

Two new outstanding species of the genus *Hedychridium* Abeille from Kyrgyzstan (Hymenoptera: Chrysididae)

Два новых своеобразных вида рода *Hedychridium* Abeille из Кыргызстана (Hymenoptera: Chrysididae)

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Abstract. *Hedychridium karakolense* sp. nov. and *Hedychridium tarbinskyi* sp. nov. from Kyrgyzstan are described and illustrated. These outstanding species are among the largest Palaearctic species. Their doubtful placement in known species groups is discussed.

Резюме. Описываются и иллюстрируются два новых вида ос-блестянок из Кыргызстана: *Hedychridium karakolense* sp. nov. и *Hedychridium tarbinskyi* sp. nov. Эти своеобразные таксоны относятся к самым крупным Палеарктическим видам. Обсуждается их неясное таксономическое положение среди известных групп видов.

Key words: cuckoo wasps, taxonomy, Central Asia, Kyrgyzstan, Chrysididae, Chrysidinae, Elampini, new species

Ключевые слова: осы-блестянки, таксономия, Центральная Азия, Киргизия, Chrysididae, Chrysidinae, Elampini, новые виды

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Introduction

The genus *Hedychridium* Abeille de Perrin, 1878 is the second largest genus of Chrysididae after *Chrysis* Linnaeus, 1761, and the largest one in the tribe Elampini. *Hedychridium* includes about 300 known species worldwide. Most of the species described in this genus, about 200, occur in the Palaearctic region (Rosa et al., 2017b) and 47 in Central Asia (Rosa, 2018a, 2018b). Semenov (1954b) and Semenov & Nikol'skaya (1954) described eleven genera based on Central Asian chrysidids closely related to *Hedychridium*; all of them later synonymised with *Hedychridium* by Linsenmaier (1968) and Kimsey & Bohart (1991) (Rosa et al. 2017a). Nevertheless, at least

one of these genera, *Colpopyga* Semenov, 1954b, is still considered valid (Rosa, 2017), as recently confirmed by means of molecular analyses (Pauli et al., 2018). For further discussions on these genera see Rosa (2017, 2018a). Despite all the species described by Semenov (1954, 1967) and Semenov & Nikol'skaya (1954), the number of *Hedychridium* known for Central Asia is underestimated (Rosa, 2018a), considering the diversity of habitats and potential hosts. One of us (P.R.) has already started the revision of this genus, describing some remarkable species from Kazakhstan (Rosa, 2018a, 2018b, 2019). We describe here two new species from Kyrgyzstan, easily recognizable by large size up to 7.5 mm, shape of the head and colouration.

Material and methods

The specimens were examined and described under a Carton Togonal SCZ stereomicroscope. Photographs of the specimens were taken with a Nikon D-3400 camera connected to the Togonal SCZ stereomicroscope and stacked with the Combine ZP software. Abbreviations used in the descriptions are as follows: F1, F2, F3, etc. = flagellomere 1, 2, 3, and so on; MOD = midocellus diameter; MS = malar space, the shortest distance between the base of mandible and lower margin of compound eye; OOL = ocello-ocular line, the shortest distance between the posterior ocellus and the compound eye; P = pedicel; PD = puncture diameter; POL = posterior ocellar line, the shortest distance between posterior ocelli; PPW = propodeum posterior width, the distance between apices of propodeal angles.

The specimens examined in this study are deposited in the following collections: Institute of Biology and Pedology of the National Academy of Sciences of Kyrgyzstan, Bishkek (IBPB); Musée de zoologie, Lausanne, Switzerland (MZLS); Muséum national d'Histoire naturelle, Paris, France (MNHN); Zoological Institute of Russian Academy of Science, St Petersburg, Russia (ZIN);

Gian Luca Agnoli private collection, Bologna, Italy (GLAC); Paolo Rosa private collection, Bernareggio, Italy (PRC).

Taxonomic part

Order **Hymenoptera**

Family **Chrysididae**

Subfamily **Chrysidinae**

Tribe **Elampini**

Genus ***Hedychridium*** Abeille de Perrin, 1878

Hedychridium Abeille de Perrin, 1878: 3. Type species *Hedychrum minutum* Lepeletier, 1806 [= *Hedychridium ardens* (Coquebert, 1801)], by subsequent designation of Ashmead, 1902: 227.

