

CARABIDAE (COLEOPTERA) RECORDS FROM UPLAND-MEADOWS OF TÜRKMEN MOUNTAIN (KÜTAHYA - ESKİŞEHİR), TURKEY

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ABSTRACT: This study is based on 14 different Carabidae species recorded from 10 different upland-meadows Kütahya province part of Türkmen Mountain between 2005-2008. Specimens were collected with pitfall traps, hand and aspirator. Species World and Turkey distribution and ecological informations are given.

KEY WORDS: Carabidae, Coleoptera, Türkmen Mountain, Kütahya, Turkey

Biodiversity are investigating under tree topics which are; Genetic, Species and Ecosystem. There are 34 “Hot-Spot Areas” on the World ever since 2005. Turkey, lies at the nexus of Europe, the Middle East, Central Asia and Africa. Turkey’s location, mountains, and its encirclement by three seas have resulted in high terrestrial, fresh water, and marine biodiversity. Most of Turkey’s land area is covered by one of three biodiversity hotspots (Caucasus, Irano-Anatolian, and Mediterranean). In Turkey there are 17 600 pterygota species belong to 16 orders, but It’s interpret that this number is greater than that (Şekercioğlu et al., 2011).

Carabidae represents with 40.000 species belong to 61 tribus and 16 subfamily, this number contains %10 of all Coleoptera. There are near 11.333 species in Palearctic region 18 subfamily in Europe and above 1100 species belong to 170 genus in our country. %41 of these species are endemic to Turkey (Casale & Taglianti, 1999; Kocatepe, 2011). The abundance, species richness, and attractive coloration of many species have made carabids popular objects of study for both professional and amateur entomologists. This family is among the dominant groups of terrestrial predators and members of this group are commonly known as ground beetles. These beetles are important elements of terrestrial ecosystems and usually regarded as bioindicators of broad scale of environmental changes (Rainio & Niemela, 2003; Skalski et al., 2011).

MATERIAL AND METHODS

Study Area

The material of this study comprises the Carabidae specimens which are collected from 10 upland-meadows of Kütahya province part of Türkmen Mountain between 2005-2008. These upland meadows names as follows; Saray, Göçmen, Dümbüldek, Sandıközü, İnli, Çobanlar, Güllüdere, Ürünlü, Göknebi, Türkmen baba.

Türkmen Mountain (Fig. 1) is situated in the middle Anatolian region of Turkey. The mountain is a border between Kütahya and Eskişehir provinces (30° 06' E, 39° 16' N) with different altitudes ranging up to 1850m. The region is also

known as a wildlife development area, covering a land of approximately 17.500 ha., and including typical continental climatic conditions (Şenyüz, 2009). Mean altitude from sea level is approximately 700 m and summit of the mountain is 1850 m. The study areas are ranges from 1500 m to 1800 m.

Specimens were collected with pitfall traps, hand and aspirator. Each specimen identified and turn into a museum material with classic preparation methods. All of the specimens are stored in Entomology Laboratory of Department of Biology in Dumlupınar University.

Carabid Beetle Sampling and Identification

Sampling was performed every two weeks. Pitfall traps are plastic cups with 12 cm diameter and 11 cm depth. Beetles were collected twice a month from pitfall traps and trap liquid (vine-vinegar and salt) were renewed after each sampling. Specimens were pinned and identified by using the keys published by (Jeannel, 1941; Lindroth, 1985); (Trautner & Geigenmüller, 1987; Hurka, 1996; Avgın, 2006; Cavazzuti, 2006; Kesdek, 2007).

RESULTS AND DISCUSSIONS

As a result of this study 86 Carabidae specimens belong to 14 different species has identified. This species are;

***Amara (Amara) eurynota* (Panzer, 1796)**

Material examined: İnli upland, 23.IX.2007, 1 female. **Records in Turkey:** Eskişehir, Gaziantep, Kahramanmaraş, Kayseri (Avgın, 2006; Fidan & Şirin, 2016). **Records in Palearctic:** Albania, Algeria, Altai, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, Caucasia, China, Crimea, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Germany, Georgia, Hungary, Holland, Iran, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Morocco, North America, Norway, Poland, Portugal, Romania, Russia, Serbia, Siberia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Transcaucasia, Tunisia, Turkey, Ukraine (Gueorguiev & Gueorguiev, 1995; Hurka, 1996; Löbl & Smetana, 2003).

