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Crabronidae (Insecta: Hymenoptera) fauna of Kelkit Valley, Türkiye part I: subfamilies Astatinae and Dinetinae

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Keywords:
Hymenoptera,
Crabronidae,
Astatinae,
Dinetinae,
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Abstract — This study is the first part of the faunistic, and systematic research conducted in 2013-2018 to determine the Crabronidae species in Kelkit Valley, and the subfamilies Astatinae and Dinaetinae were evaluated in this part. In this study, 10 species and one subspecies of *Astata* and two species and one subspecies of *Dryudella* belong to the subfamily Astatinae and one species of *Dinetus* belongs to the subfamily Dinetinae have been recorded. Most of the identified species were recorded for the first time from Kelkit Valley. In addition, data on the seasonal and vertical distributions of the identified species are also presented. Distribution of species in the research area, Türkiye, and the world is included.

Subject Classification (2020):

1. Introduction

Astatinae and Dinetinae are two subfamilies of the solitary wasp family Crabronidae. Members of the subfamily Astatinae are relatively large wasps measuring 4 to 16 mm in size and are special predators of the order Hemiptera [1]. Astatinae contains 161 species in four genera worldwide. Most of the species are included in the two well-known genera, Astata and Dryudella, with 82 and 58 species, respectively [2]. Thus far, 16 taxa belonging to the genus Astata and seven taxa belonging to the genus Dryudella have been reported from Türkiye [3]. Dinetinae is the smallest subfamily of the Crabronidae family, with a single genus, Dinetus, containing only 14 species in the world [1]. These brightly colored small wasps usually have a black-yellow body pattern. Members of this group make their nests on the sand dunes and prey on hemipteran insects like the subfamily Astatinae [4]. *Dinetus pictus* is the only species representing this subfamily in Türkiye [3].

Kelkit Valley is the longest valley of the Yeşilırmak Basin, located in the inner parts of the Central Black Sea region in the east-west direction from Gümüşhane to Amasya. The valley, whose altitude decreases from 1500 m to 230 m from Kelkit to Taşova, is surrounded by Yeşilırmak and Canik mountains with an average height of 1400 - 1500 m. It is found in a transition zone between the humid Black Sea climate and the arid Central Anatolian climate. In addition, the Mediterranean climate and vegetation locally found in the Valley contribute to the diversity of habitats throughout the region [5]. The geographic location and habitat diversity of the valley has made it one of the richest faunal areas in Türkiye, and therefore the determination of insect diversity will provide important data. Although various insect

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species have been identified in the region to date [6-17], studies on the subfamilies Astatinae and Dinetinae are very limited [18-24]. Only four species are known from Kelkit Valley belonging to these two subfamilies, i.e., *Astata boops, A. kashmirensis, A. miegi scapularis and A. minor.*

The family Crabronidae was investigated comprehensively by field expeditions in the Kelkit Valley between 2013 and 2018. In this first part of the study, faunistic data concerning the subfamilies Astatinae and Dinetinae were included, together with some ecological observations about the species.

2. Material and Methods

In this study, adult insect specimens belonging to the Astatinae and Dinetinae subfamilies (Insecta: Hymenoptera) of the Kelkit Valley were collected. Totally, 230 specimens belonging to Astatinae and 16 specimens belonging to Dinetinae were collected from 34 localities between 2013 and 2018. Table 1 presents information about the collecting localities and habitat types of five provinces in the valley. All the specimens collected were prepared as standard museum materials and deposited in the Entomology Research Laboratory of the Biology Department in Tokat Gaziosmanpaşa University. The identification of the samples was made according to Bitsch et al. [25]. Identified taxa and collection localities of the specimens are given in alphabetical order in the following list.

