ABS ACTA BIOLOGICA SIBIRICA
A journal on the biodiversity of Siberia and the adjacent lands

Acta Biologica Sibirica 11: 171–195 (2025)
doi: 10.5281/zenodo.14915341
http://journal.asu.ru

RESEARCH ARTICLE

An annotated checklist of ladybeetle species (Coleoptera, Coccinellidae) of Ferghana Valley (Uzbekistan)

Saodat T. Gafurova[1], Bakhtiyor R. Kholmatov[2], Gulnara S. Mirzaeva[2]

1 *Namangan State University, Namangan, Uzbekistan*
2 *Institute of Zoology of the Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan*

Corresponding author: Saodat T. Gafurova (saodat.0312.84@mail.ru)

Academic editor: R. Yakovlev | Received 20 January 2025 | Accepted 11 February 2025 | Published 26 February 2025

http://zoobank.org/078DE310-7FF2-4E3E-91B2-3679BFD9A0C0

Citation: Gafurova ST, Kholmatov BR, Mirzaeva GS (2025) An annotated checklist of ladybeetle species (Coleoptera, Coccinellidae) of Ferghana Valley (Uzbekistan). Acta Biologica Sibirica 11: 171–195. https://doi.org/10.5281/zenodo.14915341

Abstract

The article presents the results of a study on the fauna of lady beetles (Coleoptera, Coccinellidae) based on our observations in the Fergana Valley during the spring, summer, and autumn seasons as well as the winter season from 2022 to 2024. Thirty-five species of lady beetles, belonging to 5 subfamilies (Scymninae, Chilocorinae, Ortaliinae, Coccinellinae, Hyperaspidinae), 9 tribes, and 19 genera, were found along the valley. Noteworthy species identified in the Fergana Valley during the research include *Novius yemenensis* (Raimundo & Fürsch, 2006), *Platynaspidius saundersi* (Crotch, 1874), *Brachiacontha ursine* (Chevrolat in Dejean, 1837), *Scymnus marinus* (Mulsant, 1850). The species *Calvia muiri* (Timberlake, 1943), *Clitostethus arcuatus* (Rossi, 1794) were recorded for the first time in the fauna of Uzbekistan and 23 species were recorded for the first time in the Fergana Valley.

Keywords

Coleoptera, Coccinellidae, Uzbekistan, Namangan, Fergana, Andijan, distribution, coccidophagous

Introduction

The family Coccinellidae belongs to the superfamily Cucujoidea within the order Coleoptera. Beetles of the Coccinellidae family are ubiquitous and are significant subjects for faunistic, ecological, taxonomic, genetic, and other studies. The name Coccinellidae is derived from the Latin word “coccineus”, meaning "red" and was first introduced in 1807 by Latreille (Latreille 1807). Both the larvae and adults of these insects are carnivorous, feeding on Aleyrodoidea, Aphidoidea, larvae of Chrysomelidae, Coccoidea and Psylloidea. Some species of the genus “Harmonia” prey on ants (Hymenoptera: Formicidae), while others, such as those in the tribe Stethorini, are predators of spider mites. Additionally, there are also herbivorous species, including agricultural pests, some members of the tribes Tytthaspidini and Halyziini are mycophagous (Majerus et al. 2007; Biddinger et al. 2009; Hodek and Honěk 2009; Obrycki et al. 2009; Sutherland and Parella 2009; Hodek and Evans 2012; Harris 1921). The family Coccinellidae comprises approximately 6,000 species distributed among 360 genera worldwide (Nedved and Kovar 2012).

A number of scientific studies on this family have also been conducted in Central Asia. In particular, G.I. Savoyskaya studied the fauna, biology, and ecology of coccinellids in southeastern Kazakhstan and developed identification keys for 133 larval species and 180 beetle species of coccinellids (Savoyskaya 1983). The faunal analysis, biology, and ecology of coccinellids in the territory of Tajikistan were studied by M.A. Ataeva in 1963, who described 37 species of coccinellids, providing their main ecological characteristics (Ataeva 1963). Research conducted by F.R. Khakimov in the southwestern region of Tajikistan recorded 30 species of coccinellids (Khakimov 2019). In Uzbekistan, 106 species and subspecies of coccinellids, belonging to 25 genera and 2 subfamilies, have been recorded (Azimov et al. 1993). Research conducted by A.K. Mansurov on the species composition, ecology, and agricultural significance of coccinellids in southern Uzbekistan identified 42 entomophagous species and 2 phytophagous species from this family (Mansurov 1968). In the Bukhara region, O.I. Jabbarova documented 41 species belonging to 20 genera (Jabbarova 2011), while H.P. Buriyeva identified 38 species from 19 genera in the agrocenoses of Kashkadarya (Buriyeva 2023). T. Vakhidov provided data on the biology of *Adonia variegata* and *Synharmonia conglobata*, predators of apple aphids in the Fergana Valley (Vakhidov 1977).

Materials and methods

Studies on coccinellids were conducted across various biotopes, landscapes, and agrocenoses in the Fergana, Andijan, and Namangan regions of the Fergana Valley from 2022 to 2024. Observations were carried out at permanent monitoring sites every 7–10 days throughout the growing season and on transects 2–3 times per month. Material was primarily collected from March to December, with additional samples gathered in January and February (Fig 1).

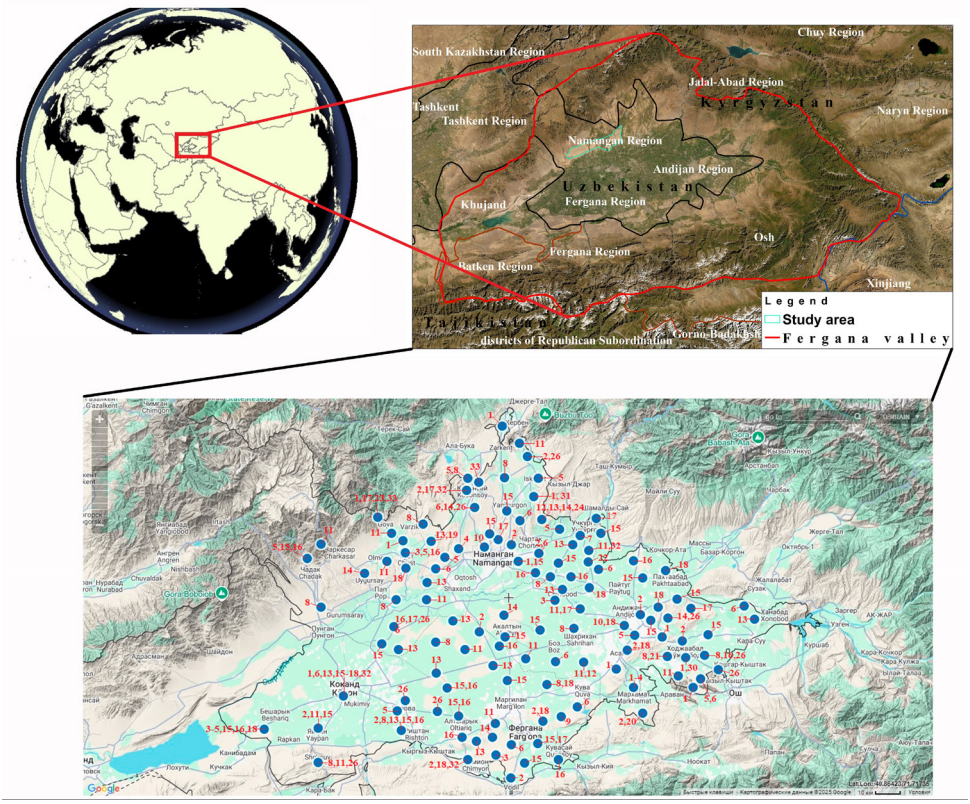

Figure 1. Map of the study area (note: the numbers shown on the card correspond to the numbers assigned to the types listed in the order in the article).

Coccinellid surveys in agrobiocenoses and stations were conducted following the methodologies of G.I. Savoyskaya (1983, 1991) and V.P. Semyanov (1984). The collection, processing, and preparation of insect specimens for collections were guided by V.B. Golub, M.N. Tsurikov, and A.A. Prokin (Golub et al. 2012).

The study encompassed various natural and agrobiocenoses, including alfalfa, cotton, and grain fields, fruit orchards, vegetable and sugarcane fields, greenhouses, medicinal plant plantations, residential and sanatorium areas, as well as mountain and hilly regions, stream banks, and wintering-reservation zones within the mid-mountain area, which also included small stone-gravel terrains. In many cases, the imago, eggs, larvae, as well as their food sources, were collected primarily by hand. A portion of the collected biomaterial was preserved in 96% ethanol in standard laboratory test tubes for molecular analysis. The following data were recorded for each sample: the name and coordinates of the collection site, the date, the name of the plant, altitude above sea level, relative humidity, air temperature, wind speed, and depth of wintering sites. Each sample was labeled with these measurements, and photographic evidence was also collected during the sampling process. During

the research, the morphometric measurements of coccinellids were conducted using a Trinocular Stereo Zoom Microscope (SZM-45NT, China), and the collected data were analyzed.

