

A new invasive species *Proagopertha lucidula* (Faldermann, 1835) (Coleoptera, Scarabaeidae, Rutelinae) for Kazakhstan

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Abstract

Shining leaf chafer *Proagopertha lucidula* (Faldermann, 1835) is firstly found in Kazakhstan. Records in South-East Kazakhstan (Almaty and Zhetysu oblast) are the westernmost for this species. This species causes damage in the fruit orchards of the Almaty and Zhetysu oblast.

Keywords

Proagopertha lucidula, shining leaf chafers, new finds, adventive species, harmful, South-East Kazakhstan

Introduction

Apple fairy chafer, or lucidula chafer *Proagopertha lucidula* (Faldermann, 1835) belongs to the genus *Proagopertha* Reitter, 1903 of the subfamily Rutelinae Mac Leay, 1819 (shining leaf chafer), the family – Scarabaeidae Latreille, 1802 (scarab beetles). The subfamily includes almost 200 genera and 4000 species (Allsopp and Schoolmeesters 2024). Adult shining leaf chafers feed on leaves, flowers, and flower parts.

Larvae feed on decaying wood, compost or roots (Medvedev 1949; 1974; Berlov et al. 1989; Gusakov 2009). Some species can harm agriculture and are included in the list of quarantine objects in different countries of the world (for example, Japanese beetle *Popillia japonica* Newman, 1838). The genus *Proagopertha* is represented in the world fauna by three species (*P. lucidula*, *P. ohbayashii* Nomura, 1965, and *P. pubicollis* C.O. Waterhouse, 1875), distributed mainly in the eastern Palearctic, with the exception of *P. lucidula* (Medvedev 1949; 1974; Berlov, Kalinina and Nikolaev 1989; Kral et al. 2006; Gusakov 2009; Jin Ill Kim 2011; Zorn and Bezdek 2016).

A generation of *P. lucidula* develops for one year. The flight of adults occurs from early May to mid-June or June–August. Imago feed mainly on flowers and to a lesser extent on young leaves of various plants. The beetles stay in well-lit clearings of deciduous forests, on the flowers of various plants, preferring Rosacea. During the apple blossom season, they fly in masse into the gardens and cause great harm to the flowers. After the apple trees have finished blooming, the beetles again fly to wild vegetation, feeding mainly on rose flowers (Amur rose *Rosa daurica* Pall. etc.). Other known food plants – Hubei angelica *Angelica cincta* H. Boissieu, Dahurian angelica *A. dahurica* (Fisch.) Benth. et Hook. fl. ex Franch. et Savat. (Apiaceae), White spirea *Spiraea betulifolia* Pall., Bridewort *S. salicifolia* L., False spiraea *Sorbaria sorbifolia* (L.) A. Braun, Prickly rose *Rosa acicularis* Lindl. (Rosaceae), Manchurian viburnum *Viburnum burejaeticum* Regel & Herder (Viburnaceae), Tartar maple *Acer tataricum* L. (Sapindaceae), White poplar *Populus alba* L. (Salicaceae), Siberian elm *Ulmus pumila* L. (Ulmaceae), *Ammopiptanthus* spp. (Fabacea). Eggs are laid in the soil. The larva is soil-dwelling and feeds on plant roots. Beetles cause severe damage to flowers and leaves of apple (*Malus* spp.), pear (*Pyrus* spp.), plum (*Prunus* spp.), hawthorn (*Crataegus* spp.), rose (*Rosa* spp.), elm (*Ulmus* spp.), tree-of-heaven (*Ailanthus* spp.), tea tree (*Melaleuca* spp.) and other fruit and decorative trees. The species is one of the important pests of fruit trees in the Far East. Also, larvae feed on the roots of grapevines *Vitis vinifera* L. while adults feed on the buds, leaves, flowers or fruit of grapes (Medvedev 1949; Lee et al. 1973; Medvedev 1974; Li 1981; Gusev 1990; Hao et al. 2005; Meng and Wang 2008; Lu et al. 2009; Reed 2009; Shabalin 2009; Biosecurity Australia 2010; Bezborodov, Aistova and Rogatnykh 2011; Bezborodov 2014; 2019; Xu and Teulon 2019; Bezborodov 2023; Yan Xiongfei et al. 2023; Yang et al. 2023; Wang et al. 2024). A Poxvirus (Tsuey Ding and Siu-Yu Tsia 1985) and parasitic fly *Istocheta unicolor* (Aldrich, 1928) (Borisova-Zinov'eva 1965) was found on the larva of beetle. Adults are noted in the diet of azure-winged magpie *Cyanopica cyanus* (Pallas, 1776) (Nechaev 2023) and black-naped oriole *Oriolus chinensis* Linnaeus, 1766 (Gluschenko et al. 2025).