Table 1. Collecting localities in Kelkit Valley

Locality	Localities	Latitude/Longitu	Altitude (m)	Habitat	Collectors
1	Amasya, Central district, Ziyaret	40.696 / 35.853	435	Steppe	F. T. Çubuk
2	Amasya, Central district, Sarılar	40.677 / 35.893	1120	Steppe	F. T. Çubuk
3	Erzincan, Refahiye, Sakaltutan	39.870 / 39.092	1970	Steppe	İ. Can
4	Erzincan, Refahiye, Sağlık	39.920 / 38.777	1670	Farmland, Steppe	İ. Can
5	Erzincan, Refahiye, Akçiğdem	39.926 / 38.813	1720	Farmland, Steppe	İ. Can
6	Erzincan, Refahiye, Çat	40.021 / 38.774	1250	Steppe	İ. Can
7	Giresun, Alucra, Gürbulak	40.290 / 38.805	1560	Shrubs, Steppe	İ. Can
8	Giresun, Çamoluk, Hacıören	40.183 / 38.821	1410	Steppe	İ. Can
9	Giresun, Şebinkarahisar, Central	40.320 / 38.435	1200	Shrubs, Steppe	İ. Can
10	Gümüşhane, Kelkit, Ağıl	39.976 / 39.474	1660	Forest	İ. Can
11	Gümüşhane, Kelkit, Çilhoroz	40.159 / 39.290	1550	Oak Forest	İ. Can
12	Gümüşhane, Şiran, Güreşköy	40.112 / 38.950	1190	Steppe	İ. Can
13	Gümüşhane, Şiran Fındıkbeli	40.266 / 38.946	1675	Steppe	İ. Can
14	Gümüşhane, Şiran, Seydibaba	40.096 / 39.055	1450	Gallery Forest	İ. Can
15	Sivas, Akıncılar, Şenbağlar	40.060 / 38.396	1140	Shrubs, Steppe	İ. Can
16	Sivas, Gölova, Arslanca	40.068 / 38.771	1180	Shrubs	İ. Can
17	Sivas, Gölova, Çobanlı	40.015 / 38.585	1290	Shrubs	İ. Can
18	Sivas, İmranlı, Aşağıçulha	39.905 / 38.130	1830	Steppe	İ. Can
19	Sivas, Koyulhisar, İskenderşeyh	40.259 / 37.839	750	Steppe	F. T. Çubuk
20	Sivas, Koyulhisar, Kılıçpınarı	40.247 / 38.005	1200	Steppe	F. T. Çubuk
21	Sivas, Suşehri, Aşağısarıca	40.155 / 38.147	930	Steppe	İ. Can
22	Sivas, Suşehri, Boyalıca	40.150 / 38.126	975	Steppe	F. T. Çubuk
23	Sivas, Suşehri, Çokrak	40.133 / 38.093	1040	Steppe	İ. Can
24	Sivas, Suşehri, Akşar	40.050 / 38.184	1110	Steppe	İ. Can
25	Sivas, Suşehri, Geminbeli	39.990 / 37.986	2010	Galary forest	İ. Can
26	Sivas, Zara, Kumoğlu	39.955 / 37.925	1660	Steppe	İ. Can
27	Tokat, Erbaa, Karayaka	40.750 / 36.571	360	Shrubs, Steppe	F. T. Çubuk
28	Tokat, Erbaa, Tepekışla	40.680 / 36.670	230	Steppe, Shrubs	F. T. Çubuk
29	Tokat, Erbaa, Eryaba	40.707 / 36.713	900	Forest, Shrubs	F. T. Çubuk
30	Tokat, Niksar, Akıncı	40.424 / 37.083	600	Forest, Shrubs	F. T. Çubuk
31	Tokat, Niksar, Dönekse	40.522 / 36.907	320	Steppe	F. T. Çubuk
32	Tokat, Reşadiye, Zinav	40.450 / 37.277	970	Forest, Shrubs	F. T. Çubuk
33	Tokat, Reşadiye, Soğukpınar	40.360 / 37.301	780	Forest, Shrubs	F. T. Çubuk
34	Tokat, Reşadiye, Karlıyayla	40.395 / 37.512	1320	Forest, Steppe	F. T. Çubuk

3. Results

Famliy Crabronidae Latreille, 1802

Subfamily Astatinae Lepeletier de Saint Fargeau 1845

Genus *Astata* Latreille, 1796

***Astata affinis radoszkowskii* Pulawski, 1957 (Figure 1a)**

Material examined: Erzincan: Refahiye, Çat, 1250 m, 01.VIII.2017, 2 ♀♀; Sivas: Akıncılar, Şenbağlar, 1140 m, 18.VIII.2015, ♀.

Distribution in the world: Algeria, Germany, Greece, Iran, Italy, Morocco, Spain, Türkiye, Ukraine [2].

Distribution in the Türkiye: Bilecik, Erzurum, Hatay, Kars, Konya, Tokat, Tunceli [3] .

Remarks: New record for Erzincan and Sivas provinces

***Astata boops* (Schrank, 1781) (Figure 1b, c)**

Material examined: Erzincan: Refahiye, Çat, 1250 m, 11.VIII.2016, 2 ♀♀; 01.VIII.2017, ♀; 12.VII.2018, 3 ♀♀; 27.VII.2018, ♀, ♂; Refahiye, Sağlık, 1660 m, 29.VI.2017, ♀; Refahiye, Sakaltutan, 1970 m 12.VII.2018, 2 ♂♂; Giresun: Çamoluk, Hacıören, 1410 m, 20.VII.2017, ♀; Gümüşhane: Kelkit, Ağıl, 1700 m, 13.VII.2016, ♀; Şiran, Güreşköy, 1190 m, 03.VII.2018, ♀; Şiran, Fındıkbeli, 1700 m, 13.VII.2016, 2 ♂♂; 24.VII.2016, ♂; Sivas: Akıncılar, Şenbağlar, 1140 m, 18.VII.2016, ♀; 03.VIII.2016, 4 ♀♀; 01.VIII.2017, ♀; 12.VIII.2017, ♀; 11.VII.2018, ♂; Gölova, Çobanlı, 1290 m, 13.VII.2017, 2 ♂♂; 23.VI.2017, ♂; Koyulhisar, İskenderşeyh, 750 m, 03.VIII.2016, ♂; Suşehri, Aşağısarıca, 930 m, 02.VI.2018, ♀; Suşehri, Çokrak , 1040 m, 05.VII.2018, ♀; Suşehri, Geminbeli, 2010 m, 12.VIII.2017, ♀; Zara, Kumoğlu, 1660 m, 09.VIII.2016, ♂; Tokat: Erbaa, Eryaba, 900 m, 21.III.2015, ♀.

