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Lacewings Fauna of Çimen Mountain and Its Surroundings (Neuroptera: Planipennia) Kahramanmaraş, Turkey

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Abstract: In this study, totally 146 specimens belonging to the Neuroptera Order (Neuroptera: Planipennia) were collected and evaluated in Çimen Mountain, between May and August in the years of 2015 and 2016. Totally, 16 species belonging to the Neuroptera Order have been determined. All of those species were recorded from Çimen Mountain for the first time. Among these species; *Chrysopa perla* (Linnaeus, 1758), *Italochrysa italica* (Rossi, 1970) and *Palpares libelluloides* (Linnaeus, 1764) are abundant and widespread species in the research area.

***Keywords*:** Çimen Mountain, Kahramanmaras, fauna, biodiversity, neuroptera

Çimen Dağı ve Çevresi Sinir Kanatlı Faunası (Neuroptera:Planipennia) Kahramanmaraş, Turkey

Özet: Çimen Dağı ve çevresinden toplanan sinir kanatlı (Neuroptera: Planipennia) türlerinin değerlendirildiği bu çalışmada, 2015-2016 yıllarının Mayıs-Ağustos ayları arasında, toplam 146 birey toplanmıştır. Araştırma bölgesinde, Neuroptera takımına ait toplam 16 tür belirlenmiştir. Bu türlerin tamamı Çimen Dağı'ndan ilk defa kaydedilmiştir. Bulunan türlerden, *Chrysopa perla* (Linnaeus, 1758), *Italochrysa italica* (Rossi, 1970) ve *Palpares libelluloides* (Linnaeus, 1764) araştırma alanlarında sık rastlanan ve yaygın olan türlerdir.

***Anahtar Kelimeler*:** Çimen Dağı, Kahramanmaraş, fauna, biyoçeşitlilik, sinir kanatlı

1. INTRODUCTION

Species belonging to Neuroptera, also known as lacewing, are the most widely observed predators which feed on nectar in ecosystems or harmful plants. Especially, Chrysopidae, Hemerobiidae and Coniopterygidae are used as biological control. Neuroptera Order live in large habitat extending from Melbourne, Australia in the West to Ontario and Queensland in the East. Neuroptera species are found in altitudes starting from seal level up to 2800 meters, mostly in needle-leaved and broad-leaved tree formations, in the front sides of stream or slack water and in various culture plants [1-3].

As their wings have a primary shape and lots of cross-lode, they are known as `` dantela" or "sinir kanatlılar`` in Turkish, ``lacewing" in English and ``Netzflugler`` in German. Neuroptera (Planipennia) group has 687 species and 27 subspecies in Palearctic Area and are represented with more than 6500 species belonging to 17 families [4]. In Turkey, according to recent researches, there are 193 species and 6 subspecies belonging to 10 families (Ascalaphidae, Berothidae, Chrysopidae, Coniopterygidae, Dilaridae, Hemerobiidae, Mantispidae, Myrmeleontidae, Nemopteridae and Osmylidae) [5].

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Natural or semi-natural unfinished areas create microhabitats in order for lacewings to leave eggs, to make cocon and to exhibit wintering behaviors. Besides that, they are found on most of broad-leaved tree formations, various culture lands, tropical fruit trees and some garden plants [2,6].

There is few data about digestion behaviors of Hemerobidae. In intestine analysis, aphids' remnants are discovered and also few omnivores are found. Generally, they live in habitats where they will be able to find their prey. Investigations have shown that *Hemerobius pasficus* larvae need 350 various aphid species in order to become pupa.

Mountain ecosystem climates have various plants and wild animals and are complex and rich. Because of height difference, there are differences at short distance in terms of heat, light, wind and moisture. That is why mountain ecosystem is bio-diversity Island being gen bank, shelter for plants and animals and surrounded with habitats [7].

Altitudes around Cimen Mountain are between 440 m and 2.259 m. The highest point of the area is Ulu Ziyaret Hill which is 2.259 m. Cilmezar Hill (1.889 m) and Catalkaya Hill (1.800m) are the other two highest points in the research area. There are three vegetation types which are forest, bush and step.

