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PREDATORY ACTINEDID MITES OF ZAGATALA DISTRICT (ACARIFORMES)

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The paper provides a review of the predatory actinedid mites found in Zagatala district of Azerbaijan. The data on 21 species from 9 families are provided. *Leptus clethrionomydis* Haitlinger, 1987 is a new species to the fauna of the Caucasus. It has been established that *Labidostomma caucasica* Reck, 1940 is an indicator species of the mountain forest belt and low-mountain broad-leaved forest landscape. The most species are found in mountain forests (19 species belonging to 8 families). It should be mentioned that 3 species – *Foveacheles willmanni*, *Robustocheles hilli*, *Brevipalpus zachardi* have been found only in Zagatala region in the Caucasus (*F.willmanni* – was found in cornfield, *R.hilli* and *B.zachardi* were found in mountain – hornbeam forest). *Neognathus terrestris* was found in Zagatala region (barrow – breech-false sycamore forest) in the Caucasus. Among 9 families of the wild Actinedida mites found in the research area, the families of *Bdellidae* (6 species) and *Rhagidiidae* (5 species) are rich with species. *Cunaxidae* family is represented in Zagatala region by its 3 species. The rest 6 families are equipped with 1–2 species in the research area.

Key words: Zagatala district, predatory mites, actinedids, mountain forests, tea plantations.

Алізаде Г.А., Асланов О.Х. Хижі актінедіди кліщі (Acariformes: Actinedida) Загатальського району Азербайджану

Наведено інформацію про 19 видів із 9 родин. У статті представлений огляд хижих актінедідних кліщів, знайдених у Загатальському районі Азербайджану. Представлені дані по 21 виду з 9 родин. *Leptus clethrionomydis* Haitlinger, 1987 – новий вид фауни Кавказу. Встановлено, що *Labidostomma caucasica* Reck, 1940 є індикаторним видом гірничо-лісового поясу і низькогірських широколистяних лісових ландшафтів. Більшість видів зустрічається в гірських лісах (19 видів, що належать до 8 родин). Слід зазначити, що 3 види – *Foveacheles willmanni*, *Robustocheles hilli*, *Brevipalpus zachardi* були виявлені тільки в Загатальському регіоні на Кавказі (*F.willmanni* були виявлені на кукурудзяному полі, *R. hilli* і *B.zachardi* були виявлені в Загатальському регіоні на гірському грабі (ліс). *Neognathus terrestris* був виявлений (курган – казенна частина – помилковий платан) на Кавказі. Серед 9-ти сімейств диких кліщів Actinedida, що мешкають у районі досліджень, сімейства *Bdellidae* (6 видів) і *Rhagidiidae* (5 видів) багаті підвидами. Сімейство *Cunaxidae* представлено в регіоні Загатала трьома видами. Решта 6 сімейств представлені 1–2 видами і в районі досліджень.

Ключові слова: Хачмазський район, хижі кліщі, актиніди.

Ализаде Г.А., Асланов О.Х. Хищные актинедидные клещи (acariformes: actinedida) Загатальского района Азербайджана

Приведена информация о 19 видах из 9 семейств. В статье представлен обзор хищных актинедидных клещей, найденных в Загатальском районе Азербайджана. Представлены данные по 21 виду из 9 семейств. *Leptus clethrionomydis* Haitlinger, 1987 – новый вид фауны Кавказа. Установлено, что *Labidostomma caucasica* Reck, 1940 является индикаторным видом горно-лесного пояса и низкогорных широколиственных лесных ландшафтов. Большинство видов встречаются в горных лесах (19 видов, принадлежащих к 8 семействам). Следует отметить, что 3 вида – *Foveacheles willmanni*, *Robustocheles hilli*, *Brevipalpus zachardi* – были обнаружены только в Загатальском регионе на Кавказе (*F.willmanni* были обнаружены на кукурузном поле, *R.hilli* и *B.zachardi* были обнаружены в Загатальском регионе на горном грабе (лес). *Neognathus terrestris* был обнаружен (курган – казенная часть – ложный платан) на Кавказе. Среди 9 семейств диких клещей Actinedida, обитающих в районе исследований, семейства *Bdellidae* (6 видов) и *Rhagidiidae* (5 видов) богаты подвидами. Семейство *Cunaxidae* представлено в регионе Загатала тремя видами. Остальные 6 семейств представлены 1–2 видами в районе исследований.

