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RESEARCH PAPER

Review of the tribe Typoderini (Coleoptera: Curculionidae) from Caucasus with the description of a new species of *Caulomorphus* from Armenia

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Abstract. All genera of the tribe Typoderini presented in the Caucasus Region, i.e. *Adexius* Schönherr, 1834 (which is here transferred to Typoderini from Molytini based on morphological characters), *Anchonidium* Bedel, 1884, *Aparopion* Hampe, 1861, *Caulomorphus* Faust, 1886, and *Pseudaparopion* Borovec, Osella & Zuppa, 2002, are diagnosed and partly illustrated. One new species, *Caulomorphus kociani* sp. nov., is described; *Caulomorphus besucheti* Osella, 1970, *Caulomorphus talyschensis* Reitter, 1897, and *Anchonidium perpensum* Faust, 1886 are redescribed. Lectotype is designated for *Anchonidium perpensum*. Keys to Caucasian genera of Typoderini and to all species of Caucasian *Anchonidium* and *Caulomorphus* are provided. A complete list of species with their distribution is given.

Key words. Coleoptera, Curculionidae, Molytinae, lectotype designation, new species, redescription, Caucasus, Palaearctic Region

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Introduction

The tribe Typoderini belongs to the large and certainly polyphyletic subfamily Molytinae of the family Curculionidae. Molytinae (Cryptorhynchinae excluded, see Riedel et al. 2016) currently consist of 35 tribes (Alonso-Zarazaga & Lyal 1999, Alonso-Zarazaga et al. 2017); the majority of them are poorly defined and their monophyly has never been properly tested. The first attempt based on three genes and a very limited number of taxa did not give any applicable result (Grebennikov 2017). The validity of tribes is also questionable as genera are often transferred among them (Alonso-Zarazaga & Lyal 1999, Alonso-Zarazaga 2013, Alonso-Zarazaga et al. 2017) without providing clear evidence of the necessity of such acts.

A recent study of Cryptorhynchinae (Riedel et al. 2016) has shown that Cryptorhynchinae are monophyletic and have been excluded from Molytinae, a statement not accepted in the most recent catalogue of the Palaearctic Curculionoidea (Alonso-Zarazaga et al. 2017). Cryptorhynchinae are not treated as a part of Molytinae in this paper.

The subfamily Molytinae according to Alonso-Zarazaga et al. (2017), excluding Cryptorhynchinae, are represented in the Palaearctic Region by 88 genera and 689 species and subspecies; only 38 genera with 327 species and subspecies are present in the western part of the Palaearctic Region (Alonso-Zarazaga 2017).

Typoderini is a small Palaearctic, Oriental and Afrotropical tribe (the assignment of the genus *Plessisellus* Hoffmann, 1964 from Vanuatu to this tribe needs further verification) of flightless, litter-dwelling or subterranean small weevils (Alonso-Zarazaga & Lyal 1999, Lyal 2014). All members of the tribe are externally very similar, morphologically there are only weak diagnostic characters which support the existence of the tribe in its current composition; however, the monophyly of the tribe is very doubtful (Grebennikov 2017).

The Caucasus Region, as used here, covers the southern territory of European Russia, Georgia, Armenia, Azerbaijan, eastern Turkish provinces Rize, Artvin, Ardahan, Kars and Igdir, and finally West Azerbaijan of Iran. The fauna of Molytinae of this region is composed of 16 genera and 99 species (including a new species of *Caulomorphus*

described in this paper) while the genus *Plinthus* Germar, 1817 with 58 described species is by far the most dominant genus. Adjacent Turkey has 14 genera and 95 species and subspecies of Molytinae. The tribe Typoderini is represented in the Caucasus Region by five genera and twelve species, as reviewed in this paper.

The aim of this paper is to provide a diagnosis and key of all genera of Typoderini of the Caucasus Region, to designate a lectotype for the problematic species *Anchonidium perpensum* Faust, 1886, to describe a new species of the genus *Caulomorphus* from Armenia, and to provide new records and redescribe some other species of this genus.

Material and methods

The adult specimens were examined with a Leica S8APO stereomicroscope with diffuse lighting at magnifications up to 128×. Dry mounted specimens were relaxed in warm water and dissected. Male and female terminalia were macerated in KOH solution, embedded in Euparal and illustrated. All dissected parts were mounted on plastic labels and pinned together with the respective specimen. Illustrated structures were studied using a ZEISS stereoscopic microscope and figured using a camera lucida. The terminology of the rostrum and the genitalia follows Oberprieler et al. (2014). The head length was measured from the anterior margin of pronotum (base of head) to the anterior margin of the rostrum; the head width was measured across the eyes; the length of pronotum (PL) and the length of head (HL) was measured in midline, the elytral length (EL) was measured along the suture; the width refers to the maximum width of pronotum (PW) and elytra (EW). The body length is a combined length of the head, pronotum and elytra, measured separately.

The distribution of each species follows the Cooperative catalogue of Palaearctic Coleoptera Curculionoidea (Alonso-Zarazaga et al. 2017).

Label data are cited verbatim. Slash '/' separates different labels, (p) denotes printed labels, (h) denotes handwritten labels. All type specimens were provided with the following red printed label: HOLOTYPE, PARATYPE or LECTOTYPE, genus and species name of the respective taxon, P. Hlaváč det. or des., 2019.

The material is deposited in the following collections:

BMNH	The Natural History Museum, London, United Kingdom (Max Barclay, Michael Geiser);
CJKH	Jiří Krátký's private collection, Hradec Králové, Czech Republic;
CJPH	Jan Pelikán's private collection, Hradec Králové, Czech Republic;
CLFC	Luca Fancello's private collection, Cagliari, Italy;
CPHP	Peter Hlaváč's private collection, Prague, Czech Republic;
NMPC	National Museum, Prague, Czech Republic;
OUMNH	Hope Entomological Collections, Oxford University, Oxford, United Kingdom (Amoret Spooner);
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang Schawaller);
SMTD	Museum für Tierkunde, part of Staatliche Naturhistorische Sammlungen Dresden, Germany (Olaf Jaeger);
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin (Joachim Willers, Bernd Jaeger).

Results

Typoderini

Typoderina Voss, 1965: 343 (as a subtribe of Liparini Latreille, 1828).
Typoderina: Alonso-Zarazaga & Lyal (1999): 196 (catalogue; as a subtribe of Molytini Schönherr, 1823).
Typoderini: Lyal (2014): 552 (diagnosis); Alonso-Zarazaga (2013): 496 (catalogue); Alonso-Zarazaga (2017): 490 (catalogue).
Anchonidium-group: Zherichin (1987): 38 (diagnosis).

Diagnosis. Body length usually below 10 mm (less than 6 mm for west Palaearctic taxa). Eyes variable in size, from large (*Adexius* Schönherr, 1834, *Pseudaparopion* Borovec, Osella & Zuppa, 2002), smaller (*Anchonidium* Bedel, 1884), reduced to single ommatidium (*Caulomorphus* Faust, 1886) or completely absent (cavernicolous genera *Baezia* Alonso-Zarazaga & García, 1999 and *Oromia* Alonso-Zarazaga, 1987). If eyes present, they are positioned on head capsule at base of rostrum. Head sculptured, with strong punctation, sometimes with carinae, strongly and deeply retracted into prothorax so that anterior margin of prothorax seems much wider than visible part of head. Rostrum not separated from head capsule by transverse constriction or furrow, curved downwards, scrobe visible dorsally. Antennae inserted near apex of rostrum, scape pedunculate, reaching or not reaching anterior margin of eyes, funicule with 5–7 antennomeres, club well-defined, well-separated from funicule, its basal antennomere long, considerably longer than two following ones.