Forest Vegetation: This vegetation is found in different zones according to local climate condition, altitude ranges from 600 m to 1800 m.

Brush vegetation: This vegetation type spreads around from 500 m to 900 m.

Step vegetation: This vegetation type spreads in local areas which Abides and *Cedrus* forests that are ruined in 1600 m and above forest vegetation (1900-2250m) (Golluoglu, 2010). Cimen Mountains which take place in the West part of Amanos Mountains become habitat for various insect species including neuropteran. Regular zoning is seen in the area based on altitudes. Vegetation types can be ordered in that way: Forest vegetation is between 600 m-1800 m, brush vegetation is between 700 m – 950 m and step vegetation is between 1600 m and 2100 m [8].

2. METHOD

Study Area

Research Area, Cimen Mountains, ranks among 36° 30' 00"-36° 52 ' 30" west longitude and 37° 22 ' 30" - 37° 37' 30" north latitude whose distance is 45 km to Kahramanmaras city center. Size of the area is 17.522 ha. Uludaz Hill form is the highest point of Cimen Mountain by having 2.273 m altitude. Cimen Mountain is selected as research area because it includes many ecological species such as step, wetland and steppe. Survey was conducted in micro habitats and different altitudes in and around the Cimen Mountain between 2015 – 2016 years.

Data Collection

Specimens were collected by using different biotopes and altitudes by using net traps, electric lambs with charged and japan umbrella (Figure 1,2).

Samples were collected from short plants and weed through net traps whose radius is 20 m and thin: it was provided to fall them into fabrics which are covered under the tree previously by beating with stick like rolling pin from short, frequent, brush and thorn. Catching with japan umbrella carried out to collect species of Hemerobiidae and Mantispidae. As Neuroptera rest inside trees and big plants in hot and sunny time, catching insect process was conducted in morning or evening hours or dark shape areas that do not get sunlight in afternoon hours. To catch adult species, white fabric which is another method was used. 250-350 Watt lamb in the shape of screen and powered by a small portable generator hanged in 30 cm front of a cloth standing as centered. Specimens that came to light and alighted on curtain were collected with thin pin forceps. With the light trap, mostly Chrysopidae and Ascalaphidae species have been caught.

Specimens in laboratory have been dried at 30°C between 2-4 days, in softening period, in order to prevent the formation of bacteria and fungi, 2-3 ml acetic acid (CH_3COOH) has been dropped in the softening vessel. Well dried specimens have been distended on stretching board by pinning. Stretched specimens have been placed in collection boxes as standard museum material by implementing the label information after drying. In order to prevent any harm to the stored specimens, naphthalene has been put into the boxes.

In the process of Species diagnosis, the Neuropter's abdomen terminal has been cut with a sharp lancet, by any chance the specimens is all dry and its abdomen can be break away immediately, the specimens has been held to a steam or got soften in a humidifier. By tagging with the same number, it has been prevented that they might mix. Cutted abdomen terminal has been left in a KOH (%10 concentration) melt, the part that has been cut according to the size and chitin ratio of abdomen left in KOH melt between 5-24 hours and after the color of the solution got lighter structures that create genital have been cleaned from muscle and digestive residues.

This cleaning period in some species has been reduced to 5-10 minutes by heating KOH melt. When cleaning process has been completed in KOH melt, abdomen end has been transferred into distilled water, abdomen has been purified by waiting there 2-9 hours. The abdomen terminal has been investigated under the stereomicroscope by putting in one drop of glycerine and the image of particulars has been taken on Soif brand SZM 45-T2 type Stereo Microscope with 9 Megapixel view feature MShot (Micro Shot v 1.0) Digital Microscope Camera.

3. RESULTS and DISCUSSION

In scope of this study, 16 species were gathered. Of them, 1 belongs to Ascalaphidae family, 6 to Chrysopidae family, 3 to Hemerobiidae family, 5 to Myrmeleontidae family, and 1 to Nemopteridae family. Taxonomic and zoogeographical information is given for each species.

