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Longhorned beetles (Coleoptera: Cerambycidae) of southeastern Mongolia with particular emphasis on the genus *Anoplistes* Audinet-Serville, 1833 (Cerambycinae: Trachyderini)

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Abstract

New data on the distribution, bionomy, and taxonomy of the longhorned beetles that occur in the poorly studied region of southeastern Mongolia (Ömnögovi, Dornogovi, and Sükhbaatar aimags) are presented together with a list of all taxa that are known from this area. The literature records for all known species from this area were summarized, verified, and mapped. *Chlorophorus caragana* Xie & Wang, 2012 is recorded from Mongolia for the first time. New localities of some little-known taxa that are endemic to Mongolia and adjacent territories, such as *Anoplistes halodendri minutus* Hammarström, 1892, *Anoplistes kaszabi* Karpiński, 2020, and *Eodorcadion gorbunovi* Danilevsky, 2004 are given. High-quality stacked images of several unique species, e.g., *Anoplistes gobiensis* (Namkhaidorzh, 1973), *Ch. caragana*, and *Chlorophorus obliteratus* (Ganglbauer, 1889) are presented for the first time along with photographs of their habitats. New remarks on highly complex taxonomic issues concerning some species in the genera *Anoplistes*, *Chlorophorus*, and *Eodorcadion* are also provided.

Key words: arid ecosystems, *Chlorophorus*, endemic species, *Eodorcadion*, Gobi Desert, semi-desert, steppe, zoogeography

Introduction

The cerambycid fauna of Mongolia is represented by nearly 170 species, although the occurrence of some taxa is doubtful and requires confirmation (Danilevsky 2021a). Some species, however, especially in the genera *Brachyta* Fairmaire, 1868 and *Eodorcadion* Breuning, 1947 are represented by a few subspecies, thus the total number of Mongolian cerambycid taxa is higher (approx. 180). Due to an inland location and complicated tectonic and structural geology of the territory as well as its almost pristine habitats, the cerambycid fauna of southeastern Mongolia is unique. Although this arid region is relatively poor considering a total number of species in this phytophagous beetle group, most of the taxa found here are endemics that are very interesting in terms of their biology and ecology. Desert, semi-desert, and steppe habitats in the southeastern region of the country are inhabited by little known cerambycids, especially of the genera *Anoplistes*, *Apatophysis*, *Chlorophorus*, and *Eodorcadion* (Karpiński, Szczepański, Boldgiv *et al.* 2018; pers. obs.).

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The greatest contribution to the fauna of Mongolian longhorned beetles, particularly of the southeastern region of the country, was made by Namhaidorzh (1972, 1974, 1976a,b, 1979, 1982) and Heyrovský (1964, 1965, 1967a,b, 1968, 1969, 1970, 1973a,b, 1975), the latter of whom elaborated the material collected by Zoltán Kaszab during his six expeditions in Mongolia conducted between 1963 and 1968 (Kaszab 1964, 1965, 1966, 1967, 1968, 1969). In turn, Danilevsky (2004, 2007) presented new records and verified most of the literature data regarding the genus *Eodorcadion*. Recently, Karpiński, Szczepański, Boldgiv *et al.* (2018) published new data on the distribution and bionomy of some cerambycids occurring in the country, however, that work mainly covered the region of northern and central Mongolia and it did not include most of the taxa presented in this paper.

The state of the knowledge on the longhorned beetles of southeastern Mongolia as well as data on the bionomy of most of the species distributed in the region is still very poor. Also, the taxonomic status of some species of the genera *Anoplistes*, *Chlorophorus*, and *Eodorcadion* requires verification and more detailed examination, including a molecular approach. Therefore, the present study aims to supplement the knowledge in this field. The secondary goal of this work was to gather and disseminate information contained in valuable but more local and scattered papers that are difficult to access and have been published mainly in Russian and German.

Study area and methods

Mongolia, which spans the southernmost border of the permafrost and the northernmost deserts of Inner Asia, is located in a transitional zone between the boreal forests of Siberia and the Gobi Desert. Due to its great distance from oceans, being surrounded by high mountains and being situated at a relatively high elevation of more than 1500 m above sea level on average, this landlocked country has an extreme continental climate with marked variation of seasonal and diurnal temperatures and low amounts of precipitation (MEGD 2014).

The region of southeastern Mongolia, the area studied in this work, is not homogeneous in terms of climatic conditions, and is currently subdivided in three provinces (aimags): Ömnögovi, Dornogovi, and Sükhbaatar. Ömnögovi and southern area of Dornogovi aimags are characterised by dry warm summers and cold winters, while Sükhbaatar aimag and northern area of Dornogovi aimag have dry but cool summers (Gunin & Saandar 2019). The climate of eastern Mongolian region is generally defined by anticyclone in winter and cyclones from the east during the summer season. The southern part of the Hyangan and Dariganga Plateau in eastern Mongolia is characterised also by moist cold summers and harsh winters. Sand and snowstorms, frequent in the Gobi Desert regions, amplify the harsh weather conditions. Temperatures in desert region (in Dornogovi) can range from -40 °C to 40 °C with ground temperatures as high as 60 °C, while eastern region (Sükhbaatar) is characterised by much smaller annual temperature fluctuations from approx. -20 °C to 20 °C. Annual precipitation varies from approx. 120 mm in Ömnögovi and 140 mm in Dornogovi to approx. 200 mm in the eastern region of the country, including Sükhbaatar. Approximately 85–90% of the total precipitation falls in summer (Gunin & Saandar 2019).

Ömnögovi aimag is located in the southern arid area of the Gobi Desert. The eastern part of the Gobi-Altai mountain range, which rises almost 3000 m a.s.l., includes high mountains such as Gurvansaikhan, Sevrei, Noyon, Tost, Nemegt, and Gilbent. The province is characterized by a great variety of habitats, both grassy and non-vegetated surfaces, such as mountains, depressions, plains, deserts, and steppes, which, according to Gunin & Saandar (2019), is the main cause of creating unique climatic conditions. Dornogovi aimag that spans in eastern part of the Gobi Region is mainly lowland, with an average altitude of approx. 1000 m a.s.l. Valleys, hills, and cliffs are frequent in the region, while some areas belong to desert zone (Ganbaatar *et al.* 2005). Vegetation is dominated by moderately dry steppes, including *Allium polyrhizum* Turcz. ex Regel, *Kalidium gracile* Fenzl, *Anabasis brevifolia* C.A. Mey., and *Halognemum* M. Bieb. (Gunin & Saandar 2019). The easternmost Sukhbaatar aimag includes numerous sand dunes, such as Ongon and Moltsog. The mountains here are characterised by steep slopes, and some of the tops exhibit past volcanic activity. Desert steppes with feathergrass and reedgrass are also common in the region (Gunin & Saandar 2019).

The field studies that are presented here were conducted in the region of southeastern Mongolia in the desert, semi-desert, and steppe zones. The beetles were collected during two expeditions in 2019. A minor part of the material was sampled by a local scientist (BI) during the first shorter survey carried out at the turn of May and June, which was primarily focused on a different group of beetles. The second one-month-long expedition, which consisted of three scientists from Poland (LKa, LKr, and WTS) and one from Mongolia (TG), took place in July and at

the beginning of August and provided the main part of the material for this study. During these sampling campaigns, field surveys were carried out in various locations in the southern and eastern aimags: Ömnögovi [Өмнөговь], Dornogovi [Дорноговь] and Sükhbaatar [Сүхбаатар]. The investigations were conducted *inter alia* in the environs of Burdene Bulag [Бүрдэнэ Булаг], Khatanbulag [Хатанбулаг], Mandakh [Мандах], Saikhandulaan [Сайхандулаан], Sainshand [Сайншанд], Shiveegovi [Шивээговь], and Zuunbayan [Зүүнбаян] (Fig. 1: green and yellow spots).

Considering specific habitat conditions in the region, mainly arid areas with sparse and low vegetation (e.g., shrubs and clumps of grass), three different methods were mostly used: sighting for imagines on their host plants and on the ground, searching for larvae in the soil and branches and stems of woody plants, and attracting them to artificial light sources.

The beetles were studied using an Optek SZM7045-J4L and Olympus SZH10 stereo microscope at 7–140× magnifications. Photographs of the habitus were taken with a Canon EOS 50D digital camera equipped with a Canon 100 mm f/2.8 USM Macro lens and a Canon MP-E 65 mm f/2.8 1-5× lens. The images that were produced were stacked, aligned and combined using Helicon Focus (www.heliconsoft.com). Photographs of the cerambycids in nature, their host plants and habitats were taken with Canon EOS 550D, EOS 600D and Panasonic Lumix DMC-ZS3 cameras. All plates were prepared using Adobe Photoshop CS5 and GIMP 2.10.22 software. The geographical coordinates were read and recorded using a Garmin Oregon 550T 3-Inch Handheld GPS Navigator. The coordinates of the localities were given in WGS 84 format. The distribution of the species was illustrated in Quantum GIS (QGIS) 3.6.0 'Noosa' (QGIS Development Team 2021) using National Geographic World Map (National Geographic *et al.* 2021) and OpenTopoMap (https://opentopomap.org), under Creative Commons licence, as the raster layer.

The nomenclature was adopted from the Titan database (Tavakilian & Chevillotte 2020). On the taxa list, the literature records were sorted first by aimags (provinces) and then chronologically, always indicating the original source. Wherever several records in a row come from the same publication, a phrase "ibid" (=ibidem) was used. For species with an uncertain taxonomic position, the status of which requires further study, the current taxonomy was used, although an appropriate commentary is provided. Broader characteristics of more common and widely distributed species, as well as those already discussed in our previous papers were omitted or reduced. Taxa that are endemic to Mongolia were indicated with an asterisk (*) and those collected during 2019 expeditions were marked with a section sign (§).

The following abbreviations are used in the text:
BB—Bazartseren Boldgiv,
BI—Badamnyambuu Iderzorig,
DE—Davaadorj Enkhnasan,
HNHM—Hungarian Natural History Museum, Budapest, Hungary,
LKa—Lech Karpiński,
LKr—Lech Kruszelnicki,
MAS—Mongolian Academy of Sciences, Ulaanbaatar, Mongolia,
MIZ—Museum and Institute of Zoology Polish Academy of Sciences, Poland,
TG—Temerlen Gantulga,
USMB—Upper Silesian Museum, Bytom, Poland,
WTS—Wojciech T. Szczepański.

The specimens collected in 2019 were deposited in the entomological collections of the MIZ and USMB, as well as in the private collections of the authors.

This is the fourth of a series of papers on longhorned beetles from the region of Central Asia that includes Soviet Central Asia (=Middle Asia), Mongolia, and most of the territory of Afghanistan and northwestern China (Xinjiang and Inner Mongolia). The first one (Kadyrov *et al.* 2016) was devoted to western Tajikistan, the second (Karpiński, Szczepański, Boldgiv *et al.* 2018) primarily to central Mongolia, and the third (Karpiński, Szczepański, Plewa *et al.* 2018) to the region of South and East Kazakhstan.

Results

A total of 28 species (31 taxa including subspecies) belonging to three subfamilies (Apatophyseinae, Cerambycinae, and Lamiinae) that were recorded in the region of southeastern Mongolia (Ömnögovi, Dornogovi, and Sükhbaatar aimags) are presented. They constitute approx. 17% of the known Mongolian cerambycid fauna. *Chlorophorus caragana* Xie & Wang, 2012 is recorded from the country for the first time based on both the specimens collected during our expedition and those deposited in the MAS collection. We also present two new localities for *Anoplistes kaszabi* Karpiński, 2020 from outside the region covered in this paper since additional specimens of this recently described Mongolian endemic species were found in the MAS collection during our investigation.

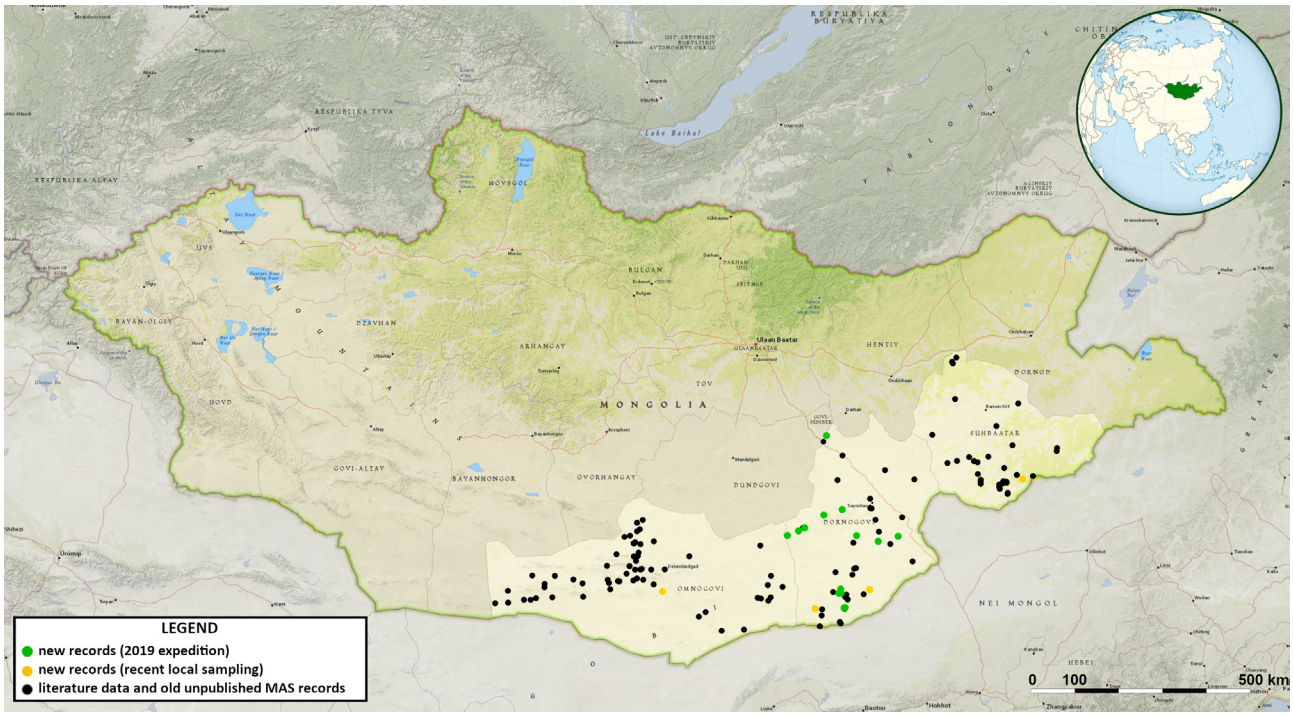

FIGURE 1. General map of all literature and new records of longhorned beetles in the region of SE Mongolia (raster layer: National Geographic *et al.* 2021).

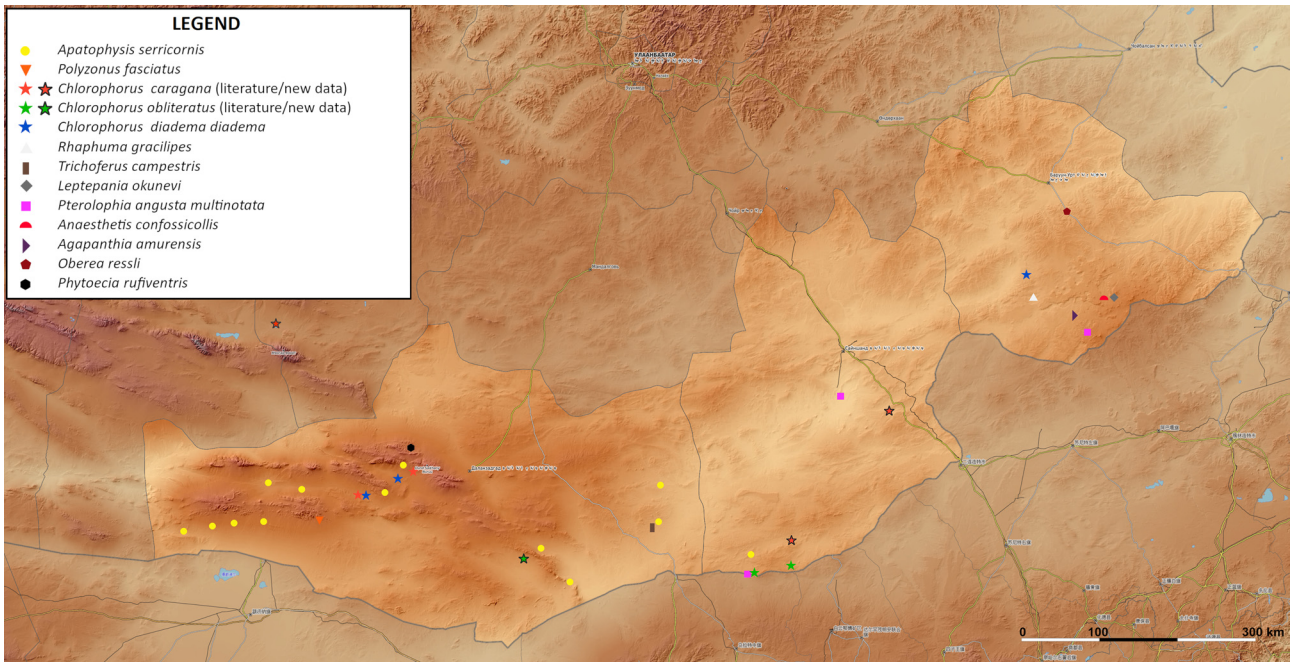

FIGURE 2. Literature and new records of representatives of several cerambycid genera in the region of SE Mongolia (raster layer: OpenTopoMap).