Sexual dimorphism. All studied genera have clear sexual dimorphism on all tibiae (Figs 3a–f). In males tibiae are simple, with sharp uncus, lacking premucro while in females in front of uncus there is always well-defined premucro. Ventrites 1 and 2 in males shallowly depressed.

Distribution. The centres of the diversity of the tribe are in the western part of the Palaearctic Region, especially in Turkey, Caucasus, the Near East, and in the Afrotropical Region, where many species are waiting for description, especially in mountain regions, especially in Cameroon, Democratic Republic of the Congo, Kenya, Tanzania and South Africa. The tribe is also present in China and Japan but so far unrecorded in the New World and Australia.

Biology. Members of the tribe as currently defined are edaphic or subterranean weevils, some known only from caves, but the majority of the genera are typical litter dwellers in well-protected temperate, subtropical or tropical deciduous forests.

Key to genera of Typoderini in the Caucasus Region

1 Elytra oval, EL/EW ratio ≤ 1.25. 2
– Elytra elongate, parallel-sided, at most slightly rounded in posterior half, EL/EW ratio ≥ 1.40. 3
2 Rostrum lacking carinae, antennae slender, all funicular antennomeres longer than wide, elytral striae granulate, elytra with fine and short setae, tegmen of aedeagus simple without parameres. ..... ***Pseudaparopion*** Borovec, Zuppa & Osella, 2002
– Rostrum carinate, antennae stouter, at least some funicular antennomeres quadrate or transverse, elytral

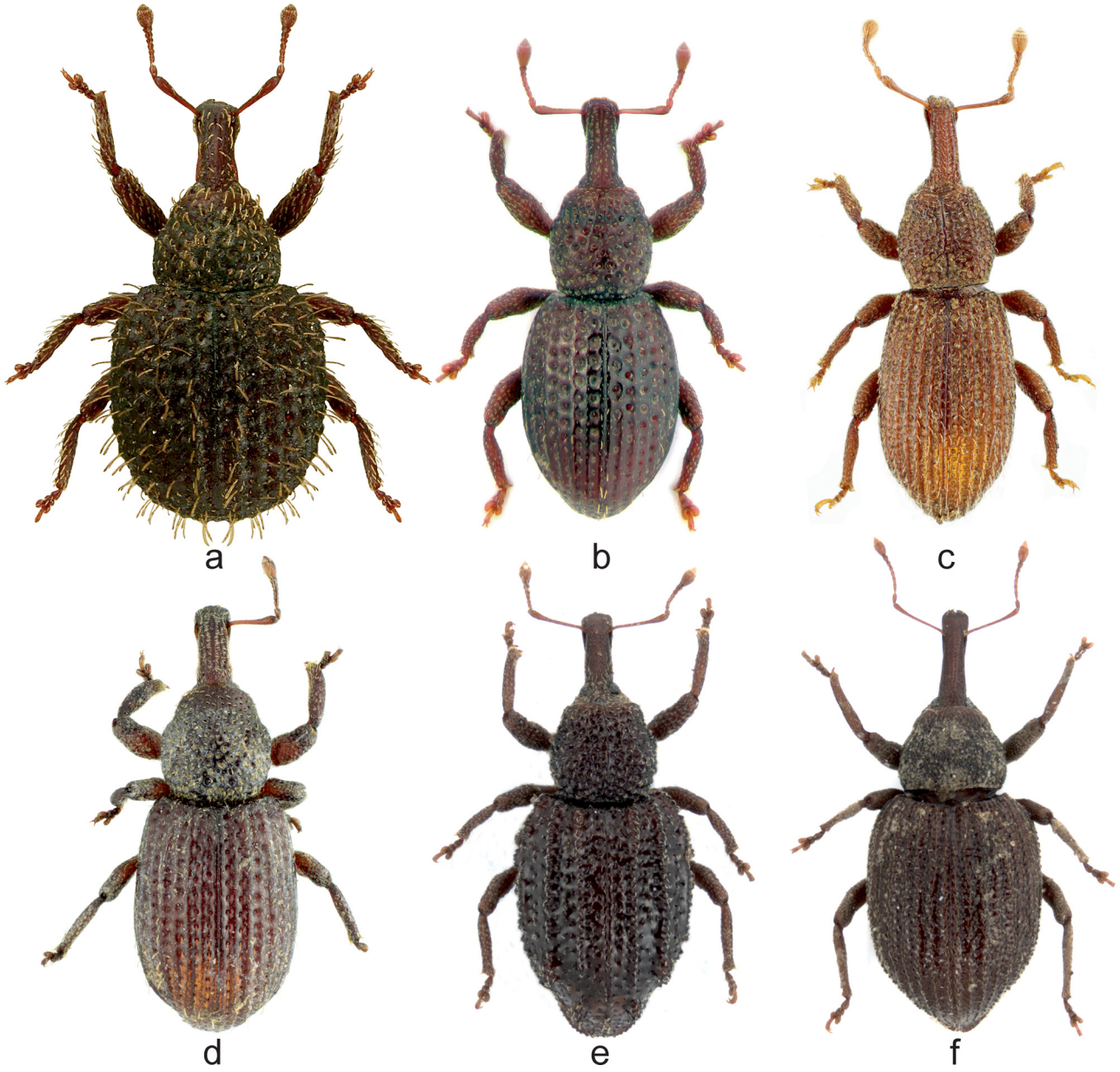

Fig. 1. Dorsal habitus. a – *Adexius scrobipennis* Gyllenhal, 1834; b – *Anchonidium caucasicum* Motschulsky, 1845; c – *Caulomorphus kociani* sp. nov.; d – *Anchonidium perpensum* Faust, 1886; e – *Aparopion costatum* (Fåhraeus, 1843); f – *Pseudaparopion kadleci* Borovec, Osella & Zuppa, 2002.

striae with large punctures, elytra with erect setae, tegmen of aedeagus with well-defined parameres. .... ***Adexius*** Schönherr, 1834

3 Eyes reduced to single ommatidium, apex of median lobe of aedeagus with a few short setae. .... ***Caulomorphus*** Faust, 1886

– Eyes present, apex of median lobe lacking setae. 4

4 Rostrum carinate, elytra lacking tubercles, antennomere II more than 1.5× as long as III, head shorter than pronotum, median lobe of aedeagus dorsally symmetrical. ..... ***Anchonidium*** Bedel, 1884

– Rostrum lacking carinae, elytra with tubercles, antennomere II about as long as III, head longer than pronotum, median lobe of aedeagus dorsally asymmetrical. ..... ***Aparopion*** Hampe, 1861

Adexius Schönherr, 1834

(Figs 1a, 2a–e, 3a–h)

Adexius Schönherr, 1834: 366 (original description). Reitter (1913): 53 (key); Alonso-Zarazaga & Lyal (1999): 195 (catalogue); Alonso-Zarazaga (2013): 488 (catalogue); Alonso-Zarazaga (2017): 480 (catalogue).

Type species. *Adexius scrobipennis* Gyllenhal, 1834 by original designation.

