

BIODIVERSITY OF THE DİYARBAKIR REGION, TURKEY

ÖZET

Bu çalışma, Diyarbakır yöresinde gerçekleştirdiğimiz çalışmalar ve önceki yıllarda yapılmış olan bilimsel yayınlar temel alınarak bölgenin biyoçeşitliliği özetlenmiş ve sentezi yapılmıştır. Diyarbakır'da bilinen tür sayısının yaklaşık 20 000 olduğu düşünülmekte ancak tür sayısının 50 000 veya üzeri olduğu tahmin edilmektedir.

Diyarbakır, Türkiye'nin Güneydoğu Anadolu Bölgesinde, Mezopotamya ovasının kuzeyinde, Dicle nehrinin kıyısında yer almaktadır. Bölge biyoçeşitliliği, bölgenin coğrafik konumunun farklı zoocoğrafik bölgelerin (Oriyantal, Palearktik ve Sahra-Sina) kavşağında bulunmasından dolayı etkilenmektedir.

Diyarbakır bölgesi bitki türleri bakımından zengindir; Türkiye'de dağılışı gösteren türlerin %30-35'i bu bölgede bulunmaktadır. Bölge, biyoçeşitlilik için, özellikle içerdiği genetik çeşitlilik, tarımsal önemi olan bazı bitkiler ve bunların çoğunun evcilleştirildiği merkez olarak kabul edilmektedir.

Bölgenin faunası hakkındaki bilgiler kısıtlıdır. Özellikle omurgasızlar hakkındaki bilgiler yetersizdir. Omurgasızların özellikle böceklerin dağılışı, bitki çeşitliliğinin zengin oluşundan kaynaklanmaktadır. Bununla birlikte omurgasızların sayısı hakkındaki tahminler güvenilir olmamasına rağmen 30 000'den az değildir.

Bölgede, 47 *zooplankton*, 34 *rotifera*, 44 liken ve 22 *mollusca* türü teşhis edilmiştir. Dicle nehri ve kollarında yaklaşık 40 kadar balık türü ve alttürü yaşamaktadır. 30 türden oluşan *herpetofaunanın* 5 'i amfibi, 25'ini de sürüngenler (*reptiller*) oluşturur. *Reptillerden* 11 tanesi kertenkeledir. Kuşlar en fazla bilinen grup olup bölgede 221 tür kaydedilmiştir. Karasal memeliler ise 33 türden oluşmaktadır.

ABSTRACT

This paper summarizes biodiversity based on records from the scientific literature and results of our own surveys carried out in the Diyarbakır province. This is an attempt to synthesis the biodiversity of the region. The number of known species in Diyarbakır is approximately 20,000 though the estimated number is far higher - from 50,000 or more.

DIYARBAKIRDA
DOĞAL HAYAT
SU, İKLİM,
ENERJİ VE
MADEN

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The Diyarbakır region is located on the right bank of the Tigris River (Dicle) in the southeast Anatolian region of Turkey, to the north of the Mesopotamian plain. The composition of the regional biodiversity is influenced by its geographical position on a crossroad of different zoogeographic realms (Oriental, Palaearctic, and Saharo-Sindian). The Diyarbakır region is rich in plant species; about 30–35% of Turkey's plant species are distributed in this area. The region has been especially considered as a center for biodiversity, including genetic diversity, of some agriculturally important plants and as a possible place of domestication for some of them. Information on the fauna of the region is very limited, especially pertaining to invertebrates. The diversity of invertebrates (mainly insects) is very high due to the richness in plants. However, no reliable estimate is available for the number of invertebrates although it is assumed to be not less than 30,000 species.

A total of 47 zooplanktonic, 34 rotifera, 44 lichens, and 22 molluscs species have been identified. About 40 species and subspecies of fish are living in the Dicle (Tigris) River and its tributaries. Thirty species of herpetofauna — 5 amphibians and 25 reptiles — occur in the region. About nine of these are lizards. Birds are by far the most studied taxon and 221 bird species have been reported from the region. The terrestrial mammal fauna of the region consisted originally of 33 species in Diyarbakır.

Introduction

Diversity of life can be measured in several ways; the number of species (species diversity), the number of groups (taxonomic diversity), the

number of distinct body plans (morphological diversity), the number of feeding strategies (trophic diversity), and the number of genotypes (genetic diversity). To fully characterize diversity at any location, the above-mentioned characteristics need to be examined, but this remains intractable (1). The biological diversity of a given region depends primarily on its geographic position, climate, and habitat heterogeneity.