The global distribution of these species was analyzed using the Global Biodiversity Information Facility (GBIF) database (Global Biodiversity Information Facility, www.gbif.org). The taxonomy and nomenclature of the coccinellids were verified according to the Integrated Taxonomic Information System (ITIS) (https://www.itis.gov).

The species composition of the collected materials was compared with the samples of the collection of coccinellids collected by Mansurov and Muradov in the Entomological Laboratory of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan, using identification keys and information tables (Savoyskaya 1983; Iablokoff-Khnzorian 1982; Bienkowski 2020). Species new to the region are marked with (*).

Results

According to our observations conducted in the Fergana Valley during the spring, summer, autumn, and winter seasons of 2022 - 2024, coccinellids (Coleoptera, Coccinellidae) were represented by 5 subfamilies (Scymninae, Chilocorinae, Ortaliinae, Coccinellinae, Hyperaspidinae), 19 genera, and 33 species belonging to various genera.

Order Coleoptera Linnaeus, 1758

Suborder Polyphaga Emery, 1886

Family Coccinellidae Latreille, 1807

Subfamily Coccinellinae Latreille, 1807

Genus *Adalia* Mulsant, 1850

***1. Adalia bipunctata* (Linnaeus, 1758)**
Figs 1, 2A[1]–2A[4]

Material examined. From walnut (*Juglans regia* L.), Chartak District, village of Arbagish, Zirkota Temple (22.04.2023): 744 m a.s.l., 41°15'41.77" N, 71°50'40.99" E. Andijan Province, Marhamat District (23.04.2023): 613 m a.s.l., 40°36'01.06" N, 72°17'26.6" E. Bogishamol, Khodzhabad Hills (05.01.2023): 574 m a.s.l., 40°42'57.25" N, 72°26'56.07" E. Shirmanbulok (01.05.2023): 647 m a.s.l., 40°35'51.73" N, 72°30'21.16" E, Bulokboshi (01.05.2023): 551 m a.s.l., 40°38'18.07"

N, 72°27'05.5" E. Fergana Province, Dangara District, almond (*Amygdalus communis* L.) (05.05.2023): 500 m a.s.l., 40°18'26.69" N, 70°46'47.79" E, Chartak District, 41°04'27.88" N, 71°50'09.22" E, 465 m a.s.l., (13.05.2023). From plum (*Prunus spinosa* L.) and walnut, Yanikurgon District, village of Nanay (06.05.2023): 1387 m a.s.l., 41°32'17.2" N, 71°42'11.71" E.

Distribution. Cosmopolitan species (Biranvand et al. 2018).

Diagnostic signs. This species can vary in color, with two predominant color types:

- The pronotum is white with a black M-shaped spot. The elytra are red or orange, each with a single black spot, and the margins are not black;
- The pronotum is black with a thin white line along its edge. The elytra are black, each with 1–3 orange or red spots (which may be absent);
- The claws of the legs in *Adalia bipunctata* have square-shaped denticles Body length 3.5–5.4 mm. It is common in the valley and feeds on aphids.

2. Adalia decempunctata (Linnaeus, 1758)

Figs 1, 2 B^1–B^4

Material examined. From walnut (*Juglans regia* L.) Namangan City, Namangan Region, (27.04.2023): 3♀♀, 2♂♂, 371 m a.s.l., 40°58'53.77" N, 71°42'01.02" E, Chust District, Gova Village, (27.04.2023): 5♀♀, 3♂♂, 371 m a.s.l., 41°07'00.07" N, 71°08'10.14" E, Bogishamol, Khodzhabad Hills, (01.05.2023): 574 m a.s.l., determined from coordinate points 40°42'57.25" N, 72°26'56.07" E and 40°33'37.91" N, 72°36'56.07" E.

Distribution. Europe, North Africa, Asia (Biranvand et al. 2018).

Diagnostic signs. The length of the body is 3.5–5 mm. The color and number of spots on the elytra are highly variable, ranging from yellow-red to dark brown. Some individuals may lack spots entirely. Typically, there are between 2 and 15 black spots. Among the specimens collected from the research area, almost all individuals of this species had orange elytra with 2 spots, dark brown elytra with 2 spots, and light yellow imagos without spots.

3. Adalia facciatopunctata (Linnaeus, 1758)

Figs 1, 3A

Material examined. From walnut (*Juglans regia* L.) Namangan City, Namangan Region, (27.04.2023): 2♀♀, 1♂♂, 371 m a.s.l., 40°58'53.77" N, 71°42'01.02" E, Bulakboshi, Andijan Region, (01.05.2023): 551 m a.s.l., 40°38'18.07" N, 72°27'05.5" E.

Distribution. Asia Minor, Syria, Central Europe, Siberia, Kazakhstan, Caucasus, Central Asia (Jabbarova 2011).

Diagnostic signs. Elytra are red or yellowish with 7 black spots on each, which may partially disappear or merge.

4. Adalia quatuordecimpunctata (Linnaeus, 1758)

Figs 1, 3B

Material examined. Bulakboshi, Andijan Region (01.05.2023): 2♀♀, 1♂♂, 551 m a.s.l., 40°38'18.07" N, 72°27'05.5" E.

Distribution. Far East, Siberia, Iran, Iraq, Israel, Turkey, Ukraine, Central Asia (Kazakhstan, Tajikistan, Turkmenistan), China, North America, Australia (Jabbarova 2011).

Diagnostic signs. The pronotum is white with 5 black spots in the center. The elytra are red or yellowish, each with 7 black spots, which may partially disappear or merge with each other.

5. Adalia tetraspilota (Hope, 1831)

Figs 1, 3C

Material examined. Gova Village, Chust District, from apricots (*Prunus armeniaca* L.), walnuts, and corn (*Zea mays* L.) (26.06.2021; 14.06.2023; 21.08.2023): 3♀♀, 2♂♂, 912 m a.s.l., 41°07'57.18" N, 71°06'54.39" E, Yorkhishlok Village, from cherry tree (*Prunus domestica* L.) (21.05.2022): 1♀♀, Nanay Village, Yangikurgan District, from plum tree (*Prunus spinosa* L.) (04.12.2022): 1♀♀, 1384 m a.s.l., 41°32'17.87" N, 71°42'11.52" E, Chartak District, Arbagish Hills, Zirkota Shrine, from walnut (*Juglans regia* L.) (22.04.2023): 2♀♀, 1♂♂, 737 m a.s.l., 41°15'41.77" N, 71°50'40.99" E, Khojaabad Hillocks, Bogishamol District, Andijan Province (01.05.2023): 1♀♀, 1♂♂, 574 m a.s.l., 40°42'57.25" N, 72°26'56.07" E, Imomota Village (same day as above): 2 individuals from walnut, 697 m a.s.l., 40°33'37.91" N, 72°36'28.47" E, Kosonsoy District, Namangan Region, Almazor Village, from almonds (*Amygdalus communis* L.) (05.05.2024): 2♀♀, 1♂♂, 41°16'01.14" N, 71°32'06.42" E.

Distribution. Asia (Biranvand et al. 2014).

Diagnostic signs. The body of *Adalia tetraspilota* is oval-shaped and resembles *Adalia bipunctata* (Linnaeus, 1758). The body length is 3.2–5.5 mm. The pronotum is black, with cream-yellow sides and a transparent front. The elytra range from orange-yellow to red, with two pairs of black spots in a shallow arc shape located slightly before the middle, with the outer pair usually larger than the inner one.

Genus *Calvia* Mulsant, 1846

6. Calvia punctata (Mulsant, 1853)

Figs 1, 2C¹, 2C²

Material examined. Gova Village, Chust District, from apricot, walnut, and poplar trees (*Populus alba* L.) (09.03.2022; 21.08.2022; 25.11.2022; 14.06.2023): 3♀♀, 2♂♂, 910 m a.s.l., 41°07'57.18" N, 71°06'54.39" E, Yorkhishlok Village, from walnut (20.03.2022; 15.05.2022): 3♀♀, 630 m a.s.l., 41°02'34.79" N, 71°14'33.83" E,

Chartak District, (22.03.2022; 02.05.2022; 29.05.2022): 2 ♀♀, 3 ♂♂, 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E, Toza Havo Sanatorium, Asaka, Andijan Region (23.04.2023): 1♀♀, 1♂♂, 40°36'01.06" N, 72°17'26.6" E, Imomota Village, Andijan Region, (01.05.2023): 1♀♀, 1♂♂, 40°33'37.91" N, 72°36'28.47" E, Shirmanbulok, (01.05.2023): 1♀♀, 640 m a.s.l., 40°35'51.73" N, 72°30'21.16" E, Fergana Region, (05.05.2023): 1♀♀, 1♂♂, 40°33'16.69" N, 71°13'57.52" E, Almazor Village, Kosonsoy District, Namangan Region, from almonds (05.05.2024): 2♀♀, 1♂♂, 41°16'01.14" N, 71°32'06.42" E, Marhamat District, Andijan Region, from bluer (*Populus alba* L.) (04.08.2022): 1♀♀, 1♂♂, 41°01'40.08" N, 71°38'18.29" E, Quince (*Cydonia oblonga* M.) Chimyon District, Fergana Region (11.08.2022): 40°22'35.35" N, 71°47'28.71" E, Arbagish Hills, Chartak District, from Zirkota Shrine Otquloq (*Rumex crispus* L.) (22.04.2023): 1♂♂, 762 m a.s.l., 41°14'58.84" N, 71°50'46.63" E.