Diagnosis. Body oval (Fig. 1a), length 2.2–3.2 mm, elytra and pronotum with erect, sparse setae on whole surface, head shorter than pronotum. Eyes large, oval, clearly visible in dorsal view, situated at base of rostrum and on head. Rostrum carinate, densely punctate, scrobes visible dorsally. Antennae stout, scape short, not reaching anterior margin of eyes, funicule with 7 antennomeres

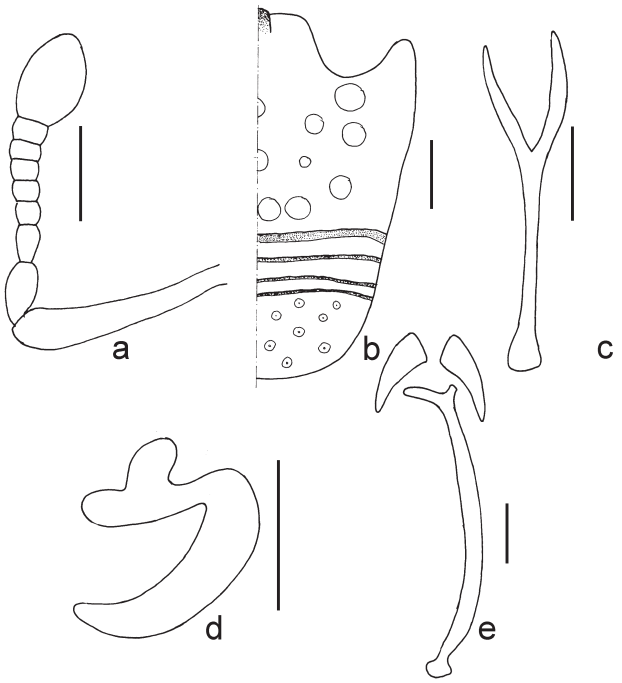

Fig. 2. *Adexius scrobipennis* Gyllenhal, 1834: a – antenna; b – abdominal ventrites I–V; c – sternite VIII; d – spermatheca; e – sternite IX and hemisternites. Scale bars: 0.2 mm.

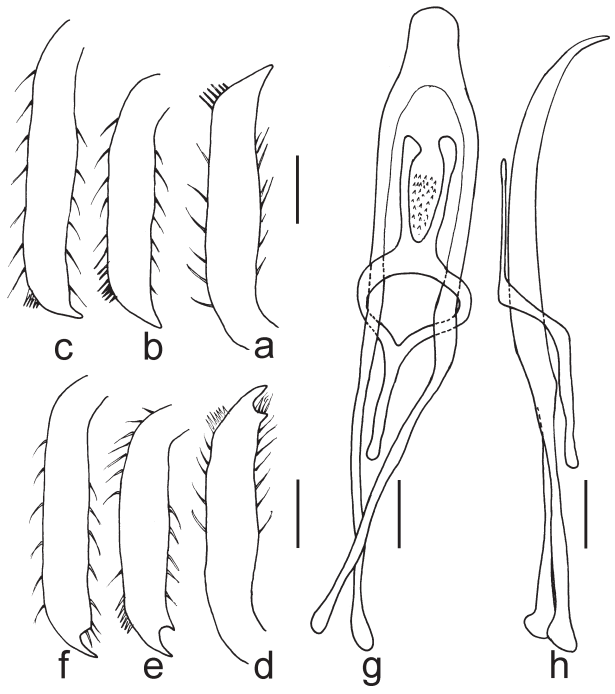

Fig. 3. *Adexius scrobipennis* Gyllenhal, 1834: a – left foreleg, male; b – left midleg, male; c – left hindleg, male; d – left foreleg, female; e – left midleg, female; f – left hindleg, female; g – aedeagus, dorsal view; h – aedeagus, lateral view. Scale bars: 0.2 mm.

(Fig. 2a), antennomeres II and III of about same length. Pronotum lacking carinae or smooth median line, rugosely punctate, constricted before apex, postocular lobe absent, scutellum not visible. Elytra wide, EL/EW ratio < 1.25, interstriae flat, striae with large punctures, apex of elytron rounded. Procoxae contiguous, mesocoxae widely separated, ventrite I and II separated by suture, ventrite I considerably longer than II (Fig. 2b). Legs stout (Figs 3a–c male, 3d–f female), tarsomere III strongly bilobed, onychium short, less than twice as long as tarsomeres II and III combined. Male terminalia: median lobe of aedeagus (Figs 3g–h) symmetrical, lacking internal sclerites, parameres well-developed, male sternite IX (Fig. 2e), hemisternite slender, subtriangular. Female terminalia: spermatheca (Fig. 2d), sternite VIII cradle-like (Fig. 2c).

Remarks. *Adexius* is a monotypic genus, currently classified in the tribe Molytini, subtribe Plinthina. The genus is here transferred to Typoderini based on the general appearance, the position of eyes and similar sexual dimorphism of tibiae. All reports of *Adexius corcyreus* Reitter, 1884 from Greece (Kerkyra) in recent catalogues (Alonso-Zarazaga 2013, Alonso-Zarazaga et al. 2017) are erroneous and refer to *Styphlidius corcyreus* Reitter, 1884 of the subfamily Curculioninae. *Adexius scrobipennis* is widely distributed in central and southern Europe; it is also reported from Russian south European territory (Alonso-Zarazaga et al. 2017), therefore its presence in the northern part of Caucasus Region is possible but it needs confirmation.

Distribution. Austria, Belgium, Bosnia and Herzegovina, Croatia, Czech Republic, France, Germany, Hungary, Italy, Luxembourg, Poland, Romania, Russia (central and southern territory), Slovakia, Slovenia, Spain, Switzerland, and Ukraine.

Anchonidium Bedel, 1884

(Figs 1b, 1d, 4a–f)

Anchonidium Bedel, 1884: 92 (original description). Reitter (1913): 53 (key); Osella (1979): 348 (illustration of aedeagus, new records); Alonso-Zarazaga & Lyal (1999): 195 (catalogue); Alonso-Zarazaga (2013): 496 (catalogue); Alonso-Zarazaga (2017): 490 (catalogue).

Type species. *Styphlus unguicularis* Aubé, 1850 by original designation.

Diagnosis. Body oval (Figs 1b, 1d), length 2.70–3.90 mm; elytra in posterior part with erect setae. Head shorter than pronotum; eyes small, oval, invisible in dorsal view, situated at base of rostrum; rostrum carinate, densely punctate; scrobes visible dorsally; antennae (Fig. 4a) stout, scape short, not reaching anterior margin of eyes, funicule with 7 antennomeres, antennomeres II more than 1.4× as long as III. Pronotum lacking carinae or smooth median line, rugosely punctate, constricted before apex, postocular lobe absent, scutellum not visible. Elytra elongate, EL/EW ratio > 1.30, interstriae flat, striae with large, shallow punctures, apex of elytron rounded. Procoxae separated, mesocoxae widely separated. Ventrite I and II separated by straight suture, ventrite I clearly longer than II (Fig. 4b). Tarsomere III strongly bilobed, onychium long, at least as long as tarsomeres II and III combined. Median lobe of aedeagus symmetrical, with internal sclerites, parameres absent.

Distribution. Three species of *Anchonidium* are known; two are present in the Caucasus Region and another one is widespread in Europe.

Anchonidium caucasicum (Motschulsky, 1845)

(Figs 1b, 4a–d)

Orthochaetes caucasicum Motschulsky, 1845: 100 (original description).
Anchonidium caucasicum: Savitsky (2018): 105 (new combination).
Anchonidium corticeum Faust, 1886b: 32 (original description). Alonso-Zarazaga (2013): 496 (synonymy).
Styphlus ulcerosus Aubé, 1850: 341 (original description).
Anchonidium ulcerosum: Osella (1979): 348 (illustration of aedeagus, distribution); Savitsky (2018): 103 (synonymy).

