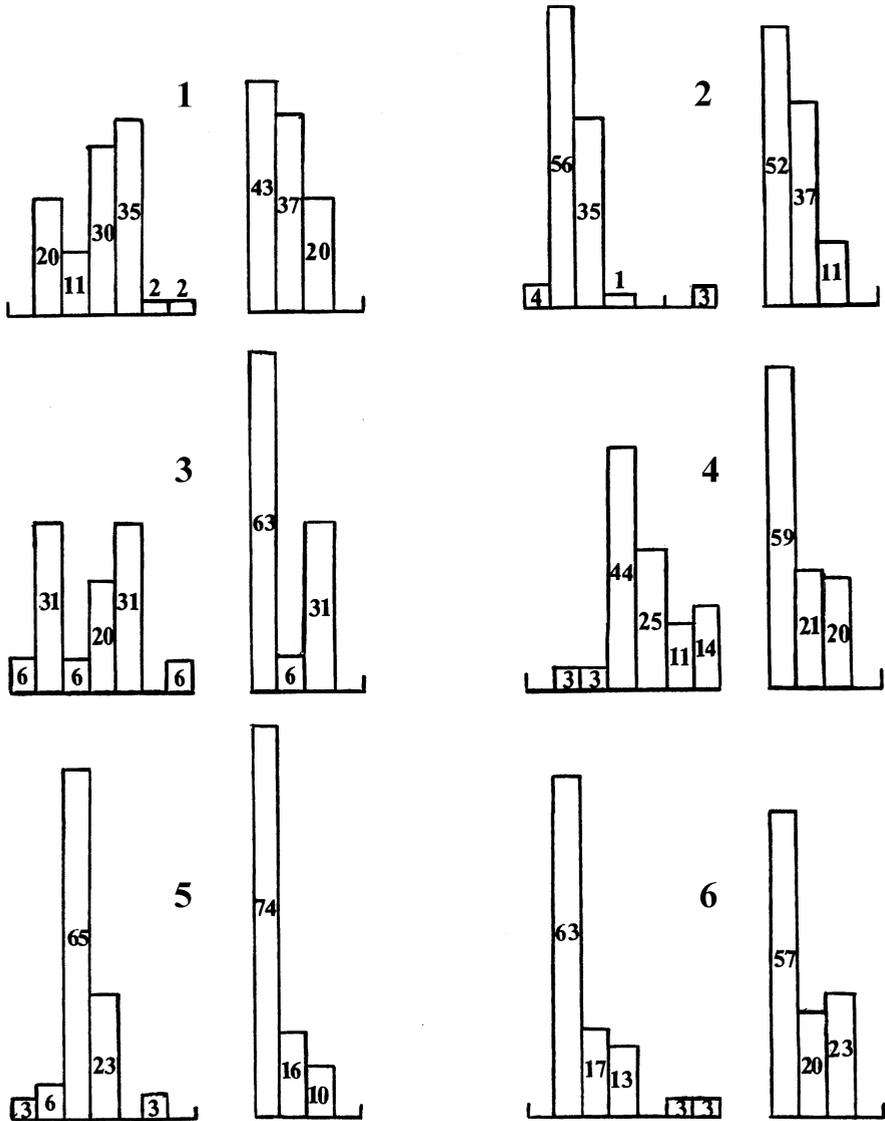
The results of karyological studies on *Ch. aurichalcea* are rather ambiguous. TAKENOUCI and SHIITSU (1972) (after PETITPIERRE 1981) reported on diploid number of 44 + XY chromosomes for Japanese specimens. BARABÁS and BEŽO (1978) found 40 chromosomes (19x2+XY) in "*Ch. aurichalcea asclepiadis*" from Slovakia (evidently, subspecies *bohemica*). PETITPIERRE (1981) analyzed one male from Korea (Soeul) and three males from Japan (Honshu: Nagano) and showed 32 chromosomes in the first case and 44 + unpaired X-chromosome in the second one. FUJIYAMA (1988, 1992) reported on the allopatric distribution of *Ch. aurichalcea* forms with different chromosome numbers in Japan: form with 41 chromosomes inhabits Hokkaido, Yakushima, Miyake-jima and mountain localities of other Japanese islands, and form with 31 chromosomes inhabits lowlands of the latter. Both forms segregate in localities along borders of their areas (FUJIYAMA 1996). No correlation between the chromosome numbers and phenotypic frequencies of different colour forms was observed (FUJIYAMA 1988). Crossing of 31 and 41 chromosome forms showed a normal viability in the first generation and its great decrease in the second (FUJIYAMA 1988). Thus, further genetic studies on *Ch. aurichalcea* from different parts of its distribution area are desirable.



121. Interrelation of unicolour forms of *Chrysolina aurichalcea*

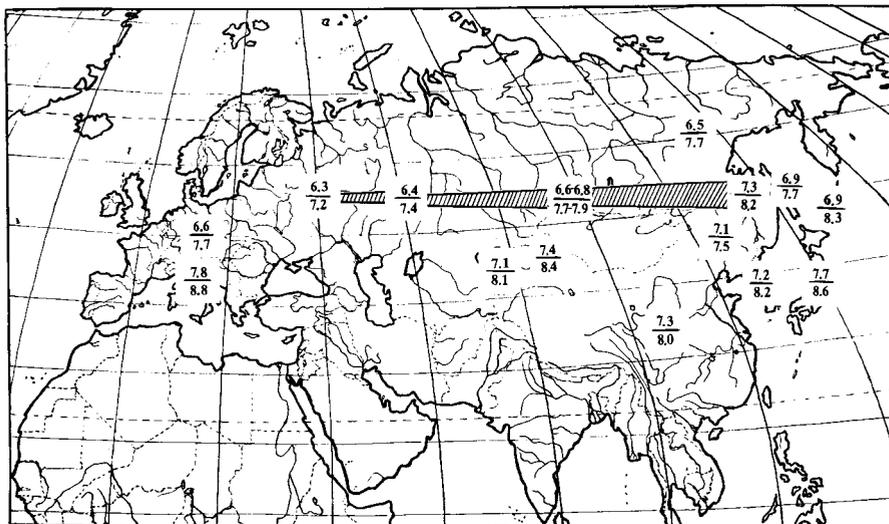


122. Left columns: colour of dorsum (1 - black, 2 - blue, 3 - violaceous, 4 - bronze, 5 - coopery, 6 - green, 7 - pronotum bronze, elytra violaceous), right columns: relief of elytra (1 - confusely punctured, 2 - with longitudinal bands flat, 3 - with bands somewhat convex, 4 - with bands very convex), 1 - *Chrysolina aurichalcea asclepiadis*, 2 - *Ch. aurichalcea bohémica*, 3-6 - *Ch. aurichalcea aurichalcea*: 3 - European part of Russia, 4 - W. Siberia, 5 - Altai, Tuva, 6 - Sayans, Dauria. Numbers in rectangles mean rates of the corresponding variant



123. Colour of dorsum and sculpture of elytra in *Chrysolina aurichalcea aurichalcea* (designations as in Fig. 122): 1 - N.-E. China, Korea, 2 - Central, S., S.-E. China, 3 - Amur reg., 4 - Russian Far East, 5 - Sakhalin, Maneron Is., 6 - Japan

At present I hold the morphological species concept: species is a group of specimens with a continuous variation of morphological characters. The species are separated from one another by a morphological *hiatus*.



124. Average body length in *Chrysolina aurichalcea* from different part of area (in fractions: numerator - males, denominator - females; clinal variation marked with striped band)

### *Chrysolina (Anopachys) eurina* (FRIVALDSZKY, 1883)

(Figs 54, 55)

*Chrysolina eurina* FRIVALDSZKY, 1883: 17 (Roumania: Mountain Bihariei, type deposition not indicated).

*Chrysolina aurichalcea* var. *asclepiadis* ab. *eurina*: WEISE in JUNK and SCHENKLING 1916: 60.

*Chrysolina aurichalcea asclepiadis* ab. *eurina*: BECHYNÉ 1950: 148.

*Chrysolina eurina*: BOURDONNÉ and DOGUET 1991: 55; WARCHAŁOWSKI 1993: 185; KIPPENBERG and DÖBERL 1994: 54.

*Chrysolina perplexa* BREIT, 1920: 86, 87 (Austria: riverside Donau, type deposition not indicated).

*Chrysolina perplexa*: BECHYNÉ 1950: 146.

*Chrysolina eurina perplexa*: KASZAB 1962: 97 (I have not seen).

*Chrysolina eurina* (=perplexa): BOURDONNÉ and DOGUET 1991: 55.

#### ETYMOLOGY

The name is derived from the Latin word *eurinus* (-a, -um), meaning eastern; this may refer to the type locality which is located in Eastern Europe.

## DESCRIPTION

Above weakly shining, shagreened, dark goldish-bronze or coppery-bronze. Antennae black with segments 1 and 2 wholly or only below rufous, sometimes segments 3 and 4 rufous apically. Below blackish-olivaceous or almost black. Legs and palpi black.

Last segment of maxillary palpus strongly broadened in male.

Pronotum broadest basally or at middle of its length. Lateral sides almost straight or slightly rounded anteriorly. Anterior angles produced. Disk sparsely and finely or densely, coarsely and rugosely punctate. Lateral callus sparsely punctate. Lateral impression deep in basal part, shallow or obsolete medially and anteriorly, covered by large dense punctures.