Order: Neuroptera

Family: Nemopteridae Burmeister, 1839

Nemoptera sinuata Olivier, 1811

Studied Material: 2♀♀, 4♂♂; Kahramanmaraş, Uluziyaret, 27.V.2015 2050m; 1♀, 2 ♂♂; Akyar Stream, 13.VI.2015, 1520 m; 3♀, 1♂♂, Yalangaz Stream, 19.VII.2015, 442m; 6♀♀, 1 ♂♂, Beylik Stream, 322m, 16.VI.2016.

Turkey Distrubition: Adana, Ankara, Antalya, Aydın, Burdur, Denizli, Muğla, Isparta, İstanbul, İzmir, Kahramanmaraş, Kars, Kütahya, Konya, Mersin, Muğla, Muş, Tokat, Van [9].

World Distribution: Azerbaijan, Bulgaria, Ermenia, Georgia, North-East Iran, Makedonia, Syria, Turkey, Greece, Yugoslavia [1,2,10].

Zoogeographic Origin: Pontomediterranean: Anatolia [2,4,11].

Family: Ascalaphidae Latreille, 1803

Libelloides macaronius (Scopoli, 1763)

Material Examined: 4♀♀, 3♂♂; Kahramanmaraş, Keklik Stream, 09.VI.2016 1004m; 1 ♀, 4 ♂♂; Çatak Stream, 25.VIII.2016, 1233m; 2♀, 1♂♂, Çınar Stream, 14.VI.2015, 541m; 4♀♀, 7♂♂, Hüsam Stream, 977 m, 16.VI.2015.

Turkey Distribution: South and North Anatolia, Ankara, Antalya, Ardahan, Burdur, Çanakkale, Edirne, Hakkari, Kırşehir, Kayseri, Isparta, Niğde, Sakarya [12-20].

World Distribution: Albania, Australia, Azerbaijan, Bosnia-Herzegova, Bulgaria, Czech Republic, Ermenia, Georgia, Croatia, Italy, Caucasia, Kazakhstan, Cyprus, Kirghizstan, Lebanon, Hungary, Macedonia, Moldova, Iran, Uzbekhstan, Poland, Romania, Russia, Slovenia,

Tajikistan, Turkmenistan, Ukraine, Old Yugoslavia, Greece [2, 4, 21-28].

Zoogeographic Origin: Pontomediterranean: Anatolia [2, 4, 11].

Family: Hemerobiidae Latreille, 1803

Hemerobius nitidulus Fabricius, 1777

Material Examined: 3 ♀♀, 2 ♂♂; Kahramanmaraş, Gedikli Stream, 17.VI.2015 820 m; 2♀, 2♂♂; Çınar Stream, 18.VI.2016, 580 m; 3♀, 3♂♂, Akyar Stream, 27.VI.2015, 1520m; 1♀♀, 1 ♂♂, Kuşharman Stream, 1526 m, 16.VIII.2016.

Turkey Distribution: Middle Anatolia Area, East Black Sea Area, Antalya, Ardahan, Aydın, Burdur, Denizli, Kars, Kocaeli, Kırklareli, Muğla, Sakarya [9, 18-20, 29-31].

World Distribution: Germany, Andora, Albania, Australia, Belgium, Bulgaria, England, Czech Republic, Denmark, Estonia, Finland, France, Croatia, Greece, Holland, Ireland, Spain, Sweden, Switzerland, Italy, Cambogia, Cyprus, Letonia, Liechtenstein, Lithuania, Luxemburg, Hungary, Mongolia, Norway, Poland, Romania, Russia, Siberia, Slovenia, Turkey, Ukraine [21, 22, 32-41].

Zoogeographic Origin: Siberian [2, 4, 11].

Hemerobius handschini Tjeder, 1957

Material Examined: 1♀♀, 5♂♂; Kahramanmaraş, Hüsam Stream, 11.VII.2015, 977m; 2♀, 1♂♂; Yavşan Stream, 14.VII.2015, 1609m; 1♀, 1 ♂♂, Aya Stream, 09.VII.2016, 1123m; 4♀♀, 1 ♂♂, Kelpınar Stream, 613 m, 11.VI.2016.