Actineuchrum Semenov, 1954b: 141. Type species *Actineuchrum soloriens* Semenov 1954b: 144, by monotypy and original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Kimsey & Bohart (1991).

Claudiola Semenov, 1954a: 107. Type species *Claudiola rhodochlora* Semenov and Nikol'skaya, 1954a, by

original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Cyrteuchridium Semenov, 1954a: 100. Type species *Cyrteuchridium pusio* Semenov, 1954a, by original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Cyrteuchrum Semenov, 1954a: 105. Type species *Cyrteuchrum flos* Semenov, 1954a, by original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Euchrum Semenov, 1954a: 103. Type species *Chrysis carnea* var. *rosea* Rossi, 1790 [= *Hedychridium roseum* (Rossi, 1790)], by original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Euchridium Semenov, 1954a: 96. Type species *Euchridium trossulum* Semenov, 1954a, by monotypy and original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Kimsey & Bohart (1991).

Homaleuchrum Semenov, 1954b: 141. Type species *Homaleuchrum smaragdinum* Semenov 1954b, by monotypy and original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Kimsey & Bohart (1991).

Irenula Semenov and Nikol'skaya, 1954: 102. Type species *Irenula margaritacea* Semenov, 1954a: 102, by original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Zarudnium Semenov, 1954a: 72. Type species *Hedychrum aheneum* Dahlbom, 1854, by monotypy and original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Zarudnidium Semenov, 1954a: 104. Type species *Zarudnidium sapphirinum* Semenov, 1954a, by original designation. Junior subjective synonym of *Hedychridium* Abeille de Perrin, 1878 according to Linsenmaier (1968).

Description. *Hedychridium* is a quite heterogeneous genus of small colourful species ranging from 2.0 to 7.5 mm in length. Diagnostic morphological features include the single perpendicular tooth of the tarsal claw, the posterior margin of the third metasomal tergite evenly rounded, without notches, teeth or angular projections [excluding a very few species, such as the Central Asian *Hedychridium soloriens* (Semenov, 1954) with four sharp teeth]. Some species have a transverse and

sharp frontal carina (*Hedychridium flos* group) or metasoma entirely or largely non-metallic red to orange, sometimes with more or less obvious iridescent or metallic reflections (*Hedychridium roseum* group).

Hosts. The biology of most *Hedychridium* species is poorly known, and available data are recorded only on a few European species; however, as far as we know, the larvae develop as nest parasites of ground-nesting wasps of the family Crabronidae (Hymenoptera).

Distribution. *Hedychridium* from Central Asia are scarcely known, and only the fauna of Tajikistan (27 species) has been properly studied by Semenov & Nikol'skaya (1954). Kazakhstan (19 species), Turkmenistan (13) and Uzbekistan (13) have been less investigated, yet the number of unidentified species in museum collection is considerably high. The fauna of Kyrgyzstan (6 species) is almost unknown; this is true not only for *Hedychridium*, but even for the tribe Elampini in a whole, because the most active chrysidologist of Kyrgyzstan, Yuri S. Tarbinsky, published articles related to the tribe Chrysidini only and could not complete his research on the rest of the family.

Hedychridium karakolense sp. nov.

(Figs 1–4, 5–6)

Holotype. Female, **Kyrgyzstan**, Northern Tian Shan, Issyk Kul Region, Eastern Terskey Ala Too Range, 4 km S of Teplokluhenka Vill., 25 km SE of Karakol, 2200 m, 15–30.VIII.2000 (ZIN).

Paratypes. **Kyrgyzstan**: 3 females, same data as for holotype (GLAC; PRC); 1 male, Naryn Too Range, Krysya gorge or canyon, 15.VII.1987, leg. S. Ovchinnikov (IBPB).

Description. *Female*: body length 7.0–7.3 mm; fore wing length 4.4 mm; OOL = 1.95 MOD; POL = 1.4 MOD; MS = 0.9 MOD; relative length of P:F1:F2:F3 = 1.0:1.4:0.9:0.8.