Type localities. *Orthochaetes caucasicum*: 'Montagnes du Caucase' [= Caucasus Mts.]; *Anchonidium corticeum* and *Styphlus ulcerosus*: 'environs de Batoum, en Imériti e' [= Georgia, Batumi env., …].
Material examined. TURKEY: Samsun: 33 km SW of Samsun, 7 km SE of Kavak, 41°03′04″N, 36°06′ 33″E, 470 m, 20.vii.2008, 13 spec., V. Assing lgt. (CPHP); 41 km W of Samsun, 27 km S of Bafra, 41°18′55″N, 35°50′51″E, 220 m, 21.vii.2008, 1 ♂, 5 spec., V. Assing lgt. (CPHP). **Sinop:** ca 22 km S of Sinop, N of Lala, 41°53′21″N, 35°03′21″E, 160 m, oak & laurel forest, 31.iii.2009, 13 spec., V. Assing lgt. (CPHP). **RUSSIA: West Caucasus:** 35 km NNE of Sochi, Babuk-Aul, in forest litter, 43°53′26″N, 39°49′11″E, 560 m, 11.vii.2011, 2 ♂♂, 6 spec., V. Assing lgt. (CPHP). **GEORGIA: Imereti:** Likani, 41,8428N, 43,3353E, 24.vii.2006, 1 ♀, Chaladze lgt. (CPHP). Borjomi-Kharagauli NP, vill. Nunisi, sifting in mixed forest, 41°56′41.5″N, 43°24′33.3″E, 880 m, numerous spec., P. Hlaváč lgt. (CPHP). **Kakheti:** Tetritsklobi env., deciduous forest, sifting, 41.861638N, 45.861638E, 1300 m, 15.vii.2015, 1 ♂, M. Kocian lgt. (CPHP). **Mtskheta-Mtianeti:** Sagurano Res., sifting, 29.v.2006, 1 ♀, Chaladze lgt. (CPHP). **Southern Ossetia:** Džava [Java] env., v.[19]87, 3 spec., Rous lgt. (CJKH). Gufta [Didi Gupta] env., v.[19]87, 1 ♂ 3 spec., Rous lgt. (CJKH). Ratacha Fl. [unknown location], v.[19]87, 1 spec., Rous lgt. (CJKH). **Svaneti:** valley of the Khuberi River, leaf litter sifting, 42.856190N, 42.039260E, 720 m, 4.vii.2015, 6 ♂♂ 5 ♀♀, M. Kocian lgt. (CPHP). Lakhamula vill., Madina River, sifting in mixed forest, 43.047559N, 42.456989E, 1100 m, 8.vii.2015, 1 ♂, M. Kocian lgt. (CPHP). Nadashi, Manshura valley, mixed forest, sifting, 43.055932N, 42.426047E, 1000 m, 8.vii.2015, 1 ♂ 3 ♀♀, M. Kocian lgt. (CPHP).

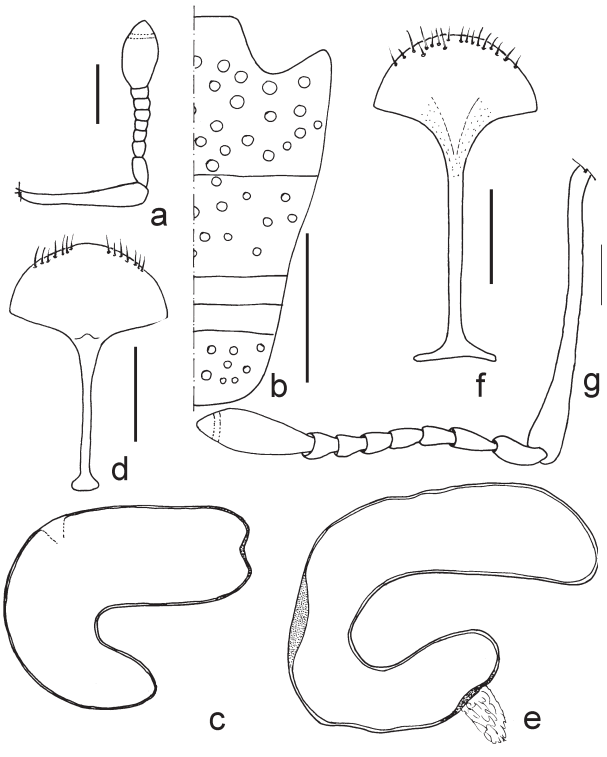

Fig. 4. *Anchonidium caucasicum* Motschulsky, 1845: a – antenna; b – abdominal ventrites I–V; c – spermatheca; d – sternite VIII. *Anchonidium perpensum* Faust, 1886: e – spermatheca; f – sternite VIII. *Aparopion costatum* (Fåhraeus, 1843): g – antenna. Scale bars: 0.2 mm.

Distribution. Bulgaria, Georgia, Romania, Russia (Caucasus), Turkey, Ukraine.

Anchonidium perpensum Faust, 1886

(Figs 1d, 4e–f)

Anchonidium perpensum Faust, 1886b: 32 (original description).

Type locality. 'Muchet' [probably Mccheta, Georgia].
Type material. Holotype: ♀, 'Muchet, Balassog [h] / Type [p, red label] / Coll. J. Faust, Ankauf 1900 [p] / Staatl. Museum für Tierkunde, Dresden [p] / HOLOTYPE *Anchonidium perpensum* Faust, P. Hlaváč det., 2016 [p, red label]' (SMTD).

Redescription. Body convex (Fig. 1d), dark reddish-brown, legs and antennae of same colour. Length 3.78 mm, maximum width of elytra 1.46 mm. Eyes oval, clearly visible dorsally. Rostrum curved downwards, with three longitudinal carinae, median carina wide, lateral carinae narrow. Antennal scrobe deep, straight, reaching lower border before eyes. Antennae with scape about 1.25× as long as funicule; antennomeres II and III elongate and expanded towards apex, II about 1.4× as long as III, antennomeres IV–VI subequal, quadrate, shortest, antennomere VII 1.25× as long as VI and 0.85× as long as VIII, antennal club about 2.33× as long as antennomere II and about 1.90× as long as wide. Pronotum about 1.07× as long as wide, 1.46× as long as head, widest in middle, basal margin slightly convex, with closely arranged large punctures which become smaller, even evanescent in anterior third. Elytra long, subparallel-sided, 1.35× as long as wide, 1.81× as long as pronotum, with 9 striae of large punctures, distance between punctures less than diameter of puncture, elytral interstriae flat, with macrosetae in posterior part, humeri prominent. Female terminalia. Spermatheca (Fig. 4e), female sternite VIII (Fig. 4f), plate large, with evenly rounded apex bearing short setae.
Remarks. The original description of *A. perpensum* is based on a unique female specimen (thus holotype by monotypy) from Muchet in Caucasus (Faust 1886b), which is most likely referring to Mccheta, ancient capital of Georgia situated close to Tbilisi. Despite many specimens of *Anchonidium* collected around Tbilisi, this species has never been recorded again since its original description. The study of the holotype revealed that this species is distinct from the widely distributed *A. caucasicum*. However, study of more specimens and particularly male would be desirable to confirm this hypothesis.
Differential diagnosis. Two Caucasian species can be separated using the key bellow.
Distribution. Georgia, so far known only from the type locality the exact location of which is not known for certain.

