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On the micropterous *Quedius* (*Raphirus*) species with a punctate scutellum of Turkey (Coleoptera: Staphylinidae: Staphylininae)

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Abstract: Four micropterous species of *Quedius* STEPHENS, 1829, subgenus *Raphirus* STEPHENS, 1829, with a punctate scutellum are reported from North Turkey, one of them unidentified. *Quedius brevalatus* nov.sp. (Armenia; Turkey: Rize) is described and illustrated. *Quedius omissus* COIFFAIT, 1977, a species previously known only from the West Caucasus, is reported from Turkey (Rize) for the first time. Three synonymies are proposed: *Quedius boops* (GRAVENHORST, 1802) = *Philonthus boops tauricus* NORDMANN, 1837, nov.syn., = *Quedius crius* TOTTENHAM, 1948, nov.syn. (previously a synonym of *Q. reitteri* GRIDELLI, 1925), = *Quedius boops islandicus* FAGEL, 1960, nov.syn.

Key words: Coleoptera, Staphylinidae, Staphylininae, Quediina, *Quedius*, *Raphirus*, Turkey, Armenia, taxonomy, new species, new synonymies, new records, distribution map.

Introduction

The genus *Quedius* STEPHENS, 1829 is represented in the Palaearctic region by significantly more than 600 species in five subgenera (ASSING 2016a, SCHÜLKE & SMETANA 2015). *Raphirus* STEPHENS, 1829, the most speciose of these subgenera, alone accounts for more than 300 species and subspecies.

COIFFAIT (1978) had attributed the species currently in *Raphirus* to four subgenera, *Raphirus* (type species: *Quedius attenuatus* GRAVENHORST, 1802, today a synonym of *Q. limbatus* (HEER, 1839)), *Sauridus* MULSANT & REY, 1876 (type species: *Staphylinus picipes* MANNERHEIM, 1830), *Microquedius* COIFFAIT, 1967 (type species: *Philonthus alpestris* HEER, 1839), and *Quediops* COIFFAIT, 1963 (type species: *Quedius plancus* ERICHSON, 1840). However, the type species of *Raphirus*, *Q. attenuatus* GRAVENHORST, 1802, had been synonymized with *Q. limbatus* (HEER, 1839) by GANGLBAUER (1895) (HERMAN 2001b), and HERMAN (2001a) proposed *Q. limbatus* as a nomen protectum and *Q. attenuatus* as a nomen oblitum. *Quedius limbatus* belongs to *Sauridus* sensu COIFFAIT (1978). In consequence, SMETANA (1971, 1993) and most subsequent authors eventually treated *Sauridus* as a junior synonym of *Raphirus*.

Coiffait's concept of *Raphirus* and *Sauridus* may have been based on a misinterpretation of type species, but his group concept was informative and of practical value, at least as far as West Palaearctic *Quedius* species are concerned. The species he included in

Raphirus are distinguished from those he attributed to *Sauridus* not only by morphological characters (punctate scutellum; morphology of the aedeagus), but also ecologically. Many of the species of *Raphirus* sensu Coiffait inhabit unforested habitats (ruderal biotopes, grassland, shrub habitats), whereas species of *Sauridus* sensu Coiffait tend to inhabit the leaf litter of forests or deeper, subterranean habitats (see, e.g., ASSING 2017).

Up until the end of 2014, 71 *Quedius* species (subspecies not considered) had been reported from Turkey (SCHÜLKE & SMETANA 2015), four of the subgenus *Distichalius* CASEY, 1915, 16 of *Microsaurus* DEJEAN, 1833, six of the nominal subgenus, one of *Velleius* LEACH, 1819, and 44 of *Raphirus*. In the meantime, one species has been moved from *Microsaurus* to *Raphirus*, one species of *Raphirus*, *Q. paradisiacus* (HEER, 1839), has been removed from the list of Turkish Staphylinidae, and two new species of *Raphirus* have been described (ASSING 2016a, b, 2017), so that prior to the present study 72 *Quedius* species were known from Turkey, 46 of them in the subgenus *Raphirus*.