Head. In frontal view, head distinctly wider than high, for the narrowest interocular distance 1.25 times longer than distance between lower margin of midocellus and antennal sockets. Frons finely and densely punctate, with small (0.2 MOD) subcontiguous punctures; punctation on face with similar punctures, medially transversally irregularly wrinkled; face asetose; subantennal space 1.0 MOD; ocellar triangle isosceles; in dor-

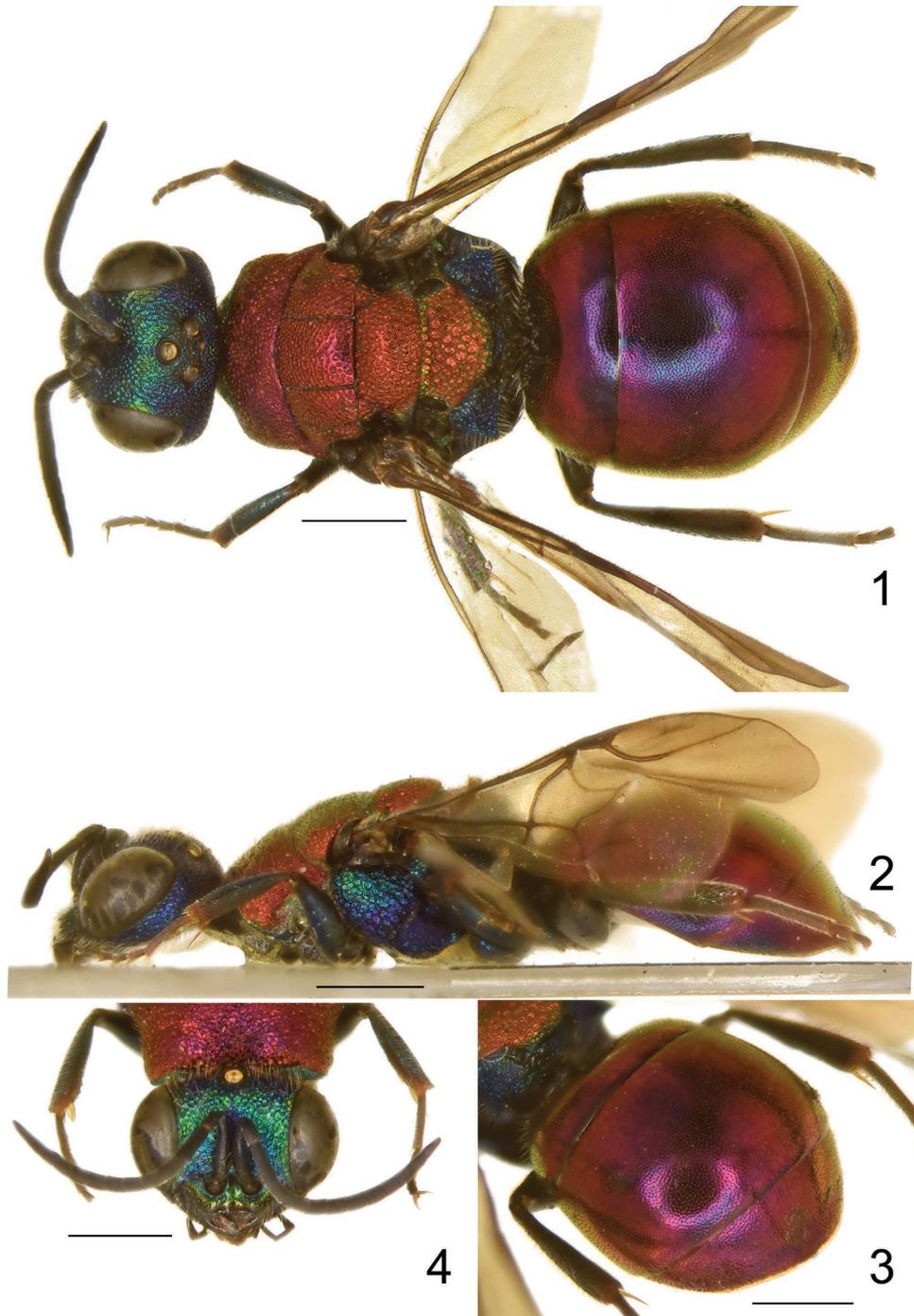
sal view, temples from posterior margin of the eye to occiput, rounded and enlarged (> 2 MOD). F1 3.3 times long as wide; mandibles toothed.