Key to the species of *Anchonidium* from the Caucasus Region

1. Head longer, PL/HL ratio = 1.35–1.40; rostrum with dense setae; anterior median part of pronotum as densely punctate as on posterior two thirds; elytra evenly rounded; spermatheca with short corpus and cornu, corpus at apex with shallow excavation (Fig. 4c). ..... ***A. caucasicum*** (Motschulsky, 1845)

– Head shorter, PL/HL ratio = 1.46; rostrum with sparse setae; anterior median third of pronotum with smaller punctures than on posterior two thirds; surface close to anterior margin with very sparse punctation; elytra in anterior two thirds more parallel-sided; spermatheca with longer and slenderer corpus and cornu, corpus at apex rounded (Fig. 4e). ..... ***A. perpensum*** Faust, 1886

Aparopion Hampe, 1861

(Figs 1e, 4g)

Aparopion Hampe, 1861: 68 (original description). Reitter (1913): 53 (key); Alonso-Zarazaga & Lyal (1999): 196 (catalogue); Alonso-Zarazaga (2013): 496 (catalogue); Alonso-Zarazaga (2017): 491 (catalogue).

Type species. *Aparopion costatum* Hampe, 1861 (= *Trachodes costatus* Fåhraeus, 1843) by monotypy.

Diagnosis. Body slightly oval, length 3.7–5.8 mm. Elytra and pronotum lacking erect setae, head about as long as pronotum. Eyes large, oval, clearly visible in dorsal view, situated at base of rostrum. Rostrum lacking carinae, densely punctate, scrobes visible dorsally. Antennae (Fig. 4g) slender, scape long, reaching anterior margin of eyes, funicule with 7 antennomeres, antennomeres II and III approx. of same length, all antennomeres elongate. Pronotum lacking carinae or smooth median line, rugosely punctate, constricted before apex, postocular lobe absent, scutellum not visible. Elytra wide, EL/EW ratio < 1.25, interstriae elevated, granulate, striae composed of single row of small deep punctures, apex of each elytron with well-defined preapical constriction. Procoxae separated, mesocoxae widely separated, ventrite I and II separated by straight suture, ventrite I clearly longer than II. Tarsomere III strongly bilobed, onychium long, at least as long as tarsomeres II and III together. Median lobe of aedeagus asymmetrical, with internal sclerites, parameres absent.

Remarks. The genus was recently revised (Zuppa & Osella 1999) and four species were recognized, *A. chevrolati* (Jacquelin du Val, 1855) and *A. suturidens* Reitter, 1891 from France and Italy, the newly described species *A. numidicum* Zuppa & Osella, 1999 from Algeria, and relatively widespread *A. costatum*.

Aparopion costatum (Fåhraeus, 1843)

(Figs 1e, 4g)

Trachodes costatum Fåhraeus, 1843: 409 (original description).

Aparopion costatum: Zuppa & Osella (1999): 9 (redescription, all previous relevant references listed).

Type locality. 'Passau Bavariae' [= Germany, Bavaria, Passau].

Material examined. GEORGIA: Imereti: Borjomi-Kharagauli NP, vill. Nunisi, SAMPLE 3, sifting in mixed forest, 41°56′41.5″N, 43°24′33.3″E, 880 m, numerous spec., P. Hlaváč lgt. (CPHP). **Kakheti:** Tetritsklebi env., deciduous forest, sifting, 41.861638N, 45.337633E, 1300 m, 15.vii.2015, 1 spec., M. Kocian lgt. (CPHP); Pshaveli env., above Lechuri, deciduous, forest sifting, 42.147491N, 45.413303E, 580 m, 14.vii.2015, 2 spec., Z. Švec lgt. (CPHP). **Svaneti:** Valley of the Khuberi River, leaf litter sifting, 42.856190N, 42.039260E, 720 m, 4.vii.2015, 1 ♀, 2 spec., 11.vii.2015, 1 spec., M. Kocian lgt. (CPHP). **NORTH MACEDONIA:** Bistra Mts., Mavrovo env., valley of Radika River, 1515 m, 17.vi.2011, 1 spec., P. Hlaváč lgt. (CPHP). **RUSSIA: Western Caucasus:** 4 km NNE Krasnaya Polyana, 43°42′30″N, 40°10′32″E, 1000 m, 18.vii.2011, 2 spec., V. Assing (PHPC).

Distribution. Species widely distributed in central and southern Europe but absent in western Europe, the Iberian Peninsula and Italy.So far reported from Albania, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Germany, Greece, Hungary, North Macedonia, Romania, Serbia, Russia (southern European territory), Turkey, and Ukraine.

Caulomorphus Faust, 1886

(Figs 1c, 5a–f, 6a–c, 7a–e)

Caulomorphus Faust, 1886a: 28 (original description). Reitter (1913): 53 (key); Osella (1970): 361 (revision); Osella (1976): 93 (new species, key); Alonso-Zarazaga & Lyal (1999): 195 (catalogue); Osella et al. (2003): 690 (new species, new records, key); Alonso-Zarazaga (2013): 488 (catalogue); Alonso-Zarazaga (2017): 481 (catalogue); Morrone & Hlaváč (2017): 60 (catalogue).

Type species. *Styphlus lederi* Chevrolat, 1880 by original designation.

Diagnosis. Body parallel-sided, length 3.0–4.2 mm. Elytra and pronotum lacking erect setae, head slightly longer than pronotum. Eyes reduced to single ommatidium, situated at base of rostrum. Rostrum carinate, densely punctate, scrobes visible dorsally. Antennae slender, scape short, not reaching anterior margin of eyes, funicule with 7 antennomeres, antennomeres II more than 1.4× as long as III. Pronotum lacking carinae or smooth median line, rugosely punctate, simply convergent to apex, postocular lobe absent, scutellum not visible. Elytra elongate, EL/EW ratio > 1.30, interstriae flat, striae with large punctures, apex of each elytron rounded. Procoxae separated, mesocoxae widely separated, ventrite I and II (Fig. 6h) separated by sinuate suture, ventrite I clearly longer than II, tarsomere III strongly bilobed, onychium long, at least as long as tarsomeres II and III together. Median lobe of aedeagus symmetrical, with internal sclerites, parameres absent.

Biology. *Caulomorphus* species are collected by sifting litter in deciduous forest, one female was collected in Armenia by sifting dead wood.

Distribution. Armenia, Azerbaijan, Georgia, Iran, and Turkey.

Remarks. The genus *Caulomorphus* was revised by Osella (1970). After that, only three new species were described (Osella 1976, 1977; Osella et al. 2003). Catalogue of all species was provided by Moronne & Hlaváč (2017). Currently the genus contains twelve species including the new one described in this paper.

Females of *Caulomorphus* are not possible to be reasonably identified if they are not collected together with males; the study of the aedeagus is inevitable for the correct species identification.

Caulomorphus besucheti Osella, 1970

(Figs 5a–c)

Caulomorphus besucheti Osella, 1970: 366 (original description). Osella et al. (2003): 689, 691 (key), 692 (key).

Type locality. Turkey, Trabzon, Yomra.