Materials and methods

The material was collected from 2025 in South-East (Almaty and Zhetysu oblast) Kazakhstan. Standard techniques (Fasulati 1971) used in entomology were used during the collection of the material. The locations of material collection were

recorded using a GPS navigator GPSMAP 66i and Google Earth. The following sources (Medvedev 1949; Borisova-Zinov'eva 1965; Lee, Lee and Hseuh Tsai 1973; Medvedev 1974; Li 1981; Tsuey Ding and Siu-Yu Tsia 1985; Berlov et al. 1989; Gusev 1990; Hao et al. 2005; Kral, Smetana and Zorn 2006; Meng and Wang 2008; Gusakov 2009; Reed 2009; Shabalin 2009; Biosecurity Australia 2010; Bezborodov et al. 2011; Jin Ill Kim 2011; Bezborodov 2014; Zorn and Bezdek, 2016; Bezborodov 2019; Xu and Teulon 2019; Bezborodov 2023; Nechaev 2023; *Proagopertha lucidula* in GBIF Secretariat 2023; Yan Xiongfei et al. 2023; Yang et al. 2023; Wang et al. 2024) were used for species determination of the beetles, clarification of their taxonomic position, biology and the distribution. In addition to our own collections, we reviewed specimens and these pictures, collected in fruit-growing farms in the Zhetysu oblast and sent to the Kazakh Scientific Research Institute of Plant Protection and Quarantine named after Zh. Zhiembayev (KazSRIPPQ named after Zh. Zhiembayev) for subsequent identification. Studied specimens are kept in the private collection of I.I. Temreshev (Almaty, Kazakhstan) and in KazSRIPPQ named after Zh. Zhiembayev (Almaty, Kazakhstan).

Photographs of *P. lucidula* were taken with a camera Honor X9c 8/256 Titanium Black by author (Figs 1, 2B). Photographs of *P. lucidula* from Zhetysu oblast, neighborhoods of Zharkent city (Fig. 2A) given to us by a research fellow Kuanysh Tusupbaev (KazSRIPPQ named after Zh. Zhiembayev). Descriptions and body measuring were performed using a Micromed MC var 1-C dissecting stereomicroscope and Digital microscope G 1200.

Results

Family Scarabaeidae Latreille, 1802

Subfamily Rutelinae Mac Leay, 1819

Genus *Proagopertha* Reitter, 1903

Proagopertha lucidula (Faldermann, 1835)

= *Anomala acutisterna* Fairmaire, 1878

= *Proagopertha aeneoflavida* Reitter, 1913

= *Proagopertha starki* Reitter, 1913

Figure 1

As a result of the research, new locations of finds of apple fairy chafer *P. lucidula* were established on the territory of Kazakhstan (Figs 2, 3).

Material examined. 5 ex. – 10.04.2025, South-East Kazakhstan, Almaty oblast, Uygur district, neighborhoods of Charyn village, on the Wild apricot *Prunus armeniaca* L., N 43°46'33.90", E 79°22'15.84", I.I. Temreshev; 12 ex. – 14.04.2025, South-

East Kazakhstan, Zhetysu oblast, Panfilov district, neighborhoods of Zharkent city, apple garden, on the flowers of Domestic apple *Malus domestica* (Suckow) Borkh., collector and coordinates unknown; 52 ex. – 22.05.2025, South-East Kazakhstan, Zhetysu oblast, Panfilov district, neighborhoods of Avat village, apple garden, on the flowers of Domestic apple *M. domestica*, collector and coordinates unknown; 3 ex. – 24.04.2025, South-East Kazakhstan, Almaty oblast, Uygur district, thickets on the slope near the road, on the flowers of *Spiraea tianschanica* Pojark, N 43°45'12.78", E 79°6'30.28", I.I. Temreshev.