Distribution in the world: Albania, Algeria, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, China, Croatia, Cyprus, Czechia, Denmark, Egypt, England, Estonia, Finland, France, Germany, Greece, Hungary, India, Iran, Ireland, Israel, Italy, Kazakhstan, Korea, Kuwait, Latvia, Libya, Lithuania, Luxembourg, Malta, Morocco, Netherlands, Norway, Oman, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Tunisia, Türkiye, Turkmenistan, Ukraine, Uzbekistan [2].

Distribution in the Türkiye: Adana, Afyonkarahisar, Ankara, Artvin, Aydın, Bayburt, Bilecik, Bingöl, Burdur, Bursa, Çanakkale, Erzurum, Eskişehir, Hatay, Isparta, İzmir, Kahramanmaraş, Kars, Kayseri, Kocaeli, Konya, Mersin, Niğde, Rize, Tokat, Trabzon, Tunceli [3].

Remarks: New record for Erzincan, Giresun, Gümüşhane, and Sivas provinces.

***Astata costae* A. Costa, 1867 (Figure 1d, e)**

Material examined: Amasya: Central district, Ziyaret, 435 m, 07.VII.2013, ♂; Erzincan: Refahiye, Akçiğdem , 1700 m, 13.VII.2017, ♂; Refahiye, Çat , 1250 m, 11.VIII.2016, ♀; Refahiye, Sakaltutan , 1970 m, 11.VII.2018, ♀, ♂; 27.VII.2018, ♂; Giresun: Alucra, Gürbulak , 1600 m, 13.VII.2016, ♀, 3 ♂♂; 24.VII.2016, ♂; 11.VII.2017, 2 ♂♂; Çamoluk, Hacıören , 1410 m, 20.VII.2017, ♀; Gümüşhane: Kelkit, Ağıl , 1560 m, 13.VII.2016, ♀; Şiran, Fındıkbeli , 1700 m, 13.VII.2016, 2 ♂♂; Sivas: Zara, Kumoğlu, 1660 m, 22.VII.2015, 4 ♂♂; 09.VIII.2016, ♂; Tokat: Erbaa, Tepekışla, 230 m, 03.VI.2017, ♂; Reşadiye, Soğukpınar, 780 m, 18.X.2014, ♂.

Distribution in the world: Algeria, Azerbaijan, Bulgaria, Croatia, Cyprus, Czechia, France, Greece, Hungary, Iran, Italy, Kazakhstan, Malta, Morocco, Portugal, Russia, Slovakia, Spain, Switzerland, Tajikistan, Tunisia, Türkiye, Turkmenistan, Ukraine [2].

Distribution in the Türkiye: Ağrı, Antalya, Artvin, Bingöl, Diyarbakır, Edirne, Erzurum, Hatay, Iğdır, Kars, Konya, Kütahya, Samsun, Tunceli [3].

Remarks: New record for Amasya, Erzincan, Giresun, Gümüşhane, Sivas and Tokat provinces.

Astata diversipes Pulawski, 1955 (Figure 1f)

Material examined: Sivas: Zara, Kumoğlu, 1660 m, 22.VII.2016, 2 ♂♂; Tokat: Niksar, Akıncı, 600 m, 13.V.2014, ♀.

Distribution in the world: Syria, Türkiye [2].

Distribution in the Türkiye: Erzincan, Hatay, Sivas [3].

Remarks: New record for Tokat province.

Astata gallica de Beaumont, 1942

Material examined: Tokat: Niksar, Dönekse, 320 m, 28.V.2015, ♂; Reşadiye, Sarıyayla, 1250 m, 15.VIII.2015, ♂; Sivas: Koyulhisar, Kılıçpınarı, 1200 m, 22.VI.2016, ♂.

Distribution in the world: Czechia, France, Italy, Morocco, Poland, Portugal, Slovakia, Spain, Türkiye [2].

Distribution in the Türkiye: Erzurum, Kars, Samsun [3, 26].

Remarks: New record for Sivas and Tokat provinces.

Astata graeca de Beaumont, 1965 (Figure 1g, h)

Material examined: Erzincan: Refahiye, Çat , 1250 m, 12.VII.2018, ♀, ♂; 27.VII.2018, ♀; Refahiye, Sağlık , 1660 m, 13.VII.2017, ♂; Refahiye, Sakaltutan , 1970 m, 12.VII.2018, 3 ♂♂; Giresun: Alucra, Gürbulak , 1560 m, 24.VII.2016, ♂; Şebinkarahisar, Central district, 1200 m, 02.VII.2018, ♀; Sivas: Koyulhisar: Kılıçpınarı, 1200 m, 03.VIII.2016, ♀; Suşehri, Geminbeli, 2010 m, 12.VIII.2017, ♂; Zara, Kumoğlu, 1660 m, 18.VII.2017, ♂.