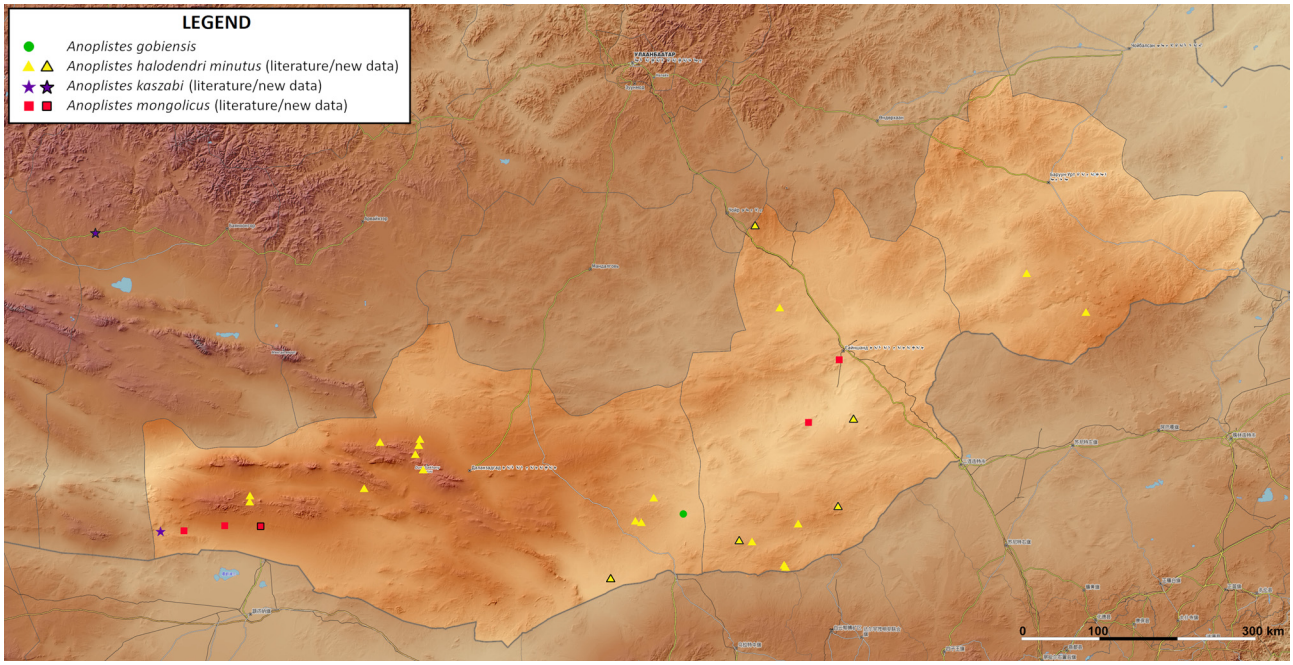

FIGURE 3. Literature and new records of representatives of the genus *Anoplistes* in the region of SE Mongolia (raster layer: OpenTopoMap).

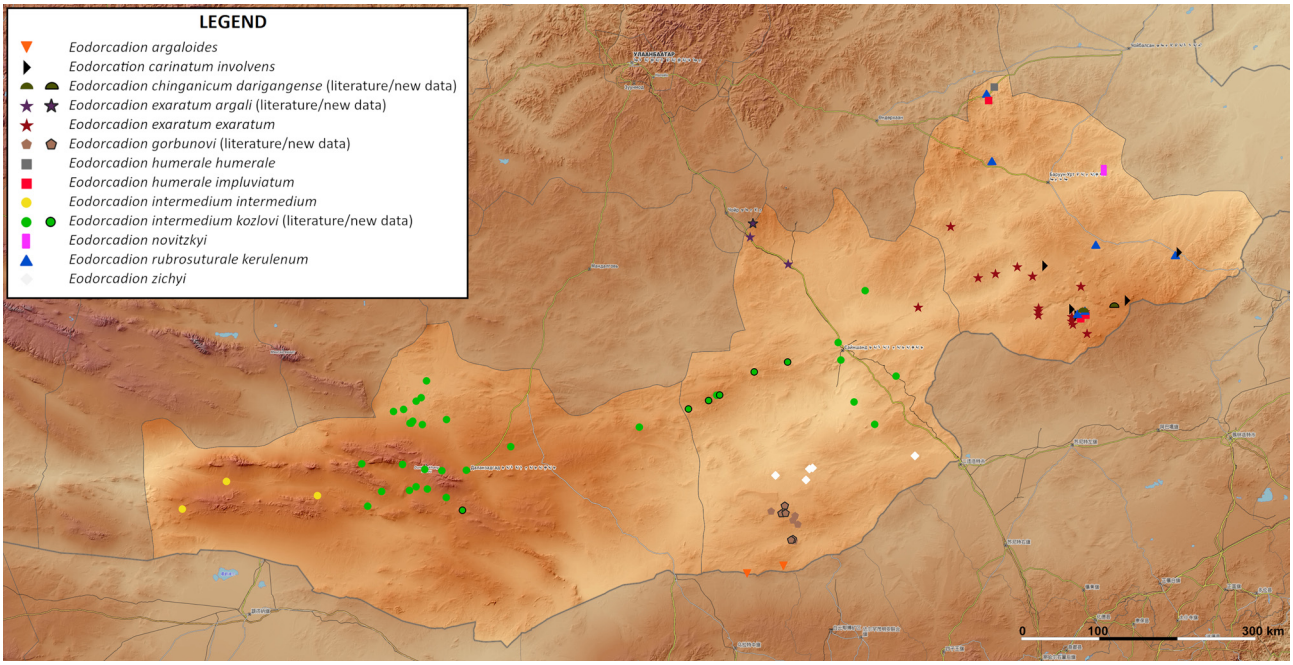

FIGURE 4. Literature and new records of representatives of the genus *Eodorcadion* in the region of SE Mongolia (raster layer: OpenTopoMap).

The list of the taxa along with their localities (new and verified literature records: Figs 1, 2, 3, 4), general characteristics, and remarks on their bionomy and taxonomy are presented below. High-resolution images of the habitus of many unique species are also provided (Figs 5, 6, 7, 8), as well as photographs of their habitats and living beetles *in situ* (Figs 9, 10, 11). In particularly interesting cases of a few species, data from the neighboring aimags were also presented. One locality presented in the general map (30 km SW of Zuunbayan, 759 m a.s.l., 23.07.2019) was not included in the detailed maps of particular genera nor in the material, as only several larvae of an unidentified *Chlorophorus* species have been collected there, and, consequently, this site could not be assigned to any specific taxon.

APATOPHYSEINAE Lacordaire, 1869

Apatophyseini Lacordaire, 1869

***Apatophysis* (*Apatophysis*) *serricornis* (Gebler, 1843)**
Fig. 5A

Literature data. Ömnögovi: between wells Balbarkhai-Zalaagiin-Khudag and Zost [Балбархай-Дзалагийн-Худук и Цзосто], 22–27.06.1909, 1 ex. (Namhaidorzh 1972: as *Apatophysis mongolica*); valley of Zost [ур. Цзосто], 28.06–02.07.1909, 1 ex. (ibid); eastern edge of Zöölön Uul mountains, 34 km WSW from Bayandalai [Баян-Далая] [43.334, 103.129], 1600 m a.s.l., 15.06.1967, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1970: as *A. mongolica*); between Sevrej and Dund gol, 35 km SW from Sevrei [43.369, 101.856], 1350 m a.s.l., 18.06.1967, 1 ex, exp. Dr. Z. Kaszab (ibid); Noyon nuruu mountains, border post Ovootiin Khural [43.010, 101.272], 1500 m a.s.l., 20.06.1967, 2 exx., exp. Dr. Z. Kaszab (ibid); Noyon nuruu mountains, oasis by stream Mukhar Ereg Gol, 64 km W from border post Ovootiin Khural [42.959, 100.487], 1450 m a.s.l., 21.06.1967, 1 ex., exp. Dr. Z. Kaszab (ibid); valley of Mukhar [ур. Мухор], Gurvantes [Гурван-Тэс] [ca. 42.992, 100.819], 21.06.1967, 1 ex. (Namhaidorzh 1972: as *A. mongolica*); 100 km W from border post Ovootiin Khural, 22 km W from Sairyn khudag [42.901, 100.048], 1250 m a.s.l., 22.06.1967, 2 exx., exp. Dr. Z. Kaszab (Heyrovský 1970: as *A. mongolica*); 20 km WNW of Bayandalai [Баян-Далая] [ca. 43.638, 103.410], 31.07–01.08.1967, at light, 2 exx. (Namhaidorzh 1972: as *A. mongolica*); SW edge of lake Dund gol [43.442, 101.343], 1300 m a.s.l., 18.06.1968, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1970: as *A. mongolica*); Zeemegiin-govi [Дзээмгийн-Гоби], 25 km SE of Khailaastyn Hudag (well) [кол. Хайластын-Худук] [ca. 42.329, 105.962], in *Haloxylon*, 19–20.06.1971, 29 exx. (Namhaidorzh 1976a: as *A. mongolica*); Khanbogd [хан-богд], 30 km ESE of Nomgon (Номгон) [ca. 42.710, 105.519], 24.06.1971, 22 exx. (ibid); 25 km S of Khanbogd [Хан-Богдо], district Maanit [Маньт] [ca. 43.008, 107.320], on *Sympegma*, 19.06.1974, 1 ex. (ibid); Nariin zag, Gunii Khooloi, depression of the Galba Gobi [43.433, 107.393], 06–09.2019, in pitfall trap (Batchuluun *et al.* 2020).

Dornogovi: 5 km of NW of Tenger-Nuur Lake [тэнгэр-нур] [42.640, 108.733], 25.06.1971, 15 exx. (Namhaidorzh 1976a: as *A. mongolica*).

Remarks. According to the most recent revision of the Chinese species of this genus (Miroshnikov & Lin 2017), *A. serricornis* is distributed in China (Xinjiang and Inner Mongolia; however, the authors also reported on the two problematic males that are known from one of the southernmost provinces—Guangdong), Mongolia (mainly southern part of the country) and SE Kazakhstan.

This highly variable species has been already described several times based on its different forms (*A. tomentosa* (Gebler, 1845); *A. obtusicollis* (Motschulsky, 1860); *A. mongolica* Semenov, 1901; *A. kadyrbekovi* Kadlec, 2006) (Danilevsky 2008; Miroshnikov & Lin 2017). It also shows a strong sexual dimorphism, which causes additional difficulties in its systematics.

Apatophysis serricornis, unlike some other representatives of the genus, is most likely a nocturnal species (at least two specimens have been recorded as attracted to a light trap by Namhaidorzh (1972)) and its bionomy remains largely unknown. According to Danilevsky (2008), it is ecologically associated with desert and semi-desert habitats of different types (both sandy and clay soils). Larvae develop in roots of probably different desert shrubs and trees, however, development only in *Haloxylon* Bunge (Amaranthaceae) was confirmed (Danilevsky 1988). Adults are active from June to August (Danilevsky 2008).

We have not collected any individual of this species despite the frequent use of light traps in the region of its occurrence. This is probably explained by the fact that our research was conducted in a rather late season, in the last quarter of July. Most of the Mongolian records relate to the second half of June. The depicted female comes from the Kaszab's material (HNHM), and it was collected in southern Mongolia (Ömnögovi aimag).

CERAMBYCINAE Latreille, 1802

Callichromatini Swainson, 1840

***Polyzonus* (*Polyzonus*) *fasciatus* (Fabricius, 1781)**
Fig. 5B, C

Literature data. Ömnögovi: Noyon mountains [горы Ноён], 14 km S of Noyon [Ноён] [43.020, 102.127], 23.08.1969, 2 exx., 1 ex., on *Amygdalus* (Namhaidorzh 1972).

Remarks. *Polyzonus fasciatus* is widely distributed in SE Palaearctic (most of the territory of China and the Korean Peninsula) (Danilevsky 2020), however it is rather sporadic in northern Asia (including northern Mongolia) (Cherepanov 1990a).

In northern Asia, the species inhabits forest-steppe zone and is ecologically associated with *Rosa* L. (Rosaceae). Adults are active from the end of June to the last days of September and they require supplementary feeding, which is held on plants of Rosales, Apiaceae, Asteraceae and some others. Larvae feed in viable shoots of different roses (*Rosa acicularis* Lindl., *Rosa maximowicziana* Regel, *Rosa rugosa* Thunb.) that usually grow in well-warmed soil. Cherepanov (1990a) reported the case of one larva developing on each inhabited shoot, which leads to damage of basal section of shoots.

The depicted pair comes from the collection of USMB and was collected in northern Mongolia.

Clytini Mulsant, 1839

§ *Chlorophorus caragana* Xie & Wang, 2012
Fig. 5D–G

New records. Ömnögovi: 40 km SE of Khatanbulag [Хатанбулаг] [42.795, 109.356], 1099 m a.s.l., 25.07.2019, 1 ex., leg. et coll. LKr.

Dornogovi: Burdene Bulag [Бүрдэнэ Булаг] env. [44.234, 110.850], 985 m a.s.l., 21.07.2019, 1 ♂, 1 ♀, leg. et coll. WTS (1 ex. MIZ); 1 ♀, leg. et coll. LKr.

Övörkhangai: near the eastern shore of Taatsiin Tsagaan Lake [Таацын Цагаан Нуур] [ca. 45.179, 101.459], 2–4.08.1969, 2 exx., leg. Gurjeva (MAS).

Literature data. Ömnögovi: eastern edge of Zöölön Uul mountains, 58 km WSW from Bayandalai [Баян-Далая] [43.300, 102.839], 1500 m a.s.l., 16.06.1967, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1970: as *Ch. diadema kaszabi*); 60 km S of Bulgan [булган] [43.568, 103.564], on *Caragana*, 15.07.1972, 3 exx. (Namhaidorzh 1976a: as *Ch. faldermanni*).

Remarks. The species was recently described from northwestern China (Ningxia Hui Autonomous Region) (Zong *et al.* 2012) and it was later recorded also from the neighboring province—Inner Mongolia (Lin 2014).

Chlorophorus caragana is a destructive wood-boring beetle that damages peashrub bushes. Zong *et al.* (2012) cited two host plants for this species: *Caragana korshinskii* Kom. and *Caragana intermedia* Kuang & H.C. Fu (Fabaceae) (currently, the latter is a synonym of the former). Zhang *et al.* (2018) stated solely *Caragana davazamcii* Sancz. as a host plant, which is another synonym of *C. korshinskii*. Zhang *et al.* (2015), in turn, mentioned that this cerambycid damages *C. davazamcii* but also another valid species, *Caragana microphylla* Lam.

Although this species is a serious pest of *Caragana* bushes, which are very common in this region, it was described only in 2012 because of its resemblance to the related *Chlorophorus obliteratus* (Ganglbauer, 1889). However, the holotype of the latter was not presented or even mentioned in the original description of *Ch. caragana*. Therefore, considering the distribution of *Ch. caragana* also in Mongolia (the region from which *Ch. obliteratus* and two of its three synonyms were described), there is an urgent need to examine the holotype of *Ch. obliteratus* and all its synonyms to resolve whether *Ch. caragana* is a valid taxon. Since such scenario is quite likely, this taxonomic issue requires special attention in a separate study (in prep.) but in this work we adopt the current taxonomy until this matter is verified. Regardless of the problem with the unstudied type material, a high individual variability of *Ch. obliteratus* needs to be taken into account since the only diagnostic characters provided in the original description of *Ch. caragana* concern the pubescence, while the comparative material of the former shows high variability in this respect. According to Zong *et al.* (2012), *Ch. caragana* is distinguished by its uniformly clothed pronotum and non-contrast elytral pattern, while *Ch. obliteratus* has a transverse glabrous area on the pronotum and clearly contrasting elytral pattern (Fig. 5H). Although a single female collected by us (Fig. 5G), in the locality 40

km SE of Khatanbulag, fits the description of *Ch. obliteratus* sensu Zong *et al.* (2012) in having a hairless spot on the pronotum (relatively small though) and contrasting elytral pattern, it clearly differs in the type of body pubescence (density, thickness, length, and arrangement of hairs) and a few other characters, which in turn are identical as in our typical specimens of *Ch. caragana* from Burdene Bulag. Therefore, we presume that while indeed two taxa exist here, both can reveal some variability in the contrast of the elytral pattern and the presence (and size) of the pronotal spot.