Ключевые слова: Хачмазский район, хищные клещи, актиниды.

Material and methods. Material has been collected as following methods. Actinedid mites are collected from the plants with the flapping method or by examining their parts individually. 10 examples are collected from each species. Wild actinedid mites are collected under the stones, from the land surface, from the bunch of tree and bushes with the help of thinner, fluffy, little brush. Collecting the actinedid mites occurred in the land, on the floor, in the autumn leaves, moss, lichen and in the tree remnants is carried out by photo-electret or sifter (Vinkler device). Also, in order to collect the wild actinedid mites lived in the land, the hunting vessels (Barber baits) that have fixating water inside are used. In conclusion, the exhaustor is used in collecting of some mites (such rigidified) lived in the grain plants and oil. All collected material is detected (fixated) in ethyl and is labelled. Also 10-20% of milk acid is used in order to keep the mites.

In order to define the mites and to study their morphological factors, the certain drugs are prepared from them in Phorate. The microscopes named MBS-1, MBÍ-3, Olympus CX-41, MBI-15U4.2 are used in the preparation of the drugs and prescription of their material. The prescription of the species is carried out by means of modifier tables. When working with MBÍ-3 and MBÍ-15U4.2 microscopes, the phased contrast, oil and water immersion are used. The predators actinedids were measured under ocular-micrometres. The drawings were drawn on a drawing machine-5 and the photos were taken with the help of a camera Sony DSC-P8.

Introduction. Actinedid mites are very diverse animal group. With about 26000 described species it is one of the largest orders of arachnids. Representatives of this order could be found in many types of habitats. Among them saprophages, algophages, mycophages, phytophages, predators, commensals of crabs and gastropod mollusks as well as ecto – and endoparasites of arthropods, echinoderms, amphibians, reptiles, birds and mammals are found.

The fauna of predatory actinedid mites of Azerbaijan is poorly studied. Only 21 species belonging to 9 families of predatory actinedids are recorded from Zagatala district [2, 3, 4, 5]. Of these, one species, *Leptus clethrionomydis* Haitlinger, 1987, was reported for the first time for the fauna of the Caucasus. And it was the first finding of mature individual of this species in the world. Also, it has been established that *Labidostomma caucasica* Reck, 1940 is an indicator species of mountain forest belt and low-mountain deciduous forest landscape.

The present paper is a generalization of all data concerning predatory actinedid mites of Zagatala district which have been previously published in difficult available separate papers in Russian and Azeri languages.

Superorder: Acariformes Zachvatkin, 1952

Order Actinedida van der Hammen, 1968

Suborder Eupodina Krantz, 1978

Superfamily Eupodoidea Koch, 1842

Family Rhagidiidae Oudemans, 1922

Genus *Poecilophysis* Cambridge, 1876

1. *Poecilophysis pratensis* (C. L. Koch, 1835)

In Azerbaijan the species was recorded in Zagatala, Ismayilly and Lankaran districts and Absheron Peninsula (Jeiranbatan artificial forest massif). It occurs on the ground and in leaf litter in mountain hornbeam forests, lowland ironwood (*Parrrotia persica*) relic forests, artificial forest massifs and tobacco plantations. It was also reported from caves [13]. In the mountains it was found at altitudes of up to 2500 m [12]. Reproduces parthenogenetically [11].

Distribution: Europe, Caucasus (Kabardino – Balkaria), Asia (Kamchatka Peninsula), North America (USA).

Genus *Foveacheles* Zacharda, 1980

2. *Foveacheles willmani* Zacharda, 1980

The species was found on the ground in the corn field in Zagatala district.

Distribution: Central Europe (Austria).

Genus *Robustocheles* Zacharda, 1980

3. *Robustocheles mucronata* (Willmann, 1936)

In Azerbaijan it was recorded in Zagatala, Aghdere and Masally districts. Occurs on the ground and in leaf litter in mountain hornbeam forests, cereal fields and on the rock outcrops. A few specimens were collected in Botanical Garden in Baku City. In the mountains it was found at altitudes of up to 3000 m [12].