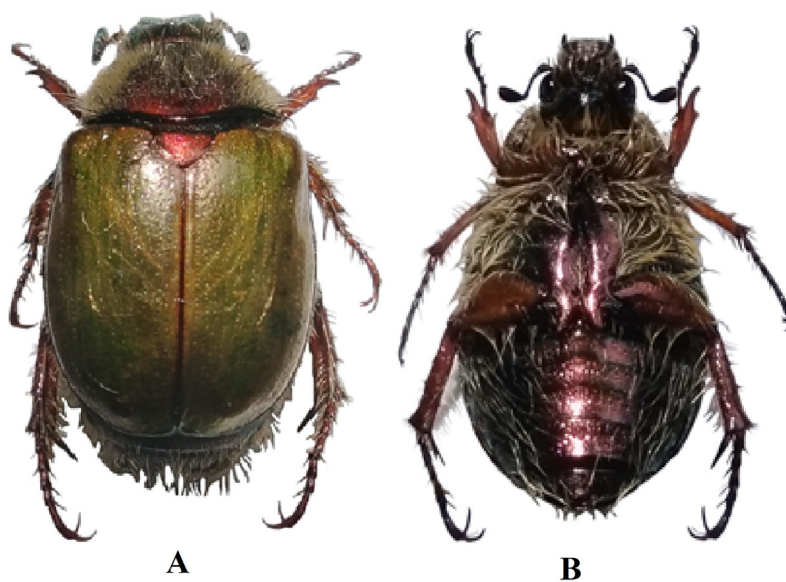


Figure 1. Apple fairy chafer *Proagopertha lucidula*: habitus, dorsal (A) and ventral (B) view (Soth-East Kazakhstan).

Distribution. *Proagopertha lucidula* was previously recorded in the Russian Far East, North and South Korea, China (Anhui, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Sichuan, Shaanxi, Shandong, Shanxi and Ili Kazakh Autonomous Prefecture in northern Xinjiang) (Medvedev 1949; Berlovet al. 1989; Bezborodov et al. 2011; Kral, Smetana and Zorn 2006; Gusakov 2009; Jin Ill Kim 2011; Zorn and Bezdek, 2016; Bezborodov 2019; 2023; *Proagopertha lucidula* in GBIF Secretariat 2023).

Remarks. In apple orchards in Zhetysu oblast, Panfilov district, mass flight and mating of beetles, damage to apple tree flowers were noted. In the Almaty oblast, Uygur district *P. lucidula* was found 177 km west of the nearest previously known point of its distribution – the Ili Kazakh Autonomous Prefecture in northern Xinjiang. Now, this find is the westernmost point both in Kazakhstan and in the world.

In the Zhetysu oblast, Panfilov district the species was identified 95,82 km Avat village and 112 km Zharkent city north-west of the nearest previously known point of its distribution – Ili Kazakh Autonomous Prefecture in northern Xinjiang. Currently, this population of *P. lucidula* is the northernmost in Kazakhstan (Fig. 3).