Danilevsky (2021b) considered all the specimens of *Chlorophorus diadema kaszabi* Heyrovský, 1970 and "*Ch. diadema* ab. *artemisiae*" identified by Heyrovsky in Kaszab collection (HNHM) from a single locality just as pale and dark forms of *Ch. obliteratus* and, consequently, he proposed the synonymisation of these taxa. It is important to emphasise, however, that despite this publication provides the latest updated remark documenting Mongolian species, this particular opinion was made many years earlier and has not been updated after the description of *Ch. caragana*. Regarding the locality 58 km WSW from Bayandalai (Heyrovský 1970), a single individual collected there is one of the paratypes of *Ch. diadema kaszabi*. This specimen and the rest of the type series seem to be identical to *Ch. caragana*.

Regarding the locality 60 km S of Bulgan (Namhaidorzh 1976a), although we failed to track down and examine the three specimens that were collected there, it seems they also belong to *Ch. caragana* since they were separated by Namhaidorzh and incorrectly identified and published as *Chlorophorus faldermanni* (Faldermann, 1837). We verified that another two unpublished records of *Chlorophorus* from Övörkhangai aimag (Taatsiin Tsagaan Lake) were also labelled as *Ch. faldermanni* by Namhaidorzh, while they clearly represent *Ch. caragana*. However, *Ch. faldermanni*, due to its geographical range, is rather impossible to occur in Mongolia and all such identifications are certainly wrong. In the MAS collection, there is a single specimen of another enigmatic *Chlorophorus* species that also has been identified as *Ch. faldermanni* by Namhaidorzh, which does not belong to any of herein discussed taxa (see more in the Discussion).

We collected *Ch. caragana* close to Burdene Bulag, in a semi-desert habitat (Fig. 9A). The imagines were sitting on twigs of *Haloxylon ammodendron* (C. A. Mey.) (Amaranthaceae) (Fig. 9B). Only three individuals (representing both sexes; Fig. 5D, F) were found on July 21 despite conducting the detailed investigation of the entire plot. This may indicate the end of the season for this species in nature. A single female was also collected on July 25 in southernmost Mongolia, about 80 km from the Chinese border. The habitat in this locality (Fig. 9C) is strongly desertified, with numerous rather small *Caragana* bushes, on which the female was found. Since this is the first record for Mongolia, we also present additional data (Övörkhangai aimag) from outside the region covered in this paper, which relates to the two specimens from the same locality that were subsequently found in the MAS collection (Fig. 5E).

Chlorophorus diadema diadema (Motschulsky, 1854)

Literature data. Ömnögovi: eastern edge of Zöölön Uul mountains, 58 km WSW from Bayandalai [Баян-Далая] [43.300, 102.839], 1500 m a.s.l., 16.06.1967, 2 exx., exp. Dr. Z. Kaszab. (Heyrovský 1970: as *Ch. diadema* ab. *artemisiae*); 15 km W of Bayandalai [Баян-далай] [43.487, 103.328], valley of Tsagaan Ders [ур. Цаган-дорс], 16.06.1967, 1 ex., leg. Tsendsuren (Namhaidorzh 1976a: as *Ch. motschulskyi*).

Sükhbaatar: Bayandelger soum [Баян-Дэлгэрэх], sands of Ongon-Els [пески Онгон-Элс] [ca. 45.705, 112.951], on *Caragana bungei*, 05.07.1971, 7 ♂♂, 10 ♀♀, leg. Namhaidorzh & Medvedev (Namhaidorzh 1974).

Remarks. Two subspecies were recognised to date: *Ch. diadema diadema* and *Ch. diadema inhirsutus* Matsushita, 1934. The nominative one is widely distributed in northeast China, Mongolia, the Korean Peninsula, and Russian Far East, while the latter is endemic to Japan and the neighbouring Russian island—Kunashir (Danilevsky 2020). However, Danilevsky (2021b) stated that only a single male of *Chlorophorus diadema diadema* with the label "Mongolei, Staudin." is preserved in the collection of Zoological Museum of Moscow State University and, therefore, the occurrence of this species in the territory of Mongolia needs to be confirmed. Our inspection of the material collected by Namhaidorzh clearly indicates that this taxon is rather common in the southeastern area of the country.

The host plant of this species has not been reliably identified. Namhaidorzh (1976a) collected numerous individuals on *Caragana bungei* Ledeb. In turn, Heyrovský (1970) informed on beating the imagines from both

Caragana and *Amygdalus mongolicus*, which is now a revised as *Prunus mongolica* Maxim. (Rosaceae). Although Cherepanov (1990b) considered this species as belonging to the group of species that form biocoenosis of broad-leaved forests, it seems to be a typical element of arid regions of Mongolia and northern China, where larvae most likely develop in bushes of *Caragana*. Therefore, considering this discrepancy, the number of synonyms under *Ch. diadema* (seven), and the general taxonomic disorder of this complex genus, it is possible that this species represents in fact a group of criptic species. The taxonomic confusion seems to be confirmed by the facts that Namhaidorzh (1976a) misidentified one of the specimens of this taxon (15 km W of Bayandalai) as *Chlorophorus motschulskyi* (Ganglbauer, 1887) and Heyrovský (1970) described a new subspecies, *Ch. diadema kaszabi* (now, formally, one of the synonyms of *Ch. obliteratus*), from the same locality (58 km WSW from Bayandalai) where he collected some individuals of the nominative subspecies. Similar to the situation with *Ch. caragana* and *Ch. obliteratus*, a taxonomic revision, ideally using also molecular data, seems essential here.

***Chlorophorus obliteratus* (Ganglbauer, 1889)**
Fig. 5H

New records. Ömnögovi: 29 km SSE of Nomgon (Номгон) [ca. 42.590, 105.255], 24.06.1971, 1 ex., leg. D. Myagmarsuren (MAS).

Dornogovi: 30 km SSE Shokhoi-Nuur Lake [оэ. Шохой-Нуур] [ca. 42.505, 109.237], on *Eurotia ceratoides* and *Salsola laricifolia*, 26–27.06.1971, 2 exx., leg. Namhaidorzh & Kozlov (MAS).

Literature data. Dornogovi: 30 km SSE of Shokhoi-Nuur Lake [оэ. Шохой-Нуур] [ca. 42.505, 109.237], on *Salsola laricifolia* and *Eurotia ceratoides*, 26–27.06.1971, 9 exx., leg. Namhaidorzh & Myagmarsuren (Namhaidorzh 1976a: as *Ch. diadema*); 30 km SSE of Tenger-Nuur Lake [оэ. Тенгар-Нуур] [ca. 42.418, 108.681], on *Caragana*, 04.08.1971, 1 ex., leg. Namhaidorzh (ibid).

Remarks. *Chlorophorus obliteratus* is a species with a relatively narrow range that is restricted to some parts of East Siberia, Mongolia, and northernmost China (Inner Mongolia) (Danilevsky 2020).

The taxonomic confusion associated with this species is discussed in the comments to *Ch. caragana*. In this paper, we accept the validity of both species and refer here to *Ch. obliteratus* sensu Zong *et al.* (2012). There is almost no data on this species in the literature. However, some basic information on *Ch. ubsanurensis*, which is currently one of the synonyms of *Ch. obliteratus*, were given by Cherepanov (1990b) and Xu *et al.* (2007). Although Cherepanov (1990b), who is also the author of the description of this taxon (based on a single female), mentioned that the biology and immature stages were not known, he informed on the similarity of this species to *Chlorophorus varius* (Müller, 1766), from which it, however, differs conspicuously in elytral pattern and other characters. The holotype (7 mm in length) was collected in Ubsanur basin, on northern bank of Lake Uvs (Mongolia). In turn, Xu *et al.* (2007) informed on the distribution of this species in Uvs Lake Basin in Mongolia (Khoton and Khurgan Lakes). They also stated that *Ch. ubsanurensis* can be distinguished from other species by its unique black spots on the pronotum.

Salsola laricifolia Litv. ex Drobow (Amaranthaceae), *Eurotia ceratoides* (which is now a synonym of *Krascheninnikovia ceratoides* (L.) Gueldenst. (Amaranthaceae)), and *Caragana* spp. were recorded as plant species, on which imagines of *Ch. obliteratus* were collected.

***Rhaphuma gracilipes* (Faldermann, 1835)**

New records. Sükhbaatar: meadow of Buguntai river (Bunkhant Lake) [ca. 45.455, 113.059], on flowers, 5.07.1971, 1 ex., leg. Yanovskii V. (MAS).

Remarks. This is an east-Palaearctic species that is distributed from Eastern Europe to Sakhalin and Japan (Danilevsky 2020). It has been widely discussed in a previous paper concerning the longhorned beetles of South and East Kazakhstan (Karpiński, Szczepański, Plewa *et al.* 2018).

Hesperophanini Mulsant, 1839

***Trichoferus campestris* (Faldermann, 1835)**

Literature data. Ömnögovi: 25 km S of Khanbogd [Хан-Богд], valley of river Undain_Gol [ур. Ундын-Гол] [42.940, 107.255], in rotten *Ulmus* tree, 23.06.1971, 1 ♂ (Namhaidorzh 1974).

Remarks. This highly invasive species, which is originally native to the southeastern Palaearctic region, recently has rapidly increased its range (e.g., Grebennikov *et al.* 2010; Dascălu *et al.* 2013; Keszthelyi *et al.* 2019). Although the determination of the exact native area of *T. campestris* is problematic, the region of the Far East, including Mongolia, central and northeastern China, and the Korean Peninsula was designated by several authors (Gressitt 1951; Cherepanov 1990a) as comprising the original distribution range of this species. However, if it is a native element in the Mongolian fauna, so few records for this species from the territory of the country seem quite surprising. We also have failed to find this nocturnal cerambycid during our two Mongolian expeditions, despite the frequent attracting insects to artificial light sources and collecting inhabited wood material. *Trichoferus campestris* was discussed in a previous paper concerning the longhorned beetles of Tajikistan (Kadyrov *et al.* 2016).

Molorchini Gistel, 1848

***Leptepania okunevi* (Shabliovsky, 1936)**

Literature data. Sükhbaatar: 12 km SW of Dariganga [Дариганга], Moltsog-Els [ур. Молцог-Элс] [ca. 45.437, 114.139], in *Ulmus pumila*, 17.07.1976, 2 ♂♂, 4 ♀♀ (Namhaidorzh 1979).

Remarks. *Leptepania okunevi* is known from the territory of the Russian Far East and Mongolia (Danilevsky 2020).

The first and probably the only record from Mongolia was published by Namhaidorzh (1979). In the same work, he transferred this species from the genus *Molorchinus* Shabliovsky, 1936 to *Leptepania* Heller, 1924 (at the same time synonymising the genus *Molorchinus*), in which it is currently placed, and designated a specimen from Iman (currently Dalnerechensk, Russia) as a lectotype. In turn, Danilevsky (1993) proposed the synonymisation of *Molorchus incognitus* Cherepanov 1975 after studying of the type specimens of both taxa.

According to Cherepanov (1990a), where this taxon is presented as *M. incognitus*, the discussed species is associated with deciduous vegetation. The adults, which are rarely observed on flowers, are active from June and disappear by mid-August. Females lay eggs in bark crevices of thin shoots 0.6 to 1.5 cm in diameter. Pupation of larvae was observed mainly in June, while emergence of imagines from wood in the end of June and in July. *Leptepania okunevi* attacks desiccated but sometimes still viable twigs of *Salix* L. (Salicaceae), *Euonymus* L. (Celastraceae), *Quercus* L. (Fagaceae), *Ulmus* L. (Ulmaceae), and *Acer ginnala* Maxim. (Sapindaceae) (Cherepanov 1990a). It is worth noting that another very rare species, *Exocentrus stierlini* Ganglbauer, 1883 (Lamiinae), was found sympatrically with *L. okunevi* on thin willow branches (Cherepanov & Cherepanova 1975).

Trachyderini Dupont, 1836

**** Anoplistes gobiensis* (Namkhaidorzh, 1973)**
Fig. 6L

Literature data. Ömnögovi: Valley of Uzuur Zag [ур. Удзур-Дзак], 40 km ESE mt. Khanbogd [г. Хан-Богдо] [ca. 43.089, 107.693], on *Efedra*, 24.06.1971, 1 ♂, 1 ♀ (Namhaidorzh 1974).

Remarks. *Anoplistes gobiensis* is probably one of the most enigmatic Palaearctic species of longhorned beetles and one of the six species of the genus *Anoplistes* Audinet-Serville, 1833 that are known to occur in Mongolia. This endemic species was described from Mongolia based on three specimens: a pair (holotype and paratype) from Ömnögovi aimag and a single male paratype from Khovd aimag, and after 50 years from its description no further specimens are known, besides a single mention from the territory of China in a short faunistic paper (Yuan *et al.*

2010), without any photographic documentation. The taxonomic status of this species does not seem to raise any doubts; however, exact morphological characteristics will be presented in the revision of the genus (in prep.).

According to Namhaidorzh (1973), the adults emerge in June and disappear by August. Imagines were observed on blooming bushes of *Ephedra* L. (Ephedraceae), which is most likely the host plant for the larvae. The immature stages and biology are unknown.

Although we were able to reach the area of the type locality of this species (Fig. 9D), we could not find any individual of *A. gobiensis* or decent number of individuals of its host plant. Only a few *Ephedra* bushes were found, which were not infested by larvae. Unfortunately, near this site, there is a huge coal mine, the functioning of which—along with the fact that the nearby areas were heavily littered, most likely by its employees—could have contributed to the degradation of this site and disappearance of *Ephedra* bushes, which seems likely to be common in such a habitat (Fig. 9E).

§ *Anoplistes halodendri minutus* (Hammarström, 1892)

Figs 5I–L, 6A–F, 9G, H

New records. Dornogovi: 50 km SW of Khatanbulag [Хатанбулаг] [42.783, 108.550], 1129 m a.s.l., 22.05.2019, 1 ♂, 1 ♀, leg. BI (MIZ) (sand ecotype); 60 km E of Khatanbulag [Хатанбулаг] [43.166, 110.063], 1231 m a.s.l., 28.05.2019, 8 ♂♂, 6 ♀♀, 1 ♂, 1 ♀, leg. BI (MIZ) (sand ecotype); Choiriin Bogd Mountain [Чойрын Богд Уул] env., 30 km SEE of Choir [Чойр] [46.246, 108.771], 1400–1600 m a.s.l., 17–18.07.2019, 01.08.2019, 26 ♂♂, 15 ♀♀, leg. et coll. WTS (18 exx. USMB); 17 ♂♂, 18 ♀♀, leg. LKa (MIZ); 48 exx., leg. et coll. LKr (rock ecotype); 20 ♂♂, 14 ♀♀, leg. et coll. WTS (5 exx. USMB); 11 ♂♂, 9 ♀♀, leg. LKa (MIZ); 30 exx., leg. et coll. LKr (sand ecotype); 20 km N Ulaanbadrakh [Улаанбадрах] [44.133, 110.300], 22.07.2019, larva in stem of *Caragan*a *bungei*, leg. LKa & WTS (MIZ).

Ömnögovi: 25 km SW of Khailaastyn Hudag (well) [кол. Хайластын-Худук] [ca. 42.353, 106.581], in *Haloxylon*, 19.06.1971, 1 ex., leg. I.M. Kerzner (MAS).

Literature data. Ömnögovi: Gurvan Saikhan Uul, 30 km S from Bulgan [ca. 43.841, 103.642], 1700 m a.s.l., 20.06.1964, exp. Dr. Z. Kaszab (Heyrovský 1965: as *Asias halodendri* & *Asias kozlovi*); Gurvan Saikhan Uul, 25 km S from Bulgan [ca. 43.908, 103.661], 1550 m a.s.l., 20.06.1964, exp. Dr. Z. Kaszab (ibid); eastern edge of Zöölön ul mountains; 58 km WSW from Bayandalai [Баян-Далай] [43.363, 102.806], 1500 m a.s.l., 16.06.1967, 11 exx., exp. Dr. Z. Kaszab (Heyrovský 1970: as *Asias halodendri*); valley of Unegtiin-Tal [ур. Унюгэтэн-Тала], 02.06.1909, 1 ex. (ibid); Tsagaan-Ders [Цаган-Дэрс], NW of Bayandalai [Баян-Далай] [43.571, 103.710], 16.06.1967, 10 exx. (Namhaidorzh 1972: as *A. halodendri*); Noyon nuruu mountains, in ravine between Dund gol and Noyon, 30–40 km SE from Salzsee [43.281, 101.058], 1600 m a.s.l., 19.06.1967, 6 exx., exp. Dr. Z. Kaszab (Heyrovský 1970: as *A. halodendri*); valley of Mukhar [ур. Мухор], Gurvantes [Гурван-Тэс] [ca. 43.214, 101.054], 23.06.1967, 1 ex. (Namhaidorzh 1972: as *A. halodendri*); Gurvan Saikhan Uul [хр. Гурван-Сайхан], 40 km S of Bulgan [Булган] [ca. 43.743, 103.592], 28–29.07.1967, 1 ex. (ibid); 6 km S of mt. Khanbogd [г. Хан-Богд-Ула] [ca. 42.984, 107.051], on almond *Prunus dulcis*, 17.06.1971, 1 ex. (Namhaidorzh 1976a: as *A. halodendri*); 8 km NNE of Khanbogd [Хан-Богд] [ca. 43.258, 107.243], on almond *Prunus dulcis*, 17.06.1971, 1 ex. (ibid); 25 km SW of valey of river Undayn Gol [ур. Ундын-Гол] [ca. 43.000, 106.959], in saxaul *Haloxylon*, 19.06.1971, 1 ex. (ibid); 15 km E and 30 km SE of Bulgan [Булган], Gurvan Saikhan Mts. [хр. Гурван-Сайхан] [ca. 43.875, 103.049], 05.07.1970, 7 exx. (ibid).

