



Notes on the subspecies of *Plagionotus arcuatus* (Linnaeus, 1758) with description of a new subspecies from Iran (Coleoptera: Cerambycidae)

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Abstract

This paper reviews the lower-ranked taxa within the species *Plagionotus arcuatus* (Linnaeus, 1758) and describes a new subspecies *P. arcuatus shirazensis* based on specimens from Iran. Some comments are made on the morphology of the subspecies, and a key, together with an exhaustive photographic documentation, is provided for their identification. The distribution ranges of these various taxa are discussed and basic biological information on all the subspecies is given. We explain our opposition to the subspecies *Plagionotus arcuatus tastani* Özdikmen, Atak & Uçkan, 2017, and have accordingly synonymized it with the nominative subspecies.

Key words: *Plagionotus*, new subspecies, new synonym, distribution, biology, key

Introduction

The genus *Plagionotus* Mulsant, 1842 belongs to the tribe Clytini Mulsant, 1839 within the subfamily Cerambycinae Latreille, 1802. Originally, this genus was described under the name *Platynotus* Mulsant, 1839; however, as this turned out to be pre-occupied, it was replaced by the junior synonym *Plagionotus*. Over the years, the taxonomy of this genus has been modified many times. Nomenclature doubts resulted in the formation of homonyms and synonyms (*Echidnocerus* White 1842, *Echinocerus* White 1848, *Echinocerus* Mulsant 1863), including the name reserved for representatives of one of the Crustacea genera (Burakowski et al. 1990, Sama 1994, 2008, Kasatkin 2005, Alonso-Zarazaga 2007). The deepest changes were made by Kasatkin (2005), who, on the basis of the genitalia morphology and the feeding preferences of the larvae, distinguished three independent genera within this taxon: *Plagionotus* Mulsant, 1842, *Paraplagionotus* Kasatkin, 2005 (now a synonym of *Echinocerus* Mulsant, 1862) and *Neoplagionotus* Kasatkin, 2005. In another recent division, *Plagionotus* was separated into the subgenera *Echinocerus* Mulsant, 1862, *Neoplagionotus* Kasatkin, 2005 and *Plagionotus* Mulsant, 1842 (Özdikmen & Turgut 2009). In the present paper, we use the division into genera by Danilevsky (2020), where *Plagionotus*, *Echinocerus* and *Neoplagionotus* are considered as separate genera.

The larvae of *Echinocerus* are polyphagous on various herbaceous plants of the genera *Euphorbia* L., *Medicago* L. and *Achillea* L., those of *Neoplagionotus* feed on the roots of Malvaceae Juss., while those of *Plagionotus* are xylophages on a wide variety of tree species (Kasatkin 2005).

In the Palearctic, the genus *Plagionotus* Mulsant, 1842 currently contains seven species, three of which have been reported from Iran: *P. arcuatus* (Linnaeus, 1758), *P. bartholomei* (Motschulsky, 1860) and *P. bieberi* (Bode-meyer, 1927) (Danilevsky 2020). Considerable changes within the taxon *Plagionotus arcuatus* have recently been made by Lazarev (2010), Pesarini & Sabbadini (2011) and Özdikmen *et al.* (2017), who revised some previous views and described new subspecies.

Apart from the nominative one (Figs. 1.A–B), the following subspecies of *P. arcuatus* are currently known:

P. arcuatus ghidottii Pesarini & Sabbadini, 2011 (Figs. 1.C–D), *P. arcuatus kirgizicus* Lazarev 2010 (Figs. 1.I–J), *P. arcuatus lugubris* (Ménétriés, 1832) (Figs. 1.E–H), *P. arcuatus multiinterruptus* Pic, 1933 (Figs. 1.K–L) and *P. arcuatus tastani* Özdikmen, Atak & Uçkan, 2017. Two of these, *P. arcuatus arcuatus* and *P. arcuatus lugubris* (Figs. 1.A–B and Figs. 1.E–H), have been reported from Iran.

In material from Iran at our disposal, there is a further, hitherto unknown taxon of the species *Plagionotus arcuatus* L (Figs. 2. A–E, 2G and 3.A–B).

Materials and methods

Dry-mounted specimens were studied under a Delta Optical IPOS-810 stereomicroscope. Measurements were made with an ocular micrometer. For the study of the genitalia, specimens were softened in warm distilled water and subsequently dissected under the stereomicroscope. Photographs of the habitus were taken with a Canon EOS 50D digital camera equipped with Canon 100mm f/2.8 USM Macro and Sigma 150mm f/2.8 USM APO Macro DG HSM lens. Photographs of the genitalia were taken using a Nikon D7500 camera and the Nikon M Plan10 lens. The images were stacked, aligned and combined using Helicon Focus 7 (the first author is the license holder). The map was generated with the QGIS program (GNU General Public License) and using a vector map downloaded from the website: <https://www.naturalearthdata.com/>. We have used the faunistic typology given in Mazur (2001).

The holotype is preserved in the entomological collection of the Department of Natural History of the Upper Silesian Museum in Bytom (USMB, Poland) and the rest of specimens in the collections of the authors: Roman Królik, Lech Kruszelnicki, Andrzej Lasoń and Marcin Walczak.

The acronyms used in the text are as follows:

AL—Andrzej Lasoń Collection, Poland
BB—Bartłomiej Bujnik Collection, Poland
JŁ—Jerzy Ługowoj Collection, Poland
LK—Lech Kruszelnicki Collection, Poland
MW—Marcin Walczak Collection, Poland
RK—Roman Królik Collection, Poland
USMB—Upper Silesian Museum, Bytom, Poland.