Distribution in the world: Azerbaijan, Cyprus, France, Greece, Iran, Israel, Italy, Türkiye, United Arab Emirates [2].

Distribution in the Türkiye: Ankara, Artvin, Kars, Tokat [3, 27].

Remarks: New record for Erzincan, Giresun, and Sivas provinces.

Astata kashmirensis Nurse, 1909 (Figure 1i, j)

Material examined: Erzincan: Refahiye, Sakaltutan, 1970 m, 12.VII.2018, ♂; 27.VII.2018, ♂; Giresun: Alucra, Gürbulak, 1560 m, 28.VI.2017, ♂; Çamoluk, Hacıören, 1410 m, 11.VIII.2016, ♂; 28.VI.2017, 6 ♂♂; 11.VII.2017, ♂; 20.VII.2017, ♂; Şebinkarahisar, Central district, 1250 m, 02.VII.2018, ♂; Gümüşhane: Kelkit, Çilhoroz, 1550 m, 26.VII.2017, ♂; 02.VII.2018, ♂; Şiran, Güreşköy, 1190 m, 03.VII.2018, ♂; Sivas: Akıncılar, Şenbağlar, 1140 m, 23.VI.2017, ♂; 02.VI.2018, ♂; Suşehri, Çokrak, 1040 m, 17.VII.2018, ♂; Suşehri, Geminbeli, 2010 m, 22.VII.2015, ♂; 01.VIII.2017, ♂; 12.VIII.2017, 2 ♂♂; Zara, Kumoğlu, 1660 m, 22.VII.2015, ♂; 18.VII.2016, ♀; 09.VIII.2016, 2 ♂♂; Tokat: Erbaa, Tepekışla, 230 m, 03.VI.2017, ♂.

Plants collected on: *Euphorbia virgata*

Distribution in the world: Austria, Azerbaijan, Bulgaria, China, Cyprus, Czechia, France, Germany, Greece, Hungary, India, Iran, Italy, Kazakhstan, Poland, Portugal, Russia, Slovakia, Slovenia, Spain, Switzerland, Türkiye, Turkmenistan, Ukraine, Uzbekistan [2].

Distribution in the Türkiye: Amasya, Ankara, Bilecik, Bingöl, Denizli, Diyarbakır, Erzincan, Erzurum, Hatay, Iğdır, Isparta, Kars, Konya, Mersin, Şanlıurfa, Tokat, Tunceli [3].

Remarks: New record for Giresun, Gümüşhane and Sivas provinces.

Astata miegii scapularis (Kohl, 1889) (Figure 1k, l)

Material examined: Amasya: Central district, Sarılar, 1120 m, 01.VII.2013, ♂; Erzincan: Refahiye, Çat, 1250 m, 11.VIII.2016, 4 ♂♂; 26.VII.2017, ♂; 12.VII.2018, 2 ♀♀; Giresun: Çamoluk, Hacıören, 1410 m, 24.VII.2016, ♀, 2 ♂♂; 11.VII.2017, ♂; 20.VII.2017, ♀, ♂; 07.VIII.2017, ♀; Şebinkarahisar, Central district, 1260 m, 02.VII.2018, 2 ♂♂; 24.VII.2018, ♂; Gümüşhane: Kelkit, Çilhoroz, 1550 m, 02.VII.2018, 2 ♂♂; Sivas: Akıncılar, Şenbağlar, 1140 m, 11.VII.2018, ♂; Suşehri, Akşar, 1110 m, 18.VII.2017, ♀; 29.VIII.2018, 4 ♂♂; Suşehri, Boyalıca, 975 m, 03.VIII.2016, ♂; 18.VII.2017, 5 ♂♂; Suşehri, Çokrak, 1040 m, 05.VII.2018, ♂; 17.VII.2018, ♀; Tokat: Reşadiye, Soğukpınar, 780 m, 18.X.2014, ♂; Reşadiye, Zinav, 970 m, 17.VIII.2014, ♂.

Distribution in the world: Armenia, Bulgaria, Greece, Türkiye, Ukraine [2].

Distribution in the Türkiye: Aksaray, Amasya, Ankara, Antalya, Bilecik, Bingöl, Çankırı, Erzincan, Erzurum, Gümüşhane, Isparta, İzmir, Kars, Kırıkkale, Kütahya, Manisa, Nevşehir, Tokat, Tunceli [3, 27].

Remarks: New record for Giresun and Sivas provinces.