The *Raphirus* species previously recorded from Turkey include eleven species of *Raphirus* sensu Coiffait: *Q. curtidens* SMETANA, 1967 (East Mediterranean), *Q. harpago* ASSING, 2007 (West Turkey), *Q. incensus* SMETANA, 1959 (Ponto-Mediterranean), *Q. inflatus* FAUVEL, 1875 (Middle East), *Q. korgeanus* FAGEL, 1968 (Caucasus, North Anatolia), *Q. nitipennis* (STEPHENS, 1833) (widespread in Europe, North Africa, and Middle East), *Q. reitteri* GRIDELLI, 1926 (Ponto-Mediterranean), *Q. semiaeneus* (STEPHENS, 1833) (Holo-Mediterranean), and *Q. semiobscurus* (MARSHAM, 1802) (Holo-Mediterranean). Two taxa are of doubtful identity and require revision, *Q. acuminatus* HOCHHUTH, 1849 and *Q. boops tauricus* (NORDMANN, 1837). *Quedius boops* (GRAVENHORST, 1802) currently includes three subspecies, *Q. boops boops*, *Q. boops tauricus*, and *Q. boops islandicus* FAGEL, 1960. This intraspecific concept, however, is doubtful. Neither is the presence of a distinct subspecies in Iceland zoogeographically plausible, nor is there evidence that the Turkish material of *Q. boops* studied so far represents a distinct subspecies. Only one of the species listed above, *Q. reitteri*, is micropterous.

Material collected during several field trips to North Anatolia included three micropterous species of *Raphirus* sensu Coiffait. One of them is *Q. reitteri*, one *Q. omissus* COIFFAIT, 1977, a species previously known only from the Russian part of the West Caucasus (SOLODOVNIKOV 2002), and one is undescribed.

Material and methods

The material treated in this study is deposited in the following collections:

BMNH The Natural History Museum, London (M. Barclay, R. Booth)
 MNB Museum für Naturkunde, Berlin (including coll. Schülke; J. Frisch, M. Schülke)
 cAss..... author's private collection
 cFel private collection Benedikt Feldmann, Münster

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using a photographing device constructed by Arved Lompe (Nienburg) and CombineZ software, as well as a digital camera (Nikon Coolpix 995). The map was created using MapCreator 2.0 (primap) software.

The measurements in the descriptions are given in mm and abbreviated as follows: EL: length of elytra from apex of scutellum to elytral hind margin; HL: head length from anterior sclerotized margin of frons to posterior constriction; HW: maximal head width (across and including eyes); ML: length of median lobe of aedeagus; PL: length of pronotum along median line; PW: maximal width of pronotum; TaL: length of metatarsus (claws not included); TiL: length of metatibia (lateral aspect); TL: body length from apex of mandibles to posterior margin of tergite VIII. The "parameral" side of the aedeagus (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

Results

Quedius (Raphirus) reitteri GRIDELLI, 1925 (Map 1)

Material examined: Turkey: Ordu: 6 exs., 25 km S Ordu, S Kabaduz, 40°49'N, 37°54'E, 990 m, mixed forest with alder, spruce, bramble, ivy, 30.VII.2006, leg. Assing & Schülke (cAss, MNB); 5 exs., same locality, but roadside, roots of grass and herbs, and moss sifted (cAss). Giresun: 12 exs., 40 km S Giresun, Şehitler Geçidi, 40°34'N, 38°27'E, 1790 m, spruce forest with rhododendron, litter sifted, 23.VII.2008, leg. Assing & Schülke (cAss, cFel, MNB); 8 exs., ca. 30 km S Giresun, 40°36'N, 38°27'E, 1250 m, spruce forest with rhododendron, sifted, 29.VII.2006, leg. Assing & Schülke (cAss, MNB); 1 ex., ca. 40 km S Giresun, N Kümbet, 40°34'N, 38°26'E, 1520 m, spruce forest with rhododendron, 29.VII.2006, leg. Assing (cAss). Rize: 2 exs., 50 km SSE Rize, W Sivrikaya, 40°41'N, 40°39'E, 2050 m, natural fir forest, litter and dead wood sifted, 1.VIII.2006, leg. Assing (cAss). Bosnia-Herzegovina: 2 ♂♂, Sarajevo, Jahorina, 1800 m, 7.V.1990, leg. Wunderle (cAss); 1 ♂, Vlasic Planina, 1700 m, 5.V.1995 (cAss). Montenegro: 1 ♂, Bjelasica Planina, Biogradska Gora, 19.VII.2009, leg. Stevanović (cAss). Serbia: 1 ♂, 1 ♀, Kopaonik mts., Jaram, 1550 m, 6.VI.2009, leg. Stevanović (cAss); 1 ♀, Tara Planina, Zaovine, 920 m, 28.X.2008, leg. Stevanović (cAss). Italy: 1 ♂, Lombardia, Passo di Tremalzo, 1500 m, 24.VI.1993, leg. Assing (cAss).