Taxonomy and morphology

The distribution range of *Plagionotus arcuatus* covers the Palaearctic from the Iberian Peninsula in the west to Kazakhstan and Kyrgyzstan in the east. Longitudinally, the range extends from Scandinavia in the north to North Africa in the south (Bense 1995, Özdikmen & Turgut 2009). *Plagionotus arcuatus* is highly variable throughout its range, forming localized populations having fairly consistent features. These relate primarily to the characteristic pattern and colour of the stripes, and also the spots of pubescence on the pronotum and elytra. The shapes of the antemedian and postmedian transverse elytral stripes are particularly useful diagnostic characters. It is mainly on the basis of these that the various subspecies have been distinguished (Lazarev 2010, Pesarini & Sabbadini 2011, Özdikmen *et al.* 2017), among which the two Caucasian subspecies—*P. arcuatus lugubris* (Figs. 1.E–H) and *P. arcuatus multiinterruptus* (Figs. 1.K–L)—have strongly reduced transverse stripes on the dorsal part of the body. In contrast to the nominative subspecies, *P. a. lugubris* usually has black legs and antennae, and the stripes on the dorsal surface are normally white (Figs. 1.G–H), and sometimes yellowish (Figs. 1.E–F). The characters of *P. a. multiinterruptus* (Figs. 1.K–L) are intermediate between those of *P. a. arcuatus* (Figs. 1.A–B) and *P. a. lugubris* (Figs. 1.E–H): it differs from the nominative subspecies principally by the reduced or absence of pale pronotal setae, interrupted transverse pale abdominal stripes and more blurry posterior transverse elytral stripes, and from *P. a. lugubris* by the usually yellow light body pubescence and the usually partly red antennae and legs (Lazarev 2010). *Plagionotus arcuatus ghidottii* (Figs. 1.C–D) is restricted to the island of Crete, Greece, and is distinguished from the nominative subspecies by the characteristic course and shape of the antemedian and postmedian elytral stripes. The former is always divided into a steeply inclined outer section, well separated from the inner section, which is

reduced to a spot, whereas the latter is strongly convex (Pesarini & Sabbadini 2011). According to Lazarev (2010), *Plagionotus arcuatus kirgizicus* (Figs. 1.I–J), described recently from the eastern range limits of *P. arcuatus*, differs from the nominative subspecies primarily by the interrupted transverse yellow stripes on the pronotum and abdomen, and the usually reduced antemedian elytral stripe. As can be seen in Fig. 1J, this feature is not constant in this subspecies. It also differs from the Transcaucasian subspecies by the darker yellow pubescence (never white), by the never totally black antennae and legs, and the postmedian elytral stripes never reduced to single spots.

***Plagionotus arcuatus arcuatus* (Linnaeus, 1758)**

(Figs. 1.A–B)

Callidium lunatus Fabricius, 1782

Clytus salicis Schrank, 1798

Plagyonotus reichei J. Thomson, 1861

Clytus apicalis Hampe, 1863

Plagionotus stauropolibus Pic, 1915

Plagionotus martialis Pic, 1918

Plagionotus buyssoni Dauphin, 1924

Plagionotus pagnioni Pic, 1925

Plagionotus milliati Pic, 1934

Plagionotus interrupteconnatus G. Schmidt, 1951

Plagionotus plavilstshikovi G. Schmidt, 1951

Plagionotus arcuatus tastani Özdikmen, Atak & Uçkan, 2017 **syn. nov.**

The recently described *P. arcuatus tastani* (Özdikmen, Atak & Uçkan 2017) does not, in our opinion, warrant subspecific status. According with the authors in the original description: “It is characterized by poor developed transverse stripes behind the middle of elytra especially. Antemedian band of elytra usually (9 males and 11 females of 30 specimens) is more or less complete but sometimes (3 males and 7 females of 30 specimens) is divided into an outer and an inner spots.” These characters not infrequently occur in specimens from different parts of Europe (Figs. 1.A). As can be seen from this description these characters are not constant even among the specimens from the typical series. The phrase “erect abdominal setae are not very dense” is rather imprecise and could refer to many specimens of any subspecies of *P. arcuatus*. The type locality of *P. a. tastani* Özdikmen, Atak & Uçkan 2017 (Kocaeli province in Turkey) lies not very far from the contiguous distribution range of *P. a. arcuatus*, and it is hard to imagine that the Bosphorus strait constitutes a real barrier to the various subspecies, especially as specimens of this synonymized taxon differ in no way from those caught in the Turkish Strandzha region, close to the frontier with Bulgaria (Fig. 5). Özdikmen & Turgut (2009), writing about *P. arcuatus* state that “It distributes mostly in North and West Turkey”; in our opinion, this information applies to the nominative subspecies.

***Plagionotus arcuatus shirazensis* ssp. nov.**

(Figs. 2A–E)

Type material. Holotype: male (Fig. 2E), Iran, Fars Prov., 5 km SW of Dasht-e Arzhan (29°37'55"N, 51°56'25"E), 2160 m amsl, 10.V.2017, on fallen trunk of *Quercus* L., R. Królik leg. (USMB). **Paratypes** (Figs. 2A–D): 13 exx. (7 ♂♂, 6 ♀♀), the same collecting place and microhabitat as the holotype, 30.IV.2016, 1 ♂, 1 ♀, 2.V.2016, 1 ♂ (Fig. 2B), A. Lasoń leg. (AL); 2.V.2016, 1 ♂ (Fig. 2G), 2 ♀♀, M. Walczak leg. (MW); 30.IV–2.V.2016, 2 ♂♂, 10.V.2017, 1 ♀, R. Królik leg. (RK); 2.V.2016, 2 ♂♂ (Figs. 2A, 2C), 1 ♀ (Fig. 2D), L. Kruszelnicki leg. (LK); Iran, West Azarbaijan Prov., W of Mahabad (36°43'41"N, 45°31'23"E), 27.V.2019, 1 ♀, L. Kruszelnicki leg. (LK).

***Plagionotus arcuatus shirazensis* ssp. nov.**

Description. The external morphology of the new subspecies most resembles the nominative form *Plagionotus arcuatus arcuatus* (Figs. 1.A–B). Body length 11.5–16.0 mm (holotype 15.5 mm), width 3.0–5.2 mm (holotype 5.0

mm). Integument black except antennae and part of the legs, covered by recumbent black pubescence with spots and stripes formed from dense yellow pubescence.

Head densely and deeply punctate with yellow pubescence on frons, and in vertex, partly around the eyes and with wide yellow band just behind the eyes. Antennae yellow, relatively long, reaching third (preapical) stripe in males, and second (postmedian) stripe in females.

Pronotum transverse; 1.2 (males) and 1.4 (females) times as wide as long; sides rounded, widest just below midpoint. Pronotum deeply punctate, slightly pale, protruding hairs on sides and base. Pronotum with large stripe on anterior margin, sometimes reduced and interrupted centrally, and two oblique patches laterally, situated in slight depressions. No spots at base of pronotum, but a few white hairs sometimes visible on the sides of its base.

Scutellum triangular, covered with yellow pubescence. Elytra long, almost parallel-sided up to 2/3 of their length; anteriorly with small humeral spots; first transverse elytral stripe (antemedian) large, “zigzag-shape”, on central part of each elytron arched forwards, on presutural part extended posteriorly and then directed forward, towards the scutellum, sometimes with a short break in the part of this stripe along the suture. Second transverse stripe (postmedian) relatively wide, strongly arched forward in the middle of each elytron. Distance between first and second transverse stripes smaller than width of area occupied by the first or second stripe (Fig. 2G). Third transverse stripe (preapical) widest in sutural part, gradually tapering to the middle of elytron and bending backwards. Apical stripe covers the end of each elytron in a wide arc, extending farther forwards along the suture. Elytral punctation very dense and relatively thin, evenly distributed across the whole elytral surface.