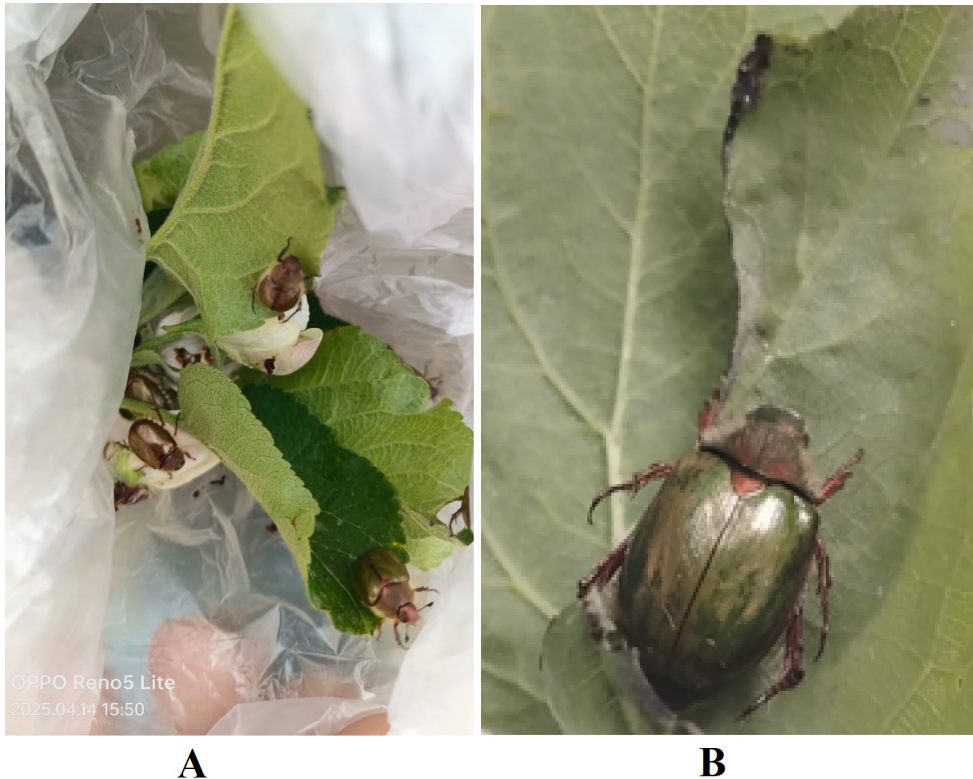


Figure 2. Apple fairy chafer *Proagopertha lucidula* on the flowers of Domestic apple *Malus domestica*, South-East Kazakhstan, Zhetysu oblast, neighborhoods of Zharkent city (A), and on the leaves of Wild apricot *Prunus armeniaca* L., Almaty oblast, Uygur district, neighborhoods of Charyn village (B).

Discussion

Taking into account our findings, the distribution of *P. lucidula* now covers partially South-East Kazakhstan. The shift in the range of the apple fairy flower chafer could be caused by climatic changes, which has already been noted for many other insect species (Lachininsky et al. 2015; Temreshev 2018; Temreshev 2023a, b; Temreshev 2024). At the same time, there could have been an accidental importation with agricultural products, planting material or soil from China, or from the southern regions of Kazakhstan, and the subsequent establishment of the species in a new habi-

tat. There are numerous examples of the introduction of harmful alien species in this part of the country (Temreshev and Childebaev 2014; Kazenas and Temreshev 2016a, b; Temreshev and Valieva 2016 a, b; Temreshev, Esenbekova and Uspanov 2018; Temreshev et al. 2018; Temreshev and Kazenas 2020; Temreshev et al. 2024; Temreshev, Kozhabaeva and Yakovlev 2025).

It should be noted that, according to our data, a change in the phenology of *P. lucidula* occurred in the new habitat. According to available information (Medvedev 1949; Bezborodov 2019), the flight of adults occurs from early May to mid-June or June-August. However, in Kazakhstan, judging by the collected specimens of apple fairy chafer, the flight occurs from April to May. These data need to be supplemented by further research due to the importance of the species as a pest.

Judging by the small number of finds in the Almaty oblast, the invasion of the pest here from the Zhetysu oblast began only recently. The further dispersal of *P. lucidula* throughout the South-East and South Kazakhstan is expected, primarily in the Almaty, Zhetysu, Turkistan and Jambyl oblasts. It is also possible that the species will spread northwards, to the southern part of the East Kazakhstan oblast. Subsequent invasion into neighboring Central Asian countries – Kyrgyzstan and Uzbekistan – is likely.

