

L.V. Kim^{1,2*}, M.Ye. Salmenova¹, A.B. Yeszhanov¹

¹*Institute of Zoology, the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan, al-Farabi Av. 93, Almaty 050060, Kazakhstan;*

²*Al-Farabi Kazakh National University, Almaty, Kazakhstan*

**Corresponding author: kim.leonid2606@mail.ru*

On the jumping spider (*Araneae, Salticidae*) fauna of Almaty city (Republic of Kazakhstan)

Spider fauna of urban landscapes in some countries remains unexplored enough. Cities of Kazakhstan are not exceptions. Meanwhile, spiders are one of the important components of ecological communities. One of the most common and most numerous families in terms of species diversity is Salticidae — the jumping spiders. In this study we provide new records of some jumping spider species from Almaty city. In result, we spotted 10 species belonging to 9 genera of Salticidae family in total. *Attulus fasciger* (Simon, 1880) was recorded for the first time for Kazakhstan range and Almaty city in particular. The illustrations of general morphology and copulatory organs of *A. fasciger* are also provided. The results are expected to be used for further studies of the spider fauna of Almaty region, as well as to update cadastral materials on the region.

Keywords: Aranei, fauna, new records.

Introduction

The fauna of spiders of the cities of Kazakhstan, and Almaty in particular, remains poorly studied. There are only data on Nur-Sultan [1] and single amateur observations listed in the GBIF global repository [2]. Other information on complex studies of cities of Kazakhstan we could not find. At the same time, this kind of research in human settlements is relatively well conducted in other countries. Research on spiders in settlements was carried out in India [3], in Mexico [4], Belgium [5], Indonesia [6], etc.

Meanwhile, spiders are also part of the urban ecosystem. As predators, mainly hunting other arthropods, they themselves are food for other animals, including insects. And the largest (= most spacious) spider family in the world is Salticidae — the jumping spiders. They are widespread around the world, consisting of small to medium-sized spiders and numbering some 6431 species described worldwide [7]. As of 2017, 157 species were recorded in Kazakhstan [8]. They are active predators, often diurnal. Representatives of this family demonstrate relatively complex behavior, have object vision and rely on it during hunt [9, 10]. As the other spider groups, jumping spiders are significantly sensitive to anthropogenic disturbances [11-13].

This study has a faunistic character and is aimed at updating the available data on the species of jumping spiders inhabiting the territory of Almaty city. We suppose that this work will fill the existing gap in the periodicity of faunistic studies of the region.

Experimental

Specimens were collected predominantly manually, by catching in bottles or vials from July 2020 to June 2022 on territory of Almaty city. The material from pitfall traps [14, 15] was included in this work. The traps were located in park areas of A. Baitursynov square (43.247N 76.927E, 6 traps for 5 days), Al-Farabi Kazakh National University campus (43.222N 76.921E, 18 traps for 5 days) and Sairan reservoir (43.243N 76.865E, 17 traps for 5 days).

The identification of species was carried out using araneae — Spiders of Europe [16], Jumping spiders (Arachnida: Araneae: Salticidae) of the world [17] and [18]. This work does not take into account juveniles, which are not identifiable to species.

The collected material was fixed in 70 % ethanol and labeled, first with a temporary date, time, and serial number and then, after identification, with permanent labels. We used MBS-9 binocular stereoscopic microscope (“LOMO”, Russian Federation) during identification. The spiders were filmed with a smartphone camera “Samsung Galaxy A50” (“Samsung Electronics”, Republic of Korea), using a macro lens with 4x magnification. Photos and videos were taken using the “Timestamp Camera Free” (ver. 1.202) program, thanks to which the date, time, location and coordinates were placed on them.

All material belongs to zoological collection of Institute of zoology, the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan. The information about distribution of species provided according to World Spider Catalog [7], while data about habitat and maturity period — according to “Spiders of Kazakhstan” [19] and araneae — Spiders of Europe [16].

Results and Discussion

The list of species that we spot on the territory of city during research is given below.

Family Salticidae Blackwall, 1841

Genus *Aelurillus* Simon, 1885

Aelurillus v-insignitus (Clerck, 1757)

Material: Kazakhstan: 1♂, Almaty, Sairan, western coast, hortobium, 43.239N 76.866E, pitfall traps, 15-20.04.2021 (leg. L.V. Kim).

Distribution: Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Central Asia, China.

Habitat: Ground-dweller, common on south-facing slopes of stony steppes, stony debris and pebble riverbanks.

Maturity period: May to June.