Turkey Distribution: Middle and South Anatolia, Antalya, Isparta, Denizli, Düzce, Kocaeli, Sakarya [18, 20, 31].

World Distribution: Germany, Australia, Bulgaria, Czech Republic, France, Croatia, Spain, Switzerland, İtaly, Hungary, Poland, Portugal, Romania, Slovenia, Turkey, Ukraine, Old Yugoslavia, Greece [2, 4, 23, 41-44].

Zoogeographic Origin: Holomediterranean [2,4,11].

Hemerobius (*Hemaerobius*) *stigma* Stephens, 1836

Material Examined: 5♀♀, 6♂♂; Kahramanmaraş, Ağıllı Stream, 621m, 17.VII.2015, 621m; 3♀, 5♂♂; Fakılar Stream, 09.VII.2016, 490 m; 3♀, 2♂♂, Kalekaya Stream, 16.VI.2016, 498m; 3 ♀♀, 1 ♂♂, Ağıllı Stream, 621 m, 22.VII.2016.

Turkey Distribution: North Anatolia [2].

World Distribution: Germany, Andora, Australia, Azor Islands, Bulgaria, Czech Republic, Denmark, Estonia, Morocco, Finland, France, Croatia, Holland, England, Spain, Sweden, Swetzerland, Japan, Canada, Canary Islands, Kazakstan, Cyprus, North Anatolia, Letonia, Liechtenstein, Lithuania, Luxemburg, Hungary, Mongolia, Norway, Poland, Portugal, Romania, Russia, Siberia, Slovenia, Ukraine, Yugoslavia [2,4,10,16].

Zoogeographic Origin: Siberian -Nearctic [2].

Family: Myrmeleontidae Latreille, 1803

Palpares libelluloides (Linnaeus, 1764)

Material Examined: 22♀♀, 5 ♂♂; Kahramanmaraş, Yalangaz Stream, 17.VI.2016 442 m; 10♀♀, 14 ♂♂; Kuşharman Stream, 11.VI.2016, 1526 m; 12♀, 22♂♂, Sazak Stream, 10.VII.2015, 1004 m; 10♀♀, 3♂♂, Çınarstream, 541 m, 16.VI.2016.

Turkey Distribution: West, Middle, South and South West Anatolia. Aydın, Antalya, Denizli, Isparta, Muğla [13].

World Ditribution: Albania, Bosnia-Herzegova, Bulgaria, Algeria, Morocco, France, Croatia, Holland, Iraq, Iran, Spain, Italy, Caucasia, Cyprus, Hungary, Macedonia, Romania, Syria, Tunisia, Turkey, Jordan, Yugoslavia, Greece [4].

Zoogeographic Origin: Holomediterranean [2,4,11].

Euroleon nostras (Geoffroy in fourcroy, 1785)

Material Examined: 1♀♀, 1 ♂♂; Kahramanmaraş, Karanlık Stream, 17.VII.2015, 1533m; 3♀, 4 ♂♂; Çamlı Stream, 17.VI.2015, 510m; 2♀, 2 ♂♂, Dereboğazı, 11.VIII.2015, 1201m; 1♀♀, 2 ♂♂, Karadere, 1228m, 16.VII.2015.

Turkey Distribution: Ankara, Iğdır, Sakarya [9,19,31].

World Distribution: Germany, Australia, Azerbaijan, Belgium, Bosnia-Herzegova, Bulgaria, Sweden, Czech Republic, Denmark, Ermenia, Georgia, Greece, Morocco, France, Cloatia, Holland, Caucasia, Luxemburg, Spain, Sweden, Italy, Hungary, Poland, Romania, Russia, Liechtenstein, Slovakia, Slovenia, Turkey, Ukraine, old Yugoslavia [2,4,21,23,26,27,38-40,45].

Zoogeographic Origin: Mediterranean [4].