***Zabrus (Zabrus) tenebrioides tenebrioides* Goeze, 1777**

Material examined: Ürünli upland, 30.IX.2007, 2 females; 3 males. **Records in Turkey:** Adiyaman, Artvin, Bingöl, Edirne, Erzurum, Eskişehir, Diyarbakır, İstanbul, Kars, Kırklareli, Kocaeli, Muş, Sakarya (Lodos, 1983; Kesdek & Yıldırım, 2010). **Records in World:** Europe, Siberia, Caucasia, Crimea, Moldavia, Turkey, Ukraine (Gueorguiev & Gueorguiev, 1995; Casale & Taglianti, 1999).

***Brachinus explodens* Duftschmid 1812**

Material examined: İnli upland, 30.X.2007, 2 female; 1 male. **Records in Turkey:** Adiyaman, Bingöl, Çorum, Erzincan, Eskişehir, Erzurum, Gaziantep, Giresun, Kahramanmaraş, Kayseri, Kars, Tokat (Yücel & Şahin, 1988; Avgın, 2006; Kesdek & Yıldırım, 2007; Kocatepe, 2011). **Records in Palearctic:** Azerbaijan, Albania, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Estonia, France, Germany, Georgia, Greece, Hungary, Iran, Iraq, Israel, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Luxembourg, Moldavia, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Syria, Turkey, Tadjikistan, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Calathus (Neocalathus) ambiguus dilitus* Chaudoir, 1842**

Material examined: Dömbüldek upland, 23.IX.2007, 4 females; 1 male. **Records in Turkey:** Ardahan, Artvin, Erzincan, Erzurum, Eskişehir, Iğdır (Yücel & Şahin, 1988; Kesdek & Yıldırım, 2010). **Records in Palearctic:** Afghanistan, Azerbaijan, Albania, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Great Britain, Greece, Hungary, Iran, Israel,

Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Syria, Sweden, Switzerland, Tadjikistan, Turkmenistan, Turkey, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Calathus (Neocalathus) erratus* C. R. Sahlberg, 1827**

Material examined: Çobanlar upland, 23.V.2007, 1 female; 1 male. **Records in Turkey:** Eskişehir (Fidan & Şirin, 2016). **Records in Palearctic:** Albania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Hungary, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, Ukraine, Yugoslavia (Löbl & Smetana, 2003).

***Calathus (Calathus) fuscipes graecus* Dejean, 1831**

Material examined: Güllüdere upland, 30.IX.2007, 1 female; 2 males. **Records in Turkey:** Afyon, Ankara, Eskişehir, Kayseri, Sivas (Yücel & Şahin, 1988; Kocatepe & Mergen, 2004). **Records in Palearctic:** South Europe, South Russia, Caucasia, North Africa, Middle Asia, Turkey (Kocatepe & Mergen, 2004).

***Calathus (Neocalathus) melanocephalus melanocephalus* Linne, 1758**

Material examined: Dümbüldek upland, 30.IX.2007, 2 males; Sandıközü upland, 30.IX.2007, 1 female. **Records in Turkey:** Afyon, Ankara, Ardahan, Artvin, Çankırı, Çorum, Erzurum, Erzincan, Eskişehir, Kars, Kayseri, Rize Tokat (Yücel & Şahin, 1988; Kocatepe & Mergen, 2004; Kesdek & Yıldırım, 2010; Kocatepe, 2011; Fidan & Şirin, 2016). **Records in Palearctic:** Afghanistan, Algeria, Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Georgia, Greece, Hungary, Iceland, Israel, Italy, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldavia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tadjikistan, Turkey, Ukraine, Yugoslavia (Löbl & Smetana, 2003).

***Carabus (Pachystus) graecus morio* Mannerheim, 1830**

Material examined: Göçmen upland, 06.VII.2008, 23 females; 9 males. **Records in Turkey:** Eskişehir; Kahramanmaraş (Avgın, 2006; Fidan & Şirin, 2016). **Records in Palearctic:** Albania, Bulgaria, Greece, Macedonia, Romania, Turkey (Gueorguiev & Gueorguiev, 1995; Löbl & Smetana, 2003).