Legs yellow, only the mid parts of pro- and mesofemora black.

Ventral part black with bands and spots of dense yellow pubescence: four spots on sides of prosternum, two on anterior margin, two beyond procoxae; elongated patches on elytral epipleurum reaching centre of metaepisternum; two spots on mesoventrite beyond mesocoxae and one on mesoventral process; whole metaventrite covered by yellow, dense pubescence except for middle and anterior parts (behind mesocoxae), anterior region of metaepisternum hairless, a large spot in its posterior region; all abdominal sternites covered with dense yellow pubescence, only very small hairless spaces at base of first sternite and between other sternites.

Male genitalia. Tegmen (Fig. 3A) and aedeagus (Fig. 3B).

Differential diagnosis. The new subspecies is similar to the nominative form, *Plagionotus arcuatus arcuatus* (Figs. 1A–B). It differs from the latter by the more distinctly parallel-sided elytra, and from all known subspecies, including the nominative one, by the more convoluted pattern on the elytra. This is best seen in the shape of the antemedian stripe, which is usually continuous transversally, very often unbroken along the suture, and curves strongly backwards near the suture, closely approaching the second, postmedian stripe (Fig. 2G). The pubescence of the ventral side of the body is dense (Figs. 2C–D), particularly on the abdominal sternites, which are almost completely covered by yellow pubescence, in contrast to the other subspecies, where the pubescence covers, at most, the posterior half of each sternite. It is worth noting that in the additional material analysed there was one specimen of *P. a. arcuatus* from Turkey, Tunceli Prov., in which the appearance of the ventral pubescence is similar to that in *P. a. shirazensis* (Figs. 2C–D). However, the arrangement of the stripes on the elytra is typical for the *P. a. arcuatus* (Fig. 2F). In our opinion, the transverse elytral stripes is the main feature to distinguish the subspecies of *P. a. shirazensis*. More pronounced ventral pubescence is a constant characteristic of this subspecies, however, it cannot be the only determinant trait to identify it.

Etymology. The species is named after Shiraz, the city in southern Iran at the foot of the Zagros Mountains, the administrative centre of Fars Province and the former capital of Persia.

Larval host plants, habitat. Very probably *Quercus macranthera* Fisch. & C.A.Mey. ex Hohen. All the specimens were caught on dead or moribund oak trunks. Most likely it is found in sunny, rarely covered oak forests, and even in small clumps of oaks (Figs. 4A–B).

Additional material examined: *Plagionotus arcuatus arcuatus*. **Bulgaria:** Vidin Prov., Rabisha ad Dimovo, 10.VII.2001, 1 ex., J. Ługowoj leg. (JŁ). **Croatia:** Krk Isl., Njivice, 10.VI.2001, 1 ex., M. Walczak leg. (MW). **Czech Republic:** Central Bohemian Reg., Velký Osek, 17.V.1995, 1 ex., L. Fiala leg. (BB); Pardubice Reg., Uherско, 2008, ex. larva, 1 ex., L. & R. Fiala leg. (BB). **Georgia:** Samtskhe–Javakheti Reg., Borjomi, V.2014, 1 ex., M. Walczak leg. (MW). **Greece:** Central Macedonia, 10 km N of Nea Santha, 25.V.2013, 2 ex., B. Bujnik leg. (BB); Epirus and Western Macedonia, 5 km S of Grevena, 09.VI.2012, 1 ex., L. Kruszelnicki leg. (LK); Ioánina, 3 km N of Métsovo (39°47'N, 21°10'E, 1390 m amsl), 12–13.VI.2007, 1 ex., A. Lason leg. (AL); 1 ex., J. Ługowoj leg. (JŁ); 1 ex. R. Królik leg. (RK); Thessaly, Karitsa, 09.VI.2012, 1 ex., L. Kruszelnicki leg. (LK); Meteora env.,