Astata minor Kohl, 1885 (Figure 1m, n)

Material examined: Erzincan: Refahiye, Çat, 1250 m, 12.VII.2018, 2 ♀♀; 27.VII.2018, ♀; Refahiye, Sakaltutan, 1970 m, 11.VII.2018, 9 ♀♀, 2 ♂♂; 27.VII.2018, 2 ♀♀, ♂; Giresun: Alucra, Gürbulak, 1560 m, 11.VII.2017, ♂; Çamoluk, Hacıören, 1460 m, 18.VI.2017, ♂; 28.VI.2017, 2 ♂♂; 02.VII.2017, ♂; 24.VII.2018, 4 ♀♀, ♂; Şebinkarahisar, Central district, 1200 m, 02.VII.2018, ♀; Sivas: Akıncılar, Şenbağlar, 1140 m, 18.VIII.2015, ♀; 23.VI.2017, ♂; 02.VII.2017, ♂; 01.VIII.2017, 2 ♀♀; 05.VII.2018, 2 ♀♀; 11.VII.2018, 3 ♀♀; Gölova, Çobanlı, 1290 m, 23.VI.2017, ♀; İmranlı, Aşağıçulha, 1830 m, 24.VII.2017, ♂; Koyulhisar, İskenderşeyh, 750 m, 03.VIII.2016, ♂; 1150 m, 13.VII.2017, ♂; Suşehri, Geminbeli, 2010 m, 24.VII.2017, ♀; 01.VIII.2017, 2 ♀♀; 12.VIII.2017, ♀; Zara, Kumoğlu, 1660 m, 22.VII.2015, 2 ♂♂; 17.VII.2018, ♀; Tokat: Erbaa, Karayaka, 360 m, 09.V.2015, 2 ♂♂; Erbaa, Tepekışla, 230 m, 16.V.2015, ♀; Niksar, Çamiçi, 900 m, 21.VI.2013, ♂; Reşadiye, Karlıyayla, 1320 m, 20.VI.2015, ♂.

Plants collected on: *Euphorbia virgata*

Distribution in the world: Algeria, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Lithuania, Luxembourg, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Türkiye, Turkmenistan, Ukraine, Uzbekistan [2].

Distribution in the Türkiye: Ağrı, Ankara, Artvin, Bilecik, Bingöl, Diyarbakır, Erzincan, Erzurum, Gümüşhane, Hatay, Iğdır, Isparta, Kars, Tokat, Tunceli [3, 27].

Remarks: New record for Giresun and Sivas provinces.

Astata pontica Pulawski, 1958

Material examined: Sivas: Koyulhisar, Suşehri road 20. km, 700 m, 27.VII.2014, ♂; Tokat: Erbaa, Tepekışla, 230 m, 02.VII.2014, ♂.

Distribution in the world: Bulgaria, Czechia, Greece, Russia, Türkiye [2].

Distribution in the Türkiye: Isparta, Niğde [3].

Remarks: New record for Sivas and Tokat provinces.

Astata rufipes Mocsáry, 1883 (Figure 1o, p)

Material examined: Erzincan: Refahiye, Sakaltutan, 1900 m, 29.VI.2017, ♂; 11.VII.2018, 2 ♂♂; Giresun: Çamoluk, Hacıören, 1410 m, 28.VI.2017, 3 ♂♂; 20.VII.2017, ♂; Şebinkarahisar, Central district, 1250 m, 06.VIII.2015, ♀; Gümüşhane: Kelkit, Çilhoroz, 1550 m, 02.VII.2018, ♂; Şiran, Seydibaba, 1450 m, 26.VII.2017, ♂; Sivas: Akıncılar, Şenbağlar, 1140 m, 23.VI.2017, 2 ♂♂; 01.VIII.2017, 2 ♂♂; Zara, Kumoğlu, 1660 m, 01.VII.2016, 4 ♂♂.

Plants collected on: *Euphorbia virgata*

Distribution in the world: Austria, Bulgaria, Czechia, France, Greece, Hungary, Italy, Kazakhstan, Libya, Poland, Russia, Slovakia, Spain, Switzerland, Tajikistan, Türkiye, Turkmenistan, Ukraine [2].

Distribution in the Türkiye: Bitlis, Kars, Tokat, Tunceli [3].

Remarks: New record for Erzincan, Giresun, Gümüşhane and Sivas provinces.

Genus *Dryudella* Spinola, 1843

Dryudella freygessneri (Carl, 1913) (Figure 1q, r)

Material examined: Erzincan: Refahiye, Sakaltutan, 2010 m, 27.VII.2018, ♂; Sivas: Zara, Kumoğlu, 1660 m, 18.VII.2016, ♀, ♂; İmranlı, Aşağıçulha, 1830 m, 18.VII.2017, ♂.

Distribution in the world: France, Italy, Switzerland, Türkiye [2].

Distribution in the Türkiye: Erzincan, Erzurum, Kütahya [3].

Remarks: New record for Sivas province.

Dryudella tricolor (Vander Linden, 1829) (Figure 1s)

Material examined: Erzincan: Refahiye, Sakaltutan, 1970 m, 11.VII.2018, ♀; 27.VII.2018, ♀; Tokat: Erbaa, Tepekışla, 230 m, 02.VII.2014, ♀; Reşadiye, Zinav, 970 m, 12.X.2014, ♀.

Distribution in the world: Austria, Belarus, Bulgaria, Czechia, France, Greece, Hungary, Iran, Italy, Kazakhstan, Kuwait, Libya, Morocco, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Tajikistan, Türkiye, Ukraine [2].

Distribution in the Türkiye: Erzincan, Kars, Kayseri [3].

Remarks: New record for Tokat province.