***Pterostichus (Platysma) niger niger* Schaller, 1783**

Material examined: Saray upland, 19.VII.2008, 4 females; 2 males. **Records in Turkey:** Adana, Erzurum, Eskişehir, Iğdır, Kahramanmaraş, Kars, Kayseri (Avgın, 2006; Kesdek, 2007; Fidan & Şirin, 2016). **Records in Palearctic:** Azerbaijan, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Greece, Hungary, Iran, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Macedonia, Moldavia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tadjikistan, Turkey, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

***Harpalus (Harpalus) attenuatus* Stephens, 1828**

Material examined: Dümbüldek upland, 23.IX.2007, 4 females; 1 male. **Records in Turkey:** Artvin, Bartın, Bayburt, Erzurum, Bingöl, Sinop, Kahramanmaraş, İzmir, Bozdağlar, Tükmen dağları (Eskişehir-Kütahya) (Kesdek, & Yıldırım, 2003; Avgın, 2006; Avgın, & Emre, 2010; Anlaş & Tezcan, 2010; Tezcan et al., 2011; Kesdek, 2013; Fidan & Şirin, 2016; Kara, 2016). **Records in World:** Albania, Algeria, Armenia, Azerbaijan, Belgium, Bosnia and Herzegovina, Bulgaria, China, Crimea, Croatia, Cyprus, Czech Republic, England, Estonia, Finland, France, Georgia, Germany, Greece, Holland, Hungary, Iran, Israel, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Mongolia, Montenegro, Morocco, Norway, Portugal, Russia, Serbia, Spain, Switzerland, Turkey, Ukraine (Löbl & Smetana, 2003; Kara, 2016).

***Harpalus (Harpalus) honestus* (Dufischmid, 1812)**

Material examined: Göknebi upland, 12.IV.2008, 5 females; 2 males. **Records in Turkey:** Artvin, Trabzon (Kesdek, 2013). **Records in World:** Arnavutluk, Ermenistan, Avusturya, Belçika, Bosna Hersek, Bulgaristan, Hırvatistan, Çek, Fransa, İngiltere, Almanya,

Gürcistan, Yunanistan, Macaristan, İran, İtalya, Lihtenştayn, Lüksemburg, Makedonya, Hollanda, Polonya, Romanya, Rusya, Slovakya, Slovenya, İspanya, Suriye, İsviçre, Türkiye, Ukrayna (Kara, 2016).

Harpalus (Harpalus) distinguendus (Dufischmid, 1812)

Material examined: Dümbüldek upland, 23.IX.2007, 4 females; 1 male. **Records in Turkey:** Ankara, Antalya, Erzurum, Trabzon Gaziantep, Kahramanmaraş, Sivas (Kesdek, & Yıldırım, 2003; Kocatepe & Mergen, 2004; Avgin, 2006). **Records in Palearctic:** Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canary Islands, Caucasia, China, Crimea, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Holland, Hungary, Iran, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Macedonia, Malay Archipelago, Moldavia, Mongolia, Montenegro, Morocco, Norway, Poland, Portugal, Romania, Russia, Serbia, Siberia, Sicily, Slovakia, Slovenia, Spain Sweden, Switzerland, Syria, Tajikistan, The Azores, Transcaucasia, Turkey, Turkmenistan, Ukraine, Ural Mountains, Uzbekistan, (Gueorguiev & Gueorguiev, 1995; Hurka, 1996; Löbl & Smetana, 2003).

Ophonus (Hesperophonus) azureus Fabricius, 1775

Material examined: Dümbüldek upland, 19.VII.2008, 3 females; 2 males. **Records in Turkey:** Ankara, Bayburt, Erzurum, Eskişehir, Kahramanmaraş, Kayseri, Sinop, Tokat, Trabzon (Yücel & Şahin, 1988; Kesdek, & Yıldırım, 2003; Kocatepe & Mergen, 2004; Avgin, 2006; Kocatepe, 2011; Fidan & Şirin, 2016). **Records in Palearctic:** Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan Azores, Belgium, Bosnia and Herzegovina, Bulgaria, Belorussia, Canary Island, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Georgia, Greece, Hungary, Iran, Israel, Italy, Kyrgyzstan, Kazakhstan, Latvia, Lithuania, Macedonia, Moldavia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tadjikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia (Löbl & Smetana, 2003).

Siagona europaea Dejean, 1826

Material examined: Çobanlar upland, 23.V.2006, 1 female; 2 males. **Records in Turkey:** Adana, Bingöl, Erzincan, Tunceli (Kesdek, 2012). **Records in World:** North Africa, Central Asia, Europe, Caucasia, Armenia, Crimea, Iraq, Iran, Kazakhstan, India, Russia, Senegal, Sudan, Tadjikistan, Ukraine (Gueorguiev & Gueorguiev, 1995).