Since the apple fairy chafer is a dangerous pest of fruit and ornamental crops, constant monitoring of its spread is necessary.

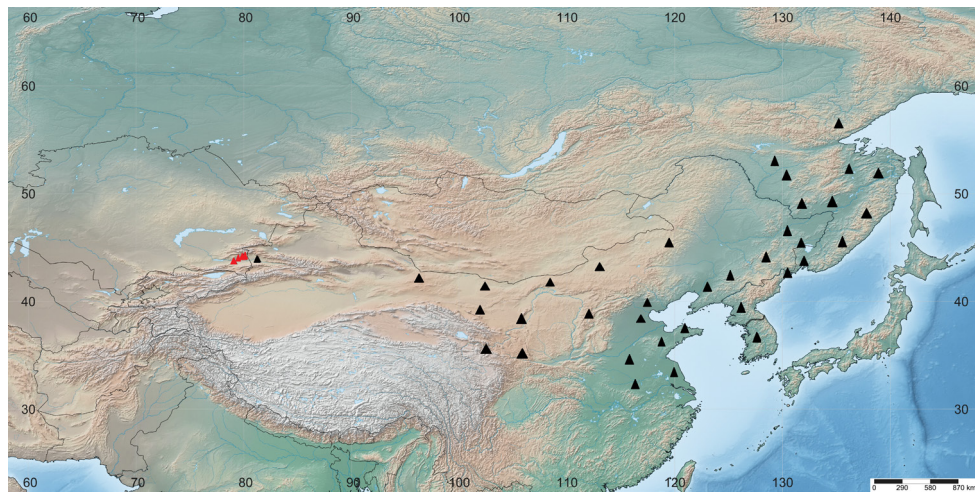


Figure 3. Distribution of apple fairy chafer *Proagopertha lucidula* in world and in Kazakhstan. New records are indicated with red triangles. Known indicated in black triangles.

Conclusions

The apple fairy chafer *P. lucidula*, has now significantly expanded its range to the west, to South-East Kazakhstan. Such a shift in the species' range became possible due to ongoing climate changes. Additionally, the species could have been accidentally introduced along with fruits or other agricultural products agricultural products, planting material or soil from China. Introduced individuals could take root in a new place, finding favorable temperature conditions due to ongoing global warming. Currently, the Almaty oblast is the westernmost record of distribution of *P. lucidula* in the world. Apparently, in the future we should expect further spread of this species, an increase in the number of species of crops damaged by it, and its harmfulness.

Since the species is polyphagous, eating many plants of the Rosaceae family, its introduction into Kazakhstan poses a threat not only to gardens and ornamental plantings. When in mass reproduction, the beetle can cause serious damage to many plants listed in the Red Book of the Republic of Kazakhstan, such as the Sievers apple tree *Malus sieversii* (Ledeb.) M. Roem., Niedzwetzky apple tree *Malus niedzwetzkyana* Dieck, Wild apricot *Prunus armeniaca* L., Wild almond *P. ledebouriana* (Schltdl.) Y.Y. Yao, *P. ulmifolia* Franch., Pavlov Rose *Rosa pavlovii* Chrshan., Persian mountain-ash *Hedlundia persica* (Hedl.) Mezhenkyj, *Cotoneaster karatavicus* Pojark., *Crataegus ambigua* C.A. Mey. ex A.K. Becker, *Spiraeanthus schrenckianus* (C.A. Mey.) Maxim, *Sibiraea tianschanica* (Krasn.) Pojark., *S. laevigata* (L.) Maxim.

Of the natural regulators of *P. lucidula* numbers, only the Poxvirus (Tsuey Ding and Siu-Yu Tsia 1985), parasitic fly *I. unicolor* (Borisova-Zinov'eva 1965), azure-winged magpie *C. cyanus* (Pallas, 1776) (Nechaev 2023) and black-naped oriole *O. chinensis* Linnaeus, 1766 (Gluschenko et al. 2025). Since measures to control the population of apple fairy chafer, as well as other species of flower chafers, have not been developed in Kazakhstan, research in this direction is necessary.

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