Comment: KORGE (1964) already pointed out that the interpretation of the name *Q. reitteri* is doubtful. This taxon was originally described as a variety of *Q. boops*, based on material from "Silesia...; Carniola; Mte. Bjtoraj (Croatia)" (GRIDELLI 1925). The name has a junior synonym, *Q. crius* TOTTENHAM, 1948, whose description is based on material from several localities in Great Britain (TOTTENHAM 1948). Available zoogeographic evidence suggested that *Q. reitteri* and *Q. crius* were unlikely to refer to the same species. A revision of the type material of *Q. crius* revealed that it is conspecific with *Q. boops* (GRAVENHORST, 1802); for details see the section on *Q. boops* at the end of this paper.

The species traditionally interpreted as *Q. reitteri* is distributed in the mountains of Southeast Europe and in Turkey. The distribution is remarkably discontinuous, as there are no records from the region between Northeast Anatolia and Bosnia-Herzegovina. The above records from Serbia and Montenegro represent the first records from these countries. In Turkey, the distribution appears to be confined to the northeast (Map 1). Previous records are from Gümüşhane, Ordu, and Rize (KORGE 1964, 1971). The specimens seen from Rize are distinguished from those collected in other Turkish provinces by a somewhat broader pronotum, but the aedeagus is identical.

***Quedius (Raphirus) omissus* COIFFAIT, 1977** (Figs 17-21, Map 1)

Material examined: Turkey: Rize: 3♂♂, 60 km SSE Rize, Ovitdağı Geçidi, 40°37'N, 40°47'E, 2710 m, N-slope, under stones, 25.VII.2006, leg. Assing (cAss).

Comment: This species was previously known only from the Russian part (Krasnodar, Adygeja, Karachaevo-Cherkessia) of the West Caucasus (SOLODOVNIKOV 2002). The above specimens were compared with material from the West Caucasus and represent the first records from Turkey (Map 1). The aedeagus is illustrated in Figs 17-21.

Quedius (Raphirus) sp. (Map 1)

Material examined: Turkey: Trabzon: 1♀, ca. 50 km S Trabzon, 20 km S Maçka, Altındere Milli Park, 40°40'N, 39°40'E, 1540 m, stream bank, 26.VII.2006, leg. Assing (cAss).

Comment: The above female is similar to *Q. omissus*, but distinguished by a differently shaped tergite IX and slightly longer elytra. Males would be required to clarify its identity.