Mesosoma. Pronotal anterior margin with carina interrupted. Overall sculpture with dense punctures, generating a dull body reflection. On pronotum and anterior part of mesoscutum with small (0.1–0.2 MOD) punctures; on posterior part of mesoscutum with double punctation, with relatively larger punctures (0.3 MOD) and polished interstices (0.1–1.0 PD); on mesoscutellum with double punctation and small polished interstices anteriorly and subcontiguous posteriorly; notauli and parapsidal furrows deep and complete. Metanotum distinctly elongate, 1.4 times longer than pronotum, with large (0.5 MOD), foveate-reticulate punctures. Mesopleuron with dense and rounded punctures. Propodeal teeth short, triangular. Forefemur unmodified not expanded or angulate, hindfemur with an elongate and wide depression on inner surface; hindtarsi unmodified, with second and third tarsomere subequal in length; fifth tarsomere as long as third+fourth. Tarsal claws with a very small submedian tooth, hardly visible. Forewing outer veins scarcely visible, medial vein gently curved; *Rs* stub longer than *R1*.

Metasoma. Metasomal terga with minute, shallow, even and dense punctation, punctures 1 PD apart, with polished intervals (Figs 1, 3). Third tergum with narrow, translucent apical rim on posterior margin. First sternum impunctate; second sternum with scattered double punctation; third tergum with dense small punctures; laterotergites minutely and densely punctured on outer side.

Colouration. Head entirely blue without red, purplish or coppery colours; pronotum, excluding pronotal collar, mesoscutum, metascutellum red to purplish; mesopleuron blue to light blue, without red or coppery reflections; rest of mesosoma blue, black ventrally; metasoma purplish dorsally and blackish ventrally. Legs metallic green to blue; tarsi brownish.

Vestiture. Erect, whitish setae on head, distinctly long (2 MOD) laterally, and very long setae (up to 2.5 MOD) on coxae, trochanters, femora, the second metasomal sternum and the apical margin of the third metasomal tergum.



Figs 1–4. *Hedychridium karakolense* sp. nov., holotype, female (Kyrgyzstan): **1**, habitus, dorsal view; **2**, habitus, lateral view; **3**, head, dorsal view; **4**, metasoma, dorsolateral view. Scale bar: 1.0 mm.

Male. Body length 6.7 mm; OOL = 1.95 MOD; POL = 1.4 MOD; MS = 0.5 MOD; relative length of P:F1:F2:F3 = 1.0:1.7:1.0:0.8. Similar to female, but apical margin of the third metasomal tergum more rounded (Fig. 5). Genital capsule as in Fig. 6.

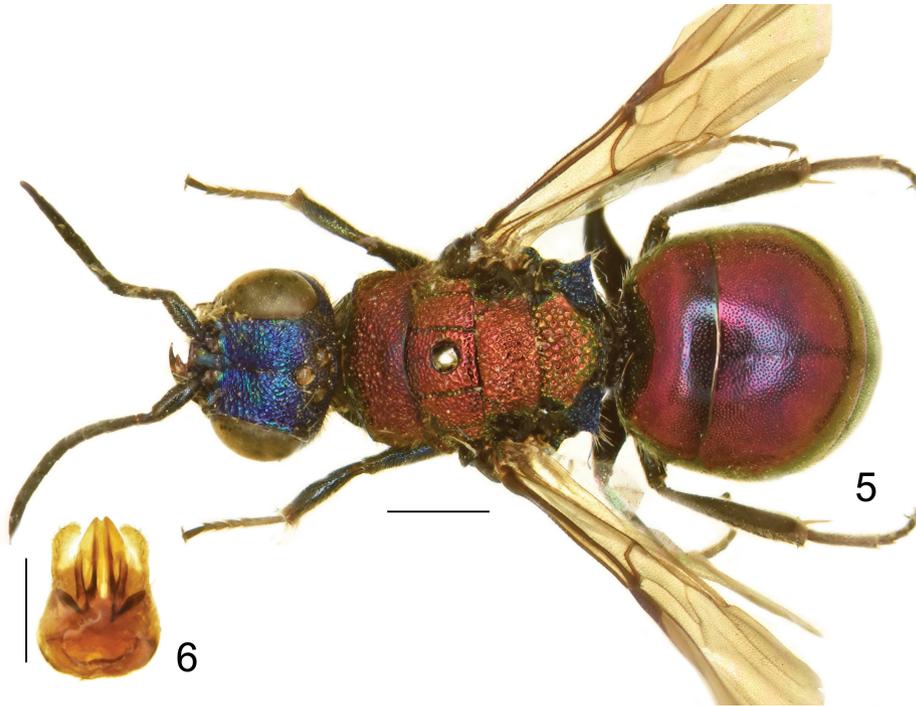
Etymology. The specific epithet *karakolense* refers to the main type locality in Kyrgyzstan, near by the Issyk Kul Lake.