Family: Chrysopidae Schneider, 1851

Dichochrysa venosa (Rambur, 1842)

Material Examined: 3 ♀♀, 2 ♂♂; Kahramanmaraş, Akyar Stream, 27.V.2009 1644m; 3♀, 10♂♂; Hançer Stream, 20.VI.2015, 1500 m; 2♀, 2 ♂♂, Ağıllı Stream, 29.VII.2015, 928m; 2♀♀, 2 ♂♂, Akyar Stream, 1644 m, 27.VI.2015.

Turkey Distribution: Mardin, Toros Mountains, Diyarbakır [3].

World Distribution: Afghanistan, Morocco, Turkey, France, Russia, Spain, Iran, Lebanon, Egypt, Pakistan, Portugal, Sudan, Saudi Arabia, Tunusia, Yemen [2,4].

Zoogeographic Origin: Pontomediterranean: Balkan [11].

Nineta carinthiaca (Hölzel, 1965)

Material Examined: 3 ♀♀, 2 ♂♂; Kahramanmaraş, Ahmetçik Stream, 25.V.2015, 590m; 1 ♀, 5 ♂♂; Kıcılı Stream, 22.VI.2015, 1602m; 2♀, 2♂♂, Deliçayı, 30.VII.2015, 705m; 1♀♀, 2♂♂, Ağıllı Stream, 930m, 21.VI.2015.

Turkey Distribution: Ankara, North East Anatolia [3].

World Distribution: Australia, Hungary, Slovenia, Turkey [2,4].

Zoogeographic Origin: Central European [11].

Chrysopa walkeri (McLachlan, 1893)

Material Examined: 3 ♀♀, 2 ♂♂; Kahramanmaraş, Yıkıkdeğirmendere, 25.V.2015, 634m; 2♀, 4♂♂; Yavşan Stream, 13.VI.2016, 1701m; 1 ♀, 2 ♂♂, Aya Stream, 30.VII.2015, 1634m; 2 ♀, 2 ♂♂, Hartlap, 1209m, 26.VI.2015.

Turkey Distribution: East Anatolia and Antalya [4,18,22].

World Distribution: Germany, Australia, Bulgaria, Czechoslovakia, Ermenia, France, Finland, Croatia, Spain, Sweden, Cyprus, Kirghizstan, Lebanon, Hungary, Mongolya, Moldova, Uzbekistan, Romania, Turkey, Ukraine, Yugoslavia [2,4].

Zoogeographic Origin: Siberian [11].

Italochrysa italica (Rossi, 1970)

Material Examined: 13♀♀, 25♂♂; Kahramanmaraş, Kozlu Stream, 22.V.2015, 644m; 10 ♀, 14 ♂♂; Zeytindere, 23.VI.2016, 704m; 1♀, 2 ♂♂, Uludere, 27.VII.2015, 1703m; 9♀♀, 11♂♂, Kelpınar Stream, 1044 m, 24.VI.2015.

Turkey Distribution: Adıyaman, Ankara, Çanakkale, İzmir, Kahramanmaraş, Konya and Mersin [14,18].

World Distribution: Bulgaria, France, Iraq, Spain, Italy, Sweden, Lebanon, Egypt, Portugal, Romania, Turkey, Greece [2].

Zoogeographic Origin: Holomediterranean [11].

Brinckochrysa amseli (Hölzel, 1967)

Material Examined: 3 ♀♀, 2 ♂♂; Kahramanmaraş, Başkonuşaşkonusara Gavurdağı Village, 27.V.2015, 1482 m; 1 ♀, 4 ♂♂; Hançer Stream, 23.VI.2015, 1500 m; 1 ♀, 2 ♂♂, Kıcılı, 30.VI.2016, 1602m; 2 ♀♀, 2 ♂♂, Gedikli, 590 m, 26.VI.2015.

Turkey Distribution: Adana [3].

World Distribution: Anatolia and Afganistan [2,4].

Zoogeographic Origin: Holomediterranean [11].