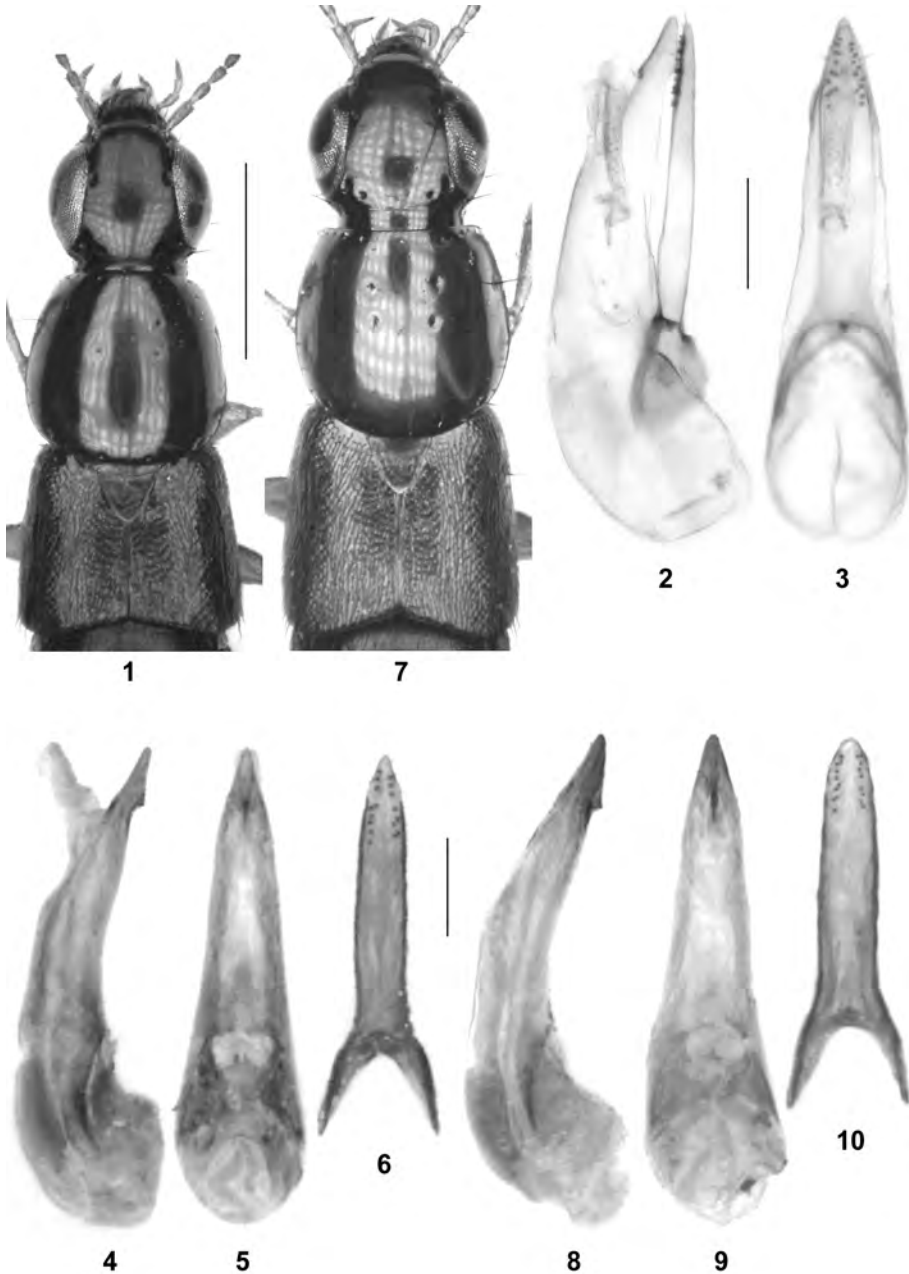


Map 1: Distribution of micropterous *Quedius (Raphirus)* species with punctate scutellum in Turkey: *Quedius reitteri* (black circles), *Q. omissus* (white circle); *Q. brevalatus* (white triangle); *Q. sp.* (white star).

Quedius (Raphirus) brevalatus nov.sp. (Figs 1-6, 11-13, Map 1)

Type material: Holotype ♂: "ARMENIA [48] – NW Goris, W Verishen, 39°31'43"N, 46°18'33"E 1670 m, forest margin, 12.VII.2017, V. Assing / Holotypus ♂ *Quedius brevalatus* sp. n. det. V. Assing 2017" (cAss). Paratypes: 5♂♂, 6♀♀: same data as holotype (cAss); 6♂♂, 3♀♀: same data as holotype, but leg. Schülke (MNB); 2♂♂ [1 teneral], 4♀♀: "TR [5a]- Rize, ca. 50 km SSE Rize, Ovitdağı Geç., 2510 m, sifted, 40°37'31N, 40°45'27E, 25.VII.2006, V. Assing" (cAss).