Distribution. Kyrgyzstan.

***Hedychridium tarbinskyi*, sp. nov.**
(Figs 7–10)

Holotype. Female, **Kyrgyzstan**, Northern Tian Shan, Eastern Terskey Ala Too Range, 4 km S of Teplokluchenka Vill., 25 km SE of Karakol, 2200 m, 15–30.VIII.2000 (ZIN).

Paratypes. **Kyrgyzstan**: 4 females, same data as for holotype (GLAC; PRC); 1 female, Northeastern Kyrgyzstan, Terskei Mountain Range, 2000 m, Aksu



Figs 5–6. *Hedychridium karakolense* sp. nov., paratype, male (Kyrgyzstan): **5**, habitus, dorsal view (scale bar: 1.0 mm); **6**, genital capsula (scale bar: 0.5 mm).

Vill., 42°28'N, 78°32'E, 24.VIII.1996, leg. S. Zonstein (IBPB).

Description. *Female*: body length 6.8 mm; fore wing length 3.9 mm; OOL = 2.0 MOD; POL = 1.4 MOD; MS = 1.0 MOD; relative length of P:F1:F2:F3 = 1.0:1.3:0.9:0.8.

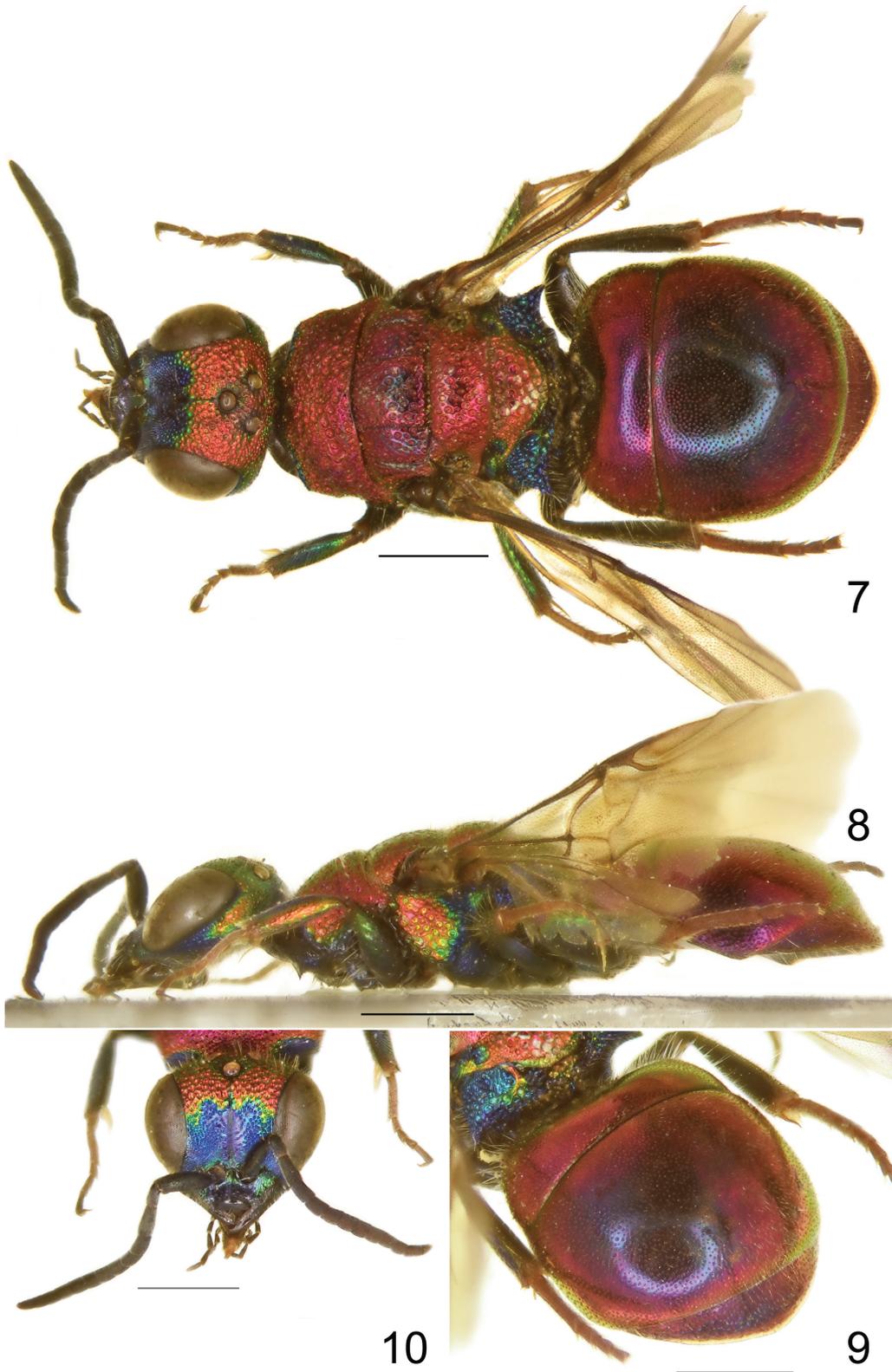
Head. Frons with double punctation, where small (0.3 MOD) punctures mix with minute ones; face finely and densely punctured laterally, punctures becoming smaller towards clypeus and malar space; face largely polished with scattered punctures along the deep mid line; face asetose; distance between lower margin of midocellus and antennal sockets equal to narrowest interocular distance; subantennal space 1.5 MOD; apex of clypeus triangular and thickened; ocellar triangle isosceles; vertex laterally to posterior ocelli polished; punctation from posterior ocelli to occiput double, with smaller punctures than on frons. F1 2.75 times long; mandibles toothed.