Genus *Attulus* Simon, 1889

Attulus fasciger (Simon, 1880)

Material: Kazakhstan: 3♂♂ 1♀, Almaty, Shevchenko str., 102, on walls, 43.2449N 76.9327E, manual collecting, 27.07.2020 (leg. L.V. Kim).

Distribution: Russia (Middle Siberia to Far East), China, Korea, Japan. Introduced to North America.

Habitat: Artificial structures, such as stone walls, wooden sheds, buildings, greenhouses and farmhouses [20].

Maturity period: May to November [20].

Remark: First record in Kazakhstan.

Genus *Evarcha* Simon, 1902

Evarcha arcuata (Clerck, 1757)

Material: Kazakhstan: 1♂ 1♀, Almaty, KazNU campus, hortobium, 43.2228N 76.9199E, manual collecting, 5.10.2020 (leg. L.V. Kim).

Distribution: Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Central Asia, China, Japan.

Habitat: In open habitats on low vegetation, mainly moist habitats, but also on dry heathland.

Maturity period: April to September, but males to October.

Genus *Heliophanus* C.L. Koch, 1833

Heliophanus potanini Schenkel, 1963

Material: Kazakhstan: 1♀, Almaty, Shevchenko str., 89b, herpetobium, 43.2451N 76.9313E, manual collecting, 20.06.2021 (leg. L.V. Kim); 1♀, Almaty, Shevchenko str., 89b, herpetobium, 43.2451N 76.9313E, manual collecting, 25.07.2021 (leg. L.V. Kim).

Distribution: Afghanistan, Central Asia, Mongolia, China.

Habitat: No data.

Maturity period: April to September.

Remark: Second female was pregnant, 5 juveniles came out from the egg sac on 22.08.2021 (at least 29 days).

Heliophanus turanicus Charitonov, 1969

Material: Kazakhstan: 1♂, Almaty, Shevchenko str., 89b, herpetobium, 43.2454N 76.9328E, manual collecting, 5.05.2021 (leg. L.V. Kim).

Distribution: Kazakhstan, Central Asia.

Habitat: No data.

Maturity period: May to June, but males to October.

Genus *Philaeus* Thorell, 1869

Philaeus chrysops (Poda, 1761)

Material: Kazakhstan: 1♀, Almaty, country house, on terrace, 43.1981N 76.9565E, manual collecting, 18.06.2021 (leg. L.V. Kim); 1♀, Almaty, near Almaty Arena, hortobium, 43.2664N 76.8178E, manual collecting, 06-07.2021 (leg. A.B. Yeszhanov); 1♀, Almaty, Zhetysu-1 microdistrict, manual collecting, 15.10.2021 (leg. Yu.A. Zima).

Distribution: Europe (not Scandinavia), North Africa to Middle East, Turkey, Caucasus, Russia (Europe to Far East), Iran, Central Asia, Afghanistan, China, Mongolia, Korea.

Habitat: Common dweller of south-facing stony slopes and pebble riverbanks.

Maturity period: May to June, but females until August.

Remark: First female was pregnant, egg sac spotted on 23.06.2021. 23 juveniles hatched on 4.07.2021 (at least 12 days).

Genus *Phlegra* Simon, 1876

Phlegra fasciata (Hahn, 1826)

Material: Kazakhstan: 1♂, Almaty, near Almaty Arena, hortobium, 43.2664N 76.8178E, manual collecting, 06-07.2021 (leg. A.B. Yeszhanov).

Distribution: Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Central Asia, Iran, Afghanistan, India, China, Mongolia, Korea, Japan.

Habitat: Ground-dweller, occurring in grass, under stones, on pebble riverbanks and stony lakeshores.

Maturity period: May to June.

Genus *Pseudeuophrys* Dahl, 1912

Pseudeuophrys obsoleta (Simon, 1868)

Material: Kazakhstan: 1♂, Almaty, Gogol str., 133, on the iron fence, 43.2590N 76.9313E, manual collecting, 2.05.2022 (leg. L.V. Kim); 1♂ 1♀, Almaty, KazNU campus, hortobium, 43.2192N 76.9218E, manual collecting, 27.05.2021 (leg. L.V. Kim).

Distribution: Europe (not Scandinavia), Turkey, Caucasus, Russia (Europe to Far East), Iran, Kazakhstan, Central Asia, China.

Habitat: Mixed forests, on lower parts of tree trunks and also on south-facing stony slopes.

Maturity period: May to June, but females until August.

Genus *Pseudicius* Simon, 1885

Pseudicius courtauldi Bristowe, 1935

Material: Kazakhstan: 1♀, Almaty, Esentai river, on the iron fence, 43.2349N 76.9203E, manual collecting, 12.05.2022 (leg. L.V. Kim); 2♂♂, Almaty, Esentai river, on the iron fence, 43.2349N 76.9203E, manual collecting, 14.05.2022 (leg. L.V. Kim).