Many other environmental factors delineate the local distribution and abundance of the number of species. The knowledge of their local distribution provides basic data for regional conservation planning, mapping, and selection of biodiversity rich areas and their further designation and management as protected territories. Our present knowledge of the biodiversity of Diyarbakır is reviewed on the basis of the published records and original data collected in the province.

Biodiversity In Turkey: An Overview

Turkey is a natural pathway for the distribution of species from east to west, because it is considered a bridge between Asia and Europe in the south. Turkey is also connected to Africa via the Arabian Peninsula, thus including many eremial faunal elements and providing a pathway for their distribution toward Caucasus and south-eastern Europe. In addition to geographic connection (also in its geological history), Turkey is diverse in its topography and climate. Due to all these factors, the Anatolian part of Turkey includes diverse faunal elements and exceptionally rich flora, see Table 1.

The biological status, various biotopes, and different ecosystems enable the superior biodiversity in Turkey. For instance, 75% of European plant species are found in Turkey (2). The number of different seeded plant species is over ten thousand, and one-third of these are endemic (3). It is estimated that the number of the animal species amounts to 70-80,000, including invertebrates. The number of seeded plants is more than 10,000 of which over 3,000 are endemic. This abundance of organisms is a result of the continental situation of Turkey. Globally threatened animals such as Monk Seal (*Monachus monachus*), Urial (*Ovis orientalis*), and Euphrates Soft-shell Turtle (*Rafetus euphraticus*) still survive in Turkey.

	Taxon	Defined species	Endemic species/ subspecies, variety	Rare and endangered species	Extinct species
VERTEBRATES	Reptiles/Amphibian (Reptilia/Amphibia)	141	16	10	-
	Birds (Aves)	460	-	17	-
	Mammals (Mammalia)	161	37	23	7
	Freshwater Fish (Pisces)	236	70	-	4
	Marine Fish (Pisces)	480	-	-	-
INVERTEBRATES	Mollusk (Mollusca)	522	203	unknown	unknown
	Butterflies (Lepidoptera)	4.500	89	89	unknown
	Locusts (Orthoptera)	600	270	-	-
	Dragonflies/Damselflies (Odonata)	114	-	-	-
	Beetles (Coleoptera)	~10.000	~ 3.000	-	-
	Half-winged (Heteroptera)	~1400	~200	-	-
	Aphids (Homoptera)	~1500	~200	-	-
PLANT GROUPS	Algae	2.150	----	unknown	unknown
	Lichen (Lichenes)	1000	----	unknown	unknown
	Moss (Bryophytes)	910	2	2	unknown
	Pteridophytes Ferns	101	3	1	unknown
	Gymnospermae (Gymnosperms)	35	5	1	unknown
	Monocotyledonous (Monocotyledons)	1.765	420	180	-
	Dicotyledonous (Dicotyledons)	9.100	3500	1100	11

Table 1. Taxon numbers of species and subspecies of various animal and plant categories, endemism, number of rare and endangered species, and extinct species (3).

Many species whose ranges are largely confined to the Mediterranean, Euro-Siberian, Alpine, Irano-Turanian and Saharo-Sindian biomes converge in Anatolia. Almost all the vertebrates of Turkey are recorded. However, the invertebrates still have to be investigated. In Table, the numbers of animal species are given along with their present status (3).

South-eastern Anatolia also called "Fertile Crescent" or "Upper Mesopotamia", describes the region between the Euphrates and Tigris rivers and represents the northernmost part of the Arabian platform which is considered one of the centres of cultivation where mankind first started sedentary agriculture. Many local animal races were first bred here by past civilizations and spread to other regions of the world. The region is characterized by relatively gentle relief, with broad plateau surfaces descending to the south from about 800 meters at the mountain foot to 300 meters along the Syrian border. The area is characterized by extremely dry and high summer temperatures (above 30 °C in July). Winters are cold, with January temperatures reaching almost freezing. Annual rain fall ranges from about 300-600 mm (4). The Euphrates and Tigris rivers form important riparian habitats in eastern and south-eastern Anatolia with extensive floodplains. *Tamarix* scrub, stands of *Populus*, sand-banks, and barren gravel islands are typical features. Several species of afro-tropical and oriental origin came to the Anatolian region following the course of these rivers (5).

Biodiversity Of Diyarbakır

The Diyarbakır province raises above the right

bank of the Tigris River (Dicle) to the north of the Mesopotamian plain, with a surface area about 15.355 km², and is located in the middle of Southeastern Anatolia (Fig. 1). The steppe vegetation blooms briefly during the spring, but dries up at the beginning of summer with the end of the rains. A smattering of oak forests can be found in the arid mountains (4).