Distribution. Europe, Russia, Mongolia, China, North and South Korea, Japan (Nikitsky and Ukrainsky 2016).

Diagnostic signs. The body is broadly oval and moderately convex, with variable coloration. The elytra can be yellow or entirely black, each with two black spots,some species may lack spots. In some species, the pronotum is black, while in others, it features yellow spots with two black dots. The body length ranges from 5.0 to 6.0 mm.

7. ****Calvia muiri* **(Timberlake, 1943)
Figs 1, 3D

Material examined. Chadak Village, Pop District, Namangan Region (24.06.2023): 2♀♀, 1♂♂, 41°10'51.32" N, 70°70'81.73" E.

Distribution. North Pacific, Japan,Taiwan. It is found in orchards and fields where vegetables are cultivated.

Diagnostic signs. The body is short, oval, and moderately convex. The elytra, underside of the body, and legs are yellow with prominent hairs, and the elytra feature very small dotted lines. The eyes are large. Body length ranges from 4 to 5.5 mm. The head is orange-brown with a white anterior margin and an elongated area around the compound eyes. The pronotum is orange-brown with a white anterior edge and four white spots at the base.

Genus *Coccinella* Linnaeus, 1758

***8. Coccinella septempunctata* (Linnaeus, 1758)**
Figs 1, 3E

Material examined. It is found in all parts of the Fargana Valley. Found throughout all four seasons of the year.

Distribution. North Africa, Europe, Russia (European part,Western Siberia, Far East), Afghanistan, Bhutan, China, Cyprus, Iran, Iraq, Israel, Japan, Jordan, In-

dia, Kyrgyzstan, Kuwait, Kazakhstan, Lebanon, Mongolia, Nepal, Pakistan, Saudi Arabia, North and South Korea, Egypt, Syria, Tajikistan, Turkmenistan, Türkiye, Uzbekistan, Afrotropical, Nearctic, Oriental regions (https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.11733).

Diagnostic signs. This species features red and orange elytra with an articular point near the scutellum and three black spots of varying sizes on each elytron. The front of the elytra may also have white spots. The pronotum is black with white front corners. Each side of the head has one white spot. The body length ranges from 6.3 to 7.9 mm.

Genus *Coccinula* Dobzhansky, 1925

***9. Coccinulla sinuatomarginata* (Faldermann, 1837)**
Figs 1, 3F

Material examined. From cotton (*Gossypium herbaceum* L.), Fergana Region, Bagdad District: 1 specimen, 390 m a.s.l., 40°25'44.15" N, 71°14'02.51" E.

Distribution. Europe, North Africa, Asia (Biranvand et al. 2018).

Diagnostic signs. The body is broad-oval and moderately convex, with small dotted lines and no hairs on the top. The elytra may feature black, yellow, or pink spots. Typically, all four points near the lateral edge of the elytra are connected, forming either a square or semicircle, with the rear point often separate. The body length ranges from 2.6 to 3.5 mm. This species feeds on aphids and thrips and is adapted to xerophytic environments.

***10. Coccinula elagantula* (Weise, 1890)**
Figs 1, 3G

Material examined. Chiganak Village, Pop District, Namangan Region: From an apple tree apple (*Malus domestica* B.) (15.05.2023): 1 specimen, 40°47'31.25" N, 71°04'20.08" E; Namangan City, from an apple tree (10.05.2024): 1 specimen, 370 m a.s.l., 40°58'54.01" N, 71°41'58.13" E.

Distribution. Europe, Russia (European part), Middle East (Iran), Central Asia (Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan), East Asia (Mongolia) (Biranvand et al. 2018).

Diagnostic signs. The body is broad-oval, moderately convex, and without hairs. Elytra are yellowish with 9 brown or brown-black spots. Pronotum is yellowish with 6 or 7 brown spots, which may sometimes be connected. The head is yellow with two brown spots at the base. The eyes are large. Body length ranges from 3.0 to 3.5 mm. This species primarily feeds on sap in both beetle and larval stages. It is a xerophilic species.

Genus *Hippodamia* Chevrolat, 1836

***11. Hippodamia variegata* (Goeze, 1777)**
Figs 1, 3H

Material examined. It is found in all parts of the Fargana Valley.

Distribution. Most of Palearctic, Afrotropical and Oriental (northern India) regions; introduced populations in Australia, Nearctic region, and Neotropics (Franzmannb 2002; Kovar 2007; Slipinski 2007).

Diagnostic signs. The body is oblong-oval, slightly convex, and hairless on top. Elytra are red or orange, with a common spot on the scutellum and a highly variable number of black spots (0–6) on each elytron. The head is black with black eyes and white spots. Pronotum is black with a central black spot bordered by white and yellow. Body length ranges from 3.0 to 5.5 mm. Feeds primarily on aphids.

***12. Hippomamia tredecimpunctata* (Linnaeus, 1758)**
Figs 1, 3I

Material examined. Namangan City, Chartak District (13.05.2023): 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E.

Distribution. Europe, Russia (European part, Caucasus, Siberia, Far East), Middle East (Iran, Iraq), Central Asia (Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan,Turkmenistan, Uzbekistan), East Asia (China, Japan, Korea, Mongolia), North Africa (Poorani 2002; Kovar 2007).

Diagnostic signs. Elytra: Orange-red with seven rows of black dots; points are rarely missing or merged. Pronotum: White and yellow with a large central black spot and two small spots on the sides. Body Length: 4.5–7 mm.

Feeding Habits: Adults and larvae feed on aphids, Colorado beetle eggs, small larvae, and mealy dew.

Habitat: Mesophilic species.

Genus *Propylea* Mulsant, 1846

***13. Propylaea quatuordecimpunctata* (Linnaeus, 1758)**
Figs 1, 2D^{1}, 2D^{2}

Material examined. It is found in all parts of the Fargana Valley.

Distribution. India, Pakistan, Bangladesh, Japan, China, Europe, North America (Poorani 2002).

Diagnostic signs. Broadly oval, moderately convex, without hair on the top. Elytra yellow with ten interlocking spots, often forming an anchor-shaped band, or six to seven elongated rectangular black spots, usually interlocking. Pronotum: Yellow with 4 to 6 black spots, and a large black median spot. Body Length: 3.5-4.5

mm. Feeding Habits: Besides aphids, it also preys on aleurodids, coccid larvae, and eggs of various butterflies and beetles.

Habitat: Mesophilic species.

Genus *Psyllobora* (Chevrolat in Dejean, 1837)

14. Psyllobora vigintiduopunctata (Linnaeus, 1758)

Figs 1, 3J

Material examined. Namangan City, Chartak District: From cotton wool (*Cirsium abkhasicum* G.) (13.05.2023): 2 specimens, 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E; Under the quince (*Cydonia oblonga* M.) tree: (13.03.2024): 25 specimens; Shirmanbulok Village, Andijan Region: From Namatak (Rosa L.) (01.05.2023): 1 specimen, 640 m a.s.l., 40°35'51.73" N, 72°30'21.16" E; Gova Village, Chust District: Under apple tree debris (*Malus domestica* L.) (25.11.2022): 1 specimen, 950 m a.s.l., 41°07'54.35" N, 71°06'37.7" E; Sherbilak MFY: From apple tree and under grass (30.07.2022; 24.08.2022): 4♀♀, 2♂♂; Guldirov Village, Chartak District: From alfalfa (*Medicago sativa* L.) (28.07.2022): 2 specimens; Gova Village House, from coreopsis (Coreopsis tinctoria N.) (11.07.2022): 5♀♀, 2♂♂, 6 larvae, 916 m a.s.l., 41°07'04.31" N, 71°07'52.94" E; Almazor Village, Kosonsoy District, Namangan Region: (05.05.2024): 2♀♀, 3♂♂, 41°16'01.14" N, 71°32'06.42" E.

Distribution. Europe, North Africa, Asia (Biranvand et al. 2018).

Diagnostic signs. The body is broadly oval and moderately convex, with a hairless dorsal surface. Each elytron features 11 black dots and is yellow in color. The pronotum is white or light yellow with 5 black dots. Occasionally, reddish elytra are observed. The body length ranges from 3 to 4.5 mm. This species feeds on honeydew and is classified as a mesophilic species.

Genus *Oenopia* Mulsant, 1850

15. Oenopia conglobata (Linnaeus, 1758)

Figs 1, 3K

Material examined. This species is dominant for the Ferghana Valley.

Distribution. Europe, Asia, North America (Biranvand et al. 2018).

Diagnostic signs. The body is oblong-oval, slightly convex, and variable in color. The pronotum is white or light yellow with seven brown spots. The elytra are yellow or pink, each with 7–8 spots, featuring a large central angle and various irregular shapes. In rare cases, the elytra are entirely black. The scutellum is small and black. The body length ranges from 3.5 to 5.0 mm. It feeds on the larvae of aphids and leaf-eating beetles.

Genus *Halyzia* Mulsant, 1846

16. Halyzia tschitscherini (Semenow, 1895)

Figs 1, 3L

Material examined. It is found in all parts of the Fargana Valley.

Distribution. India (Himachal Pradesh, Jammu & Kashmir, Uttarakhand); Pakistan; Afghanistan; Tibet (Poorani 2023).