Dornogovi: Airag [Айраг], 20 km ESE of Nuden [Нудэн] [ca. 45.337, 109.170], on blooming *Caragana*, 12–13.06.1971, 8 exx., leg. Chogsomjav L., Namhaidorzh B. (Namhaidorzh 1976a: as *A. halodendri*); 30 km SSE of Shokhoi-Nuur Lake [оз. Шохой-Нур] [ca. 42.505, 109.237], on *Caragana*, 26.06.1971, 33 exx. leg. Namhaidorzh B. (ibid); 35 km SSE of Shokhoi-Nuur Lake [оз. Шохой-Нур] [ca. 42.481, 109.259], on *Caragana*, 27.06.1971, 1 ex., leg. Namhaidorzh B. (ibid); Sulin Kheer [Сулин-Хэрэ], valley of Agaruut [ур. Агарут], mt. Khutag [г. Хутаг] [ca. 42.968, 109.452], on *Caragana*, 27.06.1971, 2 exx., leg. Namhaidorzh B. (ibid); 25 km WNW of Tenger-Nuur Lake [оз. Тэнгэр-Нур] [ca. 42.767, 108.745], 05.08.1971, 1 ex. (ibid).

Sükhbaatar: Bayandelger soum [Баян-Дэлгэрэх], sands of Ongon-Els [пески Онгон-Элс] [45.705, 112.951], on *Caragana*, 05.07.1971, 1 ex. (Namhaidorzh 1976a: as *A. halodendri*); Dariganga [Дарьганга], sands of Moltsog-Els [пески Молцог-Элс] [45.288, 113.859], 08.07.1971, 1 ex. (ibid).

Remarks. *Anoplistes kozlovi* (Semenov & Znojko, 1934) was recently synonymised with *A. halodendri minutus* based on morphological, ecological, and molecular data (Karpiński *et al.* 2021).

Anoplistes halodendri (Pallas, 1773) is an east-Palaearctic species that is distributed between the European Russia and Japan. Within its range, it was divided into seven subspecies (Danilevsky 2020), including Mongolian *A. halodendri minutus*, however, the taxonomic status of some of them needs to be verified (in prep.). This applies especially to the discussed subspecies since the preliminary results of molecular and morphological studies indicate no differences between *A. halodendri minutus* and the nominative subspecies (Karpiński *et al.* 2021).

Despite the literature records of a few different host plants (e.g., *Acacia* Mill., *Daphne mezereum* L., *Quercus*) (Cherepanov 1990b), *A. halodendri* appears to be a monophage of *Caragana* spp. (Karpiński, Szczepański, Plewa *et al.* 2018). This species was discussed in previous works concerning the longhorned beetles of Mongolia (Karpiński, Szczepański, Boldgiv *et al.* 2018) and South and East Kazakhstan (Karpiński, Szczepański, Plewa *et al.* 2018).

We observed two nearly sympatric *Anoplistes* populations (*A. halodendri minutus* and "kozlovi") in one extensive site in the environs of the Choiriin Bogd Mountain between July 17 and 19. Individuals of first population (mostly typical *A. halodendri minutus*; Fig. 9G) were found in a small canyon and on rocky slopes of the surrounding mountains (Fig. 9F). However, in the immediate vicinity, in the flat terrain with a gravelly-sand surface with no rocks, we found individuals almost exclusively with a reduced main black spot and predominance of pale orange on the elytra, which correspond to *A. kozlovi* (Fig. 9H). As it was recently explained (Karpiński *et al.* 2021), both "taxa" are just ecotypes of the same species. An incidence of copulation between two different forms was observed in several pairs, mainly in the transitional zone. All the individuals were found sitting on bushes of *Caragana leucophloea* Pojark. and *C. bungei*. This species was very abundant (several hundred individuals within one extensive locality) in the second half of July and seemed to be at the peak of its occurrence, although when we returned to this site on August 1, we found a noticeably smaller number of imagines. Further details were provided in Karpiński *et al.* (2021).

* *Anoplistes kaszabi* Karpiński, 2020

Fig. 6G–I

New records. Khovd: Yolkhon valley, Bodonch 20 km SE of Altai sum [45.725, 92.543], 27.07.1970, 1 ex., leg. Namhaidorzh (MAS collection, published as *A. mongolicus* in Namhaidorzh (1976a)).

Bayankhongor: near Buutsagaan sum [46.146, 98.691], 15.06.1980, 1 ex., leg. Puntsagdulam (MAS, misidentified with *A. halodendri*).

Literature data. Ömnögovi: 40 km E from spring Talyn Bilgech, between Tost and Tsagaan Bogd mountains [42.889, 99.689], 1100 m a.s.l., 23.06.1967, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1970: as *Asias mongolicus*; verified in Karpiński (2020)).

Remarks. *Anoplistes kaszabi* is a recently described species that is endemic to Mongolia (Karpiński 2020). It is known from two localities in Dundgovi and Ömnögovi aimags. This species is closely related to *Anoplistes mongolicus* (Ganglbauer, 1889) but they are apparently ecologically associated with different host plants: *Zygophyllum xanthoxylon* (Bunge) Maxim. (Zygophyllaceae) or *Caragana* for *A. kaszabi* and *Haloxylon ammodendron* regarding *A. mongolicus* (Karpiński 2020). Unlike the latter species, despite the much smaller number of known specimens, melanistic forms were also uncovered (Fig. 6I).

It is believed that *A. kaszabi* occurs in canyons with dense shrub vegetation, including *Zygophyllum* (Fig. 10A), in semi-arid regions of Mongolia, although it has not yet been confirmed and the immature stages are not known (Karpiński 2020).

Here, we also present two new localities for *A. kaszabi* from outside the region covered in this paper since additional specimens of this barely known species from localities not mentioned in the original publication has been found during our study in the MAS collection. The specimen from Bayankhongor aimag was misidentified with *A. halodendri*, while another one from Khovd aimag—with *A. mongolicus*. The former was most likely overlooked because it was collected as a single individual among a huge series of *A. halodendri* (unpublished), whose larvae feed on *Caragana* spp. This fact, combined with the mention in the original description that *A. kaszabi* may also be ecologically associated with *Caragana* (however, this was noted as less likely since another species-group of the genus is connected to peashrubs and, in general, to Fabaceae), suggests closer association with this plant species than with *Zygophyllum*. However, it is also possible that larvae of *A. kaszabi* feed on both these plants or develop only in one but imagines visit flowering inflorescences of several semi-arid shrub species.

The depicted pair comes from the HNHM collection and was collected in the type locality in Dundgovi aimag.

Anoplistes mongolicus (Ganglbauer, 1889)

Fig. 6J, K

New records. Ömnögovi: 33 km SSE of Gurvantes soum, border post of Khoit Ovoot [ca. 42.951, 101.224]. 20.06.1967, 1 ex., leg. Tsendsuren. (MAS).

Literature data. Ömnögovi: 100 km W from border post Ovootiin Khural [Оботын-Хурул], 22 km W from Sairiin hudag [42.901, 100.048], 1250 m a.s.l., 22–23.06.1967, 55 exx. exp. Dr. Z. Kaszab (Heyrovský 1970: as *Asias mongolicus*); Ovootiin Khural, 36 km SW of Gurvantes [Гурван-Тэс] [ca. 42.958, 100.672], 09.08.1967, 7 exx. (Namhaidorzh 1972).

Dornogovi: 50 km SW of Züünbayan [Дзун-Баяна], 16 km E of Tal Khongoriin hudag (well), [ур. Тал-Хонхорын-Худук] [ca. 44.104, 109.610], on *Brachanthemum*, 30.06.1971, 2 exx., leg. Myagmarsuren D. (Namhaidorzh 1976a); 10 km SSW of Sainshand [Сайн-Шанд], Mt. Tushleg-Uul [Г. Тушлэг-Ула] [ca. 44.789, 110.080], 01.07.1971, 2 exx., leg. Namhaidorzh B. (ibid).

Remarks. *Anoplistes mongolicus* is a Central Asian endemic that is known from Mongolia and three northern provinces of China: Inner Mongolia, Hebei, and Shanxi (Danilevsky 2020). It was previously divided into two subspecies, however, the second one, *Anoplistes amoenus* Reitter, 1898, which is distributed in Xinjiang Uygur Autonomous Region (China), was recently resurrected as a valid species by Karpiński (2020). In Mongolia, *A. mongolicus* is widely but infrequently distributed in the southern part of the country. The largest (55 exx.) and most probably the only abundant series ever collected was beaten from saxaul shrubs in Ömnögovi aimag (22 km W from Sairiin khudag) in 1967 by Zoltán Kaszab. All individuals of this series are rather homogeneous. The literature records from Khovd aimag are, however, related to other species: that of Namhaidorzh (1976a) represents *A. kaszabi* (presented in this paper as a new record) and that of Heyrovský (1968) belongs to another, yet undescribed species (in prep.).

Anoplistes mongolicus is most likely ecologically associated with *Haloxylon ammodendron*, although the immature stages are not known to date. The species occurs in desertified regions, where, typically, saxauls are accompanied by *Tamarix* L. (Tamaricaceae) shrubs (Fig. 10B) (Karpiński 2020).

LAMIINAE Latreille, 1825

Agapanthiini Mulsant, 1839

Agapanthia (*Amurobia*) *amurensis* Kraatz, 1879

Literature data. Sükhbaatar: 9 km WSW of Dariganga [Дарьганга], sands of Moltsog-Els [пески Молцог-Элс] [45.269, 113.737]. 08.07.1971, 1 ex. (Namhaidorzh 1976a).

Remarks. *Agapanthia amurensis* is distributed between Baikal and the Pacific Ocean coast, including Transbaikal, the Ussuri-Primor'e region, northern Mongolia, northeast China, the Korean peninsula, and Japan (Cherepanov 1991a).

This species is similar to *Agapanthia pilicornis* (Fabricius, 1787), however, it can be easily distinguished inter alia by colourless (not variegated) antennae and lighter body colour (Cherepanov 1991a).

According to Cherepanov (1991a), this species inhabits meadows and open forest clearances, and it is ecologically associated with *Galatella dahurica* DC. (Asteraceae) and *Astragalus membranaceus* Moench (=*Astragalus trimestris* L.) (Fabaceae). The adults are active from the end of May or early June to August.

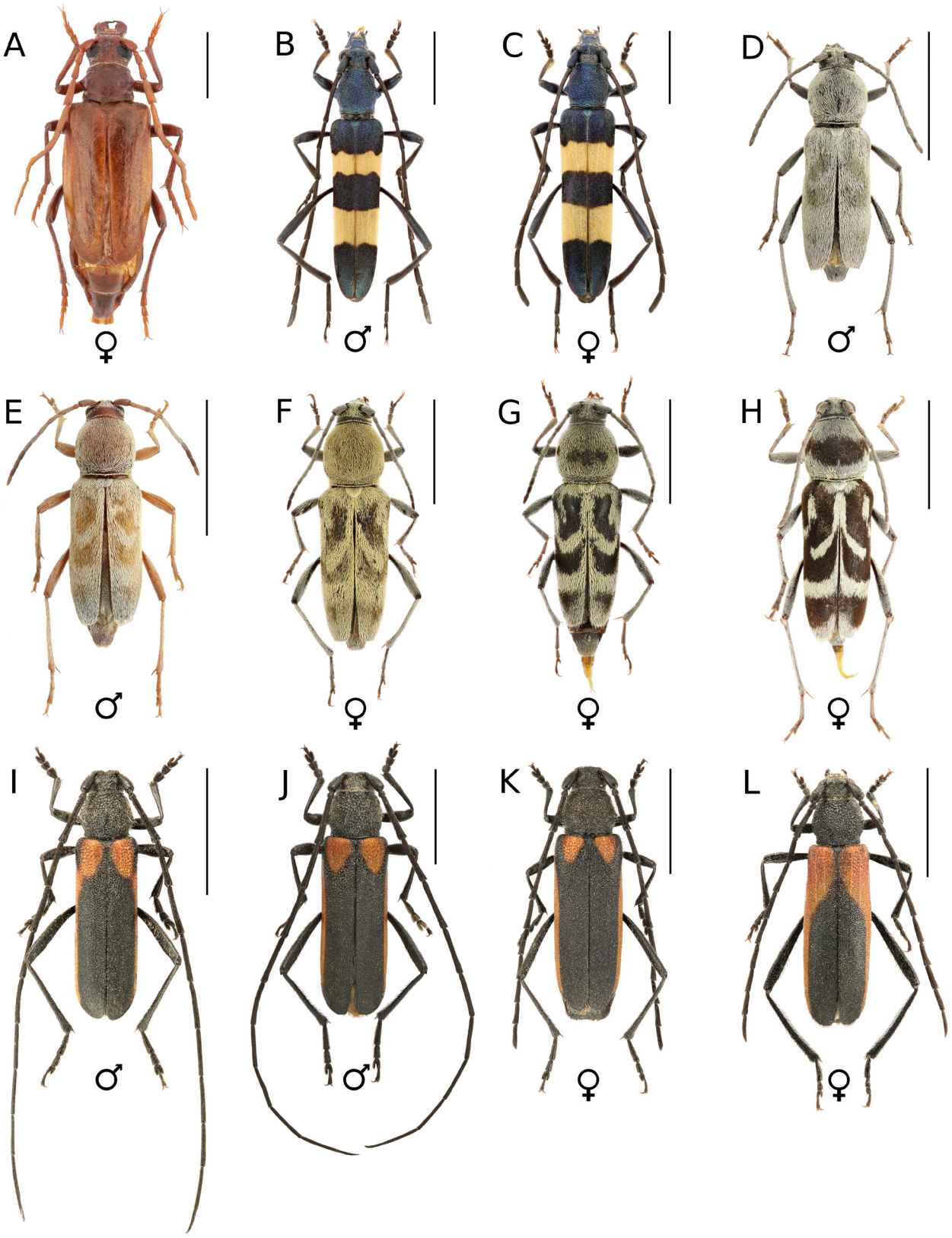

FIGURE 5. Habitus of longhorned beetle taxa distributed in the region of SE Mongolia (subfamilies Apatophyseinae and Cerambycinae). **A,** *Apatophysis serricornis* (female); **B,** *Polyzonus fasciatus* (male); **C,** *P. fasciatus* (female); **D,** *Chlorophorus caragana* (male); **E,** *Ch. caragana* (male); **F,** *Ch. caragana* (female); **G,** *Ch. caragana* (female, atypical form with hairless spot on pronotum and contrasting elytral pattern); **H,** *Ch. obliteratus* (female); **I**, *Anoplistes halodendri minutus* (male, rock ecotype); **J,** *A. halodendri minutus* (male, rock ecotype); **K,** *A. halodendri minutus* (female, rock ecotype); **L,** *A. halodendri minutus* (female, rock ecotype with intermediate elytral pattern). Scale bar: 5 mm.