Information on the fauna of the Diyarbakır region is very limited, especially concerning invertebrates. The diversity of invertebrates (mainly insects) is very high due to the richness of plants. However, no reliable estimate is available for the number of invertebrates although it is assumed to be not less than 30,000 species (Plate 1).

In the Devegeçidi Dam lake, 34 species of the phylum Rotifera were identified, three of which (*Brachionus caudatus*, *Lecane* (M.) *scutata*, and *Testudinella truncata*) were new records for Turkey (6). The zooplanktons of Göksu consist mainly of Cladocera, Copepoda, and Rotifera groups. A total of 47 species composed of 16 cladocerans, 3 copepods, and 28 rotifers were identified. All of these are recorded for the first time in Göksu Lake and one, the rotifer *Monommata arndti*, is new for Turkey's inland waters' record (7).

According to Pavlicek et al. (8) 11 earthworm species are known to be present in the Diyarbakır province, representing the first records for all of Mesopotamia. The molluscs (Mollusca) are represented by 522 species (203 are endemic) in Turkey. Diyarbakır is not rich in land snail fauna due to its geographical features. With

the studies done on the distribution and systematics of land snails, 22 different species have been identified up to now (9). *Assyriella* species are interesting due to their endemism to Southeastern Anatolia, Syria, Iraq, and Iran. A total of 236 fish species and subspecies belonging to 26 families inhabit the inland waters of Turkey (10). According to current data, 40 species and subspecies of fish, belonging to 9 families, are living in the Dicle (Tigris) River and its tributaries. Twenty-one fish species out of the 40 species are endemics; their ranges are confined to the Euphrates and Tigris basins. The dominant species of the Tigris fish community are the species belonging to genus *Capoeta*, *Barbus*, *Achantobrama*, and *Chalcalburnus*; the secondary species are those belonging to the genus *Garra*, *Mastacembellus*, and *Tor* (11).

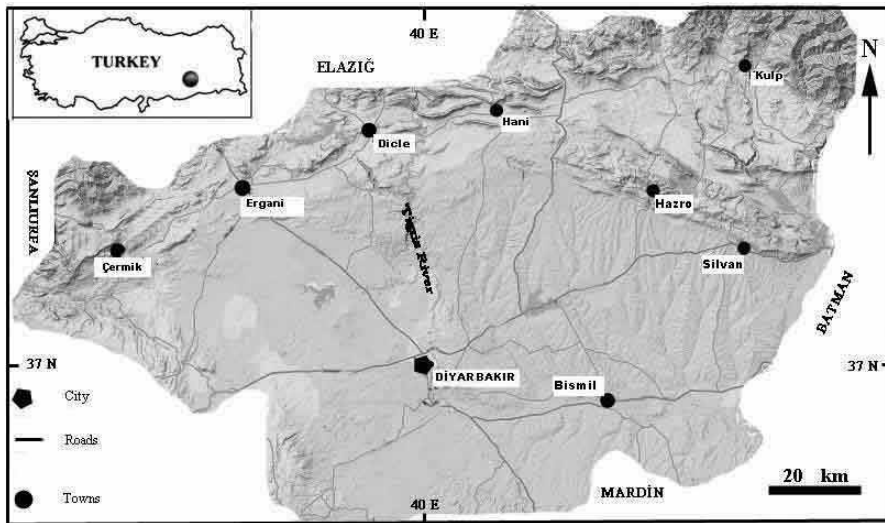


Figure1. Location of Diyarbakır.

In southeast Anatolia four kinds of herpetofaunal elements meet: Palearctic, Sahara-Arabian, Oriental, and Afrotropical (12). Thirty identified species belong to the herpetofauna of the Diyarbakır province: 5 amphibi; *Salamandra s. semenovi*, *Bufo viridis*, *Hyla arborea*, *Hyla savignyi*, and *Rana ridibunda*; 3 Testudinata; *Mauremys caspica*, *Rafetus euphraticus*, and *Testudo graeca*. The world population of the Euphrates' softshell turtle, *Rafetus euphraticus*, one of the most endangered species in the region, is confined to the Euphrates and Tigris rivers. 11 Lacertilia; *Blanus strauchi*, *Lacerta cappadocica*, *Lacerta trilineata*, *Ophisops elegans*, *Ablepharus kitaibellii*, *Mabuya aurata*, *Mabuya vittata*, *Eumecurus schneideri*, *Cyrtopodion heterocercus*, *Laudakia stellio*, and *Trapelus ruderatus*; 11 Ophidia; *Typhlops vermicularis*, *Eryx jaculus*, *Coluber caspius*, *Coluber najadum*,

Coluber jugularis, *Coluber schmidtii*, *Eirenis decemlineatus*, *Eirenis lineomaculatis*, *Natrix natrix*, *Natrix tessellata*, and *Vipera lebetina*. *Coluber schmidtii* was observed but could not be collected (13 and Unpublished information of our survey observations). Coastal viper, *Vipera* (Montivipera) *xanthina* is endemic to Turkey, occurring in this region and in the adjacent part of the Mediterranean region. Ranges of many rare species are confined to Northern Mesopotamia and the Iğdır/Van area (5) (Plate 2).