Dryudella tricolor eurygnatha (Pulawski, 1967) (Figure 1t)

Material examined: Erzincan: Refahiye, Çat, 1250 m, 12.VII.2018, ♂; Sivas: Gölova, Arslanca, 1180 m, 24.VII.2016, ♂; Suşehri, Akşar, 1110 m, 09.VIII.2016, ♂ Zara, Kumoğlu, 1660 m, 22.VII.2016, 2 ♂♂.

Distribution in the world: Azerbaijan, Bulgaria, Greece, Iran, Kazakhstan, Romania, Russia, Türkiye [2].

Distribution in the Türkiye: Amasya, Aydın, Balıkesir, Bingöl, Diyarbakır, Erzincan, Erzurum, Hatay, Konya, Mersin, Nevşehir, Sinop, Tunceli [3].

Remarks: New record for Sivas provinces.

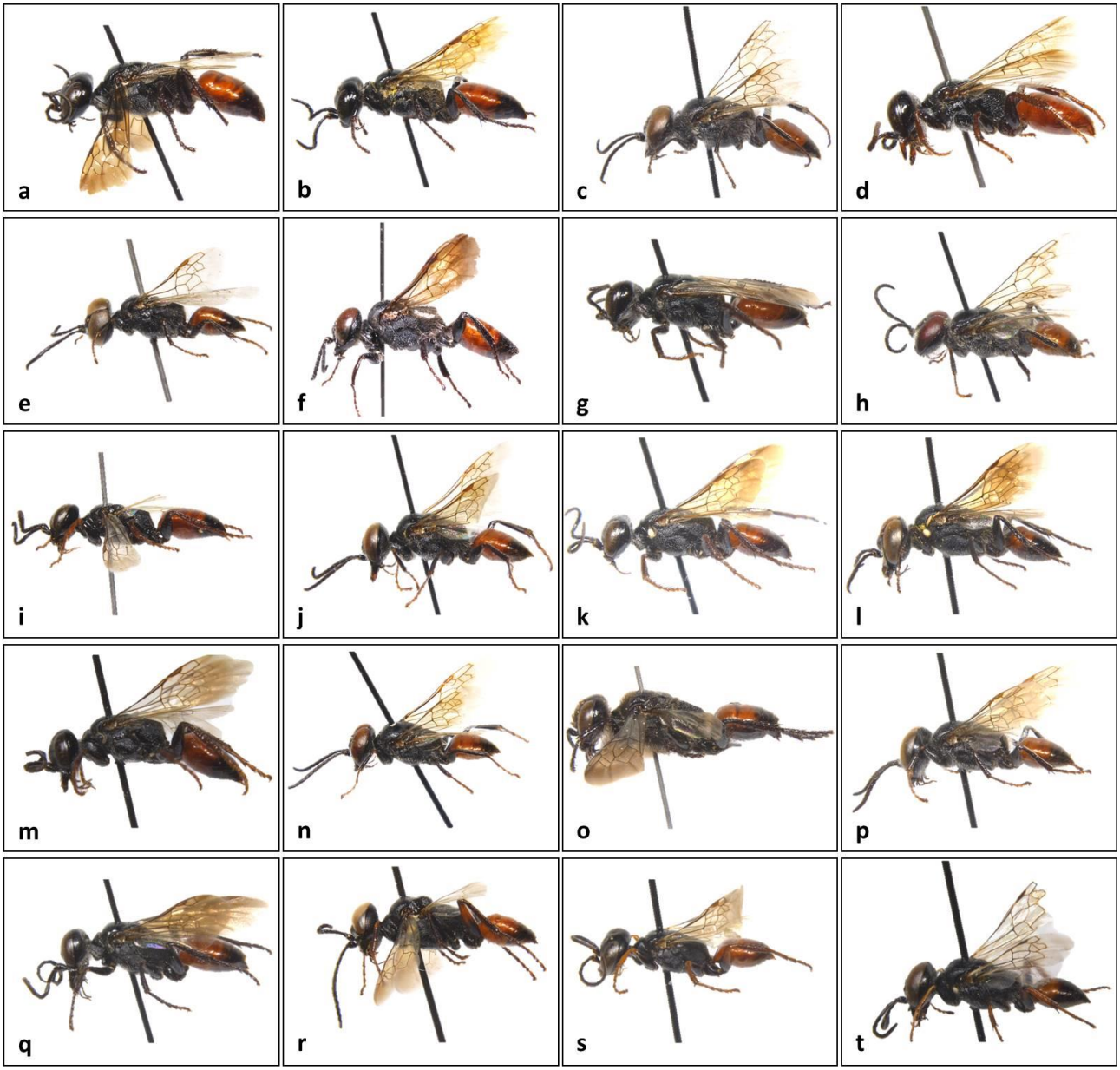


Figure 1. Some identified species belonging to subfamily Astatinae: a) *Astata affinis* (♀); b) *Astata boops* (♀); c) *Astata boops* (♂); d) *Astata costae* (♀); e) *Astata costae* (♂); f) *Astata diversipes* (♂); g) *Astata graeca* (♀); h) *Astata graeca* (♂); i) *Astata kashmirensis* (♀); j) *Astata kashmirensis* (♂); k) *Astata miegi scapularis* (♀); l) *Astata miegi scapularis* (♂); m) *Astata minor* (♀); n) *Astata minor* (♂); o) *Astata rufipes* (♀); p) *Astata rufipes* (♂); q) *Dryudella freygessneri* (♀); r) *Dryudella freygessneri* (♂); s) *Dryudella tricolor* (♀); t) *Dryudella tricolor eurygnatha* (♂)