Etymology: The specific epithet is an adjective composed of the Latin adjectives brevis (short) and alatus (winged). It alludes to the reduced length of the elytra and hind wings.



Figs 1-10: *Quedius brevalatus* from Turkey (1-6) and *Q. boopoides* from Germany (7-10): (1, 7) forebody; (2-3) aedeagus in lateral and in ventral view (in transparent light); (4, 8) median lobe of aedeagus in lateral view (dry preparation); (5, 9) median lobe of aedeagus in ventral view; (6, 10) paramere. Scale bars: 1, 7: 1.0 mm; 2-6, 8-10: 0.2 mm.



Figs 11-21: *Quedius brevalatus* from Armenia (11-14) and Turkey (15-16), and *Q. omissus* from Turkey (17-21): (11-12, 19-20) median lobe of aedeagus in lateral and in ventral view; (13-15, 21) paramere; (16) female abdominal segments IX-X; (17-18) aedeagus in lateral and in ventral view. Scale bars: 0.2 mm.

Description: Measurements (in mm) and ratios (range, arithmetic mean) ($n = 18$): TL: 5.5-7.3, 6.7; HL: 0.70-0.77, 0.74; HW: 0.84-0.90, 0.86; PL: 0.97-1.09, 1.03; PW: 1.00-1.14, 1.06; EL: 0.49-0.56, 0.52; HTiL: 0.70-0.84, 0.77; HTaL: 0.60-0.70, 0.64; ML: 0.90-1.02, 0.95; HW/HL: 1.13-1.23, 1.17; PW/HW: 1.19-1.26, 1.23; PL/PW: 0.94-0.99, 0.97; EL/PL: 0.48-0.53, 0.51; HTiL/HTaL: 1.14-1.26, 1.20.

Coloration: body black; abdominal segments IX and X anteriorly somewhat paler; legs yellowish-brown, with the metatibiae at least partly infuscate; antennae pale-brown to blackish-brown with the basal antennomeres more or less extensively yellowish-red.

Elytra (Fig. 1) only half as long as pronotum (see ratio EL/PL). Hind wings reduced. Posterior margin of tergite VIII with narrow rudiment of a palisade fringe.

Other external characters as in *Quedius boopoides* MUNSTER, 1923.

♂: protarsomeres I-IV strongly dilated; sternite VIII broadly triangularly excised posteriorly; aedeagus shaped as in Figs 2-6, 11-15.

♀: protarsomeres I-IV weakly dilated; posterior abdominal segments shaped as in Fig. 16.

Intraspecific variation: The material from Armenia is distinguished from the Turkish specimens by a slightly smaller and more slender paramere (Figs 13-15). The otherwise similar external and male sexual characters, however, suggest that both populations are conspecific.

Comparative notes: Among the West Palaearctic *Quedius* species, *Q. brevalatus* is most similar to *Q. boopoides* both in external and sexual characters. It is distinguished from that species particularly by distinctly shorter elytra (*Q. boopoides*: elytra 0.65-0.70 times as long as pronotum), reduced hind wings (shorter than elytra), darker abdominal segments IX-X, a less pronounced palisade fringe at the posterior margin of tergite VII, and by the shape of the aedeagus. In *Q. boopoides*, the median lobe is slightly larger, the apex of the median lobe is larger with the subapical tooth more distant from the apex and apically extended into a distinct carina, and the paramere is apically less acute. For comparison, illustrations of the forebody and of the aedeagus of *Q. boopoides* are provided in Figs 7-10. From the similar micropterous and sympatric *Q. omissus*, *Q. brevalatus* differs by shorter hind wings (*Q. omissus*: hind wing rudiments distinctly projecting beyond posterior margin of the elytra when unfolded) and above all by the shape of the aedeagus. For illustrations of the male primary sexual characters of *Q. omissus* see Figs 17-21.