There are approximately 9,600 bird species that belong to 23 orders and 144 families in the world. Five hundred and fourteen bird species regularly occur in Europe (14). The number of bird species in Turkey is 456, and 304 of them breed in Turkey. One hundred and fifty-two of these are guest species that can be found in Turkey during summer or winter. Some of these species are *Actitis hypoleucos*, *Alcedo atthis*, *Anas crecca*, *Apus affinis*, *Ceryle rudis*, *Charadrius dubius*, *Chlidonias leucopterus*, *Circus aeruginosus*, *Delichon urbica*, *Egretta garzetta*, *Francolinus francolinus*, *Larus genei*, *Milvus migrans*, *Phalacrocorax pygmeus*, *Platylea leucorodia*, *Scolopax rusticola*, *Sterna albifrons*, and *Tyto alba*. Diyarbakır and its surroundings have special habitats for many bird species. A total of 221 bird species that belong to 17 orders and 51 families were reported from the region (15). Ninety-six of these species belong to passerines, while 125 are non-passerines. Among the species reported, 71 of them are native, 87 are summer visitors, 36 winter visitors, 26 transitory migrants, and one vagrant species for the region (15). Of the recorded species, 13 are globally threatened species.

Of the 161 mammal species recorded in Turkey, 37 sub-species and/or varieties are endemic. Twenty-three of these species are endangered and now under conservation. The terrestrial mammal fauna of the region consisted originally of 33 species belonging to 17 families. Most of the mammal species recorded from the area have been assigned to one of the following zoogeographical categories: Palaearctic, Saharo-Indian, and Oriental. Diyarbakır has several species of carnivores, wolf (*Canis lupus*), brown bear (*Ursus arctos*), and probably the striped hyena (*Hyaena hyaena*) (16); the other carnivores species found in the region are as follows: badger (*Meles meles*), jackal (*Canis aureus*), fox (*Vulpes vulpes*), Marbled Polecat (*Vormela peregusna*) (Plate 3). The Caspian tiger (*Panthera tigris virgata*) and the Anatolian leopard (*Panthera pardus tulliana*) are big cats that once had a wider distribution in the country (17). The Anatolian leopard is critically endangered and the Caspian tiger is extinct according to the World Conservation Union (18). There are rumors about the presence of the hyaena in Diyarbakır; Kumerloeve (19) writes of the striped hyena in Diyarbakır, but Kasperek et al. (20) noted that Diyarbakır marks the northernmost point in southeast Anatolia where there is no evidence of the species in that area today. The tiger *Panthera tigris* became extinct in the region in the late 1970's (5). The large herbivore species is the goitered gazelle, *Gazella subgutturosa*, referred to as a restored species, and is bred in a desert wildlife reserve for the state production of animals in Ceylanpınar. Southeastern Anatolia has a unique floristic composition that places it in the Mesopotamia subregion of the Iran-Turan floristic zone. Of all

the vegetation in the region, 36% belongs to Iran-Turan and 32 % to the Eastern Mediterranean origin. It is estimated that 30-35% of all naturally growing plants in Turkey is observed in this region (21). The region is also important as the gene source of some wild wheat, barley, wild chickpea, lentil, and green pea. Five hundred and thirty-four plant species belonging to 264 genera from 66 families were identified in the Karacadağ area. There are 18 rare plant and 32 endemic species growing in the Karacadağ area. Some of them are; *Astragalus erythrotaenius*, *Phelypea coccinea*, *Tulipa alepensis*, *Fritillaria persica*, *Colchicum balansae*, *Lathyrus chrysanthus*, and *Iris gatesi* (22).

Lichens are a widespread group, with over 1,200 species recorded in Turkey (23). However, lichens have not been particularly well studied in Diyarbakır; but a work was conducted in the Diyarbakır province in which approximately 44 species were described (24).