Subfamily Dinetinae W. Fox, 1895

Genus *Dinetus* Panzer, 1806

***Dinetus pictus* (Fabricius, 1793) (Figure 2a, b)**

Material examined: Giresun: Alucra, Gürbulak, 1560 m, 11.VII.2017, 3 ♂♂; 20.VII.2017, 1 ♂; Sivas: Zara, Kumoğlu, 1660 m, 22.VII.2015, 2 ♀♀, 1 ♂; 06.VIII.2015, 3 ♀♀, 1 ♂; 18.VII.2016, 3 ♀♀; Tokat**:** Erbaa, Tepekışla, 230 m, 03.VI.2017,1 ♀; 03.VII.2017,1 ♀.

Distribution in the world: Albania, Algeria, Austria, Belarus, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Syria, Türkiye, Ukraine [2].

Distribution in Türkiye: Bayburt, Bingöl, Bursa, Erzincan, Erzurum, Isparta, İstanbul, Kayseri, Konya, Niğde, Sinop, Tokat [3, 27].

Remarks: New record for Giresun and Sivas provinces.

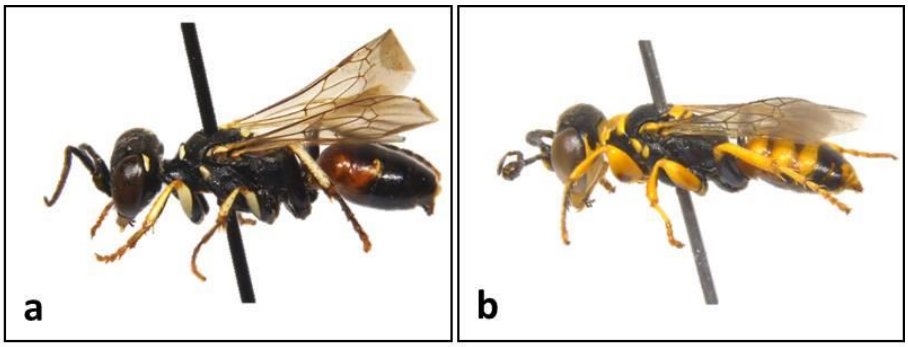


Figure 2. Identified species belonging to subfamily Dinetinae: a) *Dinetus pictus* (♀) b) *Dinetus pictus* (♂)

4. Conclusion

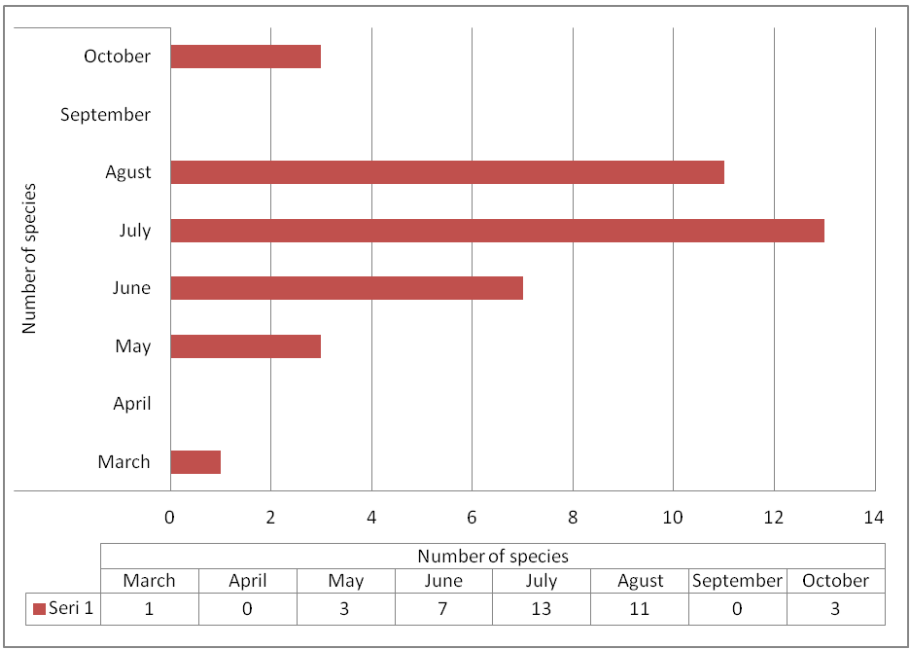
In this study, samples were caught with collection nets from the field and plant species on which samples were collected were determined as much as possible. During field studies, most of the specimens were caught in sandy or stony areas with sparse vegetation. Therefore, plant records for most specimens could not be given, probably because they were not active at the time of collection, or they were caught in the air during flight. *Euphorbia virgata* was the only plant species on which specimens belonging to three species, *Astata kashmirensis*, *A. minor* and *A. rufipes*, could be collected.