Diagnostic signs. The elytra are brown with 18 creamy dots, each elytron having 6 irregular and 3 elongated spots. There is a longitudinal creamy band at the junction of the elytra. The pronotum is brown with a creamy center. The lower part of the body is pale malla. The body length ranges from 5.8 to 6.4 mm.

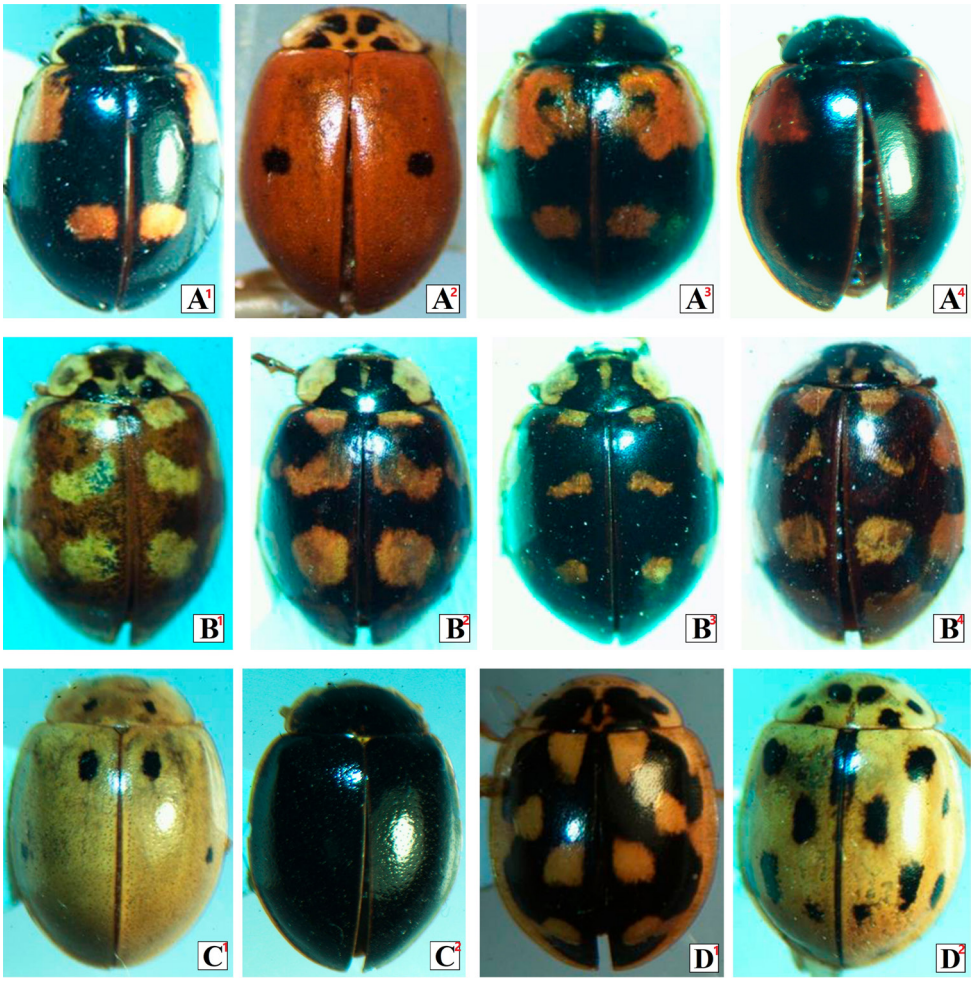

Figure 2. Variations of some representatives of the subfamily Coccinellinae: A^1–A^4 – *Adalia bipunctata* (Linnaeus, 1758); B^1–B^4 – *Adalia decempunctata* (Linnaeus, 1758); C^1–C^2 – *Calvia punctata* (Mulsant, 1853); D^1–D^2 – *Propylaea quatuordecimpunctata* (Linnaeus, 1758).

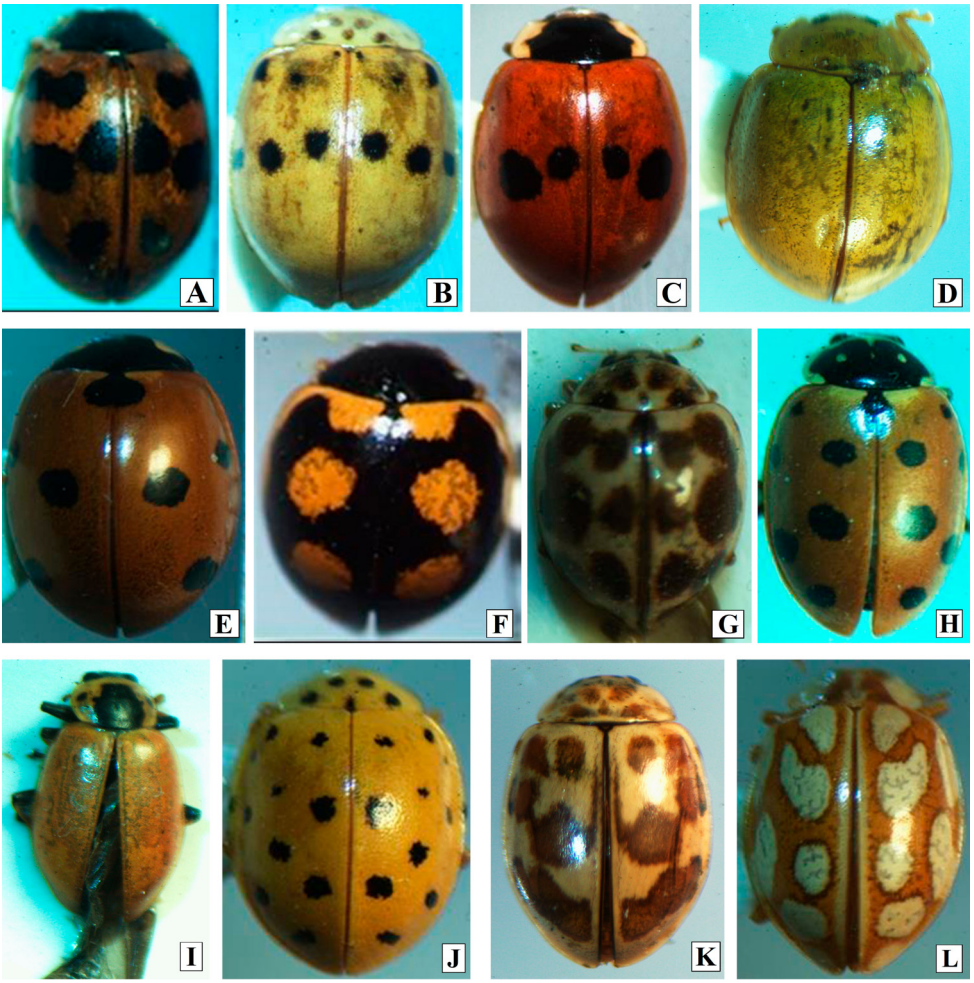

Figure 3. A – *Adalia facciatopunctata* (Linnaeus, 1758); B – *Adalia quatuordecimpunctata* (Linnaeus, 1758); C – *Adalia tetraspilota* (Hope, 1831); D – *Calvia muiri* (Timberlake, 1943); E – *Coccinella septempunctata* (Linnaeus, 1758); F – *Coccinulla sinuatomarginata* (Faldermann, 1837); G – *Coccinula elagantula* (Weise, 1890); H – *Hippodamia variegata* (Goeze, 1777); I – *Hippodamia tredecimpunctata* (Linnaeus, 1758); J – *Psyllobora vigintiduopunctata* (Linnaeus, 1758); K – *Oenopia conglobata* (Menetries, 1849); L – *Halyzia tschitscherini* (Semenow, 1895).

Subfamily Scymninae Mulsant, 1846

Genus *Stethorus* Weise, 1885

17. Stethorus pusillus (Herbst, 1797)

Figs 1, 4A

Material examined. Andijan region, Marhamat district, from apricot (*Prunus armeniaca* L.) (04.08.2022): 3♀♀, 41°04'40.08" N, 71°38'18.29" E; Namangan city, from pomegranate (*Punica granatum* L.), Chortoq district, from walnut and apple (22.05.2023, 28.06.2023): 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E; Chust district, Gova village, from alfalfa (21.08.2023); Namangan region, Kosonsoy district, Olmazor village, from apple (05.05.2024): 2♀♀, 1♂♂, 41°16'01.14" N, 71°32'06.42" E; Chortoq district, Fergana state farm, from apple (07.07.2024): 740 m a.s.l., 41°07'24.45" N, 71°49'27.07" E.

Distribution. Russia: Caucasus, Siberia, Dalniy East; Belarus, Ukraine, Moldova, Transcaucasia, Kazakhstan, Central Asia; Europe, North Africa, Western Asia: Levant, Mongolia, China, North America (Nikitsky and Ukrainsky 2016).

Diagnostic signs. The organism presents an elongated, convex, and black body, with its elytra exhibiting fine punctation and covered in almost long white setae. The pronotum appears black or brown, while the mouthparts and legs are characterized by a yellow coloration. The body length ranges from 1 to 1.6 mm. This species primarily preys on spider mites.