Bioindicators are useful tool for monitoring and detecting changes in the environment as proved before. As the abiotic or biotic state of the environment, represents the impact of environmental change on a habitat, community or ecosystems, or indicates the diversity of other species. Many species suit at least one of these criteria. Species are using as bioindicators because lots of reasons. One of the most important ones is their cost-effectiveness. By using them it is possible to assess the impact of human activities on the biota, instead of examining the entire biota. Especially useful are species that provide early warning of change (Rainio & Niemela, 2003). The sustainability of meadows is a very important factor of conservation the ecology on mountains and Carabidae species are using as habitat bioindicators from all over the World, for that reason this research is important for contribution of these species ecological information.

* Some of these informations had been presented as oral presentation on SEAB 2017 symposium on 05-08 July 2017.

LITERATURE CITED

- Anlaş, S. & Tezcan, S.** 2010. Species composition of Ground beetles (Carabidae, Coleoptera) collected by hibernation trap-bands in agricultural landscapes, Bozdağlar Mountain of western Turkey. Acta Biologica Universitatis Daugavpiliensis, 10 (2): 193-198.
- Anonymous,** 2018. Fauna Europaea. <https://fauna-eu.org/> (Date of access: 10.06.2018).
- Avgın, S.** 2006. Faunistic and Taxonomic Researches on the Family Carabidae (Coleoptera) in Kahramanmaraş and the Surrounding Area. PhD Thesis. Çukurova University. Institute of Science. 352 pp.

