

# A lizard diversity snapshot in the poorly studied Mila Region of north-eastern Algeria

Madaci Brahim<sup>1</sup>, Derradj Lotfi\*<sup>1</sup> and Benmerzouk Bilel<sup>1</sup>

<sup>1</sup>*Arthropods Biosystematics and Ecology Laboratory, Department of Animal Biology, Frères Mentouri- Constantine 1 University, Constantine, Algeria*

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## ABSTRACT

This article is the first study in the region of Mila (Algeria) that deals with the diversity of lizards. It was conducted between May and October 2020, and we collected 75 individuals of lizards which were identified on-site and released afterward. The results show the presence of seven species of lizards: *Acanthodactylus erythrurus*, *Chalcides ocellatus*, *Chamaeleo chameleon*, *Podarcis vaucheri*, *Psammodromus algirus*, *Tarentola mauritanica*, and *Timon pater*. According to the results obtained, the best-represented species is *Podarcis vaucheri* (26.67%) followed by *Tarentola mauritanica* (25.33%), while the rarest species recorded- represented with only one individual was *Chalcides ocellatus*. This study aims to establish a foundation for major projects dedicated to lizard studies in other Algeria regions and promote herpetology as a zoological discipline.

**Key words:** Algeria, *Chalcides ocellatus*, North Africa, Lizard, *Timon pater*, Semi-arid

## Introduction

The number of lizards is currently about 7,000 species (Reptile Database 2020). As reptiles, lizards have a very important place in every ecosystem, for example, as frugivores and seed dispersers (Valido and Olsen, 2007). The Mediterranean area, especially the European part, is well studied by zoologists (Sindaco, 2000). The first studies on Algerian herpetofauna were conducted by Gervais (1835, 1836). In 1891, Boulenger published his catalog concerning the reptiles and amphibians of the Kabylia region of Algeria. Doumergue (1901) published his work on the reptiles of Algeria in the West part (province of Oran). On the other hand, Saharian fauna was investigated by various authors Gauthier (1967) and Grenot et Vernet (1972, 1973). According to Guibé (1950) North African lizards belong to 8 families. Rouag and Benyacoub (2006)

inventoried 17 reptile species in north-eastern Algeria. Rouag (2012) described 50 species belonging to seven families of lizards representing 63% of the herpetofauna in Algeria. Mamou *et al.* (2014) described 18 species in the Kabylie region; 10 were lizards. This investigation was characterized by the dominance of *Psammodromus algirus* (Linnaeus 1758) and the presence of the following two types; *Timon pater* and *Chalcides chalcides* also an alien species of desert origins was recorded; *Mesalina oliveri*. The large area of Algeria may explain why there are a few papers on Algerian herpetofauna. On the other hand, the low interest of researchers in this type of research (Rouag and Benyacoub, 2006). Furthermore, those from arid North Africa have been relatively understudied. However, some data are available on the ecological relationships of lizard species from Western Sahara (Grenot and Vernet, 1972), Tunisia (Nouira, 1983 1988), and Morocco (Znari *et*

*al.*, 2000). In contrast, other important regions have remained completely unstudied (e.g., Algeria). This work is the first lizard diversity data to provide an overview of lizard species diversity in the poor studied region of Mila, north-eastern Algeria, from May to October 2020 to determine conservation strategies.

## Materials and Methods

### Study area

The region of Mila is located in the northeast of Algeria with a distance of 33 km from the Mediterranean Sea (Table 1). It is bordered to the northwest by the Wilaya of Jijel, to the northeast by the Wilaya of Constantine, to the west by the Wilaya of Sétif, to the east by the Wilayas of Constantine and Skikda, to the southeast by the Wilaya of Oum El Bouaghi, and to the south by the Wilaya of Batna (Figure 1). Two different climatic zones characterize the Mila region:

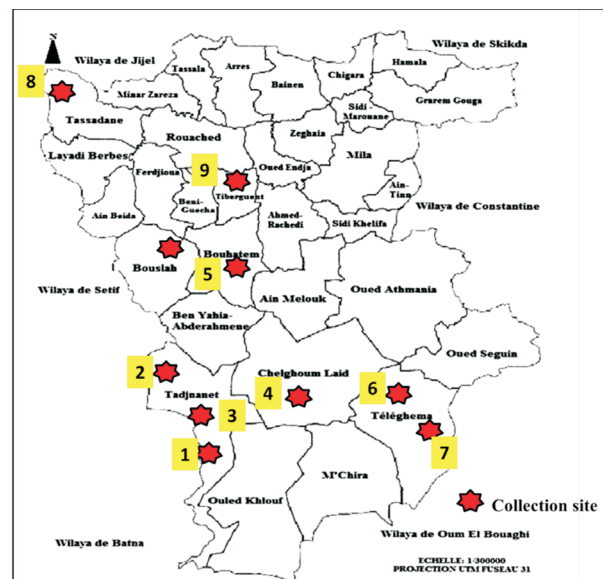
**Table 1.** Characteristics of Mila province, Algeria.