Mesosoma. Pronotal anterior margin with carina largely interrupted medially. Pronotum with deep and irregular punctuation, with differently sized punctures, ranging from 0.6 to 0.1 MOD, irregularly mixed both subcontiguous or with polished interstices. Mesoscutum with similar punctures, yet larger polished interstices (0.2–1.0 PD); notauli and parapsidal furrows deep and complete. Mesoscutellum with relatively smaller punctures,

with polished interstices. Mesopleuron rounded ventrally, with large and shallow punctures antero-ventrally. Metanotum slightly shorter than pronotum. Metascutellum with large foveate-reticulate punctures, on postero-lateral margin with small, irregular and elongate punctures. Propodeal teeth triangular, slightly curved like a sickle. Forefemur unmodified not expanded or angulate, hindfemur with an elongate and wide depression on inner surface; hindtarsi unmodified, with second and third tarsomere subequal in length; fifth tarsomere as long as third+fourth. Tarsal claws with a very small submedian tooth, hardly visible. Forewing outer veins scarcely visible, medial vein gently curved; *Rs* stub as long as *R1*.

Metasoma. Metasomal terga with minute, shallow, even punctation, punctures 1–3 PD apart, with polished intervals (Figs 7, 9); tergum 2 with smaller and denser punctures on the basal margin. Third tergum with narrow, translucent apical rim on posterior margin. First sternum impunctate, second and third tergum with scattered small punctures, broadly polished; laterotergites minutely and densely punctured on outer side.