Chrysopa perla (Linnaeus, 1758)

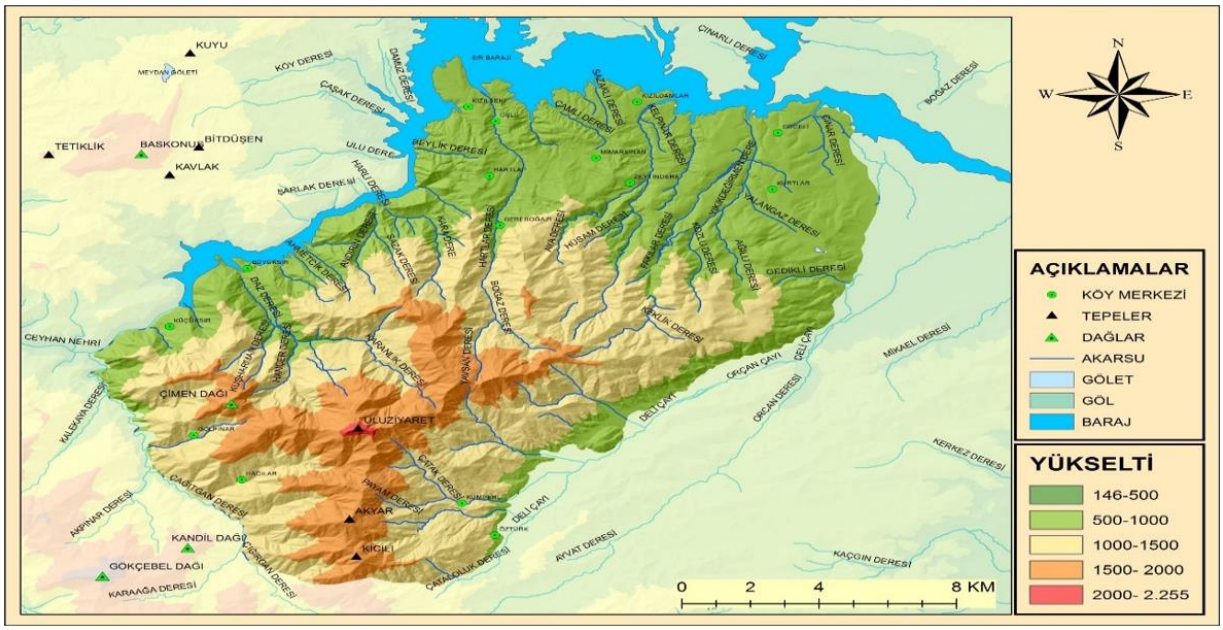

Figure 1. Çimen Mountain Map.

Material Examined: 13♀♀, 21♂♂; Kahramanmaraş, Kelpınar, 29.VIII.2016, 618m; 10♀♀, 14♂♂; Sazak Stream, 29.VIII.2016, 1006m; 12 ♀,18 ♂♂, Hüsam Stream, 30.VIII.2016, 1180m; 21♀♀, 12♂♂, Çınar Stream, 541m, 14.VIII.2015.

Turkey Distribution: Ankara, İstanbul, Muğla and North Anatolia [2-4].

World Distribution: Germany, Australia, Belgium, Belarus, Bulgaria, Bosnia-Herzegovina, Czechoslovakia, Denmark, Ermenia, Estonia, Finland, France, Georgia, Holland, Spain, England, Switzerland, Sweden, Italy, Japan, Kazakhstan, Kirgizstan, Letonia, Luxemburg, Hungary, Malta, Norway, Poland, Romania, Russia, Siberia[2,4,41,46].

Zoogeographic Origin: Siberian [11].

Previous researches about *C. septempunctata* which is found in Uludaz, Cimen Mountain started to be conducted and meetings were done with people, and especially over 70 years old who live in Buyuk Sir Urban which is the closest residence place. It was founded that *C. septempunctata* which is known as ``Nisan Bocegi`` by urban people has existed more than 100 years in that area. Also, people in the Urban Area stated that there is increase on population of *C. septempunctata* as number of aphid is raised in July and August [47].