Genus *Scymnus* Kugelann, 1794

***18. Scymnus subvillosus* (Goeze, 1777)**
Figs 1, 4B

Material examined. Specimens were collected from the following locations and dates: Namangan region, Kosonsoy district, Almazor village, found on apples (05.05.2024): 2♀♀, 1♂♂, 41°16'01.14" N, 71°32'06.42" E; Chartak district, found on walnuts, apples, and apricots (12.06.2022, 11.09.2022, 09.08.2023, 09.05.2024): 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E; Pop district, found on Yantak (*Alhagi pseudalhagi* B.) (05.05.2024): 2♀♀, 1♂♂, 40°52'49.75" N, 71°01'41.17" E; Namangan city, found on apple (10.05.2024): 1♀♀, 370 m a.s.l., 40°58'54.01" N, 71°41'58.13" E.

Distribution. Europe, North Africa, Asia, Southern Africa (Biranvand et al. 2018).

Diagnostic signs. The body is broadly oval and covered with thick hairs. The elytra are black, each with two transverse reddish spots arranged diagonally across the anterior region. The spots may enlarge and form a bridge near the elytral suture. The pronotum is black, with the anterior margin, antennae, palps, and legs being reddish. The body length ranges from 1.9 to 2.5 mm. This species feeds on aphids and psyllids.

***19. Scymnus bipunctatus* (Kugelann, 1794)**
Figs 1, 4C

Material examined. Baymak village, Chust district, Namangan region (04.06.2023): 1 specimen, 41°04'02.46" N, 71°19'53.6" E.

Distribution. This species is distributed in the southern part of the Palearctic region, including Western Europe, Asia Minor, Mongolia, Crimea, the Caucasus, Kazakhstan, Central Asia (Jabbarova 2011).

Diagnostic signs. The beetle has a body length of 1.5–2.4 mm. The elytra are black, each with a small red-yellow spot on the posterior half. It feeds on nectar and false shield insects.

***20. Scymnus rubromaculatus* (Goeze, 1777)**
Figs 1, 4D

Material examined. Manak Ota village, Andijan region, without asparagus (*Carduus* L.) (01.05.2023): 1♀♀, 740 m a.s.l., 40°36'35.71" N, 72°36'55.69" E.

Distribution. Southern Africa, Europe, North Africa, Asia. (Biranvand et al. 2018).

Diagnostic signs. The body is broadly oval and strongly convex, black, dull, shiny, with coarse punctation and thick, uniform short white hairs. The wing coverts are black with a very short black-red stripe on the upper part. The body length ranges from 2 to 2.5 mm.

Ecology. This mesophilic species is commonly found along riverbanks and in the lower parts of mountain ranges. The beetle and its larvae feed on the sap of various plants, including mint, nettle, reed, sedum, sorghum, alfalfa, and vegetable crops.

***21. Scymnus interruptus* (Goeze, 1777)**
Figs 1, 4E

Material examined. A nest in Manak Ota village, Andijan region (01.05.2023): 1♀♀, 740 m a.s.l., 40°36'35.71" N, 72°36'55.69" E.

Distribution. Asia, Europe, North Africa (Kovar 2007).

Diagnostic signs. The body is broadly oval, covered with thick, short white hairs. The head is red, with large black eyes. The elytra are black with very wide black-red spots that are connected to each other. The edges of the pronotum are black with a reddish hue. The body length ranges from 1.5 to 2 mm.

22. **Scymnus marinus* Mulsant,1850
Figs 1, 4G

Material examined. Oromgoh, Namangan city, Namangan region (03.06.2023): 1 specimen, 270 m a.s.l., 41°01'38.89" N, 71°38'17.81" E.

Distribution. Asia, Europe, North Africa (Biranvand et al. 2018).

Diagnostic signs. The head and pronotum are black, while the elytra are brightly colored. The body is covered with short hairs. The front part of the head is red,

and the eyes are large. The body length ranges from 1.0 to 1.8 mm. The legs are yellow. The species feeds on sap and is considered rare.

***23. Scymnus frontalis* (Fabricius, 1787)**
Figs 1, 4H

Material examined. Anjir (*Ficus carica* L.) in Gova village, Chust district, Namangan region (25.08.2023): 1♀♀, 910 m a.s.l., 41°07'04.31" N, 71°07'52.94" E.

Distribution. Europe, North Africa, Asia, Southern Africa (Biranvand et al. 2018).

Diagnostic signs. The beetle has a yellow-fronted head, with a body length of 2.8-3.4 mm. The head and elytra are black, with each elytron featuring one or two yellowish or reddish spots. The species feeds on aphids.

***24. Scymnus argutus* Mulsant, 1850**
Figs 1, 4F

Material examined. A walnut in Chartak District, Namangan Region (28.05.2024): 1♀♀, 41°04'26.56" N, 71°50'13.91" E.

Distribution. Europe, Asia (Kovar 2007).

Diagnostic signs. The elytra are brown, each typically with four black spots: the first on the shoulder and base of the elytra, the second laterally at mid-length, the third in the middle of the disc, and the fourth on the suture. The suture line forms a distinctive pattern. The body length is 1.6 mm.

Genus *Clitostethus* Weise, 1885

25. **Clitostethus arcuatus* (Rossi, 1794)
Figs 1, 4I

Material examined. From walnuts in Chartak District, Namangan Region (28.04.2024): 6♀♀, 4♂♂, 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E.

Distribution. Europe, North Africa, Asia, Southern Africa (Biranvand et al. 2018).

Diagnostic signs. Measuring approximately 1.2–1.5 mm in length, this small coccinellid is distinctive due to the pale horseshoe-shaped mark on the elytra. The body is dark brown to black and covered with long white hairs. The head is black, while the pronotum is white with several black spots in the center. The elytra are black or brown with two arched, concentric horseshoe-shaped stripes that cross the elytral suture. This species is known to feed on whiteflies.

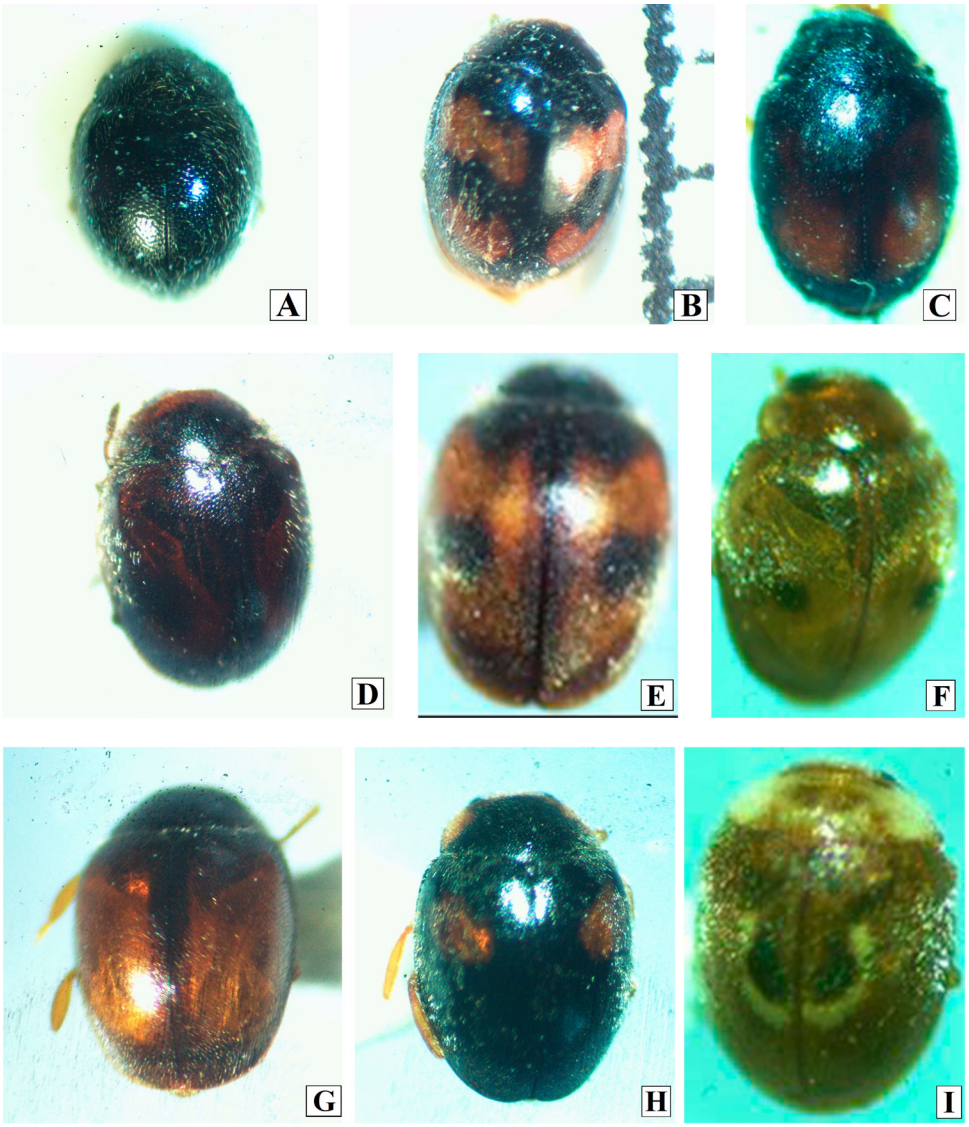

Figure 4. A – *Stethorus pusillus* (Herbst, 1797); B – *Scymnus subvillosus* (Goeze, 1777); C – *Scymnus bipunctatus* (Kugelann, 1794); D – *Scymnus rubromaculatus* (Goeze, 1777); E – *Scymnus interruptus* (Goeze, 1777); F – *Scymnus argutus* (Mulsant, 1850); G – *Scymnus marinus* (Mulsant, 1850); H – *Scymnus frontalis* (Fabricius, 1787); I – *Clitostethus arcuatus* (Rossi, 1794).