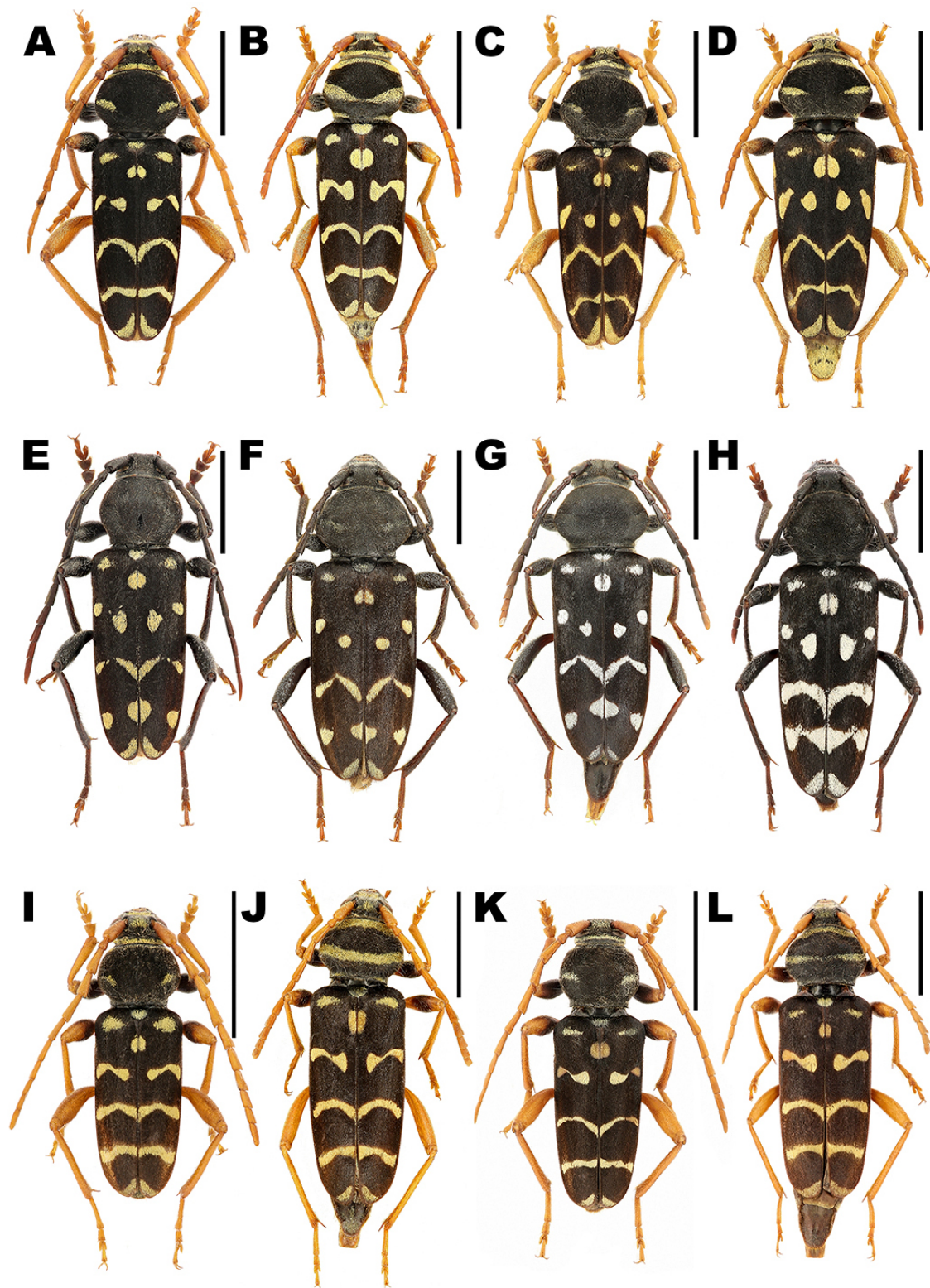


FIGURE 1. A–L, habitus (dorsal view). *Plagionotus arcuatus arcuatus*: A, male, Poland (Lower Silesia), B, female, Greece (Thessaly reg.); *Plagionotus arcuatus ghidottii*: C, male, Greece (Crete, Chania reg.), D, female, Greece (Crete, Chania reg.); *Plagionotus arcuatus lugubris*: E, male, (Azerbaijan, Yardımlı reg.), F, female, (Iran, Mazandaran prov.), G, female, (Azerbaijan, Yardımlı reg.), H, female, (Iran, Mazandaran prov.); *Plagionotus arcuatus kirgizicus*: I, male, (Kyrgyzstan, Jalal-Abad Prov.), J, female, (Kyrgyzstan, Jalal-Abad Prov.); *Plagionotus arcuatus multiinterruptus*: K, male, (Armenia, Gegharkunik Prov.), L, female, (Armenia Gegharkunik Prov.). Scale bar: 5 mm.

14–15.VI.2007, 1 ex. (Fig. 1B), R. Królik leg. (RK); Meteora-Vlachava, 28.V–11.VI.2011, 1 ex., L. & R. Fiala leg. (BB); Peloponnese, Ag. Pertos, 26.V.2009, 1 ex., M. Walczak leg. (MW). **Italy:** Sicily, Madonie ad Piano Zucchi, 08.VI.2011, 3 exx., L. Kruszelnicki leg. (LK); 5 exx., M. Walczak leg. (MW). **Poland:** Białowieża Primeval Forest, Hajnówka, 25.VI.1994, 1 ex., A. Lasoń leg. (AL); Białowieża Primeval Forest, Lipiny Res., 25.VI.1994, 1 ex., A. Lasoń leg. (AL); Lower Silesia, Bystrzyca ad Oława, 4.V.2020, 1 ex. (Fig. 1A), R. Królik leg. (RK); Dobrzyń ad Brzeg, 22.VI.2013, 1 ex., R. Królik leg. (RK); Rogalice ad Brzeg, 04.VI.2000, 2 exx., M. Walczak leg. (MW); Śmiechowice ad Brzeg, 22.IV.2012, 1 ex., R. Królik leg. (RK); Wojnów ad Wrocław, 18–19.V.2002, 2 exx., M. Walczak leg. (MW); Podlasie Lowland, Jeńki, 7.VI.2013, 1 ex., P. Lasoń leg. (AL); Knyszyńska Forest, Krasny Las env., 8.V.2020, 3 exx., A. Lasoń leg. (AL); Upper Silesia, Katowice-Murcki, 28.VI.1995, 1 ex., M. Walczak leg. (MW); 04.VI.1995, 1 ex., M. Walczak leg. (MW); 15.VI.1995, 1 ex., M. Walczak leg. (MW); 11.VI.1998, 2 exx., M. Walczak leg. (MW); Ruda Śląska–Halemba, 07.VI.1995, 2 exx. (Fig. 2H), L. Kruszelnicki leg. (LK); Wola ad Pszczyzna, 16.VI.2016, 1 ex., R. Królik leg. (RK); Wielkopolska-Kujawy Lowland, Buchałów ad Zielona Góra, 26.V.2003, 1 ex., M. Walczak leg. (MW); Czeszewo, 17.V.2020, 1 ex., R. Królik leg. (RK). **Slovakia:** Ružomberok Distr., Smrekovica, 1–2.VIII.2009, 2 exx., L. & R. Fiala leg. (BB). **Spain:** Cádiz Prov, Los Barrios, 24.V.1986, 1 ex., J. L. Torres-Mendez leg. (RK). **Turkey:** Kastamonu Prov., Küre Dağları, W of Karacaören (41°28'N, 33°01'E, 1035m amsl), 14.VI.2008, 1 ex., A. Lasoń leg. (AL); Kırklareli Prov., Demirkoy env. (41°49'N, 27°45'E), 5.VI.2001, 1 ex., J. Ługowoj leg. (JŁ); 16 km NE of Yenice (41°44'N, 27°38'E), 4–5.VI.2000, 1 ex., J. Ługowoj leg. (JŁ); 1 ex., R. Królik leg. (RK); Yenice pass (41°45'N, 27°40'E), 29.V.2002, 1 ex., R. Królik leg. (RK); Tunceli Prov., by road from Pülümur to Tunceli (39°29'N–39°07'N, 39°54'E–39°32'E), 17–19.VI.2002, 1 ex. (Fig. 2F), R. Królik leg. (RK).