C. septempunctata is reported in mountains which have 1500 m altitude in France, Czechoslovakia, Poland, Greece and Japan. While Cimen Mountain, Uludaz Hill shows differences within its 2273 m altitude from the others, *C. septempunctata* which is in Vettore Mountain, Middle Italy and its highness is 2478 seems the same with that area [47].

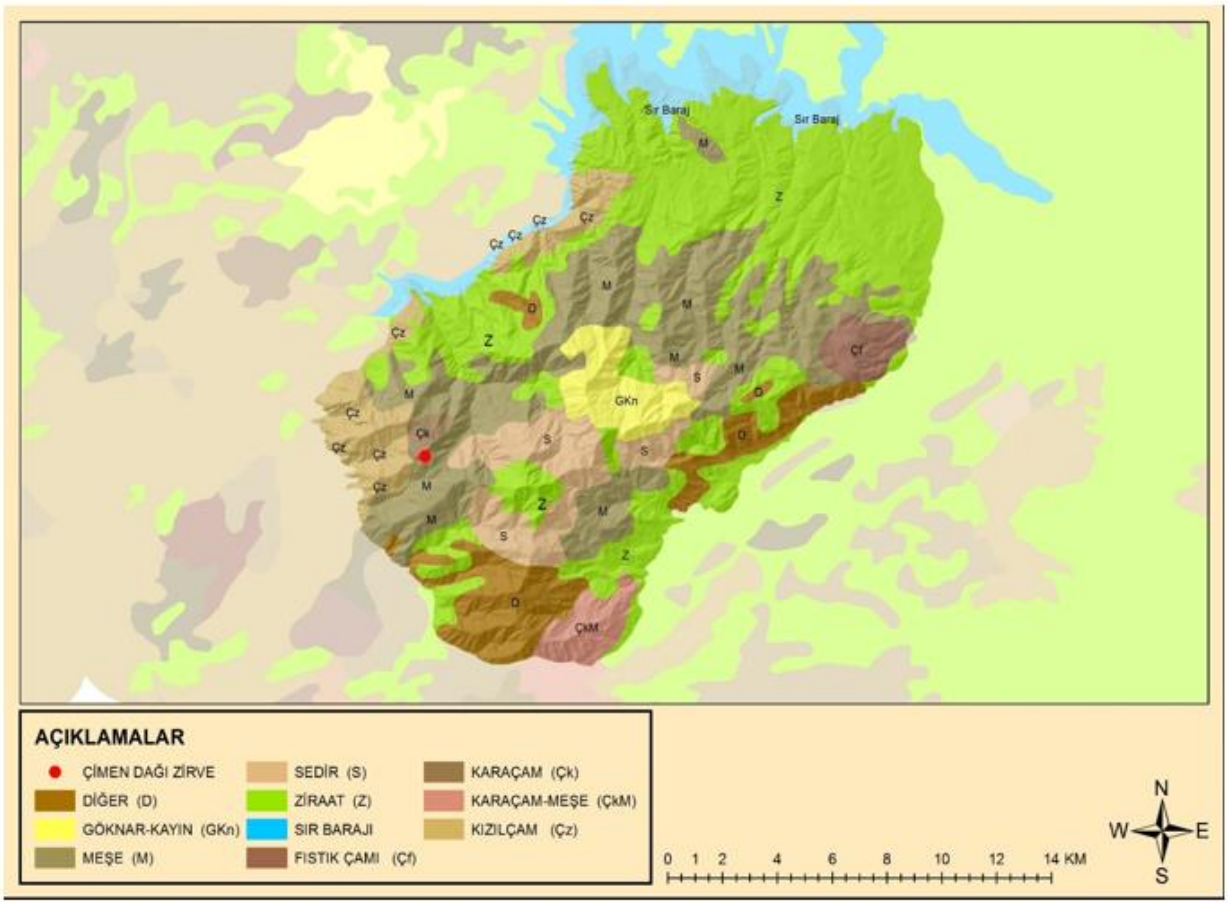

Figure 2. Çimen Mountain Altitude Scale Map.

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