Distribution: Greece to China.

Habitat: A dweller of standing tree trunks, under loose bark and in bark crevices.

Maturity period: June to August, but overwintering specimens can be collected in November to January.

Genus *Rudakius* Prószyński, 2016

Rudakius cinctus (O. Pickard-Cambridge, 1885)

Material: Kazakhstan: 1 sub-adult ♀, Almaty, Zhibek Zholy str., 124, dendrobium, 43.2619N 76.9438E, manual collecting, 3.08.2020 (leg. L.V. Kim); 2♀♀, Almaty, Institute of Zoology, 43.211N 76.912E, manual collecting, 28.02.2022 (leg. L.V. Kim et A.K. Bekitayeva); 1♂, Almaty, Esentai river, on the iron fence, 43.2349N 76.9203E, manual collecting, 12.05.2022 (leg. L.V. Kim).

Distribution: Azerbaijan, Iran, Central Asia to China.

Habitat: No data.

Maturity period: No data.

We recorded 24 individuals of 10 species belonging to 9 genera of Salticidae family in total. Several species were observed outside the specified maturity period. *Aelurillus v-insignitus* (Clerck, 1757) and *Pseudicius courtauldi* Bristowe, 1935 were found earlier, while females of *Evarcha arcuata* (Clerck, 1757) and *Philaeus chrysops* (Poda, 1761) were spotted later. Probably they were not noted at those periods. A sin-

gle individual of *A. v-insignitus* is the only member of the family that was found using pitfall traps — thereby it is suggested that this method is inefficient for salticid spider collecting at least in this case.

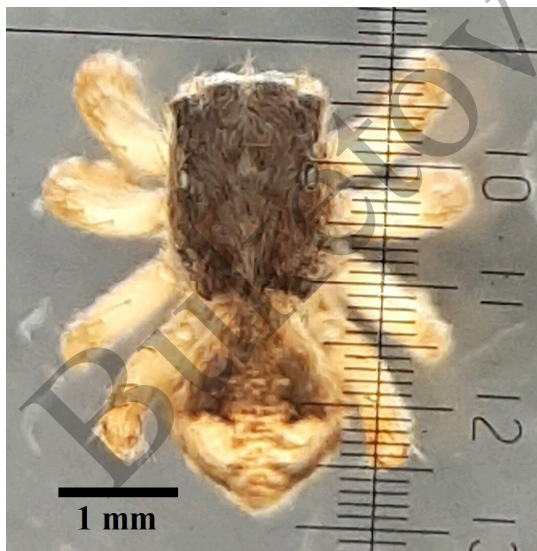
According to previous publications of other researchers, we assume that *Attulus fasciger* (Simon, 1880) was recorded for the first time from Kazakhstan and Almaty city in particular [21-23]. It was considered by Jerzy Prószyński in 1968 [24] as a synonym of *Attulus godlewskii* (Kulczyński, 1895) — morphologically similar to *A. fasciger* species, that resides in West Asia and described by Kulczyński from a single, damaged female specimen. Later, Prószyński revived *A. godlewskii* and *A. fasciger* as valid species (self-correction) [22]. However, in publications both of these species were recorded in the Kazakhstan exactly [7, 20, 25, 26].



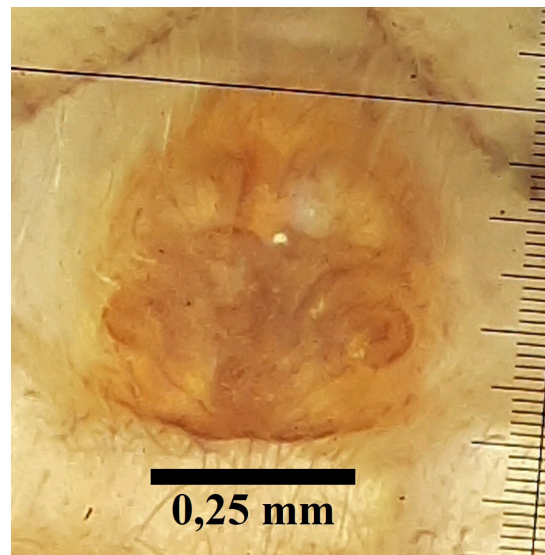
a — *Attulus fasciger* (Simon, 1880), male habitus. Magnification — 8x



b — *Attulus fasciger* (Simon, 1880), male left palp. Magnification — 56x



c — *Attulus fasciger* (Simon, 1880), female habitus. Magnification — 8x



d — *Attulus fasciger* (Simon, 1880), female epigyne. Magnification — 56x

Figure 1. *Attulus fasciger* (Simon, 1880), male (a, b) and female (c, d) from Almaty city.