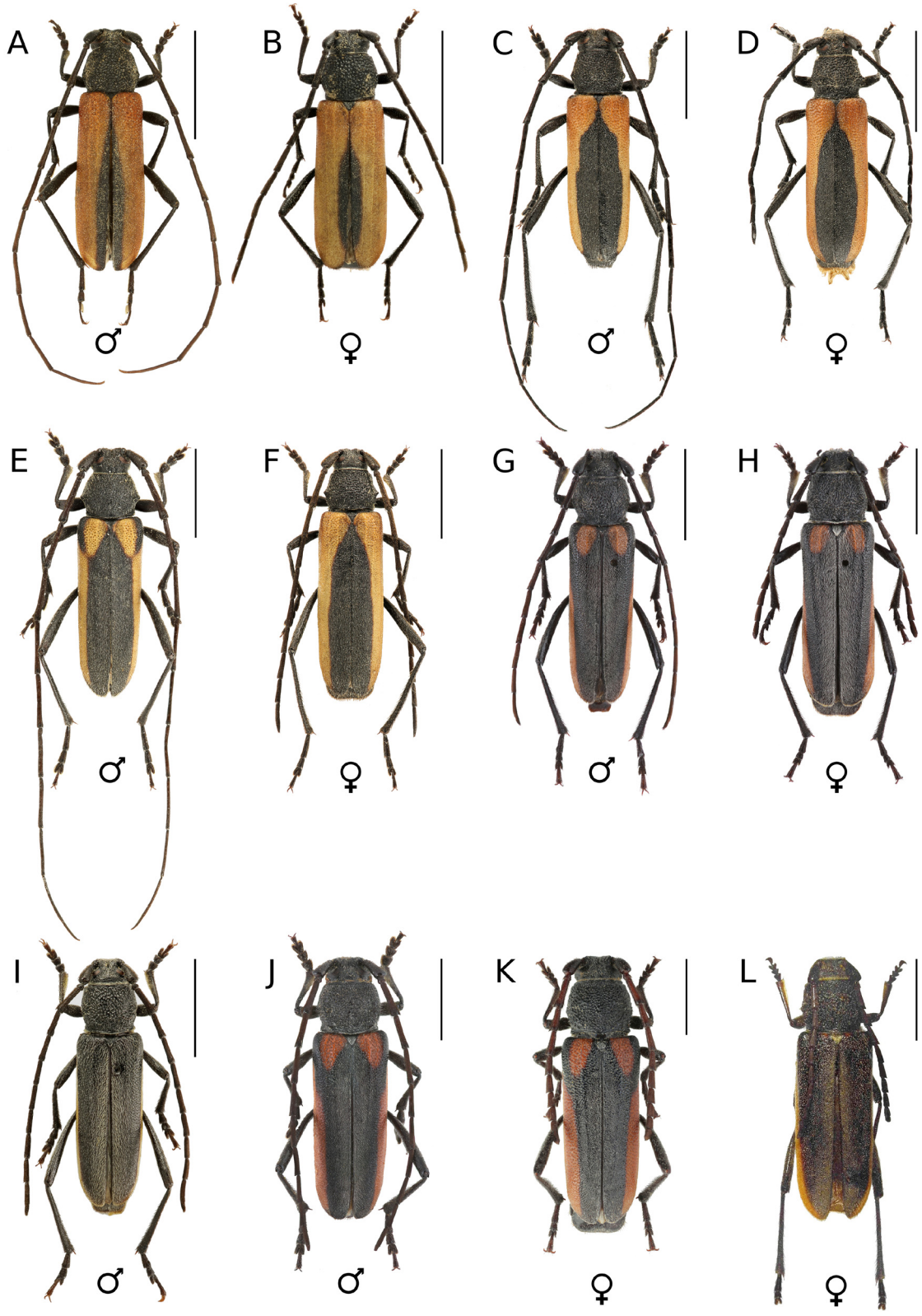

FIGURE 6. Habitus of longhorned beetle taxa distributed in the region of SE Mongolia (genus *Anoplistes*). **A,** *Anoplistes halodendri minutus* (male, sand ecotype, Dornogovi aimag—steppe region); **B,** *A. halodendri minutus* (female, sand ecotype, ibid); **C,** *A. halodendri minutus* (male, sand ecotype, Dornogovi aimag—desert region); **D,** *A. halodendri minutus* (female, sand ecotype, ibid); **E,** *A. halodendri minutus* (male, sand ecotype, Bulgan aimag—sand dunes); **F,** *A. halodendri minutus* (female, sand ecotype, ibid); **G,** *Anoplistes kaszabi* (male, paratype); **H,** *A. kaszabi* (female, holotype); **I,** *A. kaszabi* (male, paratype, melanistic form); **J,** *Anoplistes mongolicus* (male); **K,** *A. mongolicus* (female); **L,** *Anoplistes gobiensis* (female). Scale bar: 5 mm.

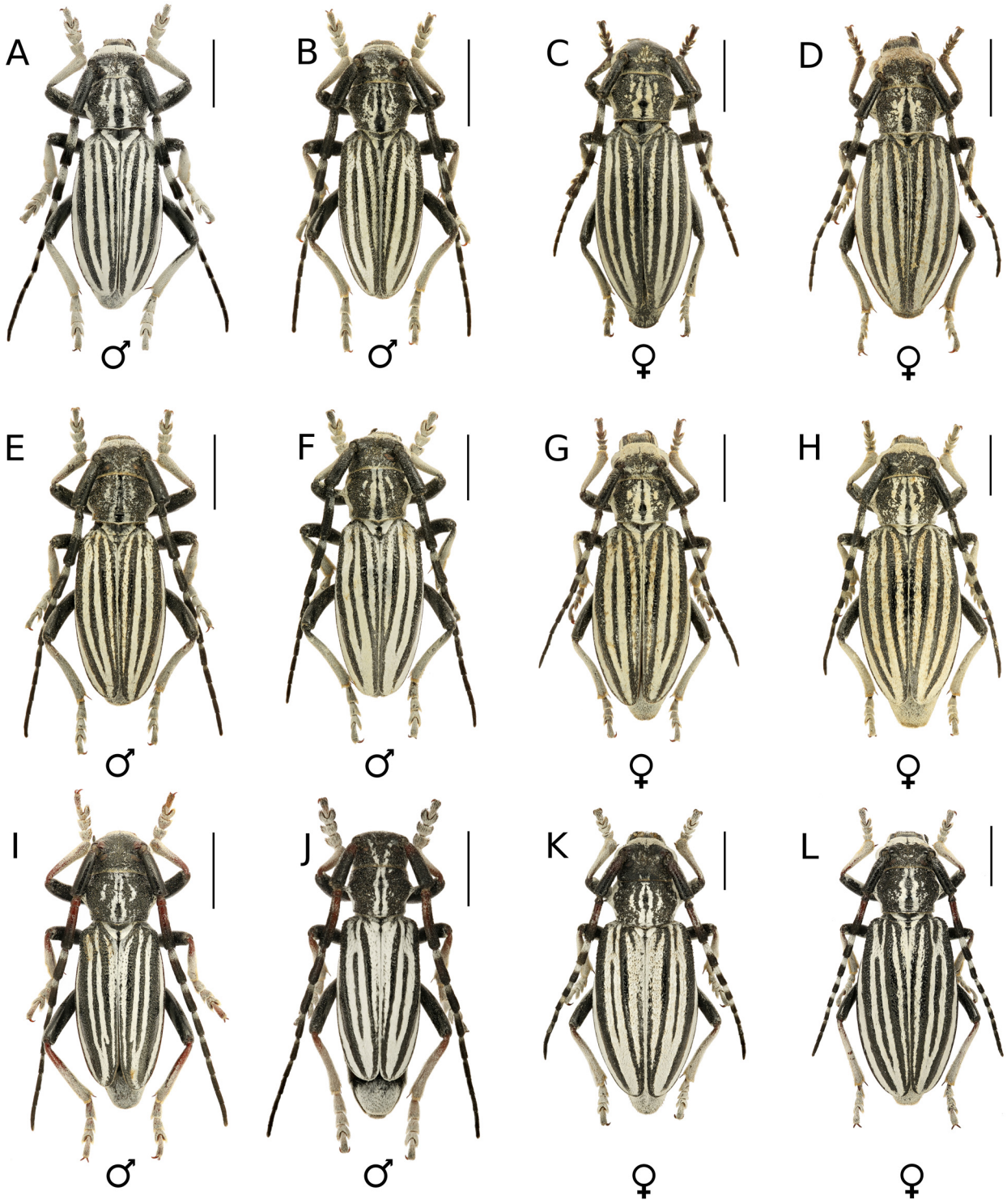

FIGURE 7. Habitus of longhorned beetle taxa distributed in the region of SE Mongolia (genus *Eodorcadion*). **A,** *Eodorcadion gorbunovi* (male, type locality area); **B,** *E. gorbunovi* (male, ibid); **C,** *E. gorbunovi* (female, ibid); **D,** *E. gorbunovi* (female, ibid); **E,** *E. gorbunovi* (male, Shokhoi-Nuur Lake area— erroneous locality of *E. argaloides*); **F,** *E. gorbunovi* (male, ibid); **G,** *E. gorbunovi* (female, ibid); **H,** *E. gorbunovi* (female, ibid); **I,** *Eodorcadion intermedium kozlovi* (male); **J,** *E. intermedium kozlovi* (male); **K,** *E. intermedium kozlovi* (female); **L,** *E. intermedium kozlovi* (female). Scale bar: 5 mm.

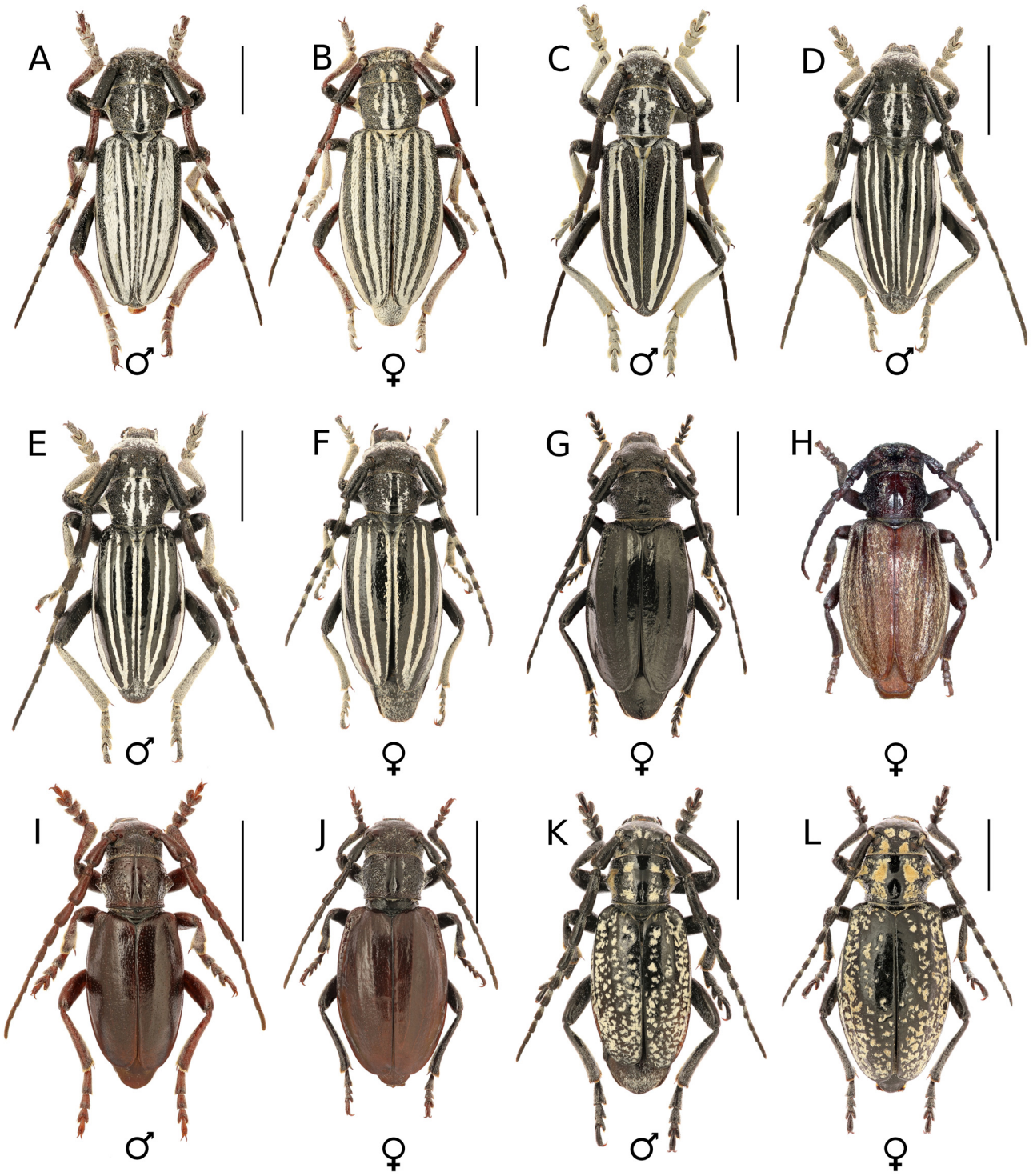

FIGURE 8. Habitus of longhorned beetle taxa distributed in the region of SE Mongolia (genus *Eodorcadion*). **A,** *Eodorcadion intermedium intermedium* (male); **B,** *E. intermedium intermedium* (female); **C,** *Eodorcadion zichyi* (male); **D,** *Eodorcadion exaratum argali* (male); **E,** *E. exaratum argali* (male); **F,** *E. exaratum argali* (female); **G,** *E. exaratum argali* (female, melanistic form); **H,** *Eodorcadion chinganicum darigangense* (female); **I,** *Eodorcadion carinatum involvens* (male); **J,** *E. carinatum involvens* (female); **K,** *Eodorcadion humerale impluviatum* (male); **L,** *E. humerale impluviatum* (female). Scale bar: 5 mm.

Desmiphorini Thomson, 1860

***Anaesthetis confossicollis* Baeckmann, 1903**

Literature data. Sükhbaatar: 12 km SW of Dariganga [Дарьганг], Moltsog-Els [ур. Молцог-Элс] [ca. 45.437, 114.139], 17.07.1976, 1 ex. (Namhaidorzh 1979).

Remarks. This species is distributed in the Ussuri-Primor'e region, Mongolia, northeast China, the Korean peninsula, and Japan (Cherepanov 1991a; Danilevsky 2020).

According to Cherepanov (1991a), *A. confossicollis* inhabits broad-leaved forests and it is ecologically associated with *Quercus*, however, it seems more likely that larvae of this species can also feed on other deciduous woody and shrub species, similar to its close relative, *Anaesthetis testacea* (Fabricius, 1781), which, however, can easily be distinguished by the more uniform fine punctation and very dense pronotal pubescence.

Imagines emerge from mid-June to the second half of July. This species was found in large numbers in fire-ravaged forest (Cherepanov 1991a).

Dorcadionini Swainson, 1840

***Eodorcadion* (*Eodorcadion*) *carinatum involvens* (Fischer von Waldheim, 1823)**
Fig. 8I, J

Literature data. Sükhbaatar: 9 km WSW of Dariganga [Дарьганга] [45.269, 113.737], valley of Ikh Bulag [ур. Их-Булак], under dungs, 08.07.1971, 11 exx. (Namhaidorzh 1976a); 10 km NW of Erdenetsagaan [Эрдэнэ-Цаган] [45.963, 115.265], steppe, 13.07.1971, 3 exx. (ibid); 65 km NNW Dariganga [ca. 45.791, 113.348], 14.08.1976, 1 ♀, Gurjeva leg. (ZIN) (Danilevsky 2007); 10 km W of Dariganga [ca. 45.312, 113.761], 16.08.1996, 2 ♀♀, Gurjeva leg. (ZIN) (ibid); Mt. Shiliin Bogd [45.417, 114.58], 19.08.1996, 1 ♀, Gurjeva leg. (ZIN) (ibid).

Remarks. *Eodorcadion carinatum involvens* is one of the five described subspecies that are distributed between the Yenisei River and the Far East. This taxon is the most common and widespread in the northern and central parts of Mongolia where it was recorded from many localities. Only a few sites are known in southern part of the country. This species was discussed in a previous paper concerning the longhorned beetles of Mongolia (Karpiński, Szczepański, Boldgiv *et al.* 2018). According to Danilevsky (2007), larvae are most likely associated with *Agropyron* Gaertn. and *Elymus* L. (currently a synonym of *Zizania* L.) (Poaceae).

*** *Eodorcadion* (*Eodorcadion*) *chinganicum darigangense* (Heyrovský, 1967)**
Fig. 8H

New record. Sükhbaatar: Dariganga, Taliin agui [45.352, 114.300], 03.07.2019, 1 ♀, leg. BI (MIZ).

Literature data. Sükhbaatar: Dariganga [ca. 45.299, 113.840], 1100 m a.s.l., 05.08.1965, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1967b); Dariganga [ca. 45.299, 113.840], 1150 m a.s.l., 5.08.1965, holotype, 1 ♂ (elytra only), exp. Dr. Z. Kaszab (HNHM) (Danilevsky 2007: as *E. darigangense*); Dariganga env., Duut-Nuur, 20.07.1985, 6 ♂♂, 1 ♀, Ulykpan leg. (MD, JV) (ibid); Dariganga env., Zeget-Nur, 20.07.1985, 1 ♂, 1 ♀, Ulykpan leg. (MD) (ibid); 2 km W Dariganga, 1230 m a.s.l., [ca. 45.299, 113.816], 14–15.07.2002, 1 ♂, and elytra, M. Danilevsky leg. (MD) (ibid).

Remarks. *Eodorcadion chinganicum* currently includes three subspecies; two of them are distributed exclusively in China. *Eodorcadion chinganicum darigangense* was reduced to subspecific level by Danilevsky & Lin (2012a). According to these authors, the range of this taxon is limited to Dariganga environs in the southern part of Sükhbaatar aimag in Mongolia.