Distribution: Europe, Caucasus (Kabardino-Balkaria), Asia (Yakutia, Kamchatka Peninsula, Vietnam), Northern Africa (Egypt), North America (Alaska Peninsula).

4. *R. hilli* (Strandtmann, 1971)

The species was found in leaf litter in mountain hornbeam forest in Zagatala district. Troglomorphic species.

Distribution: Asia (Severnaya Zemlya archipelago: Bolshevik Island), North America (USA and Canada: Canadian Arctic Archipelago-Baturst Island). In Bolshevik and Baturst islands and Alaskan tundra inhabits lichens [13].

Genus *Brevipalpia* Zacharda, 1980

5. *Brevipalpia zachardi* Kuznetsov, 1987

The species was found on the ground in mountain hornbeam forest in Zagatala district.

Distribution: Eastern Europe (Ukraine, Crimea).

Superfamily Bdelloidea Duges, 1834

Family Bdellidae Duges, 1834

Subfamily Cytinae Grandjean, 1938

Genus *Cyta* van Heyden, 1826

6. *Cyta latirostris* (Hermann, 1804)

In Azerbaijan it was recorded in Balakan, Zagatala, Gakh, Khyzy, Aghdash, Aghdam, Fuzuli, Lankaran and Astara districts and Absheron Peninsula. The species is found in mountain and riparian forests, juniper and juniper – oak (including *Quercus iberica*) woodlands, tomilliares, locoweed thickets, camphor – ephedra semi-deserts on clay slopes of mountains, forest stands, parks, gardens, vineyards, tea plantations, karst caves and oil polluted areas. It occurs under stones, on the ground, in leaf litter, moss, lichens, under bark of trees, on the grass and dwarf shrubs, tragacanth astragals, in the crown of trees and bushes, in the nests of birds and rodents. In the mountains it was found at altitudes of up to 3774 m [10]. The species feeds on oribatid mites and collembolans. Reproduction takes place from the end of May to mid-June. In the Absheron Peninsula, however, *C. latirostris* reproduces from late November to May. Immature specimens are found throughout the year. Living specimens have red colouration, sometimes brown or purple (in oil polluted areas).

Distribution: Cosmopolitan species.

7. *C. coerulipes* (Duges, 1834)

In Azerbaijan it was recorded in Balakan, Zagatala, Gakh, Guba, Agdash, Aghdere, Goy-Gol, Lankaran and Astara districts. The species is found in mountain forests, juni-

per – oak woodlands (*Quercus iberica*), in tobacco plantations planted at deforested areas of Ganikh – Aghrichay depression. It occurs on the ground, in leaf litter and moss, under the stones, under the bark of trees, in wood dust, and sometimes in crowns of trees and bushes. In the mountains it was found at altitudes of up to 2950 m [10]. Living specimens have dark red colouration, sometimes almost black.

Distribution: Europe, Caucasus (Krasnodar area and Georgia), Central Asia, Northern and Southern Afrika, North and Central America.

Subfamily Bdellinae Duges, 1834

Genus *Bdella* Latreille, 1795

8. *Bdella muscorum* Ewing, 1909

The species is distributed in all regions of Azerbaijan. It inhabits all landscapes and altitudinal belts (from sea level to 2300 m). *B. muscorum* occurs in various types of forests, on rocky sites, in thorny locoweeds, in garland thorn thickets, arid woodlands, broomsedge and subalpine Thymus – Festuca steppes, subalpine Radde birch woodlands, subalpine pine – cowberry forests on sandy slopes, orchards, forest stands, vineyards, cereal fields, tea plantations, and karst caves. It is found on the ground, in leaf litter, lichens, under the tree bark, in the crowns of trees and bushes, on thyme flowers (only in the subalpine belt), in the nests of rodents. *Bdella muscorum* is abundant in wet lowland mixed hornbeam – alder (*Alnus barbata*) – wingnut forests in Ganykh – Ayrichay depression where it inhabits moss covering tree trunks. At the same time, this species is very rare in semi-desert zone. It is found in forest stands, vineyards, courtyards, as well as in riparian forests. This species feeds on the mites of the family Tetranychidae and the genus *Nanorchestes*, as well as on collembolans [1]. In the mountain – forest zone, it is found throughout the year, whereas in semi – desert zone was observed from September to June. Reproduction occurs in April-July (Greater Caucasus). During reproductive period from up to 20 eggs develop in the body of females. Females and nymphs overwinter in crevices under stones. Living specimens have red colouration.