Distribution and natural history: The species is currently known from the type locality near Goris, South Armenia, and from one locality in Rize province, northeastern Anatolia. The material from the type locality was sifted from roots and litter beneath *Quercus* and *Rosa* at the margin of an oak forest at an altitude of 1670 m, the specimens from Turkey were sifted from grass roots and moss around large rocks at an altitude of 2510 m. One of the paratypes from Turkey is teneral.



Map 2: Distribution of *Quedius brevalatus*.

Quedius (Raphirus) boops (Gravenhorst, 1802)

Staphylinus boops GRAVENHORST, 1802: 21 f.

Philonthus boops tauricus NORDMANN, 1837: 78; **nov.syn.**

Quedius crius TOTTENHAM, 1948: 258; **nov.syn.**

Quedius boops islandicus FAGEL, 1960: 113 f.; **nov.syn.**

Type material examined: *Quedius boops*: Lectotype ♂ [dissected prior to present study], present designation: "6255 / Braunschweig, Hellwig / Grav Type *boops!* / *boops* Gr.* Gyll. / Zool. Mus. Berlin / Lectotypus *Staphylinus boops* Gravenhorst, V. Gusarov des. 1993 / *Quedius boops* (Grav.) ♂, V.I. Gusarov det. 1993 / Lectotypus ♂ *Staphylinus boops* Gravenhorst, desig. V. Assing 2017 / *Quedius boops* (Gravenhorst) ♂, det. V. Assing" (MNB).

Quedius crius: Holotype ♂: "Holotype / *Quedius crius* Tott. TYPE (Askwith, 1-v-1637 [sic], C.E.T. / C.E. Tottenham collection. B.M. 1974-587. / *Quedius boops* (Gravenhorst), det. V. Assing 2017" (BMNH). Paratypes: 2 ♂ ♂: same data as holotype, but labelled as paratypes (BMNH).

Quedius boops islandicus: Holotype ♂ [dissected prior to present study]: "Island, Reynivellir 22.8.07. Dr. Gruner S.G. / Holotypus / G. Fagel det., 1959, *Quedius boops islandicus* nov. / Zool. Mus. Berlin / *Quedius boops* (Gravenhorst), det. V. Assing 2017" (MNB). Paratype ♀: same data as holotype, but labelled as paratype (MNB).

C o m m e n t : The original description of *Q. boops* is based on an unspecified number of syntypes without specified locality from "Mus. Prof. Hellwig" (GRAVENHORST 1802). The sole syntype in the historical collection of the MNB was studied and labelled as lectotype by Vladimir Gusarov, but this designation was never published. The specimen, a male, is here designated as the lectotype.

According to SCHÜLKE & SMETANA (2015), the distribution of *Q. boops tauricus* is confined to Turkey. The original description of *Philonthus boops* "var. *taurica*" [sic], however, is based on an unspecified number of specimens collected "in Tauro-Chersoneso. (Coll. D. Stevenii)" (NORDMANN 1837). Taurus Chersonesus is an old name for the Crimean Peninsula (Ukraine) and not situated in the Taurus range, Turkey. According to HERMAN (2001b), there is only one subsequent record of *Q. boops tauricus*. KÖRGE (1964) tentatively recorded it from Soğanlı Geçidi, Bayburt, based on a single specimen.

In the beginning of the passage on *Q. boops tauricus* (pp. 124 f.) he states that it is a male, but it can be inferred from the last sentence ("Zur endgültigen taxonomischen Wertung dieser Form muß der Fund eines ♂ abgewartet werden."; p. 125) that the specimen is in fact a female. According to HORN et al. (1990), most of the Steven collection is deposited in the Zoological Museum of Moscow State University. A request for the loan of the type material remained unanswered. There are three specimens, two males and one female, of *Q. boops* from the Crimean Peninsula ("N-slope of Ai Petri Mt., 900 m, beech forest, 20-24.VII.2001, leg. Koval") in my collection. They are identical to *Q. boops* in every respect, both in external and the male sexual characters. It can be concluded, therefore, that the type material of *Q. boops tauricus* either refers to *Q. boops* or to a different species. In order to dispose of a doubtful name, the former option is preferred and *Q. boops tauricus* is synonymized with *Q. boops*. There is little doubt that the record by KORGE (1964) refers to *Q. boops*, a highly variable species. I have examined material of *Q. boops* from various provinces in North Anatolia (Düzce, Sakarya, Bolu, Kastamonu, Samsun, Ordu, Gümüşhane, Trabzon; all in cAss).