Material examined. TURKEY: Sinop: ca 22 km of S Sinop, N of Lala, 41°53′21″N, 35°03′21″E, 160 m, oak & laurel forest, 31.iii.2009, 4 ♂♂ 1 ♀, 6 spec., V. Assing and P. Wunderle lgt. (ZMHB, CPHP); Çangal Dağı, 30 km S of Ayancik, 41°48′44″N, 34°39′19″E, 920 m,

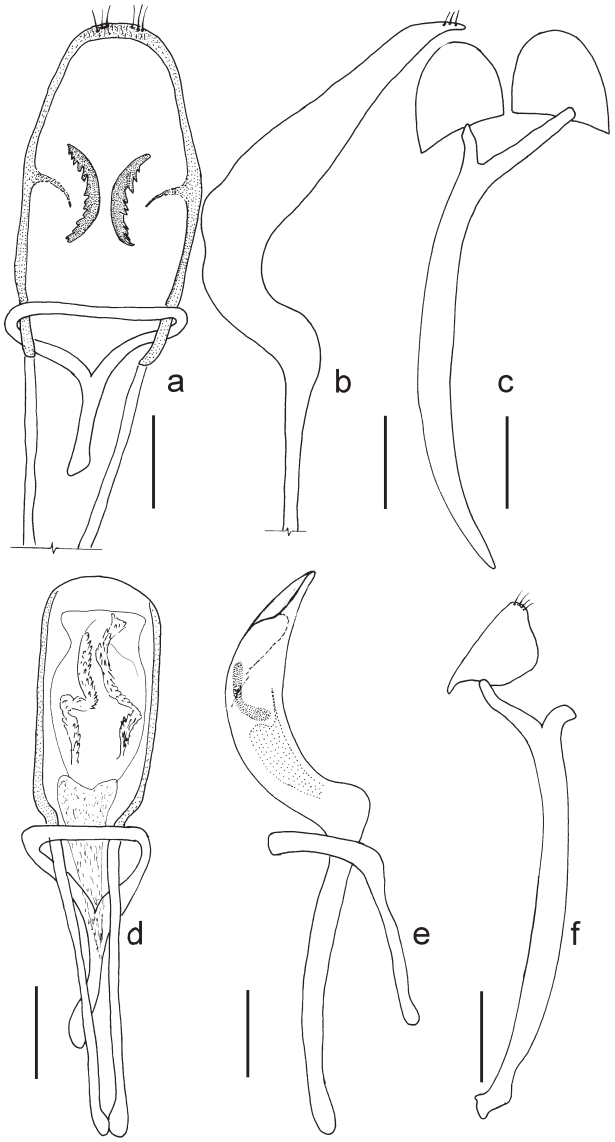

Fig. 5. *Caulomorphus besucheti* Osella, 1970: a – aedeagus, dorsal view; b – aedeagus, lateral view; c – sternite IX and hemisternites; *Caulomorphus talyschensis* Reitter, 1897: d – aedeagus, dorsal view; e – aedeagus, lateral view; f – sternite IX and hemisternite. Scale bars: 0.2 mm.

beech forest, 1.iv.2009. 2 ♂♂ 1 ♀, V. Assing lgt. (ZMHB, CPHP). **GEORGIA: Adjara:** Mtirala NP, Chakvistavi, 25.–26.vii.2014, 1 ♂, O. Konvička lgt. (CJKH); Mtirala NP, above Chakvistavi, sifting in forest, 41.654720N, 41.873877E, 1100 m, 30.v.2019, 4 ♂♂ 1 ♀, M. Kocian lgt. (CPHP). **Imereti:** Borjomi-Kharagauli NP, vill. Nunisi, sifting in mixed forest, 41°56′41.5″N, 43°24′33.3″E, 880 m, 4 ♂♂, 2 spec., P. Hlaváč lgt. (CPHP). **Mtskheta-Mtianeti:** Tbilisi NP, above Buriani, sifting in forest, 41.887274N, 44.876954E, 950 m, 28.v.2019, 2 ♂♂, M. Kocian lgt. (CPHP).

Redescription. Body convex. Length 3.30–4.20 mm, maximum width of elytra 1.10–1.35 mm. Head and pronotum matt, elytra light shiny, reddish-brown, legs and antennae of same colour, sometimes elytra and antennae more reddish. Rostrum curved downwards, with three longitudinal carinae, with short apical setae, scrobe deep, straight, not visible in dorsal view. Antennae long, with dense pubescence, scape elongately pedunculate at base, about 1.15–1.20 × as long as funicule, funicule with 7 antennomeres; antennomeres II and III elongate and expanded towards apex, II about 1.80–2.00 × as long as III, antennomeres IV–VI subequal, about as long as wide, shortest, about 0.7 × of length of antennomere III, antennomere VII 1.2 × as long as VI and 0.85 × as long as VIII, antennal club about twice as long as antennomere II and about 1.65 × as long as wide. Pronotum 1.00–1.05 × as long as wide, 1.10–1.20 × as long as head, widest in middle, basal margin straight, with closely arranged large and subequal punctures, with thin but well-defined median carina. Elytra long, subparallel-sided, 1.65–1.75 × as long as wide, 2.20–2.30 × as long as pronotum, with about ten striae composed of punctures of equal size, distance between punctures approximately as wide as diameter of puncture, elytral interstriae slightly elevated, with even, short, golden setae, humeri prominent. Prosternum rugosely sculptured, with uneven large punctures. Procoxae separated by narrow isthmus. Mesoventrite about as long as metaventrite, mesoventrite shagreened, with even, sparse, small punctures bearing microseta, with some larger punctures on short mesoventral process, mesocoxae separated, isthmus about as wide as half of coxa. Metaventrite with large, shallow, closely arranged uneven punctures and golden setation, metacoxae strongly separated by large, convex process of ventrite I. Ventrite I longer than II, both punctate and with golden setation. Male terminalia. Aedeagus (Figs 5a–b) wide, flattened dorsally, laterally curved, with acuminate apex, male sternite IX (Fig. 5c) curved, asymmetrical, hemisternite round at apex, base slightly concave, lacking apical setae.

Distribution. Georgia (Adjara, Imereti, Mtskheta-Mtianeti) and Turkey (Aydin, Artvin, Sinop, Rize).

Caulomorphus kociani sp. nov.

(Figs 1c, 6a–c, 7a–e)

Type locality. Armenia, Goris, 39.516611N, 46.322847E, 1700 m a.s.l.

Type material. Holotype: ♂, 'ARMENIA, Goris, E slope, deciduous forest, leaf litter sifting, 1700 m, 25.V.2015, 39.516611N 46.322847E, M. Kocian lgt. [p]' (NMPC). Paratypes: (21 ♂♂ 13 ♀♀): 2 ♂♂, the same data as holotype (CPHP); 3 ♂♂ 1 ♀, 'ARMENIA, Tatev env., Vorotan Valley, sifting in macchia, 1300 m, 24.V.2015, 39.394394N 46.247672E, M. Kocian lgt. [p]' (CPHP); 1 ♂ 2 ♀♀, 'ARMENIA, Syunik r., 5 km N of Shurnukh, 07.06.2015, F. Pavel lgt. [p] / 39°24′15.7″N, 046°24′37.8″E [p]' (CJKH); 1 ♂, 'ARMENIA – Syunik pr., Davit Bek env., N of Karmrakar, 7.6.2017, lgt. Jan Pelikán / 39°19′00″N, 46°28′16″E, 1474 m, kořeny [roots] *Corylus.* [p]' (CJPH); 8 ♂♂, 3 spec., 'Armenia, 25 km S Kapan, Gomarants Ps., 39°01′32″N, 46°21′59″E, 2190 m, oak forest, 7.VII.2016, V. Assing [p]' (BMNH, CPHP, OUMNH, ZMHB, CLFC); 1 ♂, 'Armenia [33]-WSW, Kapan, above Shishkert, 39°03′48″N, 46°21′36″E, 2040 m, forest litter sift., 12.vii.2018, V. Assing [p]' (ZMHB); 2 ♂♂ 3 ♀♀, 'Armenia [27]-WSW, Kapan, W Karajan, 39°09′22″N, 46°06′13″E, 2050 m, mixed forest, 10.VII.2018, V. Assing [p]' (ZMHB); 1 ♂ 2 ♀♀, 'Armenia [38]-20 km SW Sisian Darbas, 39°25′55″N, 46°06′57″E, 1680 m, forest margin, 16.VII.2018, V. Assing [p]' (ZMHB); 2 ♂♂ 2 ♀♀, 'Armenia [28]- ca 30 km W Kapan, 39°15′13″N, 46°04′16″E, 2040 m, forest margin, 11.VII.2018, V. Assing [p]' (ZMHB, PCLF).