Colouration. Head blue with frons and vertex flame red; pronotum, excluding pronotal collar, mesoscutum, metascutellum and mesopleuron flame red to purplish; remaining part of mesosoma blue, with some greenish reflections, laterally and



Figs 7–10. *Hedychridium tarbinskyi* sp. nov., holotype, female (Kyrgyzstan): 7, habitus, dorsal view; 8, habitus, lateral view; 9, metasoma, dorsolateral view; 10, head, dorsal view. Scale bar: 1.0 mm.

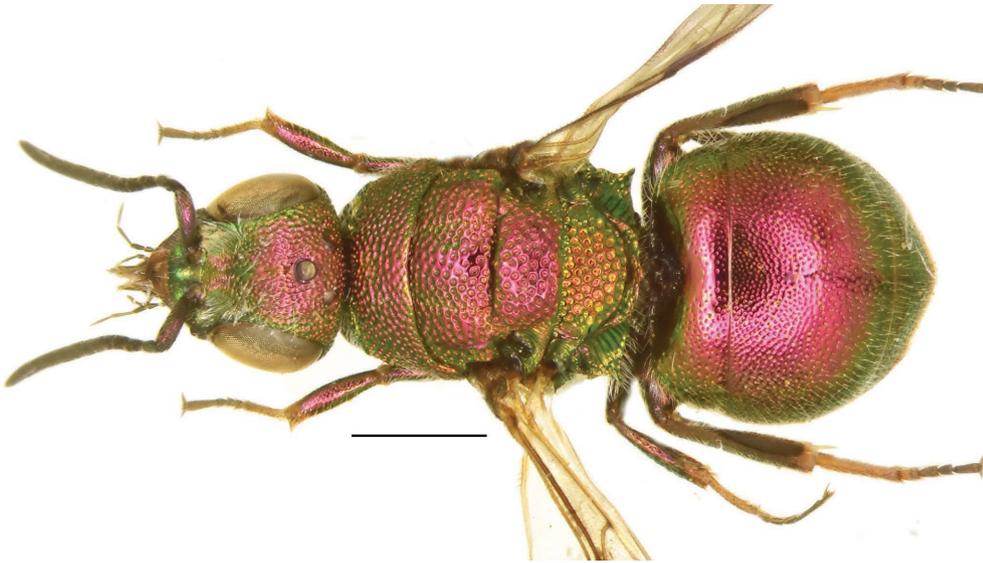


Fig. 11. *Hedychridium planifrons* du Buysson (United Arab Emirates), habitus of female, dorsal view. Scale bar: 1.0 mm.

black ventrally; metasoma purplish dorsally and blackish ventrally. Legs metallic green, foreleg golden on outer side; tarsi brownish.

Vestiture. Overall covered by erect, whitish setae, distinctly long (2 MOD) on head laterally, or very long (up to 2.5 MOD) on coxae, trochanters, femora, on second metasomal sternum and on apical margin of third metasomal tergum.

Etymology. The species is named after Yuriy Serafimovich Tarbinsky, the most active author on the chrysidid fauna of Kyrgyzstan, who died prematurely without completing the revision of the cuckoo wasps of this Country.

Distribution. Kyrgyzstan.

Discussion

Comparative diagnosis

Hedychridium tarbinskyi sp. nov. is an unusual looking *Hedychridium* due to the large size, subtriangular face with elongate malar spaces, and body colouration pattern. The closest species is *Hedychridium karakolense* sp. nov., a syntopic species similar to *Hedychridium tarbinskyi* sp. nov. for its large size, and body colouration pattern. However, *Hedychridium karakolense* sp. nov. differs in shape of the head, in both sexes distinctly wider than high, when seen frontally (Fig. 4), with the narrowest interocular distance 1.25 times longer than distance between lower margin of midocellus and antennal sockets; temples, seen in dorsal

view, from posterior margin of the eye to occiput rounded and enlarged (> 2 MOD; female temples convergent and narrower, about 1.5 MOD); face, medially wrinkled; subantennal space, shorter (1 MOD); F1 longer (3.3 times long as wide, whereas in female it is 2.75 times long). Head entirely blue without red, purplish or coppery reflections. Lastly, the two species are distinguished by colouration: the head of *Hedychridium karakolense* sp. nov. is entirely blue without the red, purplish or coppery colours encountered in *H. tarbinskyi* sp. nov., and the mesopleuron is blue to light blue, without the red or coppery reflections (Fig. 2).