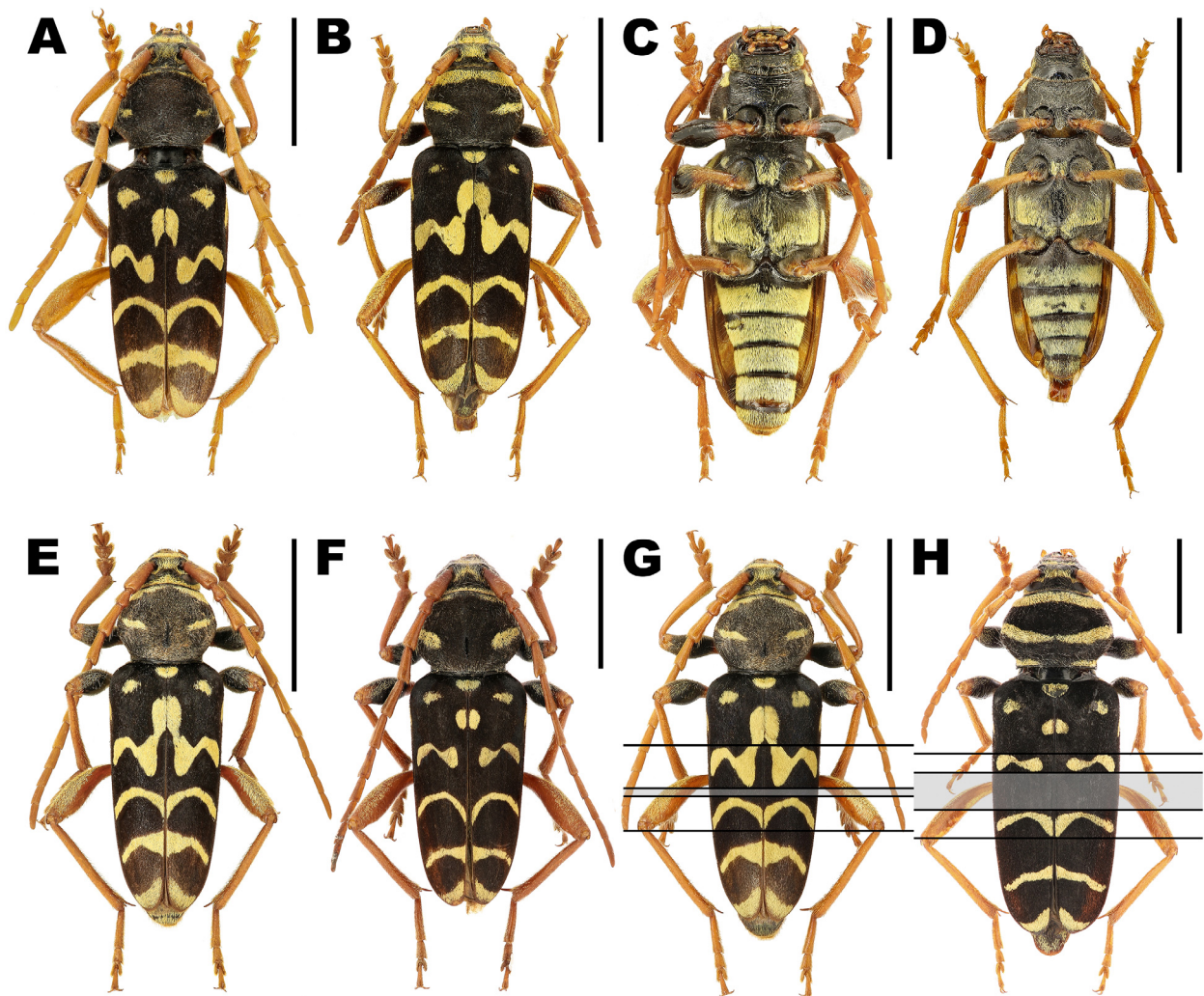


FIGURE 2. A–H, habitus. *Plagionotus arcuatus shirazensis* ssp. nov.: dorsal view, A, male (Iran, Fars Prov.), B, female (Iran, Fars Prov.), ventral view: C, male, (Iran, Fars Prov.), D, female, (Iran, Fars Prov.); *Plagionotus arcuatus arcuatus*: F, male (Turkey, Tunceli Prov.); *Plagionotus arcuatus shirazensis* ssp. nov.: G, male, (Iran, Fars Prov.). *Plagionotus arcuatus arcuatus*: H, female, Poland (Upper Silesia). Scale bar: 5mm.