Distribution: Europe, Caucasus (Krasnodar area and Georgia), Central Asia, North America (USA).

9. *B. iconica* Berlese, 1923

In Azerbaijan it was recorded in Zagatala, Guba, Khachmaz, Khyzy, Aghdash, Fuzuli and Ordubad districts. The species is found in all types of forests, thorny tussocks, juniper – oak woodlands (including *Quercus iberica*), karst caves, and sometimes in urban habitats. It occurs on the ground, in leaf litter, moss, under stones and bark of trees, in the crowns of trees and bushes, in dry dung and decaying wood, on the grass and in the nests of rodents. In the mountains it was found at altitudes of up to 3774 m [10]. First time we collected this species in lowland altitudinal belt (in lowland oak – hornbeam forest (20 m a.s.l.) near Lejet village in Khacmaz district). *B. iconica* feeds on collembolans [7]. During reproductive period from 2 to 50 eggs develop in the body of females. Living specimens have red colouration.

Distribution: Europe, Caucasus (Krasnodar area and Georgia), Central Asia, Northern Africa, New Zealand (apparently introduced).

Subfamily Odontoscirinae Grandjean, 1938

Genus *Odontoscirus* Thor, 1913

10. *Odontoscirus longirostris* (Hermann, 1804)

In Azerbaijan it was recorded in Zagatala, Gakh, Gabala, Salyan, Lankaran, Astara districts and in Baku City. The species is found in mountain beech – maple (*Acer pseu-*

doplatanus) flooded forests, low-mountain – chestnut forests, lowland and mid-mountain relic forests in Lankaran area, in fruit gardens and heathlands. It occurs on the ground, in leaf litter and moss, under stones, under bark of trees, and on feijoa and Caucasian juniper trees. In the mountains it was found at altitudes of up to 2786 m [9]. *O. longirostris* feeds on mites of the families Tydeidae and Eupodidae [1], and also on collembolans [7]. In Astara district mature specimens were observed in May, in Salyan district in the second half of November, while in the Greater Caucasus (Ilisu village of Gakh district) in July. During reproductive period up to 20 eggs develops in the body of females. The body colouration of living mites is black or red with blue spots on dorsum.

Distribution: Europe, Asia (Central Asia and Japan), North and Central America, South America (Argentina), Hawaiian Islands, Saint Helene Island.

11. *O. lapidaria* (Kramer, 1811)

In Azerbaijan it was recorded in Zagatala, Gakh, Shamakhi, Aghdere, Fizuli, Kurdamir, Saatly, Salyan, Bilasuvar, Lankaran districts and Absheron Peninsula (Baku City, Ramana, Surakhani and Nardaran villages). The species is found in mountain beech and oak forests, juniper woodlands, camphor – ephedra semi-deserts on clay slopes of mountains, sagebrush – gengiz semi-deserts, orchards, tea plantations, blackberry fields, vineyards, forest stands, heathlands and grasslands. It occurs on the ground, in leaf litter, under stones, under bark of trees, in decaying wood, on the leaves of the tea shrubs, in the nests of rodents. Feeds on collembolans. In Absheron Peninsula *O. lapidaria* reproduces from November to April. In Shamakhi district and in the upper Karabakh (Aghdere district) mature individuals were observed in April. During reproductive period up to 16 eggs develops in the body of females. The body colouration of living mites is yellowish or gray, sometimes greenish.

Distribution: Europe, Caucasus (Dagestan), Central Asia; North America (Mexico), Australia, New Zealand and Tasmania. Introduced to the South African Republic.