Species groups

Hedychridium tarbinskyi sp. nov. apparently belongs to the *Hedychridium planifrons* group, but its correct placement is considered uncertain. The *Hedychridium planifrons* group is a small group including only four species (Linsenmaier, 1968): *Hedychridium planifrons* du Buysson, 1900 (Egypt, Palestine, Arabian Peninsula) (Fig. 11); *Hedychridium aegyptiacum* du Buysson, 1898 (Egypt, Palestine); *Hedychridium iocosum* Linsenmaier, 1959 (Morocco); *Hedychridium laetificum* Linsenmaier, 1959 (Morocco). All types were examined. Members of this group are recognisable by general habitus similar to *Hedychrum*, with enlarged or elongated and flat pronotum; face with weak or without distinct scapal basin; mandibles edentate; mid and hind tibial pits; legs

and metasomal sterna with whitish and long setae; propodeal angles spiniform, without other evident derived features that are diagnostic for other species groups (e.g. transverse frontal carina, apical margin of the last tergum with teeth, fore femur ventrally carinate or angulated, mesopleuron carinate, propodeal angle truncate, lobate or emarginated, forewing medial cell angled, metasoma second and third tergum elevated).

Hedychridium tarbinskyi sp. nov. shares with *Hedychridium planifrons* the elongate face, without transverse frontal carina and without distinct scapal basin, the hind tibial pits and the large body dimensions. Nevertheless, it is separated by toothed mandibles, pronotum unmodified, not distinctly elongated and flattened, triangular propodeal angles. For such morphological differences its placement in the *planifrons* species group is considered doubtful and we wait for future molecular systematic analyses.

Despite the similarities with *Hedychridium tarbinskyi* sp. nov., *Hedychridium karakolense* sp. nov. shows some clear relations with members of the *Hedychridium uvarovi* group. In particular, the transversal shape of the head, distinctly wrinkled medially and the shape of genital capsule (see Rosa et al. 2017c for comparative pictures of the genital capsules of *Hedychridium leleji* Rosa, 2017, *Hedychridium proshchalykini* Rosa, 2017 and *Hedychridium loktionovi* Rosa, 2017). The description and diagnosis of the *Hedychridium uvarovi* group is still missing, because only females of *Hedychridium uvarovi* Semenov, 1967 have been examined so far. It is based on the unusual colour pattern, face transversally wrinkled and shape of genitalia of the three species described by Rosa et al. (2017c). Future examination of further specimens will improve the knowledge of this group and complete the diagnosis of this species group.

Remarks

Linsenmaier (1968) provided the diagnosis of *Hedychridium planifrons* group based on the most remarkable species, which is bearing all the diagnostic features of the group. Nevertheless, *Hedychridium aegyptiacum* was previously described by du Buysson (1898) and therefore this group should be renamed. However, this group is so heterogeneous that could be either split into two or

three groups or even merged with the *Hedychridium ardens* group, as Kimsey & Bohart (1991) suggested, stating that species groupings with so few information was premature in the genus *Hedychridium*. As a matter of fact, *Hedychridium iocosum* has toothed mandibles, short POL, mesosoma densely sculptured, large size and transverse head in frontal view, similarly to *Hedychridium karakolense* sp. nov.; *Hedychridium aegyptiacum* and *H. laetificum* have edentate mandible, but very short malar spaces, large POL (> 2 MOD), mesosoma sparsely punctured with large polished interstices, and small to medium size. At the moment, the main diagnostic features, grouping all together these species, are the superficial resemblance to *Hedychrum*, the face without a distinct scapal basin, the pronotum more or less flat and elongate, the tibial pits, the long whitish setae on legs and sternites, the uniform body colouration, entirely red, golden-red, purplish or coppery. Consequently, a re-evaluation of this group is needed, with examination of further material.

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