Elytron shagreened (obsolete in male, distinctly in female), sparsely finely punctulated and largely densely punctate. Punctures confused or arranged in 3 pairs of irregular rows; rows slightly rugate, mostly posteriorly. Smooth longitudinal bands placed between rows in each pair, sometimes slightly elevated. Humeral callus weakly convex.

Wings developed.

Male last abdominal sternum bearing transverse groove along apical margin.

Aedeagus very weakly gradually narrowed from middle to apex, broadly truncate and rounded at apex; apical orifice covered by membrane in basal part (Figs 54, 55).

Length (mm): 4.5-6.0 (male), 7.5-8.0 (female).

## DISTRIBUTION

Austria, Roumania.

## REMARKS

I do not have any specimens of this European Mountain species at my disposal. The description cited above is compiled after FRIVALDSZKY (1883), BREIT (1920) and KIPPENBERG and DÖBERL (1994). Unfortunately, some valuable diagnostic characters, such as position of antennal insertion, structure of last abdominal sternite in female, shape of pygidium have not been examined in *Ch. eurina* till now. I regard this species as a member of the subgenus *Anopachys*, following BREIT (1920). However, KIPPENBERG and DÖBERL (1994) noted: "Endglied der Kiefertaster beim male stark erweitert". The maxillary palpus like that is not found in other species of *Anopachys*.

## HOST PLANTS

*Tanacetum vulgare* (= *Chrysanthemum tanacetum*) (after BREIT 1920, JOLIVET and PETITPIERRE 1976).

***Chrysolina (Anopachys) gensenensis* (WEISE, 1900)**

(Figs 50, 51, 103, 127).

*Chrysomela gensenensis* WEISE, 1900: 282 (Korea: Gensan, ZIN).*Chrysomela gensenensis*: WEISE in JUNK and SCHENKLING 1916: 72; BREIT 1920: 87.*Chrysolina gensenensis*: CHEN 1935b: 157, 1936b: 148; BECHYNÉ 1950: 146; BOURDONNÉ and DOGUET 1991: 56.*Oreina (Chrysolina) gensenensis*: GRESSITT and KIMOTO 1963: 311, 319.

## ETYMOLOGY

The name is based on the origin of the type specimens.

## DESCRIPTION

Above shining, black with (or without) bronze tinge; legs, antennae and lower surface black or bluish-black; apex of maxillary palpi and antennal segment 1, or 1 and 2 below apically reddish.

Last segment of maxillary palpus oval truncate or cylindrical, as long as the preceding segment, somewhat broader than the latter in male, as broad as that in female. Antennae inserted at middle between clypeus and eye.

Pronotum (Fig. 103) transversely feebly convex, broadest basally and rounded anteriorly, or broadest at middle and narrowed toward both ends. Anterior angles strongly produced. Disk shagreened or smooth, finely punctulated and sparsely or densely unevenly punctate in basal half and mostly along middle. Lateral callus smooth, very densely, largely punctate on inner 1/2-2/3. Lateral impression moderate in basal 1/4, obsolete anteriorly, or evenly weakly impressed on the entire length, everywhere covered by broad band of very dense, large punctures which spread outside from lateral impression on inner part of lateral callus.

Elytron not shagreened, finely sparsely punctulated and coarsely densely punctate, with 5 hardly visible flat longitudinal bands, or confusedly punctate. Lateral callus convex, devoid of punctules. Humeral callus slightly convex. Epipleura strongly pubescent in apical part.

Wings developed.

Pygidium having longitudinal groove with parallel sides on the entire length. Last abdominal sternum flattened in male, convex and hardly turned back or not turned back at apex in female.

Aedeagus slightly broadened at sides of apical orifice, broadly obtused at apex; apical orifice rounded, covered by membrane in basal 1/3-1/2 (Figs 50, 51).

Spermatheca hook- or arc-shaped, constricted in basal part, more or less broadly rounded at apex.

Length (mm): 6.6-6.8 (male), 7.1-7.5 (female). Width (mm): 3.4-4.3 (male), 3.8-5.9 (female).

## DISTRIBUTION

Eastern China, Korea (Fig. 127).

## HOST PLANTS

*Artemisia feddei*, *Lamiaceae* (?) (after JOLIVET and PETITPIERRE 1976).

## MATERIAL EXAMINED

Lectotype (male) (is designated here) with labels: “*gensanensis* Ws. Typ.”, “J. WEISE 1901”, “Lectotype *Chrysomela gensanensis* WEISE, 1900. design. A. BIEŃKOWSKI, 1996” [red], “*Chrysolina gensanensis* (WSE.) A. BIEŃKOWSKI det., 1996” ZIN; paralectotype (female) with labels: “Gensan June 1887 LEACH”, “J. WEISE 1901”, my paralectotype and determination labels similar to those under lectotype, ZIN; Korea: Gensan: 3 females, 1 male (only aedeagus mounted, beetle lost); Tonne, 7.IX.1900: 1 male, P. SCHMIDT leg.; China: Shanghai: 1 female. Uncertained locality: Korea (?): Mountain Sansaban, 28.VII.1900: 1 female, P. SCHMIDT leg.

***Chrysolina (Anopachys) lineella* (WEISE, 1887)**

(Figs 45-47, 70-74, 127).

*Chrysomela aurichalcea* var. *lineella* WEISE, 1887: 182, 186 (“Amur”, types in Zoologisches Museum, Humboldt University, Berlin and ZIN).

*Chrysomela aurichalcea* ab. *lineella*: WEISE in JUNK and SCHENKLING 1916: 59.

*Chrysolina lineella*: LOPATIN 1990: 50.

## ETYMOLOGY

The specific name is derived from the Latin word *linea*, meaning a line; this may refer to the structure of elytron which carries five smooth longitudinal bands.

## DESCRIPTION

Shining, colouration varies: 1) dark bronze or violaceous with coppery elytra having suture and 4 longitudinal bands brassy green; 2) brassy above, elytra with green bands, lower surface brownish-violaceous; 3) black with metallic tinge, elytra with dark coppery bands. Antennae dark brown with segments 1-5 (sometimes also 6) apically reddish.

Last segment of maxillary palpus oval, truncate, similar to the preceding one. Antennal insertion 1.4-1.5 times closer to clypeus than to eye.

Pronotum transversely more or less convex, broadest just anteriorly to middle, with lateral margins rounded anteriorly and almost straight posteriorly, or broadest basally and narrowed anteriorly. Anterior angles moderately produced. Disk shagreened, finely or coarsely unevenly densely punctate and finely punctulated, sometimes weakly rugate. Lateral callus smooth or shagreened, finely punctulated and having several large punctures. Lateral impressions deep, moderate or shallow in basal 1/3-1/2, shallow to obsolete anteriorly, covered with large numerous punctures, some punctures spread inside from lateral impressions.

Elytron not shagreened, finely punctulated and coarsely, very densely punctured, with 5 smooth flat or convex longitudinal bands. Lateral callus weakly convex, finely punctulated. Humeral callus absent. Epipleura densely ciliate on apical part.

Wings vestigial.

Pygidium with longitudinal groove gradually tapered and nearly reaching apex. Male last abdominal sternum weakly convex, with large rounded triangular or transverse impression in apical half. Female last abdominal sternum very convex, slightly or moderately turned back at apex.

Aedeagus thick, oval in cross-section, hardly broadened at sides of apical orifice, rounded and sometimes truncate at apex (Figs 45-47).

Spermatheca arc-shaped, constricted in basal part or gradually broadened from base, with small protuberance at apex (Figs 70-74).

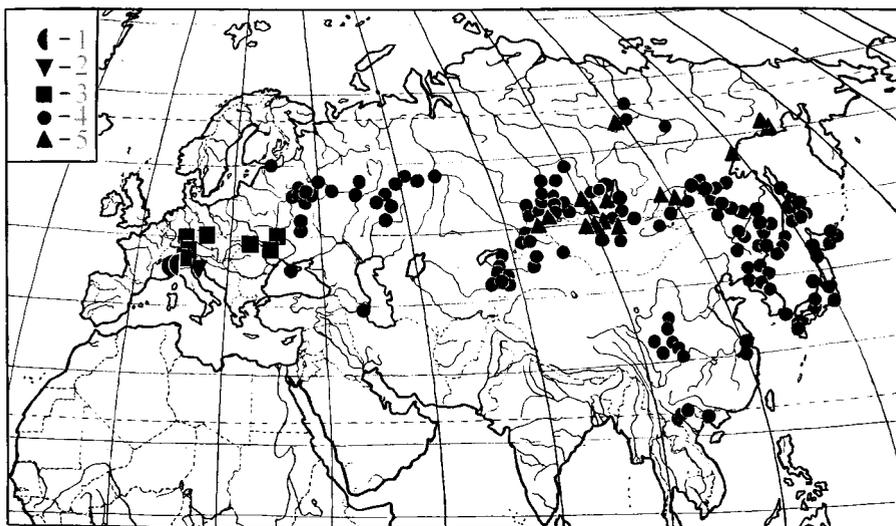
Length (mm): 7.2-7.6 (male), 6.8-8.7 (female). Width (mm): 5.0-5.3 (male), 3.9-5.6 (female).

#### DISTRIBUTION

Amur reg., Khabarovsk Terr., Primorski Krai (Fig. 127).