Family Cunaxidae Thor, 1902

Subfamily Cunaxinae Thor, 1902

Genus *Cunaxa* von Heyden, 1826

12. *Cunaxa capreola* (Berlese, 1890)

In Azerbaijan it was recorded in Nakhchivan Autonomous Republic (Babak district) and in Aghdere, Zagatala and Shaki districts. The species is found in mountain hornbeam forests, cereal fields, and sometimes in urban habitats. It occurs on the ground, in forest leaf litter, in the debris of henhouses and nests swallows. Preys on small insects and mites. In Egypt *C. capreola* produces several generations during one year. At optimal temperature (25°C) females lay about 40 eggs per day. The duration of the egg-laying period varies from 30 to 60 days. One male can fertilize several females. Depending on the temperature, the life span of single generation takes from 25 to 64 days [8].

Distribution: Europe, South-Western Asia (UAE: Sharjah), Northern Africa, North America.

Subfamily Cunaxoidinae Den Heyer, 1979d

Genus *Cunaxoides* Baker et Hoffmann, 1948

13. *Cunaxoides croceus* (Koch, 1838)

In Azerbaijan it was recorded in Zagatala, Gusar, Aghdere districts and Baku City. The species is found in mountain beech, hornbeam – oak (*Quercus macrantera*) – lime and riparian beech – maple (*Acer pseudoplatanus*) forests, as well as in artificial forest massifs. It occurs on the ground, in leaf litter and moss, under the bark of pine stumps. In Absheron Peninsula mature individuals were observed in the last decade of Decem-

ber. Only a single very large elongated ovoid egg develops in the body of females during reproductive period. Living mites have cherry colouration.

Distribution: Europe, Central Asia, Northern Africa (Morocco).

14. *C. biscutum* Baker et Hoffmann, 1948

In Azerbaijan it was recorded in Zagatala, Khyzy, Guba, Gedabey districts and Baku City. The species is found in mid-mountain beech – oak (*Quercus macrantera*), low-mountain oak – hornbeam and riparian beech – maple forests, camphor – ephedra semi-deserts on clay slopes of mountains and in orchards. It occurs under stones, on the grass (including cereal plants) and on the Caucasian juniper. In the low-mountain belt of the Greater Caucasus reproduces in May. As in previous species only a single large ovoid egg develops in the body of the females during reproductive period. Living mites have orange colouration.

Distribution: Europe, North America (USA).

Suborder Eleutherengona Oudemans, 1909

Superfamily Raphignathoidea Kramer, 1877

Family Raphignathidae Kramer, 1877

Genus *Raphignathus* Duges, 1833

15. *Raphignathus collegiatus* Atyeo, Baker et Crossley, 1961

In Azerbaijan it was recorded in Zagatala, Lankaran districts and Absheron Peninsula. The species is found in mountain riparian beech – maple and wingnut – alder (*Alnus subcordata*) forests, *Tournefortia sibirica* thickets, orchards, parks, forest stands and urban habitats. It occurs on the ground, under stones, under bark of trees and in the tree hollows. Living mites have orange colouration.

Distribution: Eastern Europe, Asia Minor (Turkey), Central Asia, Northern Africa (Egypt), North America.

Family Cryptognathidae Oudemans, 1902

Genus *Cryptognathus* Kramer, 1879

16. *Cryptognathus lagena* Kramer, 1879

In Azerbaijan it was recorded in Zagatala, Gakh, Shamakhi, Guba, Khyzy, Agdash and Lankaran districts. The species is found in wet lowland mied hornbeam – alder (*Alnus barbata*) – wingnut forests in Ganykh-Ayrichay depression, in forests in the Greater Caucasus and Talysh mountains (including riparian forests), in Caucasian juniper secondary bushlands, gum tree – oak (*Quercus longipes*), juniper – oak (*Quercus ibericus*) woodlands and garland thorn thickets. It occurs on the ground, in leaf litter and moss. In Zagatala district reproduces in May.

Distribution: Europe, Caucasus (Krasnodar area), North America.

Family Caligonellidae Grandjean, 1944

Genus *Neognathus* Willmann, 1952

17. *Neocolathus terrestris* (Summers et Schlinger, 1955).

In Zagatala district the species occurs in moss covering stones in low-mountain beech – maple (*Acer pseudoplatanus*) riparian forests, while in Gakh district it inhabits moss on the bark of *Quercus ibericus* in low-mountain oak – beech forests.