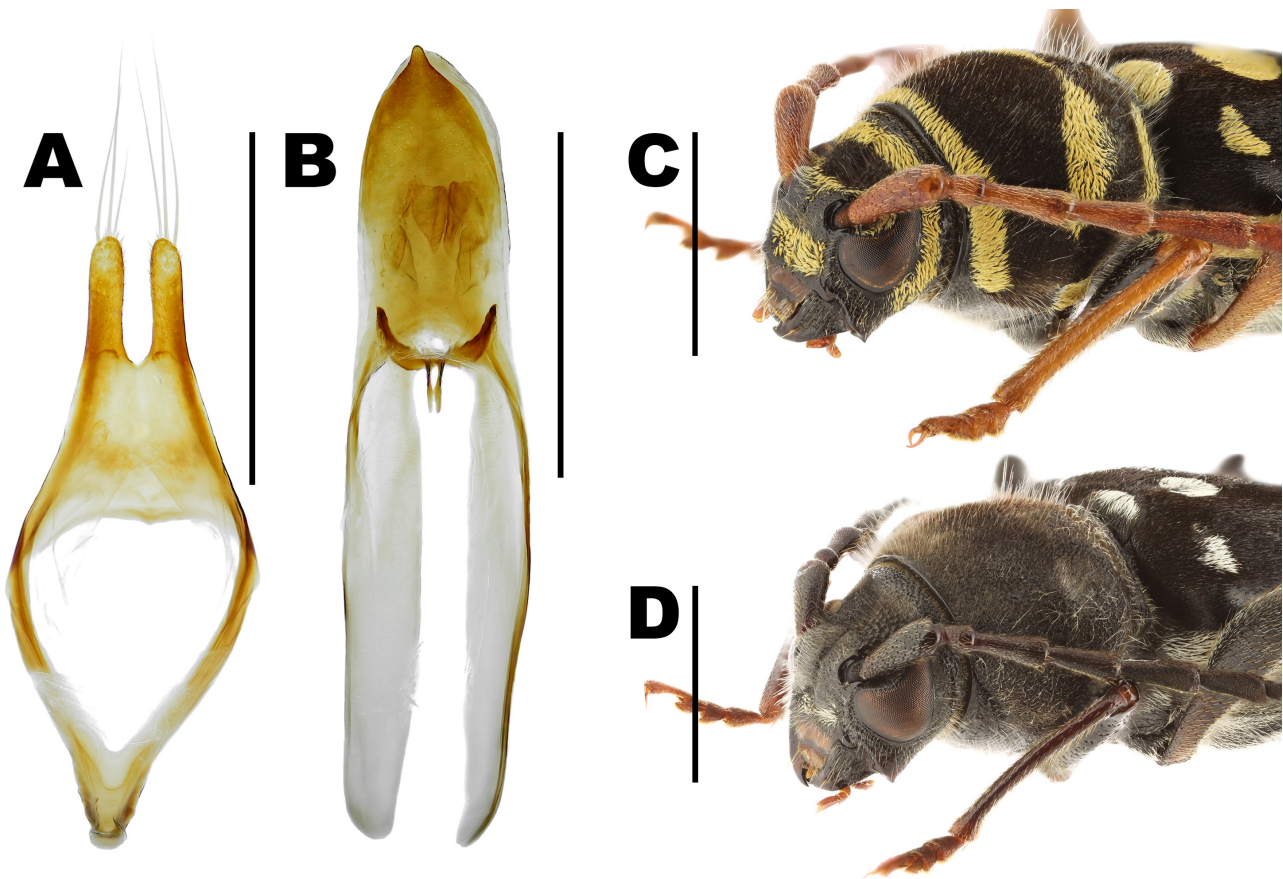


FIGURE 3. A–B, Male genitalia of *Plagionotus arcuatus shirazensis* ssp. nov., A, tegmen, dorsal view, B, aedeagus, ventral view; C–D, differences in hair in two groups of subspecies, C, yellow pubescence behind the eyes in a *Plagionotus arcuatus arcuatus*, D, pale pubescence in a *P. arcuatus lugubris*. Scale bar: 1 mm (A–B) and 3 mm (C–D).

Plagionotus arcuatus ghidottii. **Greece:** Crete, Alikampos, 15–30.V.2015, 2 exx., L. & R. Fiala leg. (BB); 2015, ex. larva, 2 exx., L. & R. Fiala leg. (BB); Alikampos-Chania, 16–30.V.2016, 1 ex. (Fig. 1D), P. Hubeny leg. (LK); Omalos, 16.V.2009, 1 ex., M. Egger leg. (BB).

Plagionotus arcuatus kirgizicus. **Kyrgyzstan:** Arslanbob env., Jalal-Abad Prov., (41°21'N, 72°57'E), 21–22.V.2016, 3 exx. (Figs. 1I, 1J), A. Shapovalov leg. (LK, MW).

Plagionotus arcuatus multiinterruptus. **Armenia:** Gegharkunik Prov., Semyonovka, 14.VI.2013, 3 exx. (Figs. 1K, 1L), L. Kruszelnicki leg. (LK); 1 ex., M. Walczak leg. (MW); Vayots Dzor Prov., Vayk env., 08.VI.2015, 1 ex., F. Pavel leg. (LK). **Azerbaijan:** Qəbələ rayonu, Qəmərvan (41°03'N, 47°47'E, 1020 m amsl), 4–9.VI.2010, 1 ex., R. Królik leg. (RK); same data, 2 exx., A. Lasoń leg. (AL).

Plagionotus arcuatus lugubris. **Azerbaijan:** Talysh Mts., Lerik rayonu, Peştətük env. (38°46'N, 48°34'E, 375 m amsl), 2–3.VI.2010, 3 exx., R. Królik leg. (RK); 4 exx., A. Lasoń leg. (AL); 5–12.VI.2014, 10 exx., R. Królik leg. (RK); Yardımlı rayonu, Üzyübaşı Mt., env. of top (38°52'N, 48°06'E, 1890–1930 m amsl), 10–14.VI.2012, 3 exx., R. Królik leg. (RK); 26.V.2013, 5 exx., R. Królik leg. (RK); 2–4.VI.2013, 6 exx. (Fig. 1G), R. Królik leg. (RK); 15.V.2014, 1 ex., R. Królik leg. (RK); 17 km NE of Yardımlı (38°56'N, 48°26'E, 368–450 m amsl), 24–27.V.2013, 2 exx. (Fig. 1E), R. Królik leg. (RK); 1 ex., A. Lasoń leg. (AL). **Iran:** Mazandaran Prov., 28 km E of Marzanabad (36°26'N, 51°32'E, 1110 m amsl), 20–21.05.2017, 1 ex., A. Lasoń leg. (AL); 4 exx. (Figs. 1F, 1H), L. Kruszelnicki leg. (LK); 1 ex., R. Królik leg. (RK); 2 exx., M. Walczak leg. (MW).