#### REMARKS

This species was first described very briefly as a colour variation of *Ch. aurichalcea*: "*Supra rubro-cuprea vel brunneo-aenea, lineis 4 subelevatis elytrorum aurichalceis*" (WEISE 1887). Then WEISE (1916) treated it as an aberration.



125. Distribution of: 1 - *Chrysolina aurichalcea asclepiadis*, 2 - *Ch. schatzmayri*, 3 - *Ch. aurichalcea bohémica*, 4 - *Ch. aurichalcea aurichalcea*, 5 - *Ch. quadrangulata*

tion. LOPATIN (1990) investigated one of the type specimens (male) and established *Ch. lineella* as a good species. He designated the lectotype and made a redescription.

#### MATERIAL EXAMINED

Paralectotype *Chrysomela aurichalcea* var. *lineella* (female) with labels: "Amur KOLTZE", "*lineella* m", "Typus" [red], "Paralectotype *Chrysomela aurichalcea* var. *lineella* WEISE, 1887. design. BIENKOWSKI, 1993" [red], "*Chrysolina lineella* (WSE.) A. BIENKOWSKI det., 1993" ZIN; Khabarovsk Terr.: ridge Khekhtsy, 5.X.1956: 1 female, O.N. KABAKOV leg.; Amur reg.: 40 km W from Svobodny, brushwood *Corylus*, 5.VI.1958: 1 female, ZINOVIEV leg.; Primorski Krai: Krivoj Kluch, 27.VI.1937: 1 male, 1 female, STEPANOV and SHUTOVA leg., Jakovlevka, 1927: 1 male, Kvashuk leg., envir. of Shkotovo, 7.VI.1927: 1 male, SOKOLOV leg., Mountain Tanchalaza (?), 1200 m, 26.VIII.1974: 1 female, A. Yu. BEREZANTSEV leg., Spasskoe, 6.X.1911: 1 female, A. CHERSKIJ leg., Khasan Distr., Barabash, 18.VIII.1980: 1 female, P. KOSTIN leg.

### *Chrysolina (Anopachys) lineigera* (JACOBSON, 1901)

(Figs 56-63, 81-86, 102, 129)

*Chrysomela angusticollis*: JACOBSON 1893: 125.

*Chrysomela lineigera* JACOBSON, 1901: 127 (Chita reg.: Gornyj Serentuj, ZIN) indication for *Ch. angusticollis*: JACOBSON 1893 nec MOTSCHULSKY 1860.

*Chrysomela lineigera*: WEISE in JUNK and SCHENKLING 1916: 79.

*Chrysolina lineigera*: BECHYNÉ 1950: 146; MEDVEDEV 1992: 567.

*Chrysolina watanabei* TAKIZAWA, 1970: 121 (Hokkaido: Moiwa-yama, Sapporo, type in Entomological Institute of Hokkaido University).

*Chrysolina lineigera* (= *watanabei*): MEDVEDEV 1992: 567.

*Chrysolina (Caudatochrysa) watanabei*: BOURDONNÉ and DOGUET 1991: 56.

#### ETYMOLOGY

This name is derived from the Latin words *linea*, meaning a line, and *gero*, meaning to carry; these may refer to the structure of elytron which usually has four or five smooth longitudinal bands.

#### DESCRIPTION

Shining, colouration varies: 1) dark bronze with pronotum brassy, elytra green, 2) bronze with elytra having 4 brassy or green bands, 3) wholly dark violaceous, 4) bronze or violaceous with coppery elytra having 5 brassy bands, 5) black with elytra violaceous. According to Hasegawa (1980), a coppery variation with golden or purplish tinge, reddish purple one and indigo-blue one occurs in Japan too. Antennae blackish or brown with segment 1 reddish below and some others reddish at apex.

Last segment of maxillary palpus oval, truncate, or cylindrical, similar to the preceding one, or slightly longer than the latter. Antennal insertion 1.4-2.0 times

closer to clypeus than to eye. Pronotum (Fig. 102) transversely convex, broadest at middle. Lateral margins rounded anteriorly, rectilinear, rounded, or slightly concave posteriorly. Anterior angles strongly produced. Disk shagreened or smooth, more or less coarsely, densely or sparsely unevenly punctate and finely punctulated. Lateral callus smooth or shagreened, having several large punctures. Lateral impressions broad and deep or small and shallow in basal half, moderate to obsolete anteriorly, covered by very large numerous punctures, some punctures spread inside from lateral impressions.

Elytron smooth or shagreened, sometimes rugate, finely punctulated and coarsely, very densely punctate, with 4 or 5 smooth, flat or somewhat convex longitudinal bands, or wholly confusely punctate. Lateral callus convex, finely punctulated. Humeral callus absent. Epipleura sparsely ciliate on apical part.

Wings vestigial.

Pygidium with longitudinal groove gradually tapered and mostly nearly reaching apex; sometimes groove present only in basal 1/2 or 2/3. Male last abdominal sternum weakly convex, with transverse impression just anteriorly to apex. Female last abdominal sternum very convex, slightly or moderately turned back at apex.

Aedeagus weakly narrowed at sides of apical orifice, broadly truncate or more or less narrowly drawn out at apex; apical orifice covered by membrane only in basal 1/8-1/4 (Figs 56-63).

Spermatheca hook-shaped, gradually broadened toward apex, rounded at apex (Figs 81-86).

Length (mm): 6.1-7.3 (male), 6.6-7.7 (female). Width (mm): 3.9-4.3 (male), 3.8-5.3 (female).

#### DISTRIBUTION

Amur reg., Khabarovsk Terr., Primorski Krai, Northern-Eastern China, Sakhalin, Hokkaido (Fig. 129).

#### REMARKS

This species was first determined by JACOBSON (1893) as *Chrysomela angusticollis* MOTSCHULSKY 1860 (i.e. *Chrysolina (Caudatochrysa) angusticollis*) and briefly described under this specific name. Later, JACOBSON (1901) proposed the new specific name *lineigera* for the specimens which had been determined before as *Ch. angusticollis*. According to the International Code of Zoological Nomenclature (1988) Art. 12b(1), the name *lineigera* is available.

I have examined external morphology and spermatheca structure of one female from Hokkaido, which was determined by H. TAKIZAWA as *Chrysolina watanabei*. I found this specimen to be conspecific with *Ch. lineigera*. Furthermore, aedeagus of *Ch. watanabei*, as drawn by TAKIZAWA (1970) (Figs 62, 63), is similar to those of *Ch. lineigera*. Therefore, I agree with MEDVEDEV (1992), who suggests *Ch. watanabei* as a synonym of *Ch. lineigera*. BOURDONNÉ and DOGUET (1991) included *Ch. watanabei* in the subgenus *Caudatochrysa* BECHYNÉ, 1950.

However, this is incorrect, because female of this species does not have ovipositor formed by greatly modified pygidium and last abdominal sternum (the main feature of the subgenus *Caudatochrysa*).

#### HOST PLANTS

*Aster glehni* in Japan (Takizawa 1970).

#### BIOLOGY

*Ch. lineigera* inhabits mountains up to an altitude of 1900 m. Larva was described by TAKIZAWA (1971).

#### MATERIAL EXAMINED

Lectotype *Chrysomela lineigera* (male) (is designated here) with labels: "Gorn. Serent.", "Lectotype *Chrysomela lineigera* JACOBSON, 1901. design. BIEŃKOWSKI, 1993" [red], "*Chrysolina lineigera* (JAC.) A. BIEŃKOWSKI det., 1993" ZIN; 4 paralectotypes (females) with labels: "Gorn. Serent.", "*Chrysomela angusticollis* Mts." (2 specimens), "coll. G. JACOBSON" (3 specimens), my paralectotype and determination labels, which are similar to those under lectotype, ZIN; Khabarovsk Terr.: 150 km N from Komsomolsk, river Kharpichikan, 15.X.1957: 1 female, O.N. KABAKOV leg., Sikhote Alin, Mountain Tordoki-Jani, 1900 m, tundra, 28.VI.1980: 1 female, 1350 m, meadow, 30.VI.1980: 1 male, 1400 m, 18.VI.1980: 1 female, G. LAFER leg., the same locality, 1730 m, tundra, 21.VI.1980: 1 male, PLUTENKO leg., Khekhtsy ridge, IX.1930: 1 female, Prinada leg., the same locality, 21.IV.1976: 1 female, Pototskaja leg.; Primorski Krai: Vinogradovka, 17.5.1929: 1 female, KIRITSCHENKO leg.; Kedrovaja Pad', 3.V.1969: 1 female; Japan: Hokkaido: Kurodake, Mountains Daisetsu, 21.VII.1962: 1 female, Y. MIYATAKE leg. Uncertain localities: Primorski Krai: Sidemi, 14.VIII.1926: 1 female, IVANOV leg., the same locality, 1897: 1 female, JANKOVSKIJ leg.; Amur: 2 females, JANKOVSKIJ leg.; Amur reg. (?): ridge Mjao-Chan, river Amut, 21.VIII.1982: 1 male, O.N. KABAKOV leg.; "Manchuria, Vetka", 14.VI.1908: 1 male, 1 female, MARTENSON leg.

### *Chrysolina (Anopachys) neglecta* sp. n.

(Figs 64-69, 75-80, 100, 104, 105, 128)

#### ETYMOLOGY

The Latin word *neglecta* means "one the has escaped the attention". This species has remained unrecognized for a long time.