It seems this is one of the first *Eodorcadion* species occurring in the season; according to Danilevsky (2007), adults are active in July and they completely disappear in August. It is worth to note that four other *Eodorcadion* species were recorded in the environs of Dariganga, including *E. exaratum exaratum*, which sometimes occurs in the same sites, however afterwards, when most adult individuals of *E. chinganicum* are already dead (Danilevsky 2007).

*** *Eodorcadion* (*Eodorcadion*) *rubrosuturale kerulenum* Danilevsky, 2007**

Literature data. Sükhbaatar: 27 km S from Bayanterem [46.891, 112.428], 07.08.1968, 26 exx, leg. Gy. Marton (Heyrovský 1973a: as *Eodorcadion chinganicum rubrosuturale*); 27 km S of Bayanterem [ca. 46.891, 112.428], 07–08.1966, 1 ♂, 1 ♀, Gy. Marton, leg. (SK) (Danilevsky 2007: as *E. chinganicum kerulenum*); Dariganga [Дарьганга] [ca. 45.303, 113.851], on sand, 08.07.1971, 21 exx. (Namhaidorzh 1976a: as *Eodorcadion darigangense*); spring Ikh-Bulag, 9 km WSW Dariganga [ca. 45.269, 113.737], 8.07.1971, 3 ♂♂, G. Medvedev, leg. (ZIN, JV) (Danilevsky 2007: as *E. chinganicum kerulenum*); 9 km WSW Dariganga [ca. 45.269, 113.737], 8.07.1971, 2 ♂♂, 1 ♀, B. Namhaidorzh and L. Chogsomzhav, leg. (ZIN) (ibid); 10 km W of Erdenetsagaan [Эрдэнэ-Цаган] [45.898, 115.235], 13.07.1971, 10 exx. (Namhaidorzh 1976a: as *Eodorcadion darigangense*); 10 km W Erdenetsagaan [ca. 45.898, 115.235], 13.07.1971, 1 ♂, (ZIN) (Danilevsky 2007: as *E. chinganicum kerulenum*); 90 km SE Baruun-Urt [ca. 46.009, 114.017], 13.07.1971, 1 ♂, (MD) (ibid); Tumen-Tzogt [ca. 47.590, 112.346], 02.07.1983, 4 ♂♂, 1 ♀, K. Ulykpan leg. (MD) (ibid).

Remarks. *Eodorcadion rubrosuturale* was recently restored to species rank with two subspecies (Danilevsky & Lin 2012a). The area of this species covers the entire eastern part of Mongolia, reaching the latitude of Beijing to the south. *Eodorcadion r. kerulenum* is only known from eastern Mongolia. Adults are active at the end of June and in July (Danilevsky 2007).

***Eodorcadion* (*Humerodorcadion*) *humerale humerale* (Gebler, 1823)**

Literature data. Sükhbaatar: Khadatyn-Bulag, 60 km N from Bayanterem [ca. 47.671, 112.464], 950 m a.s.l., 31.07.1965, 1 ♂, exp. Dr. Z. Kaszab (HNHM) (Heyrovský 1967b; Danilevsky 2007).

Remarks. *Eodorcadion humerale*, a widespread species, which includes five subspecies (Danilevsky & Lin 2012b), is distributed in Russia, between Transbaikalia and the Pacific Ocean in the Primorsky region, in the central and north-eastern territories of Mongolia, and in north-eastern China. According to Danilevsky (2020), the nominative subspecies is known from East Siberia, northeastern China (Heilongjiang and Inner Mongolia), and easternmost Mongolia (it was mistakenly given as limited to the territory of Mongolia in Karpiński, Szczepański, Boldgiv *et al.* (2018), instead of *E. h. impluviatum*).

Based on the morphology of the endophallic structures (Danilevsky *et al.* 2004), this species together with *Eodorcadion lutshniki* (Plavilstshikov, 1937) are the only representatives of the subgenus *Humerodorcadion* Danilevsky, Kasatkin & Rubenian, 2005.

*** *Eodorcadion* (*Humerodorcadion*) *humerale impluviatum* (Faldermann, 1833)**
Fig. 8K, L

Literature data. Sükhbaatar: 9 km WSW of Dariganga [Дарьганга], sands of Moltsog-Els [пески Молцог-Элс] [45.269, 113.737], under dungs, 08.07.1971, 7 exx. (Namhaidorzh 1976a: as *E. humerale*); Ikh-Bulag, 9 km WSW Dariganga [ca. 45.269, 113.737], 8.07.1971, 1 ♂, G. Medevedev leg. (ZIN) (Danilevsky 2007); Dariganga, Zegst Nuur [ca. 45.293, 113.855], 1 ♂, 20.07.1985, K. Ulykpan leg. (MD) (ibid); Tumen-Tzogt [ca. 47.562, 112.366], 3.08.1985 and 30.08.1985, 2 ♀♀, K. Ulykpan leg. (MD) (ibid).

Remarks. *Eodorcadion humerale impluviatum* is endemic to Mongolia. In the southeastern part of the country, it is only known from a few localities (Fig. 4), while most of the sites are concentrated around Ulaanbaatar (Danilevsky 2007). We observed this taxon sympatrically with other *Eodorcadion* species, for instance with *Eodorcadion oryx* (Jakovlev, 1895), however, most of the adults of *E. h. impluviatum* were already dead. This subspecies was discussed in our previous paper (Karpiński, Szczepański, Boldgiv *et al.* 2018).

***Eodorcadion* (*Ornatodorcadion*) *argaloides* Breuning, 1947**

Literature data. Dornogovi: 30 km SSE of Tenger-Nuur Lake [оз.Тэнгэр-Нур] [ca. 42.419, 108.682], in *Lasia-*

grostis and *Stipa* grass, 04.08.1971, 32 exx. (Namhaidorzh 1976a: as *Eodorcadion oryx*); [the same label data], 2 ♂♂, D. Magmarsuren leg. (or B. Namhaidorzh leg.), both identified as "*Eodorcadion oryx*" by B. Namhaidorzh (ZIN) (Danilevsky 2007); Mt. Nomt-Uul, 30 km SSE Shokhoi-Nuur Lake [ca. 42.505, 109.237], 4.08.1971, 2 ♂♂, 2 ♀♀, G. Medvedev leg. (ZIN, JV, MD), 1 ♂, Kozlov leg. (MD) (ibid).

Remarks. *Eodorcadion argaloides* is distributed in Mongolia and northern China (Inner Mongolia) (Danilevsky 2020). It was described based on a single female specimen, whose label data does not allow to determine the exact type locality. Additional material revised by Danilevsky (2007) made it possible to localise four sites of this species in the southern part of Dornogovi aimag. However, it is worth noting that the author has studied only the specimens from the two southernmost localities (30 km SSE of Tenger-Nuur Lake; Mt. Nomt-Uul, 30 km SSE Shokhoi-Nuur Lake).

We have investigated the area east of Shokhoi-Nuur Lake (previously also visited by B. Namhaidorzh), however, we exclusively found there (in two separate sites) individuals that clearly represent *Eodorcadion gorbunovi* (Danilevsky, 2004), not *E. argaloides*. They do not differ from those collected by us in big numbers in the type locality of *E. gorbunovi* and its vicinity. This clearly evidences that the two localities given by Danilevsky (2007) (25 km E of Shokhoi-Nuur Lake; Mt. Khutag-Uul), from which the specimens have not been examined, should refer to *E. gorbunovi* rather than *E. argaloides* and, consequently, they are presented as such in this paper. Therefore, in Mongolia, the real known range of the latter species is apparently limited to a narrow belt along the border zone (Fig. 4). Another issue is the placement of particular localities in the Danilevsky's (2007) map (including these two that should refer to *E. gorbunovi*). They need to be verified since according to local entomologists from Mongolian Academy of Sciences, the Mountain Nomt-Uul (30 km SSE Shokhoi-Nuur Lake) is located more to the south.

* § *Eodorcadion* (*Ornatodorcadion*) *exaratum argali* (Jakovlev, 1889)

Figs 8D–G, 10C–E

New records. Dornogovi: Choiriin Bogd Mountain [Чойрын Богд Уул] env., 30 km SEE of Choir [Чойр] [46.246, 108.771], 1400 m a.s.l., 18.07.2019, 1 ex., leg. et coll. LKr; 01.08.2019, 2 exx., leg. et coll. LKr.

Literature data. Dornogovi: Khar-Airag [Хар-Айраг] [45.813, 109.310], 31.08.1958, 2 exx. (Namhaidorzh 1972: as *Eodorcadion argali* and *E. ornatum*); 38 km SE Choir [46.101, 108.728], 1200 m a.s.l., 30.06.1963, exp. Dr. Z. Kaszab (HNHM) (Heyrovský 1964: as *Eodorcadion oryx* m. *inconstructum*; Danilevsky 2007).

Remarks. *Eodorcadion exaratum argali* is endemic to Mongolia and it is distributed mainly in the central part of the country, and the Airag District of Dornogovi aimag is one of the easternmost known localities of this subspecies (Danilevsky 2007).

Adults occur at the turn of July and August and according to Danilevsky (2007) they feed on stems of *Caragana*. Adults were observed in the late evening hours hidden under rocks and cow dung (Karpiński, Szczepański, Boldgiv *et al.* 2018), although in a typical pasture habitat, without *Caragana* bushes.

In 2019, we collected this taxon in big numbers, however, mostly in Khentii aimag (not considered in this paper), and in Dornogovi aimag only single specimens were found (Fig. 10C). In the former locality, individuals of *E. e. argali* were observed in a typical steppe habitat with high tufts of *Achnatherum* P. Beauv. (Poaceae), with which larvae are undoubtedly associated. There were no *Caragana* bushes. Numerous imagines were found hiding under cow dung (Fig. 10D). A few melanistic females (Figs 8H, 10E) have also been observed, however, they were extremely rare (approx. one in a hundred individuals).

Eodorcadion (*Ornatodorcadion*) *exaratum exaratum* (Ménétriés, 1854)

Literature data. Dornogovi: 9 km NE of Bayanmunkh [45.350, 111.300], 700 m a.s.l., 12–13.08.2002, 15 ♂♂, 15 ♀♀, M. Danilevsky leg. (MD) (Danilevsky 2007).

Sükhbaatar: Ongon-Els, 10 km S from Ongon [45.265, 113.138]; 900 m a.s.l., 3–5.08.1965, 39 exx., exp. Dr. Z. Kaszab (Heyrovský 1967b); [the same label data], 1 ♀, 1 ♂, (HNHM), 18 ♂♂, 2♀♀ (NMP) (Danilevsky 2007); Dariganga [ca. 45.302, 113.850], 1150 m a.s.l., 05.08.1965, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1967b); 5 km S of Ongon [ca. 45.311, 113.136], 900 m a.s.l., 05.08.1965, 2 exx., exp. Dr. Z. Kaszab (ibid); Moltsog Els, 2 km S from

Dariganga [45.283, 113.850], 1150 m a.s.l., 06.08.1965, 64 exx., exp. Dr. Z. Kaszab (ibid); [the same label data], 11 ♂♂, 1 ♀ (HNHM), 1 ♂, 3 ♀♀ (NMP) (Danilevsky 2007); Moltsog Els, Dariganga [45.283, 113.850], 1965, 2 exx., leg. Zanzantomboo (Heyrovský 1970: as *Eodorcadion argali rugipenne*); Khongor [=Ongon] [Хонгор], sands of Ongon Els [пески Онгон-Злс] [ca. 45.341, 113.141], 06.07.1971, 2 exx. (Namhaidorzh 1976a: as *Eodorcadion argali*); Tuvshinshiree [ca. 46.211, 111.796], 3.08.1983, 17 ♂♂, 8 ♀♀, K. Ulykpan leg. (MD) (Danilevsky 2007); 12 km SW Bayandelger [45.666, 112.216], 1050 m a.s.l., 13.08.2002, 1 ♀, M. Danilevsky leg. (MD) (ibid); 10 km ESE Bayandelger [45.709, 112.482], 980 m a.s.l., 13.08.2002, 4 ♂♂, 4 ♀♀, M. Danilevsky leg. (MD) (ibid); 38 km ENE Bayandelger [45.783, 112.816], 930 m a.s.l., 14.08.2002, 29 ♂♂, 18 ♀♀, M. Danilevsky leg. (MD) (ibid); 36 km N Ongon [45.683, 113.050], 1100 m a.s.l., 14.08.2002, 1 ♂, M. Danilevsky leg. (MD) (ibid); 2 km W Dariganga [45.299, 113.816], 1230 m a.s.l., 14–16.08.2002, 195 ♂♂, 56 ♀♀, M. Danilevsky leg. (MD) (ibid); 9 km NNW Naran [ca. 45.200, 113.650], 1200 m a.s.l., 16.08.2002, 91 ♂♂, 80 ♀♀, M. Danilevsky leg. (MD) (ibid); 5 km ENE Naran [45.166, 113.666], 1210 m a.s.l., 16.08.2002, 2 ♂♂, 1 ♀, M. Danilevsky leg. (MD) (ibid); 17 km ESE Naran [45.066, 113.883], 1350 m a.s.l., 16.08.2002, 115 ♂♂, 128 ♀♀, M. Danilevsky leg. (MD) (ibid); 16 km WSW Dariganga [45.250, 113.650], 1200 m a.s.l., 16–17.08.2002, 136 ♂♂, 60 ♀♀, M. Danilevsky leg. (MD) (ibid); 30 km N Dariganga [ca. 45.573, 113.789], 1150 m a.s.l., 17.08.2002, 1 ♂, 1 ♀, M. Danilevsky leg. (MD) (ibid).

Remarks. *Eodorcadion exaratum* is divided into two subspecies; the nominative one is distributed in southeastern Mongolia (mainly in the vicinity of Dariganga and Naran) and in China (Inner Mongolia) (Danilevsky 2007).

*** § *Eodorcadion* (*Ornatodorcadion*) *gorbunovi* Danilevsky, 2004**
Figs 7A–H, 10G, H, 11A, B

New records. Dornogovi: 10 km ENE of Khatanbulag [Хатанбулаг] [43.17801, 109.25925], 1141 m a.s.l., 24.07.2019, 1 larva, leg. et coll. WTS; 3 ♂♂, leg. LKa (MIZ); 8 ♂♂, 2 ♀♀, leg. et coll. LKr; 10 km SE of Khatanbulag [43.092, 109.207], 1222 m a.s.l., 24.07.2019, 32 ♂♂, 13 ♀♀, leg. et coll. WTS (15 exx. USMB); 26 ♂♂, 5 ♀♀, leg. LKa (MIZ); 25 ♂♂, 15 ♀♀, leg. et coll. LKr; 15 km SE of Khatanbulag [43.095, 109.270], 1202 m a.s.l., 24.07.2019, 11 ♂♂, 2 ♀♀, leg. et coll. WTS; 4 ♂♂, 2 ♀♀, leg. LKa (MIZ); 20 ♂♂, 5 ♀♀, leg. et coll. LKr; 42 km SE of Khatanbulag [42.804, 109.382], 1100 m a.s.l., 25.07.2019, 10 ♂♂, 3 ♀♀, leg. et coll. WTS; 7 ♂♂, 1 ♀, leg. LKa (MIZ); 9 ♂♂, 3 ♀♀, leg. et coll. LKr; 43 km SE of Khatanbulag [42.795, 109.356], 1099 m a.sl., 25.07.2019, 6 ♂♂, 3 ♀♀, leg. et coll. LKr.

Literature data. Dornogovi: Mt. Khutag-Uul [г. Хутаг-Ула], N of Sulin-Kheer [Сулин-Хэрэ] [ca. 42.968, 109.452], under *Caragana*, 27.06.1971, 1 ex. (Namhaidorzh 1976a: as *Eodorcadion oryx*); 25 km E of Shokhoi-Nuur Lake [оз. Пюхой-Нур] [ca. 42.776, 109.366], 03.08.1971, 2 exx. (ibid); 7 km SW Khatanbulag, [43.116, 109.050], 1120 m a.s.l., 8–9.07.2002, 1 ♂ holotype, M. Danilevsky, leg. (MD), 10 ♂♂, 9 ♀♀, M. Danilevsky and O. Gorbunov leg. (Danilevsky 2004, 2007); 11 km SE Khatanbulag [43.100, 109.266], 1240 m a.s.l., 9.08.2002, 34 ♂♂, 15 ♀♀, M. Danilevsky and O. Gorbunov leg. (ibid); 24 km SE Khatanbulag [43.016, 109.383], 1000 m a.s.l., 9.08.2002, 15 ♂♂, 3 ♀♀, M. Danilevsky and O. Gorbunov leg. (ibid); 23 km SE Khatanbulag [43.066, 109.416], 1000 m a.s.l., 9.08.2002, 1 ♂, O. Gartumnov leg. (ibid).