Subfamily Hyperaspidinae Duverger, 1989

Genus *Brachiacontha* Dejean, 1837

26. ****Brachiacontha ursine* **(Chevrolat in Dejean, 1837)
Figs 1, 5A

Material examined. From Astragal (*Astragalus* L.) in Nanay village, Yangikurgan district, Namangan region (15.07.2021): 1♀♀, 910 m a.s.l., 41°32'17.2" N, 71°42'11.71" E.

Distribution. This species is found in North America (Majka and Robinson 2009).

Diagnostic signs. The head is small with large eyes. The elytra feature five prominent yellow spots. The pronotum and head are yellow, with a large black spot in the center of the pronotum. The body length ranges from 2.5 to 3.5 mm. The species feeds on aphids, thrips, and spider mites.

Subfamily Chilocorinae Mulsant, 1846

Genus *Platynaspis* Redtenbacher, 1843

27. ****Platynaspis saundersi* **(Crotch, 1874)
Figs 1, 5B

Material examined. Specimens were collected from poplar (*Populus nigra* L.), walnut, and apricot trees in Chartak district, Namangan region, at the following dates (13.02.2022, 11.06.2023, 08.07.2023, 19.12.2023): 2 ♀♀, 3 ♂♂, 450 m a.s.l. (41°04'26.56" N, 71°50'13.91" E) and 910 m a.s.l., 41°32'17.2" N, 71°42'11.71" E).

Distribution. This species occurs in India, Pakistan, Afghanistan, Bhutan, Nepal (Ajaz et al. 2018).

Diagnostic signs. The body is oval and small, with elytra that are brown-yellow or reddish-brown, covered with fine yellowish-white hairs. Each elytron features 10 black spots of variable size, with a characteristic double spot formed by the fusion of two spots along the suture line. The pronotum is black with a reddish-brown anterolateral margin, and the head is black or brownish-black with small black eyes. The body length ranges from 2.2 to 2.85 mm. This species primarily feeds on aphids.

***28. Platynaspis luteorubra* (Goeze, 1777)**
Figs 1, 5C

Material examined. From asparagus (*Carduus* L., 1753) in Chartak district, Namangan region (01.06.2022): 1 specimen, 460 m a.s.l., 41°04'26.56" N, 71°50'13.91" E.

Distribution. Russia: European part, Caucasus, Siberia; Belarus,Ukraine, Moldova, Transcaucasia, Kazakhstan, Central Asia; Europe, North Africa, Western Asia, Afghanistan, Mongolia, Pakistan (Tyumaseva and Guskova 2008).

Diagnostic signs. The body is oval and covered with fine hairs. The elytra are black with two orange, oblong-round spots on each. The pronotum is typically red on the front and lateral parts, although it can be entirely black. The body length ranges from 2.5 to 3.5 mm.

Genus *Chilocorus* Leach, 1815

29. Chilocorus bipustulatus (Linnaeus, 1758)

Figs 1, 5D

Material examined. It is found in all parts of the Fargana Valley.

Distribution. Europe, North Africa, Asia, Southern Africa (Biranvand et al. 2018).

Diagnostic signs. The body is wide and oval. The head is red. The pronotum and elytra are dark brown or black with reddish hues. Each elytron typically has two or three very small transverse spots; sometimes, two of these spots merge, leaving only one separate spot. This species is morphologically similar to *Chilocorus geminus*, but differs in that the spots on the elytra of *Chilocorus geminus* are fused to form a transverse yellow line. The body length ranges from 3.0 to 4.2 mm. This species is a coccidoph.

Genus *Exochomus* Redtenbacher, 1843

30. Exochomus ostosignatus (Gebler, 1829)

Figs 1, 5E

Material examined. Found from the carrack (*Cousinia microcarpa* B.) (01.05.2023): 1 specimen, 810 m a.s.l., 40°32'29.26" N, 72°36'24.55" E, coordinate points, Imomota village, Andijan region.

Distribution. Azerbaijan, Armenia, France, Italy, Russia: south European Territory, Afghanistan, Iran, Iraq, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Turkey, Uzbekistan (Kovar 1997).

Diagnostic signs. The elytra are dark red, each marked with four black spots, and the scutellum is black. The pronotum is pink with a central black spot, although in some instances, the pronotum may be entirely black or dark brown. The dorsal surface of the body is devoid of setae. The body length ranges from 3.5 to 4.5 mm, and the width from 2.5 to 2.8 mm. This species feeds on plant sap, phytonomus larvae, spider mites, butterfly eggs, and small worms.

***31. Exochomus undulatus* (Weise, 1878)**
Figs 1, 5F

Material examined. Specimens were collected from apricot, plum, and white poplar trees in Nanay village, Yangikurgan district, Namangan region (04.12.2022): 9♀♀, 3♂♂, 1380 m a.s.l., 41°32'14.87" N, 71°42'11.52" E.

Distribution. Europe, North Africa, Asia (Biranvand et al. 2018).

Diagnostic signs. The body is wide and oval. The elytra are brown, each bearing dark spots and stripes. The pronotum and head are black, while the underside of the body is also black. The body length ranges from 4.3 to 5.0 mm and is hairless.

Genus *Parexochomus* (Barovskij, 1922)

***32. Parexochomus nigromaculatus* (Goeze, 1777)**
Figs 1, 5G

Material examined. Namangan Region, Oromgoh Dahasi, Namangan city, from spruce (*Juniperus* L.) (23.08.2021): 1 specimen, 41°01'39.53" N, 71°38'18.5" E; Andijan Region, Toza Havo Sanatorium, from pine (*Pinus sylvestris* L.) and spruce (*Juniperus* L.) (24.06.2022): 7♀♀, including egg clusters, 570 m a.s.l., 40°36'32.59" N, 72°17'49.94" E; Fergana Region, Chimyan District, Chimyan Sanatorium, from spruce (12.09.2022): 570 m a.s.l., 40°22'35.35" N, 71°47'28.71" E; Namangan City, Z.M. Babur Recreation Park: 1 specimen; Chartak District, from Yantak (Alhagi pseudalhagi M.) (30.05.2024): 2♀♀, 450 m a.s.l., 41°04'26.56" N, 71°50'13.91" E, Kosonsoy District, Almazor Village (05.05.2024): 2♀♀, 1♂♂, 41°16'01.14" N, 71°32'06.42" E.

Distribution. Cyprus, Europe, Western and Central Asia, the Caucasus, Kazakhstan, Siberia, Far East, Mongolia, Afghanistan, China, Pakistan (Sergeeva and Stolbov 2018).

Diagnostic signs. Pronotum yellow with a large black spot in the middle; body, head, and elytra are black; pronotum and elytra are hairless; legs are yellow. Body length is 3–4 mm.

Subfamily Ortaliinae Mulsant, 1850

Genus *Novius* Mulsant, 1846

33.**Novius yemenensis* (Raimundo & Fürsch, 2006)**
Figs 1, 5H

Material examined. From the "Nodirabegim Muhammadkhan" health center, Kosonsoy district, Namangan region (19.06.2024); Gova village, Chust district, from

walnut (25.11.2022): 3♀♀; 1 specimen from apricot, 910 m a.s.l., 41°07'57.19" N, 71°06'54.39" E, found from coordinate points.

Distribution. Asia: Yemen (Raimundo et al. 2006); newly recorded from Saudi Arabia (Al Ansi et al. 2020) and new record for Uzbekistan.

Diagnostic signs. The entire body, including the elytra both dorsally and ventrally, is uniformly reddish-brown. The dorsal surface is covered with long white setae, while the ventral surface is glabrous. The body length ranges from 4.0 to 5.1 mm. The eyes are large, and in some specimens, the head and pronotum are black. The base of the elytra is slightly concave, and the shoulders are rounded.

Discussion

During our research, the species *Novius yemenensis* (Raimundo & Fürsch, 2006), *Platynaspidius saundersi* (Crotch, 1874), *Brachiacontha ursina* (Dejean, 1837), *Scymnus marinus* (Mulsant, 1850), *Calvia muiri* (Timberlake, 1943), *Clitostethus arcuatus* (Rossi, 1794) were recorded for the first time in the fauna of Uzbekistan in the Fergana Valley. To date, the aforementioned species have not been documented in previous studies on coccinellids within Uzbekistan (Jabborova 2011; Buriyeva 2023). Research on Coccinellidae in the region has not included these species until our findings in the Fergana Valley, which represent a significant addition to the known fauna. *Novius yemenensis* (Raimundo & Fürsch 2006) was initially recorded in Yemen (Raimundo et al. 2006) and other regions of the Arabian Peninsula (Al Ansi et al. 2020). A review of the literature indicates that there have been no reports of this species in Central Asia.