#### DESCRIPTION

Holotype (male) (Fig. 100). Shining, blackish-violaceous, pronotum with bluish tinge, prothorax with greenish tinge. Antennae dark brown with segment 1 below and segment 2 apically reddish. Base of trochanters reddish.

Last segment of maxillary palpus oval, truncate, similar to the preceding one in length and width. Antennal insertion 1.2 times closer to clypeus than to eye.

Pronotum transversely convex, broadest just anteriorly to middle and narrowed toward both ends. Lateral margins rounded anteriorly, rectilinear posteriorly. Anterior angles strongly produced. Disk shagreened, unevenly coarsely punctate and finely punctulated. Lateral callus smooth, having 2 large punctures. Lateral impression small, shallow basally, obsolete anteriorly, covered by several large punctures.

Elytron not shagreened, finely punctulated and coarsely, very densely punctate, with 4 smooth, hardly visible, somewhat convex longitudinal bands. Lateral callus weakly convex, finely punctulated. Humeral callus absent. Epipleura sparsely ciliate on apical part.

Wings vestigial.

Pygidium with weak longitudinal groove which nearly reaches the apex. Last abdominal sternum weakly convex, with weak transverse impression just anteriorly to apex.

Aedeagus roundly narrowed at sides of apical orifice; apical projection narrowly drawn out, restricted at its base and broadened toward apex; apical orifice covered with membrane in basal half (Figs 64, 65).

Length (mm): 5.8. Width (mm): 4.0.

Female. Last abdominal sternum very convex, slightly or moderately turned back at apex. Spermatheca hook-shaped, constricted in basal part, sharpened at apex (Figs 75-80).

#### VARIABILITY

Colouration somewhat varies: head blackish-blue, prothorax blackish-brassy ventrally, rarely body dark brassy with head blue (1 specimen from the Khekhtsy ridge). Antennal insertion sometimes placed at middle between clypeus and eye. Disk of pronotum finely or coarsely punctate. Lateral callus shagreened or smooth. Elytron without smooth bands or with 5 bands. Pygidium with deep groove on whole length, which gradually tapers and nearly reaches the apex, or with weak groove only in basal half or 2/3. Last abdominal sternum evenly convex in some males.

Length (mm): 6.3 (male), 6.1-7.0 (female). Width (mm): 3.8-4.3 (male), 4.1-4.7 (female).

#### DISTRIBUTION

Khabarovsk Terr., Primorski Krai (Fig. 128).

#### MATERIAL EXAMINED

Holotype: Khabarovsk Terr.: Khekhtsy ridge, 21.IV.1976: 1 male, POTOTSKAJA leg., ZIN; 10 paratypes: the same locality, 6.X.1956, 20.IX.1956: 3 females, O.N. KABAKOV leg., KC, AC; the same locality, cedar-broadleaved forest, 1973: 1 male, AC; the same locality, 19.VIII.1972: 1 female, AC; the same locality,

21.IV.1976: 1 female, Pototskaja leg., ZIN; Primorski Krai: Vladivostok, IX.1876: 1 male, KHRISTOFF leg., ZIN; the same locality, 8.VI.1929: 1 female, SHABLIOVSKY leg., ZIN; Sutschan, Khlystovka river valley, 22.IV.1932: 1 female, PALSHIKOV leg., ZIN; Suputinka, 22.V.-2.6.1973: 1 male, KRAL leg., LC.

***Chrysolina (Anopachys) pala* sp. n.**

(Figs 48, 49, 129)

ETYMOLOGY

The Latin word *pala* means a spade. This species is named so because of the spade-like shape of the apex of aedeagus.

DESCRIPTION

Holotype (male). Shining, blackish-violaceous with head and pronotum blackish-blue; antennae blackish-brown with segments 1-7 apically reddish.

Last segment of maxillary palpus oval, truncate, similar to the preceding one in length and width. Antennal insertion 1.2 times closer to clypeus than to eye.

Pronotum transversely convex, broadest just anteriorly to middle, roundly narrowed toward both ends. Lateral margins hardly concave just before posterior angles. Anterior angles moderately produced. Disk shagreened, unevenly punctate and finely punctulated. Lateral callus smooth, finely punctulated, with some large punctures. Lateral impression moderate in basal 1/3, obsolete anteriorly, covered by large numerous punctures, some punctures spread inside from lateral impressions.

Elytron not shagreened, finely punctulated and coarsely very densely punctured, with 5 smooth somewhat convex longitudinal bands. Lateral callus convex, having some tiny punctules. Humeral callus absent. Epipleura densely ciliate in apical part.

Wings vestigial.

Pygidium with shallow longitudinal groove which nearly reaches the apex. Last abdominal sternum weakly convex, with transverse impression just before apex.

Aedeagus depressed in cross-section, hardly broadened at sides of apical orifice, triangularly narrowed at apex (Figs 48, 49).

Length (mm): 6.6. Width (mm): 4.5.

Female unknown.

DISTRIBUTION

This species is known only from the type locality, Primorski Krai (Fig. 129).

MATERIAL EXAMINED

Holotype: Primorski Krai: environs of lake Khanka, Troitskoye, 10.VI.1909: male, CHERSKIJ leg., ZIN.

***Chrysolina (Anopachys) quadrangulata* (MOTSCHULSKY, 1860)**

(Figs 19-31, 110, 125)

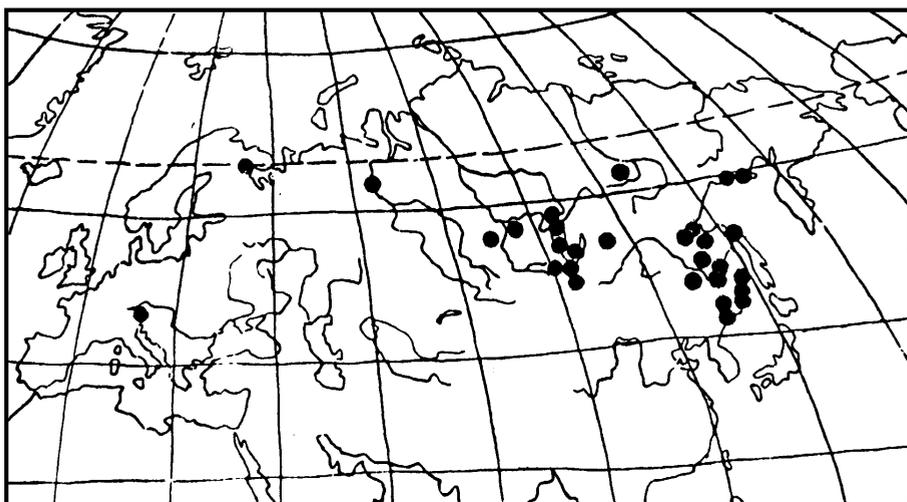
- Chrysomorpha quadrangulata* MOTSCHULSKY, 1860: 226 (Chita reg.: Nerchinsk, ZMMU).  
*Chrysomela aurichalcea* var. *quadrangulata*: GEMMINGER and HAROLD 1874: 3414.  
*Chrysomela aurichalcea* (= *4-angulata*): LEWIS 1879: 28.  
*Chrysomela quadrangulata*: KOLBE 1886: 228.  
*Chrysomela aurichalcea* var. *collaris* (= *quadrangulata*): WEISE in JUNK and SCHENKLING 1916: 59.  
*Chrysolina aurichalcea aurichalcea* ab. *quadrangulata*: BECHYNÉ 1950: 146.  
*Chrysolina aurichalcea* (= *quadrangula*): BROVDI 1977: 146. Lapsus calami.  
*Chrysomela lineaeides* WEISE, 1896: 80 (River Irkut upperhead, type deposition not indicated). **Syn. nov.**  
*Chrysolina lineaeides*: BECHYNÉ 1950: 146; BOURDONNÉ and DOGUET 1991: 56.  
*Chrysolina linoides*: MEDVEDEV and AMMOV 1978: 119. Lapsus calami.  
*Chrysomela omoka* JACOBSON, 1924: 83 (Magadan reg.: Ajan, ZIN). **Syn. nov.**  
*Chrysolina omoka*: BECHYNÉ 1950: 146.  
*Chrysolina aurichalcea omoka*: MEDVEDEV 1992: 566.

## ETYMOLOGY

The name obviously refers to the body shape: "Elongato-*quadrangulata*, vix parallela,..." (MOTSCHULSKY, 1860).

## DESCRIPTION

(Lectotype, male). Shining, coppery above and below. Antennae blackish-violaceous with segments 1 and 2 reddish below, tibiae and tarsi blackish-blue inwardly.

126. Distribution of *Chrysolina relucens*

Last segment of maxillary palpus similar to the preceding one in length and width.

Antennae inserted somewhat nearer to clypeus than to eye.

Pronotum transversely feebly convex, broadest basally. Lateral sides slightly concave in basal half, rounded in apical half. Anterior angles strongly produced. Disk shagreened, coarsely unevenly punctate. Lateral callus finely sparsely punctulated. Lateral impression deep in basal part, shallow in apical part, covered with large numerous punctures, partly coalescent near base.

Elytron not shagreened, however not so shining as in *Ch. aurichalcea*, finely punctulated and coarsely densely evenly punctate. Punctures partly arranged in rows. Lateral callus weakly convex, finely punctulated. Humeral callus convex. Epipleura densely ciliate in apical part.

Wings developed.