- Avgn, S. S. & Emre, İ.** 2010. Studies on the ground beetles (Coleoptera: Carabidae) of the Sağlık Plain - Gavur Lake marsh area, Kahramanmaraş, Turkey. *Pakistan Journal of Zoology*, 42 (1): 23-32.
- Casale, A. & Taglianti, V.** 1999. Caraboid Beetles (excl. Cicindelidae) of Anatolia, and their biogeographical significance (Coleoptera, Caraboidea). *Biogeographia, Lavori della Società Italiana di Biogeografia, Siena, Italy*, 20: 277-406.
- Cavazzuti, P.** 2006. Faune des Carabinae de Turquie-I. Collection Systematique, Vol. 13. Andresy, Magellanes. 155 pp.
- Fidan, E. C. & Şirin, Ü. D.** 2016. The Changes Related with Altitudinal Gradient and Seasonal Variation in the Species Composition of Carabidae (Coleoptera) in Turkmen Mountain (Eskisehir, Turkey). *Ekoloji*, 25 (98): 17-24.
- Guerguiev, V. B. & Guerguiev, B. V.** 1995. Catalogue of the ground-beetles of Bulgaria (Coleoptera: Carabidae). Pensoft Sofia-Moscow. 279 pp.
- Hurka, K.** 1996. Carabidae of the Czech and Slovak Republics, Illustrated key: Kabourek Zlin. 565 pp.
- Jeannel, R.** 1941. Coleopteres Carabiques. Premiere partie. Faune de France, Vol: 39. Lechevalier, Paris.
- Kara, S.** 2016. Carabidae (Coleoptera) species of Bartın province Bartın university institute of science, Forest Engineering. Msc. Thesis. 184 pp.
- Kesdek, M.** 2007. Faunistic and systematic studies on species of the Pterostichinae (Coleoptera: Carabidae) in northeast Anatolian region. PhD Thesis. Erzurum University. Department of Plant Protection. 238 pp.
- Kesdek, M.** 2012. A contribution to the knowledge of the Carabidae (Coleoptera) fauna of Turkey. *Acta Biologica Universitatis Daugavpiliensis*, 12 (1): 55-62.
- Kesdek, M.** 2013. Contributions to the knowledge of the genus *Harpalus* Latreille, 1802 fauna of Turkey (Coleoptera: Carabidae: Harpalinae). *Munis Entomology & Zoology*, 8 (1): 191-198.
- Kesdek, M. & Yildirim, E.** 2003. Contribution to the knowledge of Carabidae fauna of Turkey Part 1: Harpalini (Coleoptera, Carabidae, Harpalinae). *Linzer Biologische Beiträge*, 35 (2): 1147-1157.
- Kesdek, M. & Yildirim, E.** 2007. Contribution to the knowledge of Carabidae fauna of Turkey. Part 5: Brachinini (Coleoptera: Carabidae, Brachininae). *Linzer Biologische Beiträge*, 39 (2): 979-982.
- Kesdek, M. & Yildirim, E.** 2010. Contribution to the knowledge of Carabidae fauna of Turkey Part 6: Notiophilini and Platynini (Coleoptera, Carabidae, Notiophilinae and Pterostichinae). *Entomofauna*, 31 (2): 5-16.
- Kocatepe, N.** 2011. Systematical Studies on Family Carabidae (Coleoptera) in the Middle and East Part of Black Sea Region. PhD Thesis. Hacettepe University. Institute of Science Department of Biology. 211 pp.
- Kocatepe, N. & Mergen, O.** 2004. Faunistic research on Ankara province Carabidae (Coleoptera) family. *Turkish Journal of Entomology*, 28 (4): 295-309.
- Lindroth, C. H.** 1985. The Carabidae (Coleoptera) of Fennoscandia and Denmark fauna, *Fauna Entomologica Scandinavica*. Scandinavian Science Press, Leiden, 15 (1): 225 pp.
- Lodos, N.** 1983. A review of the Ground Beetles of the genus *Zabrus* Clairv. (Coleoptera : Carabidae) in the fauna of Turkey. *Turkish Plant Protection Journal*, 7: 51-63.
- Löbl, I. & Smetana, A.** 2003. Catalogue of Palaearctic Coleoptera. Volume I. Archostemata-Myxophaga-Adephaga. Apollo Books. Stenstrup, Denmark, 819 pp.
- Mcgeoch, M. A.** 1998. The selection, testing and application of terrestrial insects as bioindicators. *Biological Reviews*, 73: 181-201.
- Rainio, J. & Niemela, J.** 2003. Ground Beetles (Coleoptera: Carabidae) as bioindicators. *Biodiversity and Conservation*, 12: 487-506.
- Skalski, T., Kedzior, R., Maciejowski, W. & Kacprzak, A.** 2011. Soil and habitat preferences of Ground Beetles (Coleoptera, Carabidae) in natural mountain landscape. *Baltic Journal of Coleopterology*, 11 (2): 105-115.
- Şekercioğlu, H. Ç., Anderrson, S., Akçay, E., Bilgin, R., Can, Ö. E., Semiz, G., Tavşanoğlu, C., Yokeş, M. B., Soyumert, A., İpekdal, K., Sağlam, İ. K., Yücel, M., & Dalfes, H. S.** 2011. Turkey's globally important biodiversity in crisis. *Biological Conservation*, 12: 2752-2769.
- Şenyüz, Y.** 2009. Fauna of subfamily Aphodiinae (Scarabaeidae, Coleoptera) in Turkmen Mountain. PhD Thesis, Dumlupınar University, Department of Biology, Kütahya. 103 pp.
- Tezean, S., Anlaş, S. & Jeanne, C.** 2011. Species composition and habitat selection of ground beetles (Carabidae, Coleoptera) collected by pitfall traps in Bozdağlar Mt., Western Turkey. *Munis Entomology & Zoology*, 6 (2): 676-685.
- Trautner, J. & Geigenmüller, K.** 1987. Tiger beetles, ground beetles – Illustrated key to the Cicindelidae and Carabidae of Europe. J. Margraf Verlag Aichtal. Germany. 488 pp.
- Yücel, E. & Şahin, Y.** 1988. Research on morphology and ecology of Carabidae (Coleoptera) species in Eskişehir and around. *Journal of Anadolu University Science and Art Faculty*, 25-29.

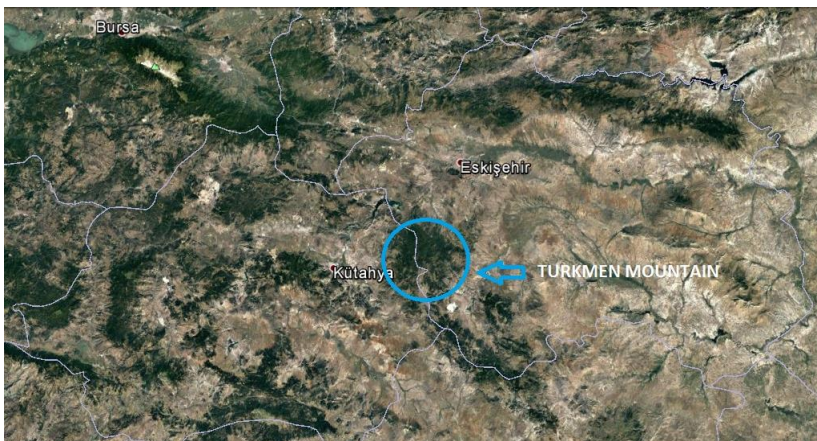


Figure 1. Türkmen Mountain (Kütahya - Eskişehir), Turkey.