Remarks. *Eodorcadion gorbunovi* is a relatively recently described species from the environs of Khatanbulag (Danilevsky 2004). Besides the localities provided in the original description (Danilevsky 2004), also the two records mistakenly given for *E. argaloides* by Danilevsky (2007) should be included for the known area of *E. gorbunovi*: 25 km E of Shokhoi-Nuur Lake and Mt. Khutag-Uul (see more in the remarks for *E. argaloides*). However, according to the local scientists, the location of Mt. Khutag-Uul needs to be verified as it is situated more to the southeast (Fig. 4).

This species inhabits depressions of stony hills that are overgrown with *Lasiagrostis* Link (=*Achnatherum*) (Danilevsky (2007), and according to Namhaidorzh (1976a) it is ecologically associated with *Lasiagrostis*, *Stipa* L. (Poaceae), and *Caragana*. Our own observations (for closely related *E. intermedium kozlovi*) indicate that while larvae indeed feed on roots of these grass species, leaves and stems of *Caragana* bushes serve as food and a night shelter for the adults.

We have investigated several suitable sites in the range of this species and found numerous imagines, as well as a single larva among *Achnatherum* roots, approx. 30 cm deep in the soil (Fig. 10G). It is worth noting that despite usually abundant occurrence of adults, it was difficult to find any premature stages in the soil and we succeeded only

once, in spite of several attempts at various depths. The sites were located within regular semi-desert with enclaves of *Achnatherum splendens* (Trin.) Nevski (Fig. 10F). Single individuals were also collected in a narrow canyon near a dried riverbed. In one of the sites, we have observed individuals rapidly hiding in *Achnatherum* tufts during the rain. When the weather started to improve and the sun came out, the individuals started to climb onto the stems of grass (Fig. 10H), most likely to dry faster in the wind and bright sun.

We found solely individuals of this species in the locality west of Shokhoi-Nuur Lake, where, in accordance with Danilevsky (2007), *E. argaloides* occurs (see the discussion above and remarks for *E. argaloides*). The imagines (Fig. 11A, B) were collected in semi-desert habitat in the immediate vicinity of a dried lake (Fig. 11C), relatively densely overgrown with *Achnatherum*. We find no differences between the individuals collected in this plot (Fig. 7E–H) and those from the type locality (and its vicinity) of *E. gorbunovi* (Fig. 7A–D). The discussed sites are distanced only approx. 35 km in a straight line from each other, though it should be noted that we have not seen suitable grassy habitats on the way (barren rocky desert). Nevertheless, despite the fact that the similar distance separates these southernmost localities of *E. gorbunovi* from the confirmed localities of *E. argaloides*, definitely stronger geographical barriers in a form of ranges of rocky hills exist between them.

Eodorcadion (*Ornatodorcadion*) *intermedium intermedium* (Jakovlev, 1889)

Fig. 8A, B

Literature data. Dornogovi: Khötöl-Us [ca. 43.450, 100.716] (type locality) (Jakovlev 1889; Danilevsky 2007); from Dalanzadgad to Tsagaan Ders, 3.08.1949, 11 ♂♂, 4 ♀♀, Eglon leg. (ZIN) (Danilevsky 2007); Noyon ridge, 10 km N of Noyon [ca. 43.292, 102.108], 22–23.08.1969, 1 ♂, Zaitzev leg. (JV) (ibid); 30 km W Tost-Uul ridge [ca. 43.142, 100.041], 8.08.1981, 2 ♂♂, 1 ♀, Lvovsky leg. (ZIN) (ibid).

Remarks. *Eodorcadion intermedium* is a very variable species that is distributed in the southern part of Mongolia, and most likely also in China (Inner Mongolia) (Danilevsky 2007). The species currently includes two subspecies. The boundary of their range runs approx. along the meridian 103° east. Populations westwards from that line belong to the nominative subspecies. Nonetheless, a status of several local populations, which can be regarded as subspecies, requires further studies (Danilevsky 2007).

The nominative subspecies was discussed in our previous paper (Karpiński, Szczepański, Boldgiv *et al.* 2018).

§ *Eodorcadion* (*Ornatodorcadion*) *intermedium kozlovi* (Suvorov, 1912)

Figs 7I–L, 11D–G

New records. Dornogovi: 30 km SW of Mandakh [Мандах] [44.249, 107.784], 1139 m a.s.l., 28.07.2019, 31 ♂♂, 4 ♀♀, leg. et coll. WTS (7 ♂♂ USMB); 28 ♂♂, 4 ♀♀, leg. LKa (MIZ); 22 ♂♂, 6 ♀♀, leg. et coll. LKr; 5 km SW of Mandakh [44.341, 108.093], 1324 m a.s.l., 29.07.2019, 6 ♂♂, 4 ♀♀, leg. et coll. WTS; 25 ♂♂, l6 ♀♀, leg. et coll. LKr; Mandakh env. [44.401, 108.262], 1296 m a.s.l., 29.07.2019, 4 ♂♂, 2 ♀♀, leg. et coll. WTS; 4 ♂♂, 3 ♀♀, leg. LKa (MIZ); 5 ♂♂, 1 ♀, leg. et coll. LKr; 10 km W of Saikhandulaan [Сайхандулаан] [44.653, 108.790], 1156 m a.s.l., 29.07.2019, leg. et coll. LKr; 20 km NE of Saikhandulaan [44.761, 109.301], 1028 m a.s.l., 29.07.2019, 3 ♂♂, 1 ♀, leg. et coll. WTS; 8 ♂♂, leg. LKa (MIZ); 6 ♂♂, 1 ♀, leg. et coll. LKr.

Ömnögovi: 20 km S of Dalanzadgad [Даланзадгад] [43.129, 104.327], 15.07.2019, 1 ex., leg. DE (MIZ).

Literature data. Ömnögovi: Tzosto River [ca. 43.350, 103.516], 28.06–2.07.1909, 1 ♂, Kozlov's exp. (ZIN) (Danilevsky 2007); Ulan-Bulak [Улан-Булак,], Mt. Dund Saikhan [г. Дунд-Сайхан] [ca. 43.583, 103.750], 5–13.07.1909, 1 ex. (Namhaidorzh 1972: as *E. kozlovi*); Khutsyn-Shand well near Mandal-Ovoo [кол. Хуцын-Шанда] [ca. 44.133, 104.083], 16.07.1909, 10 exx., syntypes *E. kozlovi* (ibid); from Dalanzadgad [Далан-Дзадагада] to Tsagaan Ders [Цаган-Дэрсун] sands, 03.08.1949, 59 exx. (ibid); 25 km N from Bulgan, Schovongin chooloi [44.334, 103.618], 1030 m a.s.l., 19.06.1964, 1 ex., exp. Dr. Z. Kaszab (Heyrovský 1965: as *Eodorcadion mongolicum* ab. *recurvatum*); [the same label data], 2 ♂♂ (HNHM) (Danilevsky 2007); 33 km W Dalanzadgad [ca. 43.568, 104.011], 1200 m a.s.l., 2–8.07.1965, 2 ♂♂, leg. Muche (NMP) (ibid); Zoolon-Uul [Dzelen-Ula ridge], 58 km WSW of Bayandalai [ca. 43.174, 102.877], 1500 m a.s.l., 6.06.1967, 1 ♀, exp. Dr. Z. Kaszab (HNHM) (ibid); Takhilga-Uul, between Tsogt-Ovoo and Dalanzadgad, 68 km S from Tsogt-Ovoo [ca. 43.834, 105.065], 1550 m a.s.l.,

12.06.1967, 1 ex., 08–09.07.1967, 18 exx., exp. Dr. Z. Kaszab (Heyrovský 1970: as *Eodorcadion mongolicum*); Gurvan Saikhan Uul mountains, between Khurmen [Хүрмэн] and Bayandalai [Баян-Далай], 24 km NW from Khurmen [Хүрмэн] [ca. 43.365, 103.790], 1550 m a.s.l., 14.06.1967, 5 exx., exp. Dr. Z.. Kaszab (ibid); Mt. Gurvan Saikhan Uul, between Khurmen Soum and Bayandalai [ca. 43.390, 103.617], 1550 m a.s.l., 14.06.1967, 2 ♂♂, 2 ♀♀, exp. Dr. Z. Kaszab (HNHM) (Danilevsky 2007); 34 km WSW of Bayandalai [ca. 43.338, 103.090], 1600 m a.s.l., 15.06.1967, 1 ♂, exp. Dr. Z. Kaszab (HNHM) (ibid); Bulgan Soum, Talyn bulag [=Dalyn Bulag] [ca. 44.078, 103.713], 1350 m a.s.l., 5.07.1967, 1 ♂, exp. Dr. Z. Kaszab (HNHM) (ibid); Mt. Takhilga Uul, between Tsogt-Ovoo and Dalanzadgad [ca. 43.834, 105.065], 1550 m a.s.l., 8–9.07.1967 [and 12.07.1967], 10 ♂♂, 1 ♀, exp. Dr. Z. Kaszab (HNHM) (ibid); Mandal-Ovoo, Bayanzag [= Bain-Dzak, 30 km NNE Bulgan] [ca. 44.372, 103.696], 26.07.1967, 1 ♂, Namhaidorzh leg. (ZIN) (ibid); Mandal-Ovoo [44.372, 103.696], 26.07.1967, 1 ♂, B. Namhaidorzh leg. (ZIN) (ibid); valley of Bayan Zag [ур. Баян-Дзаг], NNE of Bulgan [вулган] [ca. 44.115, 103.566], 26–28.07.1967, 4 exx. (Namhaidorzh 1972: as *E. kozlovi*); Khongoryn-Els [Хонгорын-Элс], 60km WNW Bayandalai [Баян-Далая] [ca. 43.645, 102.786], 30–31.07.1967, 10 exx. (ibid); Dalanzadgad [ca. 43.574, 104.386], 07–08.1967, 1 ♂, Dulamzhav leg. (ZIN) (Danilevsky 2007); 25 km ESE of Bayandalai [Баян-Далая] [ca. 43.638, 103.410], 01.08.1967, 1 ex. (Namhaidorzh 1972: as *E. kozlovi*); well Dzhandzhin-Khuduk=Janjin-Khudag [Джанджин-Худук], S of Khurmen [Хүрмэн] [ca. 43.271, 104.079], 3.08.1967, 1 ex. (ibid); 15 km NW of Bulgan [44.244, 103.426], 12.08.1967, 2 exx. (ibid); Bulgan env. [44.093, 103.523], 1–15.08.1971, 12 exx. (Namhaidorzh 1976a: as *Eodorcadion mongolicum*); Bulgan [Булган], valley of Tugreg-Us [ур. Тугрэг-Ус] [ca. 44.222, 103.271], 23.08.1971, 2 exx. (ibid); Bulgan [44.093, 103.523], 1.08.1970, 27.07.1971, 17.7–15.08.1972, 1 ♂, 3 ♀♀, L. Medvedev leg. (MD) (Danilevsky 2007); Manlai [ca. 44.050, 107.033], 1300 m a.s.l., 3 ♀♀, M. Danilevsky leg. (MD) (ibid).

Dornogovi: Baruun Sair [Баруун-Сайр], Altanshiree [Алтан-Ширээт] [ca. 45.531, 110.488], 29.08.1958, 6 exx., 1 ♂ (Namhaidorzh 1972: as *Eodorcadion princeps*); [the same label data], 1 ♂, 1 ♀, Dementiev leg. (ZMM) (Danilevsky 2007); Argalantyn-Ulan-Shire, 65 km SE from Zuunbayan [ca. 44.080, 110.634], 800 m a.s.l., 25.06.1963, exp. Dr. Z. Kaszab; 1 ex. (Heyrovský 1964: as *E. intermedium* m. *gobicum* nov.); [the same label data], 2 ♂♂ (HNHM), 1 ♂ (NMP) (Danilevsky 2007); 8 km NNW from Sainshand [Сайн-Шанд] [44.972, 110.075], 1000 m a.s.l., 28.06.1963, 5 exx., exp. Dr. Z. Kaszab (Heyrovský 1964: as *E. intermedium* m. *gobicum* nov.); [the same label data], 1 ♀ (HNHM) (Danilevsky 2007); 30 km SE from Zuunbayan [ca. 44.326, 110.318], 24.07.1968, 1 ex., leg. B. Burakowski & H. Szelegiewicz (Heyrovský 1973a: as *Eodorcadion oryx* ab. *semisegregatum*); [the same label data], 1 ♂ (HNHM) (Danilevsky 2007); 10 km NW Erdene [ca. 44.608, 110.961], 13.08.1975, 1 ♂, Gurieva leg. (ZIN), 13 ♂♂, 1 ♀ (SMTD) (ibid); 2 km SE Mandakh [44.400, 108.216], 1300 m a.s.l., 5–7.08.2002, 262 ♂♂, 44 ♀♀, M. Danilevsky leg. (MD) (ibid); 11 km S Sainshand, [44.783, 110.116], 950 m a.s.l., 11.08.2002, 5 ♂♂, 1 ♀, O.V. Gorbunov leg. (MD) (ibid).

Remarks. *Eodorcadion intermedium kozlovi* is the most widespread and common *Eodorcadion* taxon in the region discussed in this paper. According to Danilevsky (2007), this subspecies inhabits depressions of hilly landscapes covered with numerous clumps of *Lasiagrostis* (=*Achnatherum*) and both males and females were often observed feeding high on the stems of these plants.

We observed numerous individuals in early morning still hiding in *Caragana* bushes after the night (Fig. 11D). Between 6 and 7:30 a.m, adults were climbing on the plants and feeding on their leaves (Fig. 11E). Subsequently, as the sun began to rise, individuals commenced to descend from the bushes to the ground. We also observed several lizards hunting for these beetles. It is clear now that *E. i. kozlovi* is ecologically associated with both *Achnatherum* and *Caragana*. Single individuals were also collected in numerous sites between Mandakh and Sainshand (Fig. 4) almost in every controlled *Achnatherum* enclave (Fig. 11H). Similarly, as in *E. gorbunovi*, we observed individuals (mainly males) climbing on the blades of grass (Fig. 11F). Females (Fig. 11G) were less numerous in almost all sites, which indicates that the turn of July and August is still the initial phase of the occurrence of this species.

The status of this taxon leaves much confusion. While the so-far-diagnosed morphological characters to distinguish the subspecies, which are connected with the pattern of elytral stripes, do not seem to be constant and particularly useful (suggesting rather low differentiation), our preliminary results of the molecular analysis indicated considerable genetic divergence between this taxon and *E. i. intermedium*. Conversely, *E. i. kozlovi* appears to be closely related to *E. exaratum* and *E. oryx*, from which it, however, can be relatively easily differentiated morphologically. This species-group, in principle, requires further studies that should include also the molecular component (in prep.).