Pygidium with longitudinal groove in basal 2/3. Last abdominal sternum weakly convex, flattened at middle.

Aedeagus (two paralectotypes prepared) (Figs 19, 20) anchor-shaped at apex. Apical triangle longer than in *Ch. aurichalcea*, as broad as aedeagus before apex or broader; emarginations before lateral angles shallower than in *Ch. aurichalcea* (Fig. 110). Apical orifice longitudinal, covered by membrane only near base.

Length (mm): 6.5.

Female. Last abdominal sternum convex, turned back at apex. Spermatheca hook-shaped, without constriction; sclerotized duct short.

#### VARIABILITY

Colouration varies: specimens from Altai, Tuva, Sajans and Mongolia are coppery, black or bronze, rarely blue, green or violaceous, specimens from Yakutia are green, those from Magadan reg. are blue or violaceous. Elytron without smooth bands or with more or less convex bands. Last abdominal sternum in male with small transverse depression or evenly convex. Pronotum broadest before middle in some specimens.

Length (mm): 5.7-7.5 (male), 4.0-7.8 (female). Width (mm): 2.9-4.1 (male), 3.9-5.3 (female).

#### DISTRIBUTION

Altai, Tuva, Irkutsk reg., Chita reg., Yakutia, Magadan reg., Northern and Central Mongolia.

#### REMARKS

This species was suppressed as a junior synonym of *Ch. aurichalcea* by LEWIS (1879) and since then was repeatedly treated in that rank. However the type specimens of *quadrangulata* were not studied by anyone after the author, MOTSCHULSKY (1860). This is evident from the fact that they are provided only with the labels which were written by V. MOTSCHULSKY. The examination of the

type specimens and the additional materials confirms that *Ch. quadrangulata* is a separate species. It is sympatric with *Ch. aurichalcea* and differs from the latter in the shape of aedeagus (Figs 110, 125).

According to the original description of *Chrysomela lineoides*, this species is close to *Ch. aurichalcea* and differs from the latter in the shape of aedeagus: "Der Penis ist ähnlich gebaut wie der von *aurichalcea*, aber neben der Oeffnung jederseits nur unmerklich verengt, die Spitze mit einem bogenförmigen Ausschnitte" (WEISE 1896). These characters and others mentioned in the original description allow me to regard *Ch. lineoides* as a new junior synonym of *Ch. quadrangulata*.

In the original description of *Chrysomela omoka* JACOBSON (1924) brought this species together with *Ch. aurichalcea* and distinguished from the latter by the oblong body shape and the following aedeagus characters: "*Penis ut in Chr. aurichalcea ad apicem utrinque acutangulatim productus, sed prae apice perparum constrictus apiceque ipso regulariter arcuato*". Since JACOBSON (1924) did not mark the holotype, I designate the specimen, which was found among the materials of G. JACOBSON's collection (ZIN), as lectotype (Fig. 29). The examination of this specimen shows that it is conspecific with *Ch. quadrangulata*. Therefore, *Ch. omoka* is a new junior synonym of *Ch. quadrangulata*.

#### HOST PLANTS

Some specimens from Mongolia were captured on *Artemisia* spp.

#### BIOLOGY

*Ch. quadrangulata* inhabits meadows, river valleys, sea shores, mountains up to an altitude 1700 m. All specimens were captured from the middle of June to the beginning of September.

#### MATERIAL EXAMINED

Lectotype *Chrysomorpha quadrangulata* (male) (is designated here) with labels: "Nertsch." (=Nerchinsk) [pink], "Sib. or." (=Siberia orientalis), "Lectotype *Chrysomorpha quadrangulata* MOTSCHULSKY, 1860. BIEŃKOWSKI design., 1992" [red] ZMMU; 5 paralectotypes (3 males, 2 females) from the same locality, one of them with the label by V. MOTSCHULSKY: "*Chrysomorpha quadrangulata* Sib. or. MOTSCH." [large white rectangle with black margins] ZMMU; paralectotype (male) with label: "Dau. m." (=Dauria meridionalis) ZMMU; 2 paralectotypes (males) with unclear geographic label, ZMMU; all paralectotypes with my "paralectotype" labels similar to "lectotype" one.

Lectotype *Chrysomela omoka* (male) (is designated here) with labels: "Ajan primor. VIII. 11 OLENIN", "P. OLENIN", "Ajan 56°28' lat. sept., 108°=138° long. orient.", "Ajan-Primors. on Sea of Okhotsk shore", lectotype *Chrysomela omoka* JACOBSON, 1924. design. BIEŃKOWSKI, 1994" [red], "*Chrysolina (Anopachys) quadrangulata* (MOTSCH.) A. BIEŃKOWSKI det., 1996" ZIN.

## ADDITIONAL MATERIALS

Altai: Chujskaja steppe, Kosh-Agach, 24-25.VII.1909: 1 male, 18.VII.1909: 1 male, A. EMELIANOV leg.; Tuva: Mugur-Aksy, 19.VI.1971: 1 male, 1 female, 16.VIII.1971: 1 female, 2.VIII.1971: 1 female, B. KOROTIAEV leg.; Irkutsk reg.: Orlik, 20.VI.1914: 1 male, S. RODIONOFF leg., Sayan Mountains, riverhead of Oka: 1 male, Irkutsk, Kaja, 11.VI.1912: 1 male; Chita reg.: Nerchinsk: 4males, 4 females, the same locality, 5.VIII.1911: 1 female, FAJBUSHEVICH leg., the same locality, 13.VIII.1911: 1 female, SHILOVA leg., Bolshoj Zerentuj, 1891: 2 males, 3 females, J. WAGNER leg.; Yakutia: Nyurba, river Vilyui, 19.VII.1927: 7 males, 10 females, Vilyi Zoology-Botany Exp. leg.; Magadan reg.: 8.IX.1971: 2 males, 1 female, Magadan, flood-lands of river Dukchi, 30.VIII.1973: 2 males, 2 females, A. BUDARIN leg., Ajan, Sea of Okhotsk shore, IX-X.1936: 1 male, SNEGIREVSKIJ leg.; Mongolia: Dzabkhan aimak: 30 km Eastern from Toson-Tsengal, 1700 m, 10-12.VII.1976: 1 male, L. MEDVEDEV and N. VORONOVA leg.; Bulgan aimak: hilgant, flood-lands of river Selenga, 9.VII.1975: 7 males, 4 females; Central aimak: riverhead of Khara-gol river, 3-23.VIII.1924: 10 males, 10 females, KOZLOV leg.; Ar-Khangai aimak: Tevshrulekh, on *Artemisia* 12.VIII., 14.VIII., 19.(VII- ?), 10.(VII-?), 31.VII., meadow 19.VII.1970: 6 males, 10 females, 15 km Eastern from Chulut, 29.VIII.1967: 1 male, EMELIANOV and KERZHNER leg.

***Chrysolina (Anopachys) relucens* (ROSENHAUER, 1847)**

(Figs 52, 53, 101, 126).

*Chrysomela relucens* ROSENHAUER, 1847: 62 (Tirol: Lienz, type deposition not indicated).*Chrysomela relucens*: REITTER 1912: 117; WEISE in JUNK and SCHENKLING 1916: 87; BREIT 1920: 85.*Chrysolina (Chrysomorpha) relucens*: BECHYNÉ 1948: 11; 1950: 95; 1952: 364; WARCHAŁOWSKI 1993: 126; KIPPENBERG and DÖBERL 1994: 55.*Chrysolina (Anopachys) relucens*: BIENKOWSKI 1997: 198.

## ETYMOLOGY

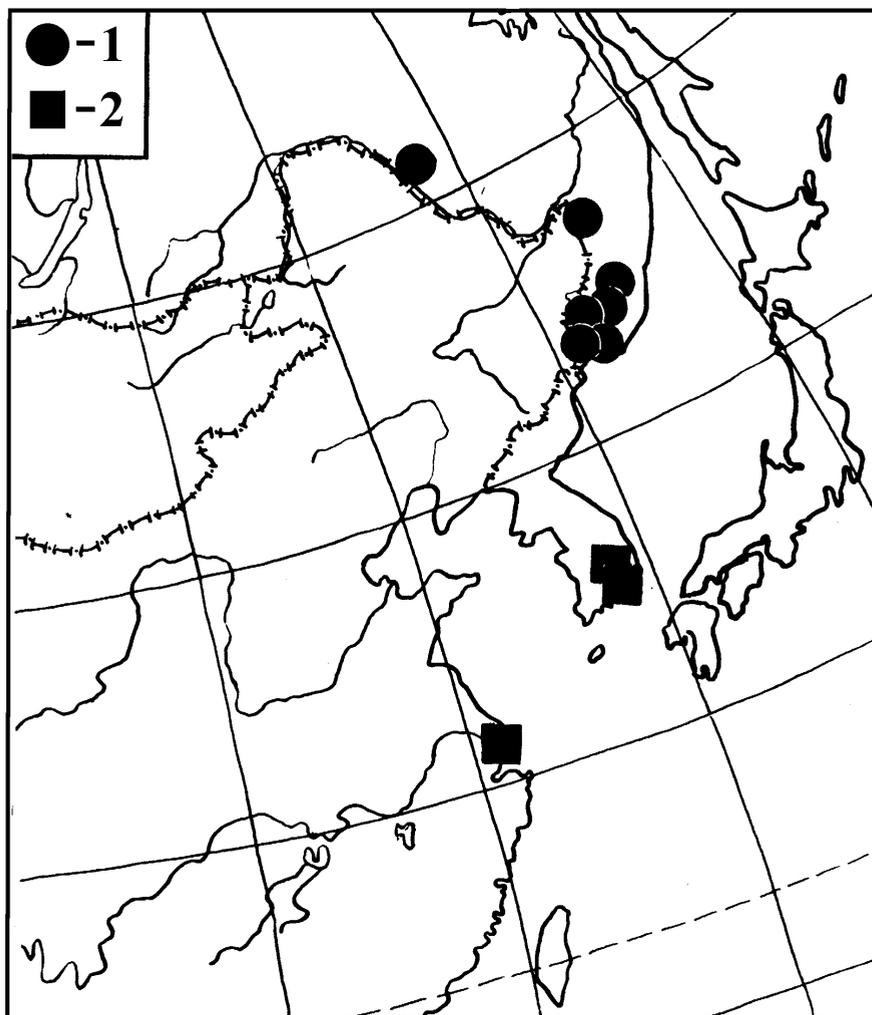
The name is derived from the Latin word *reluceo*, meaning to shine, to gleam or to beam; these may refer to the very shining dorsal surface of body.