The original description of *Quedius crius* is based on a male holotype and three male paratypes from "Askwith (MY)", and an unspecified number of "specimens in the Sharp collection at the British Museum from Rannoch (PM), Arran (B), Dumfries and Morton Mains (DF), Polmont (SG), Garlochhead (DN), and Inverness-shire" (TOTTENHAM 1948). The name was subsequently regarded as a synonym (SMETANA 1962) or as a subspecies of *Q. asturicus* BERNHAUER, 1918 (LOHSE 1964, COIFFAIT 1978, LUCHT 1987), and finally as a synonym of *Q. reitteri* (LOHSE & LUCHT 1989, HERMAN 2001b, SMETANA 2004, SCHÜLKE & SMETANA 2015), whereas POPE (1977) suspected it to be a synonym of *Q. boops*. An examination of the holotype and two paratypes from the type locality revealed that the aedeagus is identical to that of *Q. boops*, a species subject to intraspecific variation of body colour (ranging from reddish-brown to black) and also in the length of the elytra and of the hind wings (ranging from submacropterous to macropterous). According to an unpublished study of thousands of adult specimens of *Q. boops* in North Germany, only a small proportion of the material had fully developed wings and flight muscles. The relative elytral length (EL/PL) of the examined type material of *Q. crius* is 0.59-0.62 and thus well within the range of *Q. boops*, whereas that of *Q. reitteri* ranges from approximately 0.45 to 0.52. In consequence, *Q. crius* is placed in synonymy with *Q. boops*.

In the original description of *Q. boops islandicus*, which is based on a male holotype and three paratypes from "Island: Reynivellir", FAGEL (1960) gives some minor external characters (coloration, microsculpture, head width, shapes of antennomeres, coarser punctation of pronotum, relatively short elytra, elytral punctation coarser and less dense, abdominal punctation) distinguishing this taxon from the nominal subspecies and states that the aedeagus is identical. As mentioned before, *Q. boops* is highly variable regarding external characters (coloration, length of elytra, punctuation, etc.). Moreover, the presence of a distinct subspecies in Iceland would be implausible from a zoogeographic point of view. An examination of the holotype and one female paratype revealed that they are well within the range of intraspecific variation of *Q. boops*. Hence, *Q. boops islandicus* is placed in synonymy with *Q. boops*.

Acknowledgements

Michael Schülke communicated his material of *Quedius reitteri* and *Q. brevalatus* from Turkey and Armenia, respectively. Alexey Solodovnikov (Copenhagen) provided material of *Quedius omissus* from the West Caucasus for comparison and forwarded the type material of *Q. boops* and *Q. boops islandicus*. Benedikt Feldmann (Münster) proof-read the manuscript.

Zusammenfassung

Vier ungeflügelte Arten der Gattung *Quedius* STEPHENS, 1829, Untergattung *Raphirus* STEPHENS, 1829, mit punktiertem Scutellum, davon eine von ungeklärter Identität, werden aus der Nordtürkei nachgewiesen. *Quedius brevalatus* nov.sp. (Armenien; Türkei: Rize) wird beschrieben und abgebildet. *Quedius omissus* COIFFAIT, 1977, eine zuvor nur aus dem Westkaukasus bekannte Art, wird erstmals aus der Türkei (Rize) gemeldet. Drei Namen werden synonymisiert: *Quedius boops* (GRAVENHORST, 1802) = *Philonthus boops tauricus* NORDMANN, 1837, nov.syn., = *Quedius crius* TOTENHAM, 1948, nov.syn. (bisher Synonym von *Q. reitteri* GRIDELLI, 1925), = *Quedius boops islandicus* FAGEL, 1960, nov.syn.

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