Description. Body (Fig. 1c) convex. Length 3.10–4.10 mm, maximum width of elytra 1.00–1.20 mm. Head and pronotum shiny, whole body, antennae and legs unicoloured reddish-brown, elytra with dense setae. Rostrum curved downwards, with five longitudinal carinae, with short apical setae, scrobe deep, straight, not visible in dorsal view. Antennae (Fig. 7a) long, with dense pubes-

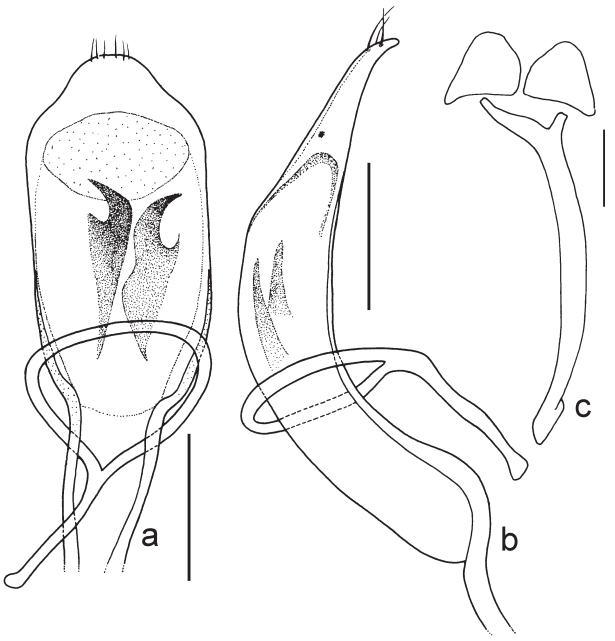

Fig. 6. *Caulomorphus kociani* sp. nov. a – aedeagus, dorsal view; b – aedeagus, lateral view; c – sternite IX and hemisternites. Scale bars: 0.2 mm.

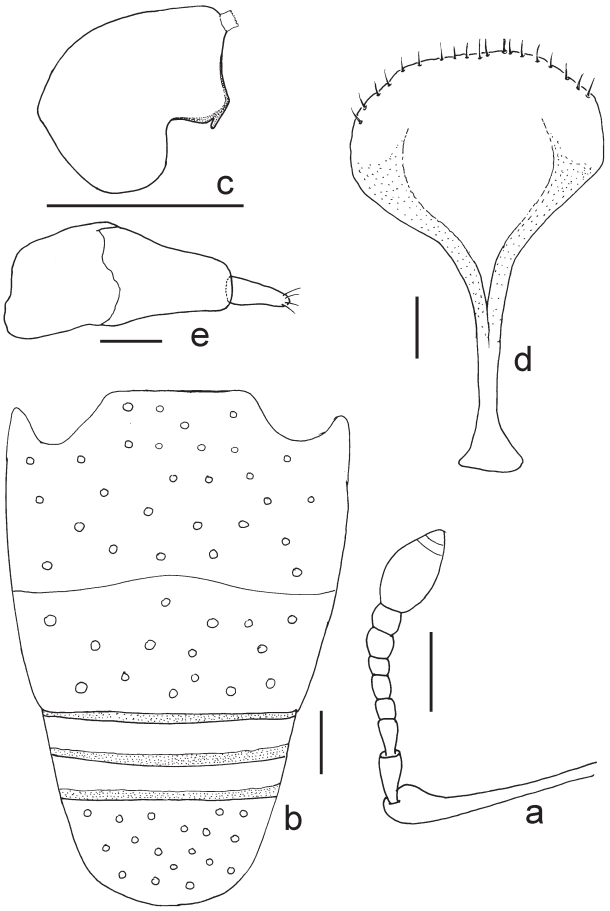

Fig. 7. *Caulomorphus kociani* sp. nov., a – antenna; b – abdominal ventrites I–V; c – spermatheca; d – sternite VIII; e – gonocoxite. Scale bars: 0.2 mm.

cence, scape thin and parallel-sided at base and expanded towards apex, about 1.10× as long as funicule, funicule with 7 antennomeres; antennomeres II and III elongate and expanded towards apex, antennomere II 1.40–1.60× as long as III, antennomeres IV–VI subequal, about as long as wide, shortest, about 0.6× as long as antennomere III, antennomere VII 1.25× as long as VI and subequal to VIII, antennal club about twice as long as antennomere II and about 1.75× as long as wide. Pronotum 0.90–1.05× as long as wide, 1.00–1.05× as long as head, widest in middle, basal margin straight, with closely arranged large and subequal punctures, with thin but well-defined median carina. Prosternum rugosely sculptured, with uneven large punctures, hypomerae fused with median part of prosternum; procoxae touching, isthmus interrupted. Mesoventrite evenly, densely punctate, in middle about as long as metaventrite. Metaventrite with even and large puctures, punctures much larger than those on mesoventrite. Mesocoxae well-separated, width of isthmus about ⅓ of mesocoxa diameter, posterior meso- and anterior metaventral processes truncate. Metacoxae widely separated by large, posterior metaventral process with well-defined median notch. Ventrite I about 1.3× longer than II, both punctate, with golden setation (Fig. 7b). Elytra long, subparallel-sided, on sides slightly rounded in apical third, 1.40–1.75× as long as wide, 2.15–2.30× as long as pronotum, with eight striae composed of large punctures of equal diameter, distance between each two punctures within row slightly less than diameter of puncture, elytral interstriae elevated, with even micropunctures bearing short, golden setae. Male terminalia. Aedeagus (Figs 6a–b) wide, flattened dorsally, before apex narrowed, laterally slightly curved, with acuminate apex, with two subequal sclerites, male sternite IX (Fig. 6c) curved, asymmetrical, hemisternite rounded at apex, base slightly concave, lacking apical setae. Female terminalia. Spermatheca (Fig. 7c), female sternite VIII (Fig. 7c), gonocoxite (Fig. 7d).

Differential diagnosis. *Caulomorphus kociani* sp. nov. and the most similar species *C. besucheti* are readily separated from its congeners by sharing the subparallel-sided elytra, symmetrical, wide, flattened and laterally curved aedeagus and pronotum lacking median carina, however the new species differs from *C. besucheti* in different shape and different internal structures of the aedeagus (see Figs 5a–b).

Etymology. Patronymic, named after Matúš Kocian (Prague, Czech Republic), specialist on Staphylinidae and the collector of part of the type series.

Distribution. Armenia.