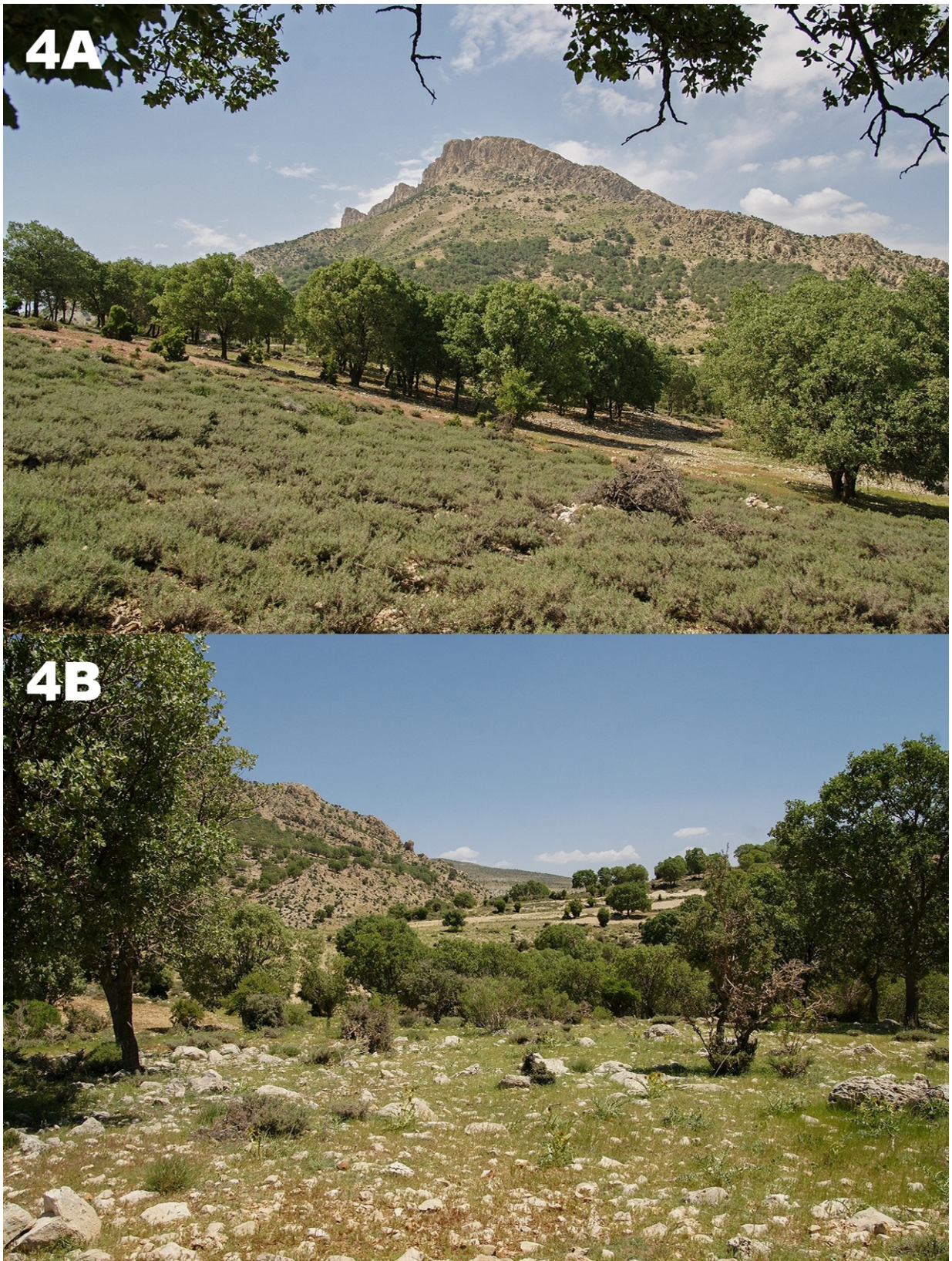


FIGURE 4 A–B, Habitat of *Plagionotus arcuatus shirazensis* ssp. nov., A, Wester view of the research plot from the road running from Dasht-e Arzhan to Burenjan, B, the same place on the south side.

Key to subspecies of *Plagionotus arcuatus* (Linnaeus, 1758)

Because of the rather small number of voucher specimens available to us, we have constructed our key mainly based on the original descriptions, stating the dominant characters in each subspecies. There are specimens, however, which deviate in appearance from most members of their subspecies. For example: *P. a. lugubris* with red legs and antennae, and yellowish spots and stripes or else with uninterrupted elytral stripes; *P. a. kirgizicus* with exceptionally prominent median stripes on the pronotum and head (see Lazarev 2010); *P. a. arcuatus* with very dense pubescence on the sternites (Figs. 1.A–B). In our opinion, such deviant specimens confirm the close relationship between the various subspecies, and their sporadic occurrence in no way undermine the validity of dividing *P. arcuatus* into subspecies. These comments should be borne in mind when using the key given below.

1. Pronotum with well developed pale stripes on the anterior margin and in its middle part, head with distinct stripe of yellow pubescence behind the eyes (Fig. 3C) 2.
 - Pronotum and head usually without or with only very slightly developed pale stripes (Fig. 3D) 4.
2. Yellow stripes and spots on whole body well developed: first transverse elytral stripe (antemedian) large, “zigzag-like”, distance between first and second transverse stripe much smaller than width of first or second stripe (Fig. 2G); abdominal sternites almost covered by yellow, dense pubescence (Fig. 2C–D). Distribution range—Iran (Fig. 5)
..... *P. arcuatus shirazensis* Królik, Kruszelnicki, Lasoń & Walczak, new subspecies
- Yellow stripes and spots on body less developed: first transverse elytral stripe expanded horizontally, in presutural area not prolonged to spots behind scutellum, distance between first and second transverse stripe much greater than width of first or second stripe (Fig. 2H); yellow pubescence covering, at most, half of abdominal sternites. 3.
3. Antemedian transverse stripes on elytra extended horizontally, sometimes split into two spots, stripes behind middle of elytra regularly arching forwards (Figs. 1.A–B). Distribution range—Europe, North Africa & Asia Minor
..... *P. arcuatus arcuatus* (Linnaeus, 1758)
- Antemedian transverse stripes on elytra always divided into a strongly inclined outer stripe, well separated from the inner spot, stripes behind middle of elytra strongly arched forwards (Figs. 1.C–D). Distribution range—Crete (Greece)
..... *P. arcuatus ghidottii* Pesarini & Sabbadini, 2011
4. Transverse stripes of elytra usually well developed, complete (Figs. 1.I–J); antemedian stripes sometimes split into two spots. Distribution range—Kyrgyzstan. *P. arcuatus kirgizicus* Lazarev, 2010
- Transverse stripes of elytra not so obvious, mostly reduced to small spots. Distribution range—Transcaucasia 5
5. Legs and antennae completely black, body pubescence usually white (Figs. 1.G–H). Distribution range—Armenia, Azerbaijan, Iran and Turkmenistan *P. arcuatus lugubris* (Ménétriés, 1832)
- Legs and antennae partly red; body pubescence yellow (Figs. 1.K–L). Distribution range—Armenia, Azerbaijan and NE Turkey *P. arcuatus multiinterruptus* Pic, 1933.

Discussion

Two groups are distinguishable within the taxon *P. arcuatus* (L.) (see key). One includes the subspecies with dense, pale pubescence and especially with distinct stripes of yellow pubescence on the head and pronotum; *P. a. arcuatus*, *P. a. ghidottii* and *P. a. shirazensis* ssp. nov. The members of the other group have very sparsely distributed pubescence, if any, on the pronotum and head, and usually vestigial pale pubescence on the rest of the body: *P. a. kirgizicus*, *P. a. lugubris* and *P. a. multiinterruptus*. Analysis of the material at our disposal revealed a slight variability among the characters, due to individual variation or sexual dimorphism. The morphological characters of these subspecies are also correlated with their distribution ranges. The places of origin of the specimens we analysed are shown on map (Fig. 5). The first group contains taxa inhabiting the Caspian—Atlantic region (indicated by circles on the map), while the second one consists of taxa inhabiting montane and sub-montane areas in the Ponto-Kyrgyz region (triangles on the map). The subspecies from the first group inhabit the whole western and southern part of the range of *P. arcuatus*. The range of the nominative subspecies is the most extensive, covering almost the whole of Europe except for its northernmost extremities (Bense 1995), and reaching eastwards as far as the Ural Mts and the foothills of the Caucasus; it also inhabits Algeria and Morocco in North Africa. In addition, it is present in a large part of Asia Minor: there are records from Turkey, Syria, northern Iran and Turkmenistan (Burakowski *et al.* 1990, Özdikmen & Turgut 2009). The reports on its occurrence in northern Iran and Turkmenistan (Fig. 5) probably refer to *P. a. shirazensis* ssp. nov., but these data require confirmation. *Plagionotus. a. ghidottii* (Figs. 1.C–D) is known only from Crete (Greece) (Pesarini & Sabbadini 2011), whereas the complete range of *P. a. shirazensis* ssp. nov. is unknown yet because it has so far been found at just two localities. The taxa of the second group inhabit the eastern ends of the overall range of distribution. The easternmost subspecies is *P. a. kirgizicus* (Figs. 1.I–J), recorded in