## DESCRIPTION

Above very shining, colouration varies: 1) head and pronotum black with blue, violaceous, brassy or bronze tinge, elytra violaceous, brassy, violetish-black with bronze tinge, or greenish-bronze black, 2) unicolour, dark bronze, brassy, black, or blue with weak green and violaceous tinge (ab. *aquilina* BECHYNÉ 1948 from Tirol); legs and lower surface bluish or brassy black, antennae brown with segment 1, or 1 and 2 fulvous below.

Last segment of maxillary palpus similar to preceding one in length, cylindrical, as broad as the preceding one or slightly broadened toward apex. Antennal insertion 1.4-1.6 times closer to clypeus than to eye.

Pronotum transversely convex, broadest basally, almost straight in basal half and roundly narrowed in apical half laterally, or broadest at middle and rounded at sides, or broadest just before middle and roundly narrowed anteriorly and weakly rectilinearly narrowed posteriorly. Anterior angles strongly produced. Disk shagreened or smooth, finely, rather densely or sparsely punctate and microscopically punctulated. Lateral callus smooth, rarely shagreened, microscopically punctulated, with some fine or large punctures. Lateral impression wide and deep in basal 1/3-1/2, shallow anteriorly, covered by large numerous punctures; some punctures spread along base of pronotum.



127. Distribution of: 1 - *Chrysolina lineella*, 2 - *Ch. gansenensis*

Elytron not shagreened, finely punctulated and moderately or largely densely punctate, with 5 smooth, somewhat convex or flat longitudinal bands. Lateral callus somewhat convex, finely punctulated. Humeral callus slightly convex. Epipleura numerous pubescent in apical part.

Wings developed.

Pygidium with longitudinal groove gradually tapered and nearly reaching the apex, or with groove only in basal half. Last abdominal sternum weakly convex in male, convex and moderately or slightly turned back, or entirely not turned back at apex in female.

Aedeagus slightly narrowed at sides of apical orifice, broadly obtused and sometimes weakly impressed at apex; apical orifice longitudinal, covered by membrane only near base (Figs 52, 53).

Spermatheca hook-shaped, gradually broadened from base, rounded at apex.

Length (mm): 5.9-6.9 (male), 6.0-7.9 (female). Width (mm): 3.1-4.9 (male), 3.8-6.2 (female).

#### DISTRIBUTION

The Alps, the White Sea shore, north of Western Siberia, Eastern Siberia, the Far East (Fig. 126).

#### REMARKS

*Ch. relucens* was treated by BECHYNÉ (1948, 1952) as a member of the subgenus *Chrysomorpha* MOTSCHULSKY 1860. The latter differs from the subgenus *Anopachys* mainly in the last abdominal sternum in female, which is weakly convex and not turned back at apex. However, most of the available females of *Ch. relucens* have the last abdominal sternum turned back at apex. In addition, *Ch. relucens* resembles the other members of the subgenus *Anopachys* in the shape of aedeagus, which is moderately evenly curved and bearing a simple flagellum. Because of this, *Ch. relucens* was transferred in the subgenus *Anopachys* by BIEŃKOWSKI (1997).

#### HOST PLANT

*Sonchus humilis* on the White Sea shore (BIEŃKOWSKI 1997).

#### BIOLOGY

All specimens from the White Sea shore were collected under decaying algae overgrown with grasses. The host plant, *Sonchus humilis*, is very common plant on sea littoral meadows. In Siberia and the Far East *Ch. relucens* inhabits lowlands, hills and mountains up to an altitude of 2000 m, occurring mainly in river valleys, lake and sea shores. All the specimens were collected from the end of April to the beginning of October.

Larva has been recently described from Western Europe (STEINHAUSEN 1994).

## MATERIAL EXAMINED

(22 males and 47 females). Central Europe: Tirol, Innsbruck: 1 male.

Northern Europe: Murmansk reg.: 12 km SE from Poyakonda: 1 male and 7 females.

Western Siberia: Beresow: 1 male.

Eastern Siberia (Krasnoyarsk Terr., Irkutsk reg., Buryatia): 21 specimens.

Russian Far East (Yakutia: Bestiah, Magadan reg.: Gadlja, lake Gluhoe, Sea of Okhotsk shore, Amur reg., Khabarovsk Terr., Primorski Krai): 39 specimens. I.K. LOPATIN (personal communication) also has one specimen collected in Yakutia: envir. of Vilyuisk, river Chana.

Northern-Eastern China: Maliy Khingan: 1 specimen.

***Chrysolina (Anopachys) schatzmayri* (MÜLLER, 1916)**

(Figs 1, 2, 96-99, 125).

*Chrysomela Schatzmayri* MÜLLER, 1916: 96 (Gulf of Venice: Ins. Grado, FC).

*Chrysomela aurichalcea schatzmayeri*: BREIT 1920: 85, 88. Lapsus calami.

*Chrysomela schatzmayri*: SCHATZMAYR 1927: 152; MÜLLER 1949-1953: 377.

*Chrysomela aurichalcea* var. *Schatzmayri*: PORTA 1934: 289.

*Chrysolina aurichalcea schatzmayri*: BECHYNÉ 1950: 148, 1952: 378; WARCHAŁOWSKI 1993: 183.

*Chrysolina schatzmayri*: BOURDONNÉ and DOGUET 1991: 55.

## ETYMOLOGY

Named after A. SCHATZMAYR, entomologist.

## DESCRIPTION

Lectotype (male) (Figs 1, 2, 96, 97). Oval. Above shining, coppery with greenish tinge at sides. Epipleura of elytra green. Lower surface, legs, antennae dark bronze. Antennal segments 1-3 reddish apically.

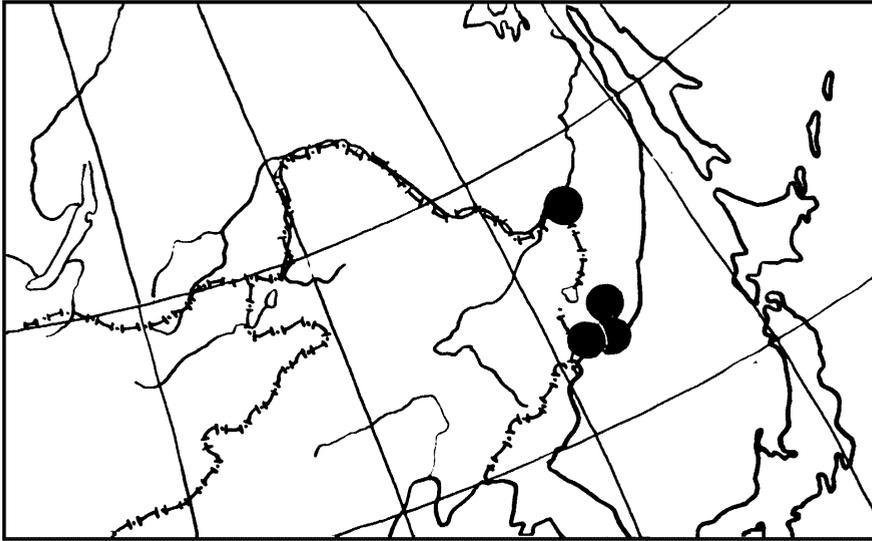
Last segment of maxillary palpus oval, as long as the preceding segment, somewhat narrower than the latter.

Pronotum transversely convex, broadest basally. Lateral sides straight and converging anteriorly in basal half, rounded in apical half. Anterior angles strongly produced. Disk finely shagreened, shining, finely densely unevenly punctate. Lateral callus very finely, densely punctulated. Lateral impression deep in basal 1/3, very shallow in anterior 2/3, everywhere covered by broad band of dense large deep punctures.