Conclusions

24 individuals of 10 species belonging to 9 genera of Salticidae family is recorded in total. *Attulus fasciger* (Simon, 1880) was recorded for the first time for Kazakhstan range and Almaty city in particular.

Funding

This study was carried out in accordance with BR10965224 “Development of an inventory of fauna of the Northern Tien Shan for the conservation of its genetic diversity” projects.

References

- 1 Bolat, Zh., Mukhamadiyev, N.S., Temreshev, I.I., & Mengdibayeva, G.Zh. (2018). To the fauna of the spiders (Arachnida, Aranei) of the green belt of the city of Astana. *News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Agricultural Sciences*, 3(45), 46-53.
- 2 iNaturalist contributors, iNaturalist (2023). iNaturalist Research-grade Observations. *iNaturalist.org. Occurrence dataset* [https://DOI.org/10.15468/ab3s5x](https://doi.org/10.15468/ab3s5x)
- 3 Dey, A., Debnath, S., Debbarma, B., & Chaudhuri, P.S. (2013). A preliminary study on spider diversity from a house hold garden (artificial mixed plantation) in West Tripura, India. *Journal of Research in biology*, 3(5), 1009-1017.
- 4 Rodríguez-Rodríguez, S.E., Solís-Catalán, K.P., & Valdez-Mondragón, A. (2015). Diversity and seasonal abundance of anthropogenic spiders (Arachnida: Araneae) in different urban zones of the city of Chilpancingo, Guerrero, Mexico. *Revista mexicana de biodiversidad*, 86(4), 962-971.
- 5 Jocqué, R., Baert, L., De Smedt, P., Bosselaers, J., Souffreau, J., Henrard, A., & Sleuwaert, T. (2016). An introductory study of house spiders (Araneae) in Belgium. *Arachnology*, 17(3), 129-136.
- 6 Jasmi, R.A., Sari, H.P.E. & Janra, M.N. (2022). Jumping Spider (Arachnida: Salticidae: Araneae) in Serang Residential Area, Banten: Inventory Study Using A Photographic Approach. *Journal Biologi Tropis*, 22(1), 30-39.
- 7 World Spider Catalog (2022). Version 23.5. Natural History Museum Bern. Retrieved from <http://wsc.nmbe.ch>
- 8 Mikhailov, K.G. (2021). Advances in the study of the spider fauna (Aranei) of Russia and adjacent regions: a 2017 update. *Invert. Zool.*, 18(1), 25–35. <http://dx.doi.org/10.15298/invertzool.18.1.03>
- 9 Richman, D.B., & Jackson, R.R. (1992). A review of the ethology of jumping spiders (Araneae, Salticidae). *Bulletin of the British Arachnological Society*, 9(2), 33-37.
- 10 Bartos, M., & Minias, P. (2016). Visual cues used in directing predatory strikes by the jumping spider *Yllenus arenarius* (Araneae, Salticidae). *Animal behaviour.*, 120, 51-59.
- 11 Argañaraz, C.I., & Gleiser, R.M. (2020). Are spider communities influenced by urbanisation? An approach using species and guilds resolutions and their interaction with the anthropogenic environment. *Journal of Natural History*, 54(41-42), 2687-2702.
- 12 Argañaraz, C.I., Rubio, G.D., & Gleiser, R.M. (2018). Spider communities in urban green patches and their relation to local and landscape traits. *Biodiversity and Conservation*, 27(4), 981-1009.
- 13 Junggebauer, A., Hartke, T.R., Ramos, D., Schaefer, I., Buchori, D., Hidayat, P., & Drescher, J. (2021). Changes in diversity and community assembly of jumping spiders (Araneae: Salticidae) after rainforest conversion to rubber and oil palm plantations. *PeerJ*, 9, e11012.
- 14 Barber, H.S. (1931). Traps for cave-inhabiting insects. *Journal of the Elisha Mitchell Scientific Society*, 46(2), 259-266.
- 15 Marusik, Yu.M., & Kowblyuak, N.M. (2011). *Spiders (Arachnida, Aranei) of Siberia and Far East*. Moscow: KMK.
- 16 Nentwig, W., Blick, T., Bosmans, R., Gloor, D., Hänggi, A., & Kropf, C. (2021). *Spiders of Europe. Version 07.2021*. Retrieved from <https://www.araneae.nmbe.ch>
- 17 Metzner, H. (2022). *Jumping spiders (Arachnida: Araneae: Salticidae) of the world*. Retrieved from <https://www.jumping-spiders.com>
- 18 Prószyński, J. (2017). Pragmatic classification of the World's Salticidae (Araneae). *Ecologica Montenegrina*, 12, 1-133.
- 19 Logunov, D.V., & Gromov, A.V. (2012). *Spiders of Kazakhstan*. Manchester: Siri Scientific Press.
- 20 Matsumoto, S., & Chikuni, Y. (1987). Notes on the life history of *Sitticus fasciger* (Simon, 1880) (Araneida, Salticidae). *Journal of Arachnology*, 205-212.
- 21 Simon, E. (2000). *Histoire naturelle des araignées. Deuxième édition, tome second*. Roret, Paris, 381-668. <http://dx.doi.org/10.5962/bhl.title.51973>
- 22 Prószyński, J. (2017). Revision of the genus *Sitticus* Simon, 1901 sl (Araneae: Salticidae). *Ecologica Montenegrina*, 10, 35-50.
- 23 Maddison, W.P., Maddison, D.R., Derkarabetian, S., & Hedin, M. (2020). Sitticine jumping spiders: phylogeny, classification, and chromosomes (Araneae, Salticidae, Sitticini). *ZooKeys*, 925, 1.
- 24 Prószyński, J. (1968). Revision of the spider genus *Sitticus* SIMON, 1901 (Araneida, Salticidae). I, The *terebratus* group= Rewizja rodzaju *Sitticus* SIMON, 1901 (Araneida, Salticidae). I, Grupa *terebratus*. *Annales zoologici*, 26(18), 391-408.