As listed above, 14 taxa from Astatinae and one species from Dinetinae were identified, among which the most common ones were *Astata boops*, *A. costae*, *A. kashmirensis* and *A. miegii scapularis*. Except for *Astata boops*, *A. kashmirensis*, *A. miegi scapularis* and *A. minor*, all identified taxa were recorded for the first time from Kelkit Valley. Moreover, detecting *Astata diversipes, A. pontica, A. rufipes*, *Dryudella freygessneri* and *D. tricolor* is an important faunistic record, since these species are rare and distributed in a narrow area in Türkiye.

The species, *Astata jucunda*, which was previously recorded from Erzincan by Yıldırım and Ljubomirov [21], could not be determined in this study. This is probably because the specific locality of the species has not been clearly defined or it has been overlooked during our field studies.

According to our results, species belonging to subfamilies Astatinae and Dinetinae are actively flying from March to October, mostly in July and August. *Astata boops* has the longest flight period among others. It is known that this species, which repeats at least three generations in a year, is seen from June to September [28]. This species was found to be active from late March to mid-August in the study area.

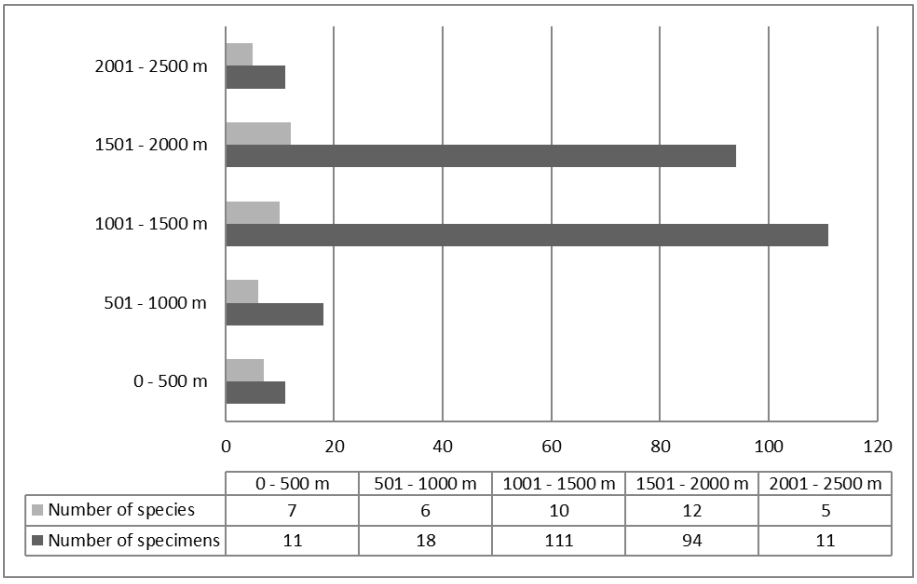
Although collections were made between March and October in the region, no samples were found in April and September (Figure 3). There may be different reasons for the unavailability of samples during these months. For example, climatic conditions, vegetation characteristics, the low prey population of these predatory insects or the inactivity of insects during visits.



	Number of species							
	March	April	May	June	July	Agust	September	October
Seri 1	1	0	3	7	13	11	0	3

Figure 3. Seasonal distribution of Astatinae and Dinetinae species in Kelkit Valley

The vertical distribution of the species according to the samples caught in the research area ranged from 200 to 2100 m. The highest number of species is detected between 1500-2000 m (Figure 3). It can be concluded that this altitude range has suitable ecological conditions for the identified species. *Astata costae, A. kashmirensis,* and *A. minor* have the widest vertical distribution range as they are found at almost all elevations.



	0 - 500 m	501 - 1000 m	1001 - 1500 m	1501 - 2000 m	2001 - 2500 m
Number of species	7	6	10	12	5
Number of specimens	11	18	111	94	11

Figure 4. Vertical distribution of Astatinae and Dinetinae species

A total of 24 taxa are known in Türkiye belonging to Astatinae and Dinetinae subfamilies. The detection of 15 taxa belonging to these subfamilies in Kelkit Valley is an indication of the rich fauna. Additionally, some of these taxa are new records for the Crabronidae fauna of the provinces in the region (Table 2).

Table 2. Number of taxa belonging to Crabronidae in Kelkit Valley

Province	Number of taxa		
	Literature	New records	Current
Amasya	96	1	97
Erzincan	107	5	112
Giresun	22	8	30
Gümüşhane	25	4	29
Sivas	61	13	74
Tokat	151	5	156

It is very valuable to document the distribution of insect species, which constantly changes with the effect of global warming, destruction of habitats, decrease in food sources, or other environmental factors, with new data. This study provided essential data for future studies, including new species records from the research area and some ecological data of the identified species.

Author Contributions

All the authors equally contributed to this work. They all read and approved the final version of the paper. This paper is derived from the first and the second authors' doctoral dissertations supervised by the third author.

Conflicts of Interest

All the authors declare no conflict of interest.

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