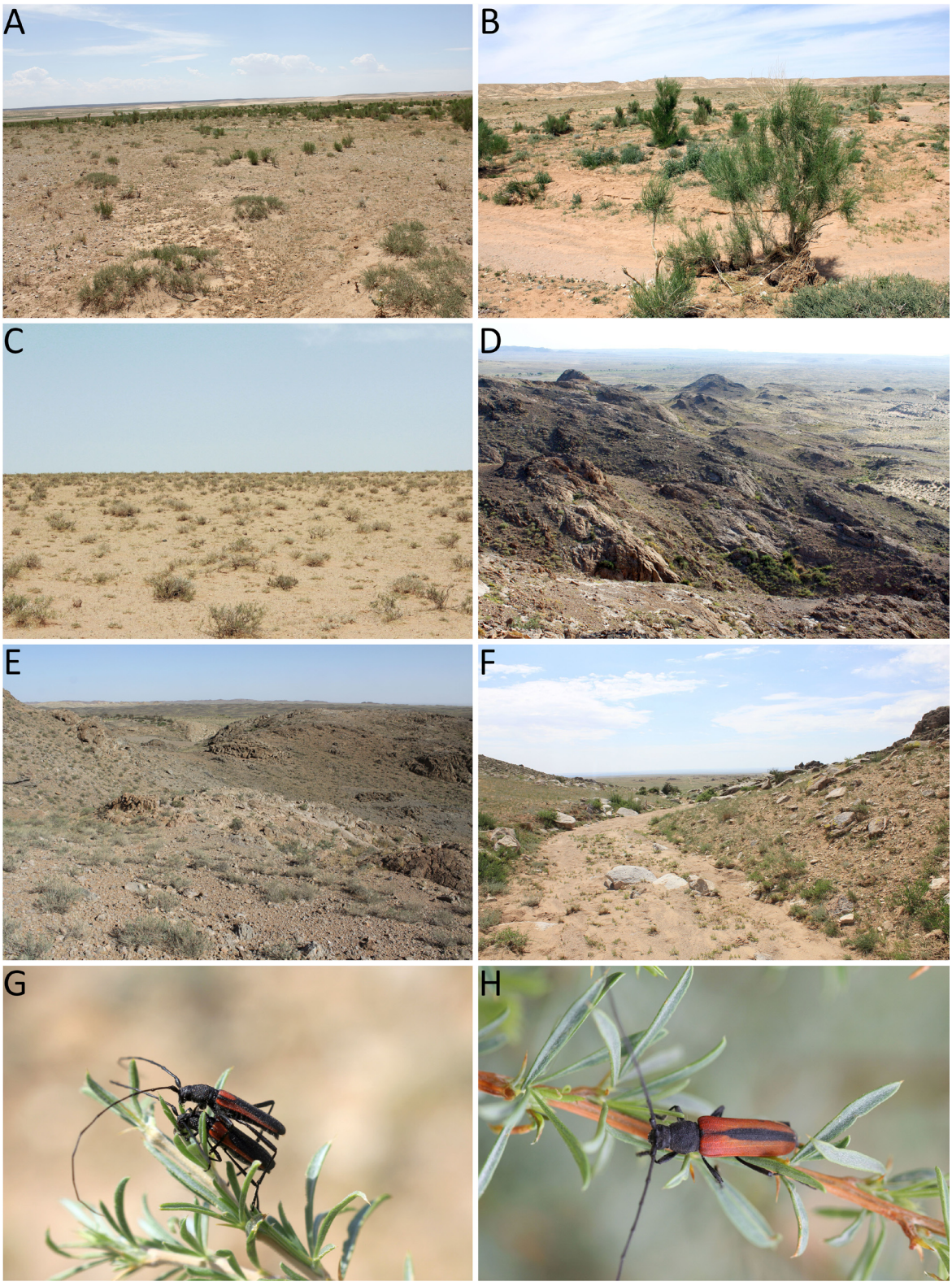

FIGURE 9. Photographs of adults *in situ* and habitats of typical SE Mongolian cerambycid species. **A,** semi-desert near Burdene Bulag, habitat of *Chlorophorus caragana*; **B,** shrubs of *Haloxylon ammodendron* in habitat of *Ch. caragana*; **C,** strongly desertified land with *Caragana* bushes in southernmost Mongolia, habitat of *Ch. caragana*; **D,** area of type locality of *Anoplistes gobiensis* in southernmost Mongolia; **E,** stony hills with diverse bush vegetation, most likely habitat of *A. gobiensis*; **F,** small canyon at the foot of rocky slopes overgrown with *Caragana* shrubs, habitat of *Anoplistes halodendri minutus*; **G,** copulating pair of *A. halodendri minutus* (rock ecotype); **H,** male of *A. halodendri minutus* (sand ecotype) on *Caragana leucophloea* steam.

FIGURE 10. Photographs of adults and larvae *in situ* and habitats of typical SE Mongolian cerambycid species. **A,** stony hills with dense shrub vegetation, including *Zygophyllum*, most likely habitat of *Anoplistes kaszabi*; **B,** saxaul and tamarisk shrubs in strongly desertified area in southern Mongolia, most likely typical habitat of *Anoplistes mongolicus*; **C,** male of *Eodorcadion exaratum argali*; **D,** female of *E. exaratum argali* under cow dung; **E,** melanistic female of *E. exaratum argali*; **F,** *Achnatherum splendens* enclave in semi-desert area, habitat of *Eodorcadion gorbunovi*; **G,** freshly digged larva of *E. gorbunovi*; **H,** male of *E. gorbunovi* climbing onto stems of grasses.

FIGURE 11. Photographs of adults and larvae *in situ* and habitats of typical SE Mongolian cerambycid species. **A,** male of *Eodorcadion gorbunovi* in Shokhoi-Nuur Lake area (erroneous locality of *E. argaloides*); **B,** female of *E. gorbunovi* (ibid); **C,** semi-desert habitat with dried lake overgrown with *Achnatherum splendens*, habitat of *E. gorbunovi* (ibid); **D,** male of *Eodorcadion intermedium kozlovi* hiding in *Caragana* bushes after the night; **E,** female of *E. intermedium kozlovi* feeding on *Caragana* leaves; **F,** male of *E. intermedium kozlovi* climbing onto stems of grass; **G,** female of *E. intermedium kozlovi*; **H,** *A. splendens* enclave between Mandakh and Sainshand, typical habitat of *E. intermedium kozlovi*.

***Eodorcadion* (*Ornatodorcadion*) *novitzkyi* (Suvorov, 1909)**

Literature data. Sükhbaatar: from Kherlen to Khyangan, ca. 750–1200 m a.s.l., 20–25.08.1906, 1 ♂, syntype (ZIN), 1 ♀, syntype (ZMM), Novitzky leg. (Danilevsky 2007).

Remarks. The species is known from several dispersed localities in central and eastern part of Mongolia and from China (Inner Mongolia) (Danilevsky 2020). According to Danilevsky (2007), the type locality is probably localised in Sükhbaatar aimag near its border with Dornod aimag (approx. 46.807, 114.177).

*** *Eodorcadion* (*Ornatodorcadion*) *zichyi* (Csiki, 1901)**
Fig. 8C

Literature data. Dornogovi: Naran [Нарaн] [ca. 43.516, 109.116], 1 ♂, HOLOTYPE *Neodorcadion zichyi* (HNHM) (Namhaidorzh 1972: as *Eodorcadion heros*); Naran, sands Elsen-Usny-Els, 1 ♂, holotype, 1 ♂, paratype, exp. Zichy, leg. Csiki (HNHM) (Danilevsky 2007); Ergel-Ovoo sands [Эргиль-Обо] = Hovsgol env. [43.600, 109.683], 1–15.09.1948, 2 ♂♂ (Namhaidorzh 1972: as *Eodorcadion heros*); Khatan-Bulak [Ergel] sum, Gashuuny els [Elsen-Usny-Els] [ca. 43.466, 109.583], 15.07.1974 and 15.07.1975, 2 ♂♂ (MD); Khoyor Zaan [ca. 43.733, 111.250], 4–15.08.1987, 1 ♀, V. Skrypnik leg. (MD) (Danilevsky 2007); 18 km SSW Hovsgol [43.588, 109.635], 1300 m a.s.l., 9–10.08.2002, 104 ♂♂, 26 ♀♀, M. Danilevsky leg. (MD) (ibid); 2 km SE Khuvsgel [43.600, 109.683], 940 m a.s.l., 10.08.2002, 7 ♂♂, 6 ♀♀, O. Gorbunov leg. (MD) (ibid)

Remarks. *Eodorcadion zichyi* is endemic to Mongolia. All its known localities are localised in Dornogovi aimag, mainly in the environs of Hovsgol (Danilevsky 2007). The locality near Khoer-Dzan seems to require some confirmation as it has not been mapped in the Danilevsky's revision, and it is the only one that slightly stands out from the compact range of this species more to the west.

This is one of the latest occuring *Eodorcadion* species in Mongolia—according to Danilevsky (2007) imagines emerge only in the first quarter of August, when the activity period of most other species is over or has been going on. A huge series of this species was collected by this author on 9–10 August 2002. Such an exceptionally late occurrence seems to be also confirmed by our own observations made in the last quarter of July in the type locality; we have not found even first single males in any of several suitable sites despite that other late *Eodorcadion* species, such as *E. gorbunovi* and *E. intermedium* were already active.

Pteropliini Thomson, 1860

***Pterolophia* (*Pterolophia*) *angusta multinotata* Pic, 1931**

Literature data. Dornogovi: 3 km SE of Zuunbayan [Зүүнбаян] [44.405, 110.111], 21.07.1963, from *Ulmus pumila*, leg. B. Burakowski et H. Szelegiewicz, 1 ♀ (holotype of *Pterolophia burakowskii*) (coll. MIZ PAN) (Heyrovský 1973b: as *P. burakowskii*); 30 km SSE of Tenger-Nuur Lake [Тэнгэр-Нур] [ca. 42.419, 108.682], on broom-grass *Thysanolaena maxima*, 04.08.1971, 1 ♀ (Namhaidorzh 1974: as *Pterolophia rigida*, Namkhaidorzh 1976a: as *P. burakowskii*).

Sükhbaatar: sands of Ongon-Els [пески Онгон-Элс], 15 km SSE of Khongor [Хонгор] = Ongon [45.088, 113.887], on almond *Amygdalus*, 4–5.07.1971, 2 ♂♂ and 5 ♀♀ (ibid).

Remarks. *Pterolophia angusta* (Bates, 1873) was divided into two subspecies: the nominative one, which is endemic to Japan, and *P. angusta multinotata* distributed in eastern Russia, Mongolia, the Korean Peninsula, and China (Shaanxi) (Danilevsky 2020).

It seems that all known *Pterolophia* specimens collected in Mongolia belong to one taxon—*Pterolophia burakowskii* Heyrovský, 1973, which is currently a synonym of *P. angusta multinotata*. *Pterolophia burakowskii* was described based on a single female collected in 1963. About this time, in 1971, another female of this genus was collected in the same aimag and identified as *Pterolophia rigida* (Bates, 1873) (Namhaidorzh 1974). However, a few years later Namkhaidorzh (1976a) published the same specimen again, as *P. burakowskii*. Finally, *P. burakowskii* has been synonymised with *P. multinotata* by Danilevsky & Smetana (2010). In turn, Cherepanov (1990c) syno-

nymised another two taxa that are currently junior synonyms of the discussed subspecies: *Pterolophia ussuriensis* Plavilstshikov, 1954 = *Pterolophia selengensis* Lyamtzeva, 1979. It is, however, not clear who formally proposed *P. ussuriensis* as a synonym of *P. multinotata*.

According to Namkhaidorzh (2007; for *P. ussuriensis*), larvae of this taxon feed in twigs and branches of *Betula* L. (Betulaceae), *Crataegus* L. (Rosaceae), and *Ulmus*. Adults are active in June and July; they do not visit flowering plants and generally lead a cryptic mode of life.

Saperdini Mulsant, 1839

Oberea (*Amaurostoma*) *ressli* Demelt, 1963

Literature data. Sükhbaatar: 40 km SE of Baruun-Urt [Баруун-Урт] [ca. 46.378, 113.572], 14.07.1971, 1 ♂ (Namhaidorzh 1974: as *Oberea* sp.).

Remarks. According to Lin & Ge (2017), *Oberea donceeli* Pic, 1907 is known exclusively from China (Beijing and Tianjin), while in Mongolia, Russia, China (Hebei, Shanxi, Inner Mongolia, Shaanxi, Gansu, Ningxia), and Turkey *O. ressli* is distributed. However, such a disjunctive range seems quite unusual and further study should be conducted to clarify wheather the Turkish and east-Palaearctic specimens belong to the same taxon. In Danilevsky (2020), the distribution for *O. ressli* has not been changed (currently only Turkey) despite the mention of Lin & Ge's (2017) paper in the remarks. Similarly, in Danilevsky (2021a), *O. donceeli*, not *O. ressli*, is recorded for Mongolia.

According to Lin & Ge (2017), *O. ressli* differs from *O. donceeli* by its antennae and elytra being black, and the prothorax with a black longitudinal stripe on each side. The Mongolian specimen from Dornod aimag (Choibalsan), collected on June 23, 1976 by V. Namkhaydorzh, which is presented in the Internet (zin.ru), clearly resembles the former species. Therefore, we consider Namhaidorzh's (1974) record of *Oberea* sp. from Sükhbaatar aimag as *O. ressli*.

Species from *Amaurostoma* group are ecologically associated with *Euphorbia* L. (Euphorbiaceae). According to the data on the biology presented by Cherepanov (1991b) for *O. donceeli*, and therefore consequently for *O. ressli*, this species inhabits montane-steppe regions and the adults occur from mid-May to mid-July.

Phytoecia (*Phytoecia*) *rufiventris* Gautier des Cottes, 1870

Literature data. Ömnögovi: Gurvan Saikhan [хр. Гурван-Сайхан], 40 km S of Bulgan [Булган] [ca. 43.831, 103.527], 28–29.07.1967, 1 ex. (Namhaidorzh 1972).

Remarks. *Phytoecia rufiventris* is distributed in eastern Russia, Mongolia, China, the Korean Peninsula, and Japan, as well as in the Orient (Danilevsky 2020).

According to Cherepanov (1991b), this species inhabits open forest glades, meadows, and roadsides, and it is ecologically associated with herbaceous plants of the family Compositae (=Asteraceae), such as *Aster tataricus* L.fil. and *Ptarmica alpina* (L.) DC. (=*Achillea alpina* L.). Adults are active from the end of May until July.

Discussion

Although we summarised all crucial literature locations and added our own records, the total number of cerambycid species that are known to date from the discussed region of SE Mongolia (approx. 23% of the country's territory, however, many of those taxa occur in the arid zone further to the west) is relatively low and accounts for less than 20% of the country's fauna. While recognition of the entomofauna in this region is clearly far from desired, the diversity of longhorned beetles' assemblages occurring in these arid habitats indeed seems quite poor. A great portion of Mongolian species occurs exclusively in a small fragment of the southern Siberian taiga in the north and in the forest steppe zone (Karpiński, Szczepański, Boldgiv *et al.* 2018). On the other hand, species occurring in the arid zones (i.e., semi-desert and desert habitats), are often endemic to the region of southern Mongolia and adjacent areas of China (mainly Inner Mongolia). These species are, however, extremely interesting in terms of their taxonomy

and bionomy. The adaptations they developed to survive in such difficult conditions, as well as the mechanisms that drive the speciation in a region that lacks serious geographical barriers can be the subject of many absorbing studies.

It is worth noting the complete absence of any representatives of the subfamily Lepturinae in the region (most likely related to the lack of suitable plants) and, which is even more surprising, also the subfamily Prioninae. The absence of the latter is particularly interesting as the habitats prevailing in this region seem to be suitable for species of the genera, such as *Macroprionus* Semenov, 1900, *Mesoprionus* Jakovlev, 1887, *Pogonarthron* Semenov, 1899, and *Psilotarsus* Motschulsky, 1860, whose distribution center is located in Central Asia. Only a single species of this subfamily, *Dorysthenes paradoxus* (Faldermann, 1833), was reported from Mongolia, although this record requires verification (Danilevsky 2021a). However, it is likely that some Prionids, which to date are only known from Kazakhstan and China, occur in the southern and western part of the country.

The taxonomic issues mentioned in the results concerning some species in the genera *Anoplistes*, *Chlorophorus*, and *Eodorcadion* require further studies, including molecular analyses, and will be discussed in separate papers. Apart from the taxonomic issues between *Chlorophorus caragana* and *Ch. obliteratus*, in the MAS collection we found also a single specimen from the environs of Bulgan (Ömnögovi aimag; collected on 20.06.1972 by J. Puntsagdulam) that certainly does not belong to any of the species discussed in this paper, but also does not seem to match any other species of this genus that is known from Mongolia or countries of the former Soviet Union. This specimen possibly represents an undescribed species, however, due to the fact it is a singleton and that the authors are not yet sure enough of the variability of all species distributed in the region of northern China, no further inference is currently possible. This specimen is not presented in this work as it cannot be assigned to any species. On the other hand, Danilevsky (2021a, b) informed on a new species to the Mongolian fauna published by Xu *et al.* (2007)—*Rhondia placida* Heller, 1923. In fact, however, this species was recorded only for China, including the autonomous region of Inner Mongolia, and, therefore, it should be removed from the list as occurring in Mongolia.

The survival of these unique endemic species depends on preservation of their priceless habitats as intact as possible. Unfortunately, even in a such sparsely populated region as southeastern Mongolia, more and more new threats to flora and fauna appear. Mongolian ecosystems are under unprecedented pressures because climate change occurring globally is happening at a much greater rate in Mongolia than the global average (the mean annual temperature has increased 2.14 °C in the last 70 years, MNET 2009; MEGD 2014). This warming trend, coupled with changes in the precipitation patterns (Goulden *et al.* 2016; Vandandorj *et al.* 2017), results in an overall drying tendency of ecosystems and the loss of surface waters. Another big challenge is the increase of livestock since its privatisation in 1992 (Karpiński, Szczepański, Boldgiv *et al.* 2018).

One of the most important factors threatening the biodiversity in the region is the mining industry (MNET 2011). According to Farrington (2005), over the last couple of decades the Mongolian government has been encouraging foreign mining companies to invest in the country. Various environmental issues have been raised as a consequence of mining, including the development of linear infrastructures, elevated levels of dust and heavy metal pollution, and threats to access to water resources. By 2011, 38.5 million hectares (or 24.6% of the territory of Mongolia) was covered by 4,728 mining licenses (Batkhishig 2013). Impacts of mining has been especially severe in southern Mongolia because the region is arid and already under multiple stressors. Another mining-related environmental threat is road erosion caused by heavy machineries used for transportation of mining products, mainly coal. This has been especially destructive for the Gobi ecosystems through which these unpaved roads pass, mainly to the Chinese market. Winds pick up highly fragile soil and coal dust in particular parts of the Gobi to make highly degraded land. By rough estimation, 1.5 million ha of land have been eroded by transportation (Batkhishig 2013).

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