Platynaspidius saundersi (Crotch, 1874) was initially recorded in India and Afghanistan as *Platynaspis saundersi*, and later reclassified as *Platynaspidius saundersi* by Miyatake in 1961. A study on the biology of this species revealed that it acts as an incidental predator of aphids (Agarwala and Ghosh 1988).

The biology of this species has been extensively studied by numerous researchers (Rafi et al. 2005; Khan et al. 2009; Hayat and Khan 2014; Shah and Khan 2014; Kundoo et al. 2018; Maqbool et al. 2020; Kasi and Waiba 2021). While it is commonly found on apple, pear, and wild apple trees, our studies have discovered this species on apricot, poplar, and walnut trees.

Brachiacontha ursina (Dejean, 1837) was documented by Ch.G. Majka and S. Robinson (2009) near marine environments in Canada. This species is known to be widespread across North America.

Scymnus marinus (Mulsant, 1850) was recorded for the first time in Syria. It is distributed in Europe and North Africa (Gourreau 1974) and was recorded from Palestine (Halperin et al. 1995). The report of the coccinellid Scymnus (Mimopullus) marinus from Lorestan province in Iran is the only report for this species from Asia (Biranvand et al. 2018).

Scymnus interruptus (Goeze, 1777) is primarily distributed in the Western Palearctic region; however, it has also been recorded in the USA, Chile, and Tajikistan (Gonzalez et al. 2019; Khakimov 2019).

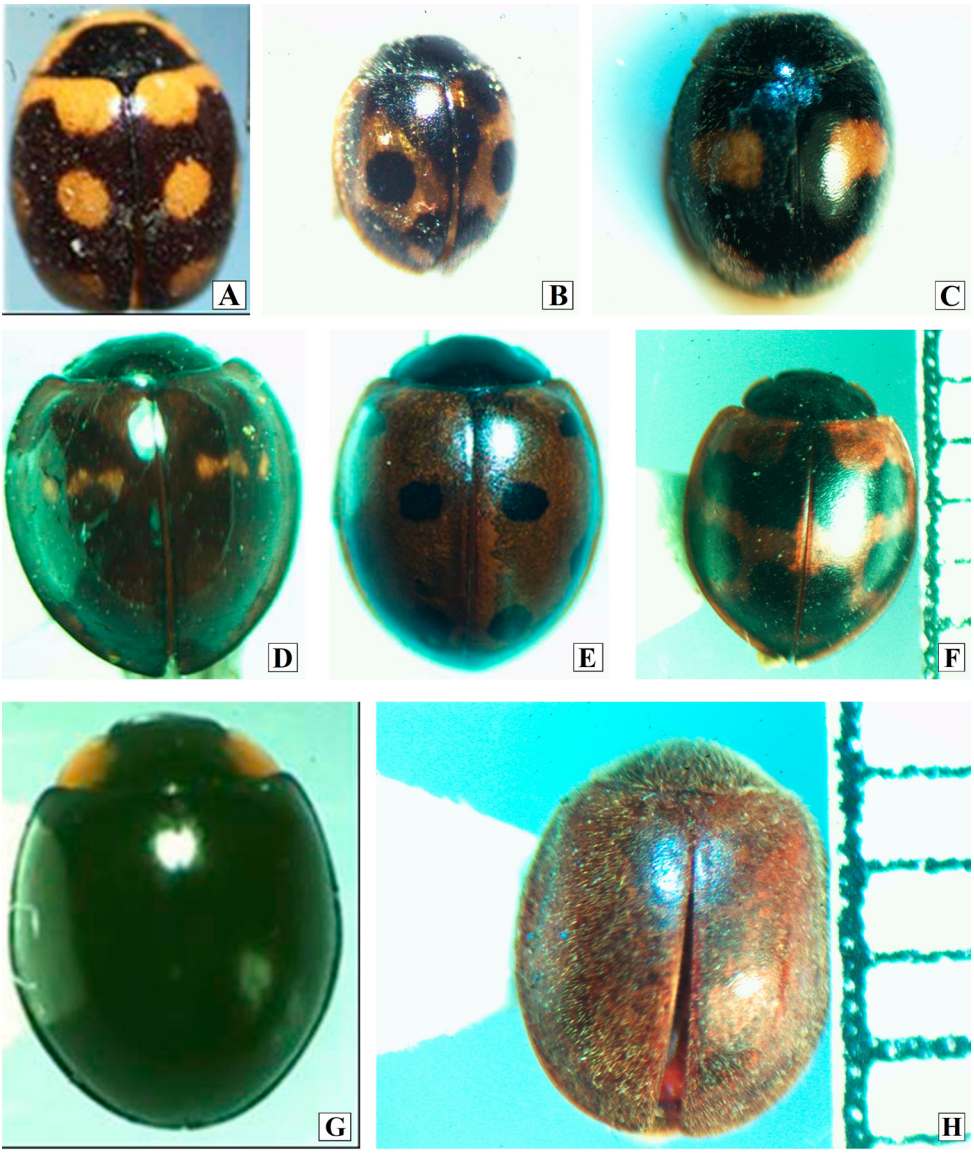

Figure 5. A – *Brachiacontha ursine* (Chevrolat in Dejeon, 1837); B – *Platynaspis saundersi* (Crotch,1874); C – *Platynaspis luteorubra* (Goeze, 1777); D – *Chilocorus bipustulatus* (Linnaeus, 1758); E – *Exochomus ostosignatus* (Gebler, 1829); F – *Exochomus undulatus* (Weise, 1878); G – *Parexochomus nigromaculatus* (Goeze, 1777); H – *Novius yemenensis* (Raimundo & Fürsch, 2006).

Calvia muiri (Timberlake, 1943) has been studied by Yang Yiming (Y. Yiming 2013) in the "Encyclopedia of Life in Taiwan."

Clitostethus arcuatus (Rossi, 1794) has been reported as a predator of the whitefly Siphoninus phillyreae (Haliday, 1835) (Hemiptera: Aleyrodidae) in Iran (Tavadjoh et al. 2010). Additionally, this species has been recorded in Europe, the Caucasus, Turkey, Syria, Palestine, and Iran (Uygun 1981; Al Jundi and Ahmed 1999; Halperin et al. 1995; Biranvand et al. 2018).

Conclusion

Based on preliminary studies of the coccinellid fauna in the Fergana Valley, the species composition and taxonomic distribution are described as follows: 9 genera (50%) and 16 species (48.5%) belong to the subfamily Coccinellinae; 4 genera (22.2%) and 6 species (18.2%) belong to the subfamily Chilocorinae; 3 genera (16.7%) and 9 species (27.3%) belong to the subfamily Scymninae; 1 genus (5.6%) and 1 species (3%) belong to the subfamily Hyperaspidinae; and 1 genus (5.6%) and 1 species (3%) belong to the subfamily Ortaliinae. A total of 33 species were identified, of which 23 species (70%) were recorded for the first time in the Fergana Valley.

References

Ajaz AK, Akhtar AK, Ishtiyaq A, Bhat NA, Chatoo MA, Khalid R (2018) Taxonomic redescription of the species of sub family Chilocorinae (Coleoptera: Coccinellidae) from Jammu and Kashmir, India. International Journal of Chemical Studies 6(6): 1465–1469.

Al Jundi A, Ahmad M (1999) Contribution to the natural enemies for the most important citrus pests in the Coastal region of Syria. Tishreen University for Research Studies, Agricultural Sciences Series 21: 29–40.

Al Ansi A, Alkhalaf AA, Fadl H, Rasool I, Al Dhafer H (2020) An annotated checklist of Coccinellidae (Insecta, Coleoptera) with eight new records from the Kingdom of Saudi Arabia. ZooKeys 1006: 35–89. https://doi.org/10.3897/zookeys.1006.59123

Agarwala BK, Ghosh AK (1988) Prey records of aphidophagous Coccinellidae in India. A review and bibliography. Tropical Pest Management 34: 1–14.

Ataeva MA (1963) Some data on predators of aphids from Tajikistan. Proceedings of the Institute of Zoology and Parasitology of the Academy of Sciences of the Tajik SSR 24: 110–115. [In Russian]

Azimov DA, Bekuzin AA, Davletshina AG, Kadyrova MK (1993) Insects of Uzbekistan. Tashkent, 320 pp. [In Russian]

Biddinger DJ, Weber DC, Hull LA (2009) Coccinellidae as predators of mites: Stethorini in biological control. Biological Control 51: 268–283.

Bienkovskiy AO (2020) Identification guide to ladybugs (Coleoptera, Coccinellidae) of the European part of Russia and the North Caucasus. Publisher Mukhametov GV, Livny, 140 pp. [In Russian]

Biranvand A, Jafari R, Shakarami J, Vafaie-Shoushtari R, Zare Khormizi M, Ebrahimi S (2014) Faunistic study of ladybirds (Col.: Coccinellidae) in Chegeni region, Lorestan Province, Iran. In: Proceedings of the 21th Iranian Plant Protection Congress, August 23–26, 2014. Urmia, 572 pp.