Distribution: Europe, Asia Minor (Turkey), Central Asia, North America.

Genus *Caligonella* Berlese, 1910

18. *Caligonella humilis* (Koch, 1838)

In Azerbaijan it was recorded in Zagatala, Guba, Aghdash and Khachmaz districts. The species is found in low-mountain beech – maple riparian forests and in mid-mountain (1600 – 1650 m a.s.l.) aspen forests growing on scree slopes, lowland hornbeam –

oak (*Quercus pedunculiflora*) forests in Samur – Devechi depression and juniper – oak (*Quercus ibericus*) woodlands. It occurs on the ground, in leaf litter and moss.

Distribution: Europe, Asia Minor (Turkey), North America.

Suborder Labidostommatina Krantz, 1978

Superfamily Labidostommatodea Oudemans, 1904

Family Labidostommatidae Oudemans, 1904

Genus *Labidostomma* Kramer, 1879

19. *Labidostomma caucasica* Reck, 1940

In Azerbaijan it was recorded in Zagatala, Gakh, Gabala, Ismayilly, Shamakhi and Khyzy districts. The species is found in mountain hornbeam, oak and beech forests, Caucasian juniper secondary bushlands and forest – steppes. It occurs on the ground, and in moss, sometimes in beehives [6]. In Khyzy district mature specimens were observed in May. One or two large elongated eggs develop in the body of females during reproductive period.

Distribution: Endemic of the Caucasus (Azerbaijan, Georgia). It is an indicator species of mountain forest belt and low-mountain broad-leaved forest landscape.

Suborder Anystina van der Hammen, 1972

Superfamily Anystoidea Oudemans, 1902

Family Anystidae Oudemans, 1902

Subfamily Erythracarinae Oudemans, 1936

Genus *Bechsteinia* Oudemans, 1936

20. *Bechsteinia schneideri* Oudemans, 1936

In Azerbaijan it was recorded in Zagatala, Gakh, Guba, Khyzy, Agdash, Shamkir, Goy-Gol, Aghdere districts and Absheron Peninsula. The species is found in mid-mountain broad leaved forests in Lesser Caucasus, low-mountain liana (honey sucle and vine) bushes, mixed oak (*Quercus pedunculiflora*) – poplar – apple forests in Greater Caucasus, high meadows, riparian forests, on the gravel banks of mountain rivers, on the rock putcrops, in wormwood – gengiz and wormwood – ephemerae semi-deserts, mountain meadow steppes, juniper – oak (*Quercus ibericus*) woodlands, astragal – tomilliarae dry steppes, vineyards, orchards, parks, forest stands. It occurs on the ground, in leaf litter, under stones, under bark of trees, in decaying wood of pine. It occurs on the ground, in leaf litter, under stones, under bark of trees, in decaying wood of pine stumps, on the grass, in moss, in the nests of birds and inside buildings. In Absheron peninsula it was found throughout the year. Living mites have brown-red colouration.

Distribution: South (Italy) and East (Ukraine: Crimea) of Europe, Caucasus (Northern Osetia).

Suborder Paracitengona Oudemans, 1909

Superfamily Erythraeoidea Robineau – Desvoidy, 1828

Family Erythraeidae Robineau – Desvoidy, 1828

Subfamily Leptinae Southcott, 1957

Genus *Leptus* Latreille, 1776

21. *Leptus clethrionomydis* Haitlinger, 1987

The species was described on the base of the larvae collected from the nest of bank vole (*Myodes glareolus*) in Poland. On 12 August 2017, we sampled one larvae and one mature male of this species from the tea shrub in the tea plantation in the territory of ehterial oil factory in Zagatala district. The species proved to be a new for the fauna of Caucasus. Moreover, it was the first finding of mature individual of this species in the world.

Conclusion. 3 species (*Foveacheles willmanni*, *Robustocheles hilli*, *Brevipalpus zachardi*) have been founded only in Zagatala in the Caucasus, but *Neomolgus terrestris* (Caligonellidae family) species have been founded in Zagatala and Gakh region in the Caucasus. 11 species of 21 species founded in the area fall to 2 families – Bdellidae (6 species) and Rhagidiidae (5 species).

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