25 Peng, X. J. (2020). *Fauna Sinica, Invertebrata 53, Arachnida: Araneae: Salticidae*. Beijing: Science Press.

26 Logunov, D.V. & Marusik, Y.M. (2000). *Catalogue of the jumping spiders of northern Asia (Arachnida, Araneae, Salticidae)*. Moscow: KMK Scientific Press.

Л.В. Ким, М.Е. Сальменова, А.Б. Есжанов

Алматы қаласының (Қазақстан Республикасы) секіргіш-өрмекші (*Araneae, Salticidae*) фаунасы

Кейбір елдердегі қалалық ландшафттардың өрмекші фаунасы жеткілікті түрде зерттелмеген. Қазақстанның қалалары да жеткілікті қарастырылмаған. Сонымен қатар, өрмекшілер экологиялық қауымдастықтардың маңызды құрамдастарының бірі. Түрлердің әртүрлілігі бойынша ең кең таралған және ең көп тұқымдастардың бірі — *Salticidae* — секіргіш-өрмекшілер. Бұл зерттеуде Алматы қаласындағы кейбір секіргіш-өрмекші түрлерінің жаңа жазбалары ұсынылған. Нәтижесінде *Salticidae* тұқымдасының 9 тұқымдастығына жататын барлығы 10 түр анықталған. *Attulus fasciger* (Simon, 1880) алғаш рет Қазақстан аумағында және оның ішінде Алматы қаласында тіркелді. Сонымен бірге *A. fasciger* жалпы морфологиясы мен копуляциялық мүшелерінің суреттері берілген. Нәтижелерді Алматы облысының өрмекші фаунасын одан әрі зерттеуге, сондай-ақ осы аймақтың кадастрлық материалдарын жаңартуға пайдалануға болады.

Кілт сөздер: *Aranei*, фауна, жаңа жазбалар.

Л.В. Ким, М.Е. Сальменова, А.Б. Есжанов

К фауне пауков-скакунчиков (*Araneae, Salticidae*) города Алматы (Республика Казахстан)

Фауна пауков городских ландшафтов в некоторых странах остается практически неизученной. Города Казахстана не являются исключением. Между тем пауки являются одними из важных компонентов экологических сообществ. Одним из самых распространенных и наиболее многочисленных по видовому разнообразию семейств являются *Salticidae* — пауки-скакунчики. В настоящем исследовании мы приводим новые данные о некоторых видах пауков-скакунчиков города Алматы. В результате мы обнаружили 10 видов, относящихся к 9 родам. *Attulus fasciger* (Simon, 1880) был впервые задокументирован на территории Казахстана и города Алматы в частности. Также приведены иллюстрации общей морфологии и копулятивных органов *A. fasciger*. Результаты предполагаются использовать для дальнейших исследований фауны пауков Алматинской области, а также для обновления кадастровых материалов по указанному региону.

Ключевые слова: *Aranei*, новые данные, фауна пауков, общая морфология, пауки-скакунчики, экологическое сообщество.