Biranvand A, Shahram H, Mehdi G, Lida F, Nedved O, Jahanshir Sh (2018) Contribution to the knowledge of Coccinellidae (Coleoptera) of Iran. Oriental Insects 53(1): 1–19. https://doi.org/10.1080/00305316.2018.1482804

Boriyeva Kh (2023) Coccinellids (Coleoptera, Coccinellidae) of agrobiocenosis of Kashkadarya Region. PhD dissertation, 125 pp. [In Uzbek]

Chazeau J (1981) Données sur la biologie de *Coelophora quadrivittata* [Col.: Coccinellidae], prédateur de *Coccus viridis* [Hom.: Coccidae] en Nouvelle-Calédonie. Entomophaga 26(3): 301–312.

Franzmann B (2002) *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae), a predacious ladybird new in Australia. Australian Journal of Entomology 41(4): 375–377. https://doi.org/10.1046/j.1440-6055.2002.00318.x

Gourreau JM (1974) Contribution a l Etude de la fauna de France: Systematique de la Tribu des Scymnini (Coccinellidea). Annnales de Zoologie, Ecologie Animale. INRA, Institut National De La Recherche Agronomique. Paris, 223 pp.

Golub VV, Surikov MN, Prokin AA (2012) Collection of insects: collection, processing and storage of material. Moscow, 339 pp. [In Russian]

Halperin J, Merkl O, Kehat M (1995) An annotated list of the Coccinellidae (Coleoptera) of Israel and adjacent areas. Phytoparasitica 23: 127–137.

Harris RHTP (1921) A note on *Ortalia pallens* Mulsant. South African Journal of Science 18: 170–171.

Hodek I, Honek A (2009) Scale insects, mealybugs, whiteies and psyllids (Hemiptera, Sternorrhyncha) as prey of ladybirds. Biological Control 51: 232–243.

Hodek I, Emden HF, Honek A (2012) Ecology and behaviour of the ladybird beetles (Coccinellidae). Blackwell Publishing, Chichester, 141–274.

Indra KK, Kanchhi MW (2021) Biology of *Platynaspis saundersi* (Coleoptera: Coccinellidae). Indian Journal of Entomology 85(3): 721–722. https://doi.org/10.55446/IJE.2021.373

Iablokoff-Khnzorian SM (1982) Les Coccinelles. Tribu Coccinellini des régions Paléarctique et Orientale. Paris, Société Nouvelle des Éditions Boubée, 566 pp.

Jabbarova OI (2011) Fauna, ecology and economic significance of beetles (Coleoptera, Coccinellidae) of the Bukhara oasis. PhD dissertation, 5–64. [In Uzbek]

Khan AA, Zaki FA, Khan ZH, Mir RA (2009) Biodiversity of predaceous ladybird beetles (Coleoptera: Coccinellidae) in Kashmir. Journal of Biological Control 23(1): 43–47. https://doi.org/10.18311/jbc/2009/3614

Khakimov FR (2019) Belt-landscape distribution of coccinellids (Coleoptera, Coccinellidae) in southwestern Tajikistan. Eurasian Entomological Journal 18(2): 79–83. [In Russian]

Kovar I (1997) Revision of the genera *Brumus* Muls. and *Exochomus* Redtb (Coleoptera: Coccinellidae) of the Palaearctic region. Part I. Acta Entomologica Musei Nationalis Pragae 44: 5–124.

Kovar I (2007) Family Coccinellidae Latreille, 1807. In: Catalogue of Palaearctic Coleoptera. Löbl I, Smetana A (Eds) Vol. 4. Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea, Cucujoidea. Apollo Books, Stenstrup, 568–631.

Latreille A (1807) Genera crustaceorum et insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata 3. Amand Koenig, Parisiis, 70–75.

Che LH, Zhang P, Deng ShH, Escalona HE, Wang X, Li Y, Pang H, Vandenberg N, Ślipiński A, Tomaszewska W, Liang D (2021) New insights into the phylogeny and evolution of lady beetles (Coleoptera: Coccinellidae) by extensive sampling of genes and species. Molecular Phylogenetics and Evolution 156(156): 107045. http://dx.doi.org/10.1016/j.ympev.2020.107045

Majerus M, Sloggett J, Godeau J, Hemptinne JL (2007) Interactions between ants and aphidophagous and coccidophagous ladybirds. Population Ecology 9: 15–27.

Majka G, Robinson S (2009) *Hyperaspis* and *Brachiacantha* (Coleoptera: Coccinellidae): two poorly known genera of native lady beetles in the Maritime Provinces. Journal of the Acadian Entomological Society 5: 3–11.

Mansurov AK (1968) Ecology and economic significance of coccinellids (Coleoptera, Coccinellidae) in the south of Uzbekistan. In: Cotton pests and their entomophages in Uzbekistan. Fan, Tashkent, 101–114. [In Russian]

Maqbool A, Rather SU, Akbar SA, Wachkoo AA (2020) Preliminary survey of ladybird beetle composition (Coleoptera: Coccinellidae) in unmanaged apple orchard ecosystems of Kashmir Himalayas. Proceedings of the Zoological Society 73: 160–174. https://doi.org/10.1007/s12595-020-00322-w

Miyatake M (1961) The East-Asian Coccinellid-beetles preserved in the California Academy of Science, tribe Hyperaspini. Memoir of the Ehime University 6(6): 147–155.

Nedved O, Kovar I (2012) Phylogeny and classification. In: Hodek I, Van Emden HF, Honek A (Eds) Ecology and behaviour of the ladybird beetles (Coccinellidae). Blackwell Publishing, Chichester, 1–12.

Nikitsky NB, Ukrainsky CA (2016) Ladybugs (Coleoptera, Coccinellidae) of the Moscow region. Entomological review 95(3): 555–582. [In Russian]

Obrycki JJ, Harwood JD, Kring TJ, O'Neil RJ (2009) Aphidophagy by Coccinellidae: Application of biological control in agroecosystems. Biological Control 51(2): 244–254. https://doi.org/10.1016/j.biocontrol.2009.05.009

Poorani J (2002) An annotated checklist of the Coccinellidae (Coleoptera) (excluding Epilachninae) of the Indian Subregion. Oriental Insects 36: 307–383. https://doi:10.1080/00305316.2002.10417335

Poorani J (2023) An illustrated guide to lady beetles (Coleoptera: Coccinellidae) of the Indian Subcontinent. Part 1. Tribe Coccinellini. Zootaxa 5332 (1): 1–307. https://doi:10.11646/zootaxa.5332.1.1

Rafi AM, Irshad M, Inaytullah M (2005) Predatory ladybird beetles of Pakistan. Rohani Art Press, Blue Area, Islamabad, Pakistan, 105 pp.

Raimundo AC and van Harten A (2000) An annotated checklist of the Coccinellidae (Insecta: Coleoptera) of Yemen. Fauna of Arabia 18: 211–243.

Raimundo AC, Fürsch H, van Harten A (2006) Notes on the ladybird beetles (Coleoptera: Coccinellidae) of Yemen, with the description of two new species. Fauna of Arabia 21: 217–245.

Savoyskaya GI (1983) Coccinellids (systematics, application in the fight against agricultural pests). Publishing house "Science" (Kazakh SSR), Alma-Ata, 210 pp. [In Russian]

Savoyskaya GI (1991) Aphidophagous Ladybirds. Agropromizdat, Moscow, 78 pp. [In Russian]

Semyanov VP (1984) On the method of accounting for coccinellids, their parasites, pathogens and predators. In: Biological method of plant protection. Abstracts of reports of scientific and practical conference. October 10–11, 1984. Minsk, 71–73. [In Russian]

Sergeeva EV, Stolbov VA (2018) The fauna of ladybird beetles (Coleoptera: Coccinellidae) of the Tyumen Province. Eversmannia. Entomological research in Russia and neighboring regions 54: 18–25. [In Russian]

Shah MA, Khan AA (2014) Assessment of coccinellid biodiversity under pesticide pressure in horticulture ecosystems. Indian Journal of Entomology 76(2): 107–116.

Slipinski A (2007) Australian ladybird beetles (Coleoptera: Coccinellidae). Their biology and classification. ABRS, Canberra, 286 pp.

Sutherland AM, Parella MP (2009) Mycophagy in Coccinellidae: Review and synthesis. Biological Control 51(2): 284–293.

Tavadjoh Z, Hamzehzarghani H, Alemansoor H, Khalghani J, Vikram A (2010) Biology and feeding behaviour of ladybird, *Clitostethus arcuatus*, the predator of the ash whitefly, *Siphoninus phillyreae*, in Fars province, Iran. Journal of Insect Science 10(1): 1–12. https://doi.org/10.1673/031.010.12001

Tyumaseva ZI, Guskova EV (2008) Coccinellidae (Coleoptera) of Mongolian Altai. Altai Zoological Journal 2: 19–25. [In Russian]

Uygun N (1981) Türkiye Coccinellidea (Coleoptera) faunasi üzerinde taksonomik araştirmalar. Dilek Matbaasi, Adana, 111 pp. [In Turkish]

Vakhidov T (1977) On the biology of *Adonia variegata* Goeze and *Synharmonia conglobata* L. – predators of apple aphids in the Fergana Valley. Reports of the Academy of Sciences of the Uzbek SSR 1: 65–66. [In Uzbek]