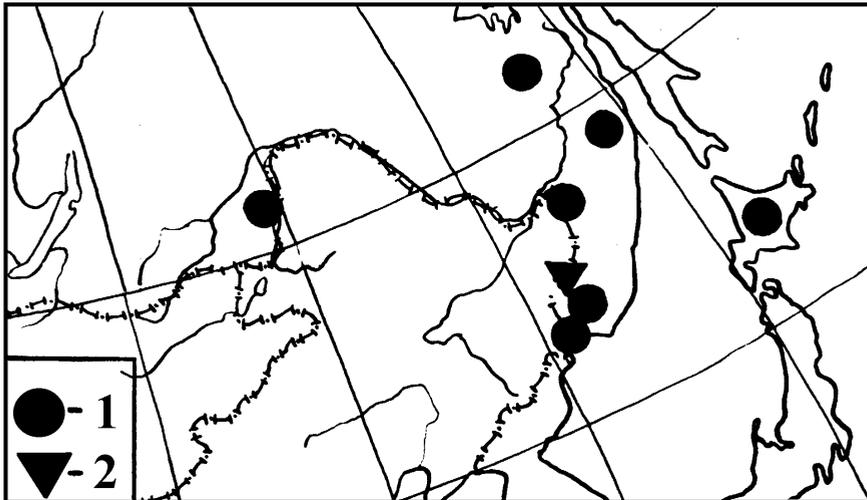
Elytron not shagreened, smooth, shining, very finely punctulated and largely densely punctate, with 3 hardly visible, weakly elevated longitudinal bands. Lateral callus convex, very finely densely punctulated. Humeral callus slightly convex. Epipleura strongly pubescent on apical part.

Last abdominal sternum convex, with weak transverse depression in apical part.

Aedeagus anchor-shaped; apical margin broadly rounded, distance between lateral angles somewhat longer than width of aedeagus before apical orifice; emarginations before lateral angles obsolete; apical orifice longitudinal, covered by membrane only near base (Figs 1, 2, 111).



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129

128-129. Distribution of: 128 - *Chrysolina neglecta*, 129 - *Ch. lineigera* (1) and *Ch. pala* (2)

Length (mm): 7.3. Width (mm): 4.7.

Female larger than male, broadened in posterior part. One specimen has greenish pronotum and bronze elytra. Lateral sides of pronotum roundly convergent from base to apex. Last abdominal sternum very convex and turned back at apex (Figs 98, 99).

Length (mm): 7.9-8.2. Width (mm): 5.8-6.0.

#### DISTRIBUTION

Gulf of Venice (Is. Grado, Is. Morosini) (Fig. 125).

#### REMARKS

I regard *Ch. schatzmayri* as a good species because it significantly differs from *Ch. aurichalcea* and *Ch. quadrangulata* in external and aedeagal characters (see key to species and subspecies).

#### HOST PLANTS

*Artemisia caerulescens*, *Dittrichia viscosa* (after MÜLLER 1949-1953).

#### BIOLOGY

*Ch. schatzmayri* inhabits sand dunes of Islands of Gulf of Venice (Adriatic Sea).

#### MATERIAL EXAMINED

Lectotype (male) (is designated here) with labels: "Grado. BERNHAUER", "ex Orig. Samlg. J. BREIT Wien" [red], "Sammlung G. FREY", "Lectotype *Chrysomela Schatzmayri* J. MÜLLER, 1916. design. A. BIENKOWSKI, 1994" [red], "*Chrysolina schatzmayri* (J. MULL.). A. BIENKOWSKI det. 1994" FC; 2 paralectotypes (females) with the same geographic labels, one of them also with label: "*aurichalcea* MNNH. sbsp. *Schatzmeyeri* MULL.", with my paralectotype and determination labels similar to those under lectotype, FC; Gulf of Venice: Is. Morosini, 28.VIII.1925: 1 female, Prince G. TORRE E TASSO leg.

#### KEY TO SPECIES AND SUBSPECIES OF THE SUBGENUS *ANOPACHYS*

- 1(18) Wings developed, at least they cover abdomen. Humeral calli convex.
- 2(3) Lateral impressions of pronotum covered by broad band of very dense, large punctures on entire length (Fig. 103). Above black with or without bronze tinge. Aedeagus broadened and obtused at apex (Figs 50, 51). Eastern China, Korea  
 ..... *gensanensis*
- 3(2) Lateral impressions of pronotum covered by large punctures, arranged more densely near base (Figs 87-89, 92, 93, 96, 97, 101). Metallic-shiny or black above. Aedeagus narrowed or anchor-shaped at apex.

4(5) Above weakly shining, shagreened. Aedeagus weakly gradually narrowed laterally from middle to apex, broadly truncate at apex (Figs 54, 55). Austria, Roumania ..... *eurina*

5(4) Above shining. Aedeagus with parallel sides on almost entire length.

6(7) Aedeagus slightly narrowed at sides of apical orifice, broadly rounded and weakly impressed at apex (Figs 52, 53). The Alps, Northern Europe, north of Western Siberia, Eastern Siberia, the Far East ..... *relucens*

7(6) Aedeagus anchor-shaped at apex.

8(11) Species from Asia.

9(10) Apical triangle of aedeagus short, emarginations before lateral angles deeper (Figs 32-44) (see also couplet 17). Azerbaijan, Kazakhstan, Kirghizia, Western and Eastern Siberia, the Far East, Sakhalin, Kuriles, Japan, Korea, China, Vietnam, Mongolia ..... *aurichalcea aurichalcea*

10(9) Apical triangle of aedeagus long, emarginations before lateral angles shallower (Figs 19-31). Altai, Tuva, Irkutsk reg., Chita reg., Yakutia, Magadan reg., northern and central Mongolia ..... *quadrangulata*

11(8) Species from Europe.

12(13) Aedeagus large, apical triangle 0.3 mm long, 0.6 mm wide, aedeagus obsoletely constricted before lateral denticles (Figs 1, 2). Above coppery with greenish tinge. Gulf of Venice ..... *schatzmayri*

13(12) Aedeagus small, apical triangle 0.1-0.2 mm long, 0.4-0.5 mm wide, aedeagus distinctly constricted before lateral denticles.

14(17) Above blue or violaceous, sometimes with greenish tinge. Epipleura of elytron very sparsely ciliate. Apical margin of aedeagus mostly triangular (Figs 3, 5, 7, 9-12).

15(16) Apical denticles of aedeagus strongly project in lateral view (Figs 4, 6). Western Alps, Lombardy, Adriatic Sea shore ..... *aurichalcea asclepiadis*

16(15) Apical denticles of aedeagus slightly project in lateral view (Figs 8, 11). Germany, Czechia, Eastern and partly Western Alps, Ukraine ..... *aurichalcea bohemica*

17(14) Above bronze, coppery or green. Epipleura of elytron densely ciliate. Apical margin of aedeagus triangular, rounded or bisinuate (Figs 13, 18). Crimea, European part of Russia ..... *aurichalcea aurichalcea*

18(1) Wings reduced, not longer than metathorax, or absent. Humeral calli absent.

19(22) Aedeagus narrowed at sides of apical orifice.

20(21) Aedeagus broadly truncate or narrowly drawn out, apical orifice covered by membrane only in basal 1/8-1/4 (Figs 56-63). Spermatheca gradually broadened from base, rounded at apex (Figs 81-86). Amur reg., Khabarovsk Terr., Primorski Krai, Sakhalin, Hokkaido ..... *lineigera*

21(20) Apical projection of aedeagus narrowly drawn out, restricted at its base and broadened toward apex, apical orifice covered by membrane in basal half (Figs 64-69). Spermatheca constricted in basal part, sharpened at apex (Figs 75-80). Khabarovsk Terr., Primorski Krai ..... *neglecta* sp. n.

22(19) Aedeagus broadened at sides of apical orifice.

23(24) Aedeagus oval in cross-section, rounded and sometimes truncate at apex (Figs 45-47). Amur reg., Khabarovsk Terr., Primorski Krai ..... *lineella*

24(23) Aedeagus depressed in cross-section, triangular at apex (Figs 48, 49). Primorski Krai ..... *pala* sp. n.

#### NOMEN NUDUM

### *Chrysomela villae* CRISTOFORI et GEORGII, 1832

*Chrysomela villae* CRISTOFORI and GEORGII 1832: 82; VILLA 1833:30.

*Chrysomela asclepiadis* (=villae): GEMMINGER AND HAROLD 1874:3414.

*Chrysomela aurichalcea* var. *asclepiadis* (=Villae): WEISE in JUNK and SCHENKLING 1916: 60.

This name was first proposed in a catalogue and not provided with a description or figure (CRISTOFORI and GEORGII 1832). Therefore, the name *villae* is unavailable according to the International Code of Zoological Nomenclature (1988) Art. 12.

#### NOMEN DUBIUM

### *Chrysomela praticola* DUFTSCHMID, 1825

*Chrysomela praticola* DUFTSCHMID, 1825: 173 (Austria: Linz, type deposition not indicated).

*Chrysomela aurichalcea* var. *asclepiadis* (= ? *praticola*): WEISE in JUNK and SCHENKLING 1916: 60.

The taxonomic position of *Chrysomela praticola* is unclear without a study of the type. DUFTSCHMID (1825) placed this species close to *Chrysolina haemoptera* (LINNAEUS, 1758) and *Ch. varians* (SCHALLER, 1783). According to the original description, *Chrysomela praticola* differs from the former in a more elongated body and inflated sides of pronotum and from the latter in a coarser puncturation of elytra.

SPECIES EXCLUDED FROM THE SUBGENUS *ANOPACHYS****Chrysolina alata* (JACOBSON, 1910)**

*Chrysolina (Anopachys) alata*: BOURDONNÉ and DOGUET 1991: 56.