western Kyrgyzstan (Fig. 5) (Lazarev 2010). The other two inhabit the Caspian Sea region and the Caucasus (Fig. 5): *P. a. multiinterruptus* inhabits Armenia (Lazarev 2010), northern Azerbaijan (original data), north-western Azerbaijan and north-eastern Turkey (Lazarev 2010), whereas *P. a. lugubris* is found in eastern Azerbaijan, northern Iran and south-western Turkmenistan. *Plagionotus a. lugubris* was also reported from Russia, but the specimens concerned turned out to be *P. a. arcuatus* (Lazarev 2010). It is doubtful whether the morphology and colour of the various populations making up the different subspecies are governed by the larval host plant species.

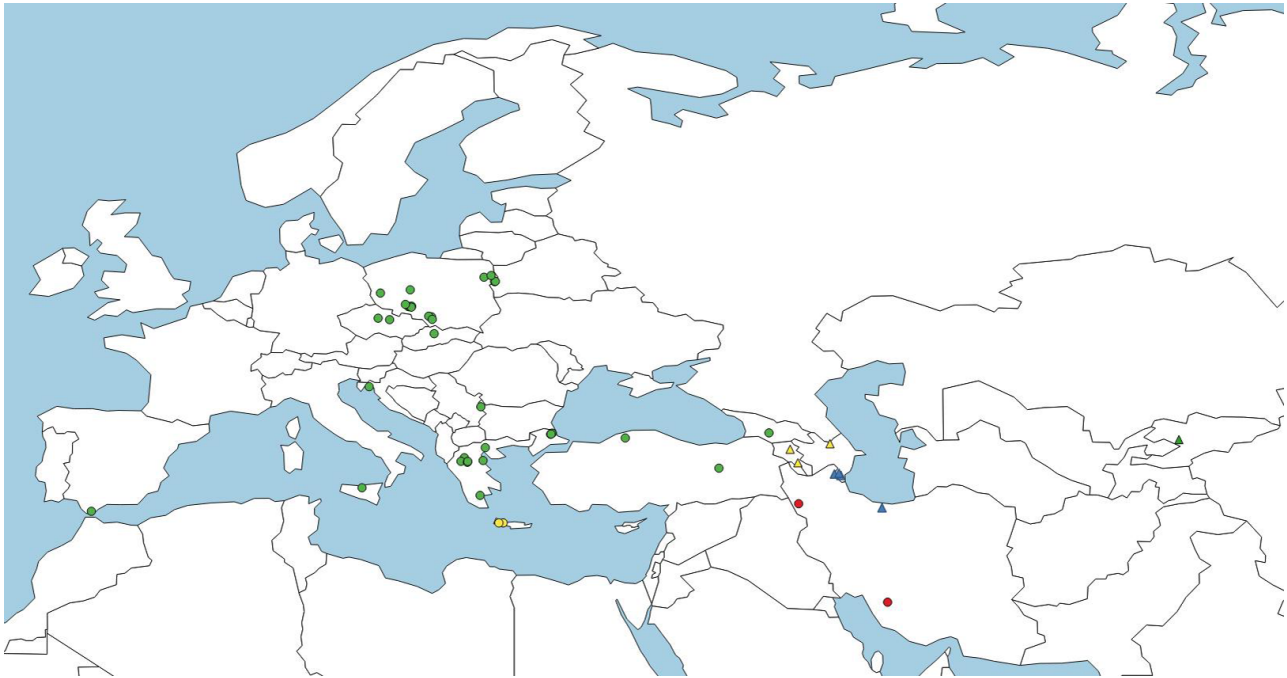


FIGURE 5. The places of origin of the analysed specimens the subspecies of *Plagionotus arcuatus* (Linnaeus, 1758): *Plagionotus arcuatus shirazensis* ssp. nov. (red circle), *Plagionotus arcuatus arcuatus* (green circle), *Plagionotus arcuatus ghidottii* (yellow circle), *Plagionotus arcuatus lugubris* (blue triangle), *Plagionotus arcuatus kirgizicus* (green triangle), *Plagionotus arcuatus multiinterruptus* (yellow triangle).

Plagionotus arcuatus inhabits woodland habitats with a large proportion of oaks *Quercus*. It attacks weakened or freshly dead trees, standing or fallen, but with intact bark, and also stacked timber (Dominik & Starzyk 2004, Plavilstshikov 1940). The nominative subspecies normally feeds on oak (*Quercus*), but there are a few reports of it feeding on beech (*Fagus sylvatica* L.), hornbeam (*Carpinus betulus* L.), ash (*Fraxinus excelsior* L.), lime (*Tilia* L.), and even willows (*Salix* L.). The feeding preferences of the eastern subspecies appear to be less well identified, and they often select other woody species. *Plagionotus a. multiinterruptus* (Lazarev 2010, Plavilstshikov 1948) is the most closely associated with oak (*Quercus*), while *P. a. lugubris* has been reported from oak (*Quercus*) and also beech (*F. sylvatica*), and occasionally from sweet chestnut (*Castanea sativa* Mill.) (Lazarev 2010, Plavilstshikov 1940). According to literature data, *P. a. kirgizicus* is associated with walnut (*Juglans regia* L.) (Lazarev 2010).

Individuals of *P. a. shirazensis* ssp. nov. were observed in woods near Dasht-e Arzhan in the early afternoon hours, on a very thick, branch several meters long, that had broken off an oak tree. This was probably *Quercus macranthera* Fisch. & C.A.Mey. ex Hohen., one of the main species of oak in northern and central Iran (Akhani *et al.* 2010). The beetles were attempting to copulate, running around the lower part of the branch, hiding under flaking bark, and females were laying eggs. One specimen was caught near Mahabad (West Azarbaijan Province) while they were feeding on the white flowers of umbelliferous plants.

We have examined a substantial number of specimens from all the taxa, but we have no basis for undertaking a phylogenetic investigation, although our results would be a good starting point for such research. At present, we have no material for genetic analyses.

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