Wheat Origins Near The Karacadağ Mountains, Turkey

Dated archeological remains of einkorn wheat (*T. monococcum*- the earliest domesticated wheats) in settlement sites near Diyarbakır region confirm the domestication of einkorn near the Karacadağ Mountain Range (25). Recent genetic and archeological discoveries indicate that both *emmer* wheat and *durum* (hard pasta wheat) also originated from this same Karacadağ region of southeastern Turkey. Remains of harvested emmer from several sites near the Karacadağ Range have been dated to between 8,800 BCE and 8,400 BCE, that is, in the Neolithic period (26).

A Case Study: Speciation Mammals In The Region, *Nannospalax Ehrenbergi*

Spalacidae, subterranean mammals, are highly specialized and adaptively convergent structurally, functionally, and behaviorally at all organizational levels to life underground (27). Spalacidae mole rats occur in southeastern Europe (Hungary, the former Yugoslavia, Romania, Bulgaria, and Greece); Asia Minor (Cilician Taurus, Turkey); Northern Africa, the Caucasus, and in the Middle East (28). Karyotype studies of *Nannospalax ehrenbergi* (Nehring 1898), from across their distribution, revealed obvious chromosome polymorphisms and several different karyotypes from this region and have already been described (29 and reference therein). *Nannospalax ehrenbergi* (Fig. 2) is a young species and represents a dynamic case of ecological

speciation in action (27).

We identified five different chromosomal forms of *Nannospalax ehrenbergi* in Turkey, which have diploid chromosome numbers (2n), and are as follows: 2n = 48 (Hatay-Yayladağı); 2n = 52a (Hatay-Arsuz); 2n = 52b (Diyarbakır); 2n = 56a (Tarsus); and 2n = 56b (Siirt-Kurtalan). Each chromosomal species and populations of mole rats select their climatic habitat in line with the climatic conditions of their geographic localities (29).

Diyarbakır Population

Diploid chromosome number 2n= 52, NF=76, and NFa=72. Their karyotypes consist of 11 pairs of meta/submetacentrics, and 14 pairs of acrocentric autosomes (Fig. 2). The X chromosomes are small sized submetacentric; Y chromosomes are small acrocentrics (29).

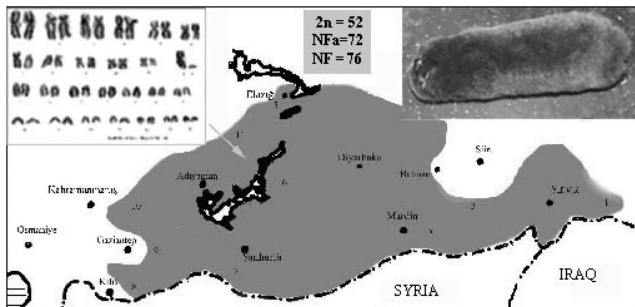


Figure 2. *Nannospalax ehrenbergi*, their karyotype and distribution area in the region (29).

Conclusions

Southeastern Anatolia, due to its geographical position, is a crossroad of different zoogeographic realms (Oriental, Palaearctic, and Saharo-Sindian) that influences the composition of the region's biodiversity. The rich biodiversity of Diyarbakır, combined with

its special geographical features, offer great opportunities for biogeographic research. The biodiversity of the Diyarbakır province has not yet been investigated in detail from a biological viewpoint. It is clear that our knowledge about the distribution and biology of several species are not sufficient for this region, and requires further intense field research.

There is a need for a great deal of research to be done in order to reveal a more complete picture of biodiversity, and more detailed faunal and floral surveys are also required. I believe that the present study will make a significant contribution to the biodiversity of Diyarbakır, which is not sufficiently known yet. Unfortunately, there is still no comprehensive inventory of Diyarbakır biodiversity, particularly the invertebrate taxa.

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Plate1. Some Invertebrate of Diyarbakır Province
Diyarbakır'ın Bazı Omurgasız Hayvan Örnekleri



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Plate 2. Some herpetofauna elements of Diyarbakır Province. 1. *Trapelus ruderatus*, 2. *Salamandra salamandra semenovi*, 3. *Rana bedriaga*, 4. *Lacerta viridis*, 5. *Laudakia stellio*, 6. *Thyphlops vermicularis*, 7. *Testudo graeca*, 8. *Blanus strauchi*, 9. *Hyla savign*
Diyarbakır'ın Bazı Herpetofauna Örnekleri



Plate 3. Some mammal species of Diyarbakır Province.. 1. *Rhinolophus ferrumequinum*, 2. *Nannospalax ehrenbergi*, 3. *Hemiechinus auritus*, 4. *Hystrix cristata*, 5. *Vormela peregusna*, 6. *Meriones tristrami*, 7. *Crocidura suaveolens*

Diyarbakır'ın Bazı Memeli Fuanası Örnekleri

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