I examined the original description (JACOBSON, 1910) and recent interpretation (LOPATIN 1977) of *Ch. alata*. This species belongs to the subgenus *Taeniosticha* MOTSCHULSKY, 1860 and has elytra rufous, lateral callus of pronotum separated by deep impression on entire length, each elytron with 11 regular puncture rows placed at equal distance and elevated interstices, pygidium devoid of longitudinal impression, aedeagus flattened dorso-ventrally, flagellum thin, long, reaching the apex of aedeagus.

Material examined: Kazakhstan: 2 males, 3 females.

***Chrysolina angusticollis* (MOTSCHULSKY, 1860)**

*Chrysomela aurichalcea (=angusticollis)*: LEWIS 1879: 28.

*Chrysomela aurichalcea* var. *angusticollis*: GEMMINGER and HAROLD 1874: 3414; WEISE 1887: 182, 184.

*Chrysolina angusticollis* is the type species of the subgenus *Caudatochrysa* BECHYNÉ, 1950 and differs from the members of the subgenus *Anopachys* in the presence of ovipositor, which is formed by stretched and laterally squeezed pygidium and the last abdominal sternum.

Material examined: Japan, Korea: 1 male, 2 females.

***Chrysolina cyaneopurpurea* (BALLION, 1878)**

*Chrysomela aurichalcea (=cyanopurpurea)*: WEISE 1887: 182.

*Chrysomela aurichalcea (=cyaneopurpurea)*: WEISE in JUNK and SCHENKLING 1916: 59.

*Chrysolina (Anopachys) aurichalcea aurichalcea* ab. *gibbipennis (=cyanopurpurea)*: BECHYNÉ 1950: 146.

LOPATIN (1990) examined the type specimen and ascertained that *Chrysomela cyaneopurpurea* is not a synonym of *Chrysolina aurichalcea* and included the former in the subgenus *Caudatochrysa*. I studied one female of *Ch. cyaneopurpurea* from the type locality. This specimen corresponds to the original description (BALLION 1878) and has a number of characters which make it impossible to regard this species as a member of subgenus *Anopachys*: prothoracic epimerum flat, without impression and rugosity; elytra densely minutely confusely punctate; female last abdominal sternum slightly swollen, not turned back. On the other hand, transferring *Ch. cyaneopurpurea* to the subgenus *Caudatochrysa* is also doubtful.

Material examined: N.-W. China: Kuldza: 1 female.

***Chrysolina difficilis yezoensis* (MATSUMURA, 1911)**

*Chrysolina (Anopachys) aurichalcea yezoensis*: BECHYNÉ 1950: 147.

*Chrysolina aurichalcea* (=yezoensis): KIMOTO 1964 (after TAKIZAWA 1970: 123).

*Chrysolina aurichalcea* (=yezoensis): BROVDIJ 1977: 146.

TAKIZAWA (1970) examined the type specimens of *Chrysomela yezoensis* and figured the aedeagus. This author pointed out that *Chrysolina yezoensis* was a separate species but not a subspecies of *Ch. aurichalcea*, and placed *Ch. yezoensis* close to *Ch. (Hypericia) nikkoensis* (JACOBY, 1885). MEDVEDEV (1992) believed it to be a subspecies: *Ch. (Hypericia) difficilis yezoensis*.

*Ch. difficilis yezoensis* differs from the members of the subgenus *Anopachys* in the following characters: lateral callus of pronotum separated by deep furrow basally, each elytron with large punctures arranged in five pairs of regular rows. There were two *Chrysolina* specimens (male and female) from Hokkaido (Nemuro) among the materials sent me from the Bavarian State Collection (Collection G. FREY). The male was provided with the label: “*Chr. aurichalcea* ssp. *yezoensis* Mt. det. Dr. J. BECHYNÉ 1950”. I mounted the aedeagus and determined this specimen as *Ch. (Allohypericia) koltzei lamii* TAKIZAWA 1970. However, another specimen, female, has last abdominal sternum turned back at apex and really belongs to *Ch. aurichalcea*.

Material examined: *Ch. difficilis yezoensis*: Japan (Hokkaido, Kyushu): 2 females.

***Chrysolina dohertyi* MAULIK, 1926**

*Chrysolina (Anopachys) dohertyi*: BECHYNÉ 1950: 146.

*Ch. dohertyi* has elytra bearing regular puncture rows which are arranged in five pairs, aedeagus is flat, straight on almost entire length and curved only at base and characteristically modified at apex (DACCORDI 1980).

Material examined. Vietnam: environs of Sha-Pa: 1 male.

***Chrysolina koltzei lamii* TAKIZAWA, 1970**

*Chrysolina (Anopachys) lamii*: JOLIVET and PETITPIERRE 1976: 132.

The author (TAKIZAWA 1970) pointed out that *Ch. lamii* had only superficial resemblance with *Ch. aurichalcea* and differed from the latter in the shape of last abdominal sternum in female, which is truncate and not turned back at apex, and in the aedeagus structure. Later TAKIZAWA (1971) treated it as a subspecies *Ch. brunneipennis lamii*. I examined specimens of *Ch. lamii* from Hokkaido and Primorski Krai and believe it to be a subspecies *Ch. (Allohypericia) koltzei lamii*.

Material examined. Japan (Hokkaido), Russia (Primorski Krai): 4 males, 5 females.

***Chrysolina medogana* CHEN et Wang, 1981**

*Chrysolina (Anopachys) medogana*: BOURDONNÉ and DOGUET 1991: 56.

According to the original description (WANG and CHEN 1981), “punctures of elytrae are arranged in paired rows with interstices finely and sparsely punctate”. WANG and CHEN (1981) placed this species close to *Ch. dohertyi*.

***Chrysolina cerealis mixta* (KÜSTER, 1844)**

*Chrysolina asclepiadis* (=mixta): GEMMINGER and HAROLD 1874: 3414.

*Chrysolina (Chrysomorpha) cerealis mixta* differs from the members of the subgenus *Anopachys* in the following characters: aedeagus strongly curved in apical half, apical orifice elongate, 3 times longer than wide, covered with membrane in basal half (BECHYNÉ 1948), segment 1 of female hind tarsi with distinct narrow stripe of sparse pubescence beneath.

Material examined: Italy: 1 female.

***Chrysolina pieli* CHEN, 1936**

*Chrysolina (Anopachys) pieli*: BECHYNÉ 1950: 146; BOURDONNÉ and DOGUET 1991: 56.

According to the original description (CHEN 1936a), pronotum is: “très convexe, marquée de points fins, assez serrés; côtés sans dépressions ni bourrelets mais avec quelques gros points”, punctuation of elytra: “disposée en onze séries longitudinales, ..., les points sont plus ou moins géminés, surtout ceux des séries internes”. Moreover, the qualitative picture of general view (CHEN 1936a) shows that body is short, broad, hemispherical. All characters, mentioned above do not allow me to include *Ch. pieli* in the subgenus *Anopachys*.

***Chrysolina porosirensis* TAKIZAWA, 1970**

*Chrysolina (Anopachys) porosinensis*: BOURDONNÉ and DOGUET 1991: 56. *Lapsus calami*.

TAKIZAWA (1970) noted that last abdominal sternum in female “produced into an ovipositor-like process, which is ... covered with long pygidium dorsally”.

This modification of female abdomen is the main distinctive character of the subgenus *Caudatochrysa* (BECHYNÉ 1950).

### ***Chrysolina rugulosa* (GEBLER, 1841)**

*Chrysolina (Anopachys) rugulosa* (GEBLER nec SUFFRIAN): BECHYNÉ 1950: 146; BOURDONNÉ and DOGUET 1991: 56.

*Chrysolina rugulosa* is the single species of the subgenus *Lithocrosita* L. MEDVEDEV 1982 and differs from *Anopachys* species in the following characters: above dull, shagreened, elytra very densely evenly minutely punctate, fore and middle tarsi enlarged in male, segments 1 and 2 of all tarsi in female and of hind tarsi in male with broad smooth stripe beneath.

Material examined: Tuva, Mongolia: 2 males, 3 females.

### ***Chrysolina stalii* (BALY, 1862)**

*Chrysomela aurichalcea* var. *Stalii*: GEMMINGER and HAROLD 1874: 3414.

*Chrysomela aurichalcea* (= *Stalii*): LEWIS 1879: 28.

*Chrysomela aurichalcea* (= *Stalii*): WEISE 1887: 182.

*Chrysomela aurichalcea* ab. *Stalii*: WEISE in JUNK and SCHENKLING 1916: 59.

Several authors consider this species to be a variation or junior synonym of *Chrysolina aurichalcea*. However, the original description (BALY 1862a) includes some characters which distinguish *Ch. stalii* from *Ch. aurichalcea*. Thorax has "upper surface smooth and shining, convex and impunctate on the disk". Elytra bear "punctures ... arranged, somewhat irregularly and at unequal distances, in ten longitudinal rows on each elytron, the first row abbreviated, the others approximating in pairs;...; interspaces shining, slightly swollen, impressed with a few fine scattered punctures; the striae here and there deeply sulcate". CHEN (1935b, 1936b) reported that *Ch. stalii* was devoid of wings and humeral calli and placed this species close to *Ch. micans* JACOBY 1893. GRESSITT and KIMOTO (1963) included *Ch. stalii* (= *micans*) in the subgenus *Allohypericia* BECHYNÉ 1950 and placed it close to *Ch. pubitarsis* BECHYNÉ 1950.

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