Caulomorphus talyschensis Reitter, 1897

(Figs 5d–f)

Caulomorphus talyschensis Reitter, 1897: 126 (original description). Reitter (1911): 159 (key); Osella (1970): 377 (redescription); Osella et al. (2003): 691 (key), 693 (key).

Type locality. 'bei Lenkoran' [= Azerbaijan, near Lenkoran].

Material examined. AZERBAIJAN: Astara, Istisu W Astara, 100 m, 2.–6.vi.1996, 1 ♂ 1 ♀, W. Schawaller lgt. (SMNS, CPHP).

Redescription. Body convex. Length 3.60–3.70 mm, maximum width of elytra 1.10–1.20 mm. Head and

pronotum shiny, body and legs pitchy-brown, antennae slightly lighter, elytra with short golden setae. Rostrum curved downwards, with five longitudinal carinae, with short apical setae, scrobe deep, straight, not visible in dorsal view. Antennae long, with dense pubescence, scape longly pedunculate at base, about 1.20× as long as funicule, funicule with 7 antennomeres; antennomeres II and III elongate and expanded to apex, II about 1.7× as long as III, antennomeres IV and V subequal, V 1.25× as long as IV, antennomeres V, VII and VIII subequal, antennal club about 1.80–1.85× as long as antennomere II and about 1.80× as long as wide. Pronotum 1.00–1.05× as long as wide, 1.05–1.15× as long as head, widest in middle, basal margin straight, with closely arranged, large and almost equal punctures, lacking median carina. Prosternum rugosely sculptured, with uneven large punctures. Procoxae separated by narrow isthmus. Mesoventrite about as long as metaventrite, mesoventrite shiny, with even small punctures bearing microseta, with some large punctures on short mesoventral process, mesocoxae separated, isthmus about as wide as half of coxa. Metaventrite with large, shallow, almost confluent punctures and golden setation, metacoxae strongly separated by large, triangular process. Ventrite I longer than II, similarly punctate. Elytra long, subparallel-sided, 1.55–1.60× as long as wide, about 2.10× as long as pronotum, with eight striae composed of large punctures of equal diameter, distance between each two punctures within row slightly less than diameter of puncture, elytral interstriae elevated, with even micropunctures bearing short, golden setae, humeri prominent. Male terminalia. Aedeagus (Figs 5d–e) slender, apical lobe parallel-sided, flattened dorsally, rounded at apex, laterally slightly curved, with sharply acuminate apex, with two subequal sclerites, male sternite IX (Fig. 5f) curved, asymmetrical, hemisternite with four short apical setae.

Distribution. So far, the species is known only from costal area of the Caspian Sea in Azerbaijan.

Key to males of *Caulomorphus* from the Caucasus Region

(modified after Osella et al. 2003)

1 Elytra oblong-oval, widest in middle. .... ***C. muelleri*** Reitter, 1911
– Elytra subparallel-sided. 2
2 Aedeagus wide, sides rounded laterally, moderately curved. 3
– Aedeagus narrow, parallel-sided, laterally strongly curved (Fig. 5d). 6
3 Aedeagus asymmetrical, pronotum lacking median carina. ..... ***C. giocoae*** Osella, 1970
– Aedeagus symmetrical, pronotum with or without median carina. 4
4 Pronotum with median carina, sometimes weak but always clearly visible. ..... ***C. lederi*** (Chevrolat, 1880)
– Pronotum lacking median carina. 5
5 Aedeagus with two dentate sclerites, apex oval (Fig. 5a). ..... ***C. besucheti*** Osella, 1970
– Aedeagus with two pointed sclerites, apex slightly constricted (Fig. 6a). ..... ***C. kociani* sp. nov.**
6 Elytra with well-defined half-recumbent setae. .... ***C. talyschensis*** Reitter, 1897
– Elytra with short recumbent setae. .... ***C. amaseianus*** Osella, 1970

Pseudaparopion Borovec, Osella & Zuppa, 2002

(Fig. 1f)

Pseudaparopion Borovec, Osella & Zuppa, 2002: 870 (original description). Alonso-Zarazaga (2013): 497 (catalogue); Alonso-Zarazaga (2017): 491 (catalogue).

Type species. *Aparopion aequale* Reitter, 1883 by original designation.

Diagnosis. Body oval, length 3.8–5.1 mm, elytra and pronotum lacking erect setae, head longer than pronotum, eyes large, oval, clearly visible in dorsal view, situated at base of rostrum, rostrum lacking carinae, densely punctate, punctures small, scrobes visible dorsally, antennae inserted subapically, slender, scape long, reaching anterior margin of eyes, funicule with 7 antennomeres, antennomeres II and III of about same length. Pronotum simply convergent in anterior part, lacking carinae or smooth median line, rugosely punctate, postocular lobe absent, scutellum not visible. Elytra wide, EL/EW ratio < 1.25, with elevated granulate interstriae, striae with punctures, confluent with interstriae, with fine setae on whole surface, apex of elytra sharp, lacking constriction, procoxae separated, mesocoxae widely separated, ventrite I and II separated by suture, ventrite I about as long as II, tarsomere III strongly bilobed, onychium long, clearly longer than tarsomeres II and III together, median lobe of aedeagus symmetrical, tegmen lacking parameres.

Remarks. The genus has been proposed for two species, *Aparopion aequale* Reitter, 1883 from Azerbaijan (Lenkoran), which was found not to be congeneric with the other species of *Aparopion* based on the structure of elytra that are not carinate and lack tubercules, and on a different shape of female genitalia (Zuppa & Osella 1999), and for a new, closely related species, *Pseudaparopion kadleci* Borovec, Osella & Zuppa, 2002 from the Mazandaran Province of Iran.

List of Typoderini taxa from the Caucasus Region

[*Adexius* Schönherr, 1834]

[*A. scrobipennis* Gyllenhal, 1834]	widespread in Europe, occurrence in the Caucasus probable

***Anchonidium* Bedel, 1884**

A. perpensum Faust, 1886	Georgia
A. caucasicum Motschulsky, 1845	Croatia to the Caucasus (S Russia, Turkey)

***Aparopion* Hampe, 1861**

A. costatum (Fåhraeus, 1843)	widespread: C and S Europe to the Caucasus (Azerbaijan, Georgia, Russia and Turkey)

***Caulomorphus* Faust, 1886**

C. amaseianus Osella, 1970	Georgia and Turkey (Amasya)
C. besucheti Osella, 1970	Georgia (Adjaria) and Turkey (Artvin, Ordu, Trabzon)
C. giocoae Osella, 1970	Turkey (Artvin)
C. kociani sp. nov.	Armenia
C. lederi (Chevrolat, 1880)	Georgia
C. muelleri Reitter, 1911	Georgia (Svaneti)
C. talyschensis Reitter, 1897	Azerbaijan (Lenkoran)

***Pseudaparopion* Borovec, Osella & Zuppa, 2002**

P. aequale (Reitter, 1884)	Azerbaijan (Talysh Mts.)

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Editorial note. This paper was originally published on-line on 3rd December 2020 but included mistakes in the legend of Figure 1 and in references to figures in the text. These mistakes would cause an incorrect understanding of the species treated. To prevent confusion and to comply the requirements of ICZN on on-line publishing, we corrected the legend of Fig. 1 and the incorrect references in the text in the current version, updated the date of publication in ZooBank to 4th December 2020 , and replaced the original file in Biotaxa for the current one. Therefore, 4th December 2020 must be understood as the publication date of the paper for the purpose of zoological nomenclature.