	Mila
Location	From 36°27'N to 6°16'E
Area (km <sup>2</sup> )	3480
Mean altitude (m)	800
Range of altitude (m)	250-1465
Mean yearly rainfall (mm)	501
Mean temperature (°C)	13.9
Range of temperature (°C)	1.6-31.1
Range of relative humidity (%)	40 - 90
Bioclimatic stratus	Semi-arid



**Fig. 1.** Geographical location of Mila, in north-eastern Algeria (source: DIVA-GIS)

the temperate and humid climate in the north, the dry and hot summer in the mild, with humid winter and annual rainfall varying from 900 to 1200 mm. The semi-arid climate of the south is marked by the thermal amplitude of around 40 C° in summer, which can fall below 0 C° in winter, and rainfall around 400 mm/year (Aissaoui, 2013). Our study is carried out at six stations (Figure 2 and 3): (i) Station de Tadjenaet (1, 2, 3), (ii) Chelghoum El Aid (4), (iii) Bouhatem (5), (iv) Telaghma (6 and 7), (v) Tassadane Haddada (8) and (vi) Tiberguent (9) (Figure 2). Topographically, we can see distinct three zones; rugged area surrounded by the mountains of M'cid-Aicha, Zouagha, and Jebel EL Halfa, the intermediate zone delimited by the vast plains and the southern fringe of the northern zone, and the area of the high plains in the south part of this region (Table 3 and 4; Figure 3 and 4) (Harrat, 1988; Benkenana *et al.*, 2019).



**Fig. 2.** Collection sites of lizard species in Mila region, in north-eastern Algeria

### Data collection

We organized trips to the sites (noted with numbers in Figure 2) every ten days. The search started at 10 am and ended at 3 pm. At each visit, three researchers silently prospected at different stations, throwing out transects from 1,000 to 5,000 and checking under trees, rocks, reefs, valleys, etc. Specific records for each individual captured or observed were established. Of course, no animals were killed, given

the rarity and low abundance of the population of these lizards (Rouag *et al.*, 2006). The lizards were captured by hand. Each specimen was identified to

species level (Corti and Cascio, 2002) using two several keys: Arnold and Ovenden (2014) and Reptile Database (2013).

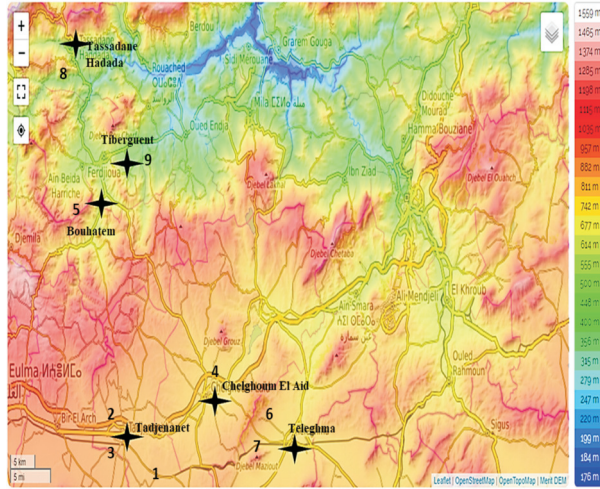


Fig. 3. Topo-map (topographical/geographical features) of Mila province

Results

A total of 75 lizards were collected between May and October 2020 in Mila, northeast Algeria. These lizards were identified based on their morphology; they belong to seven species, namely *Acanthodactylus erythrurus* (Schinz, 1833) (20%), *Chalcides ocellatus* (1.33%), *Chamaeleo chameleon* (Linnaeus, 1758)(4%), *Podarcis vaucheri* (Boulenger, 1905) (26.67%), *Psammodromus algirus* (Linnaeus, 1758) (14.67%), *Tarentola mauritanica* (Linnaeus, 1758) (25.33%) and *Timon pater* (Lataste, 1880)(8%) (Table 2). The number of species differs from site to site, except in Site 9 (Tiberguente). In contrast to the other sites, Site 1 (Tadjenanet 1) was the richest site with five species. *Tarentola mauritanica* was present in all collection sites. Site 7 (Telaghma 2) and Site 8

Table 2. Species diversity of lizards in Mila, north-eastern Algeria, from May to October 2020.

Lizard species	Number	%	Month				
			May	June	July	August	October
<i>Acanthodactylus erythrurus</i>	15	20	1	9	2	0	3
<i>Chalcides ocellatus</i>	1	1.33	0	1	0	0	0
<i>Chamaeleo chameleon</i>	3	4	1	0	0	0	2
<i>Podarcis vaucheri</i>	20	26.67	0	0	4	2	14
<i>Psammodromus algirus</i>	11	14.67	0	6	0	5	0
<i>Tarentola mauritanica</i>	19	25.33	0	10	7	2	0
<i>Timon pater</i>	6	8	0	6	0	0	0
Total	75	100	2	32	13	9	19
7 species			3	5	3	3	3

Table 3. Geographical coordinates of lizard species inventoried in the Mila region in 2020.

Map	Location	Geographical coordinates	Elevation (m)	Species founded in the site
1	Tadjenanet 1	36°00'.38"N. 6°01'.18"E	1,008	<i>A. erythrurus</i> , <i>Chamaeleo chameleon</i> , <i>T. mauritanica</i> , <i>P.vaucheri</i> , and <i>Psammodromus algirus</i> .
2	Tadjenanet 2	36°10'.24"N. 5°58'.31"E	947	<i>Timonpater</i> and <i>Psammodromus algirus</i>
3	Tadjenanet 3	36°07'.09"N. 5°59'.16"E	854	<i>Tarentola mauritanica</i>
4	Chelghoum El aid	36°08'.16"N. 6°09'.14"E	782	<i>Tarentola mauritanica</i>
5	Bouhatem	36°18'.05"N. 5°59'.58"E	1,047	<i>Timonpater</i> and <i>Chalcidesocellatus</i>
6	Telaghma 1	36°08'.31"N. 6°15'.50"E	958	<i>Acanthodactylus erythrurus</i> , and <i>Tarentola mauritanica</i>
7	Telaghma2	36°06'.00"N. 6°16'.42"E	1,039	<i>Tarentola mauritanica</i> , <i>Podarcis vaucheri</i> , and <i>Psammodromus algirus</i>
8	Tassaden Heddada	36°08'.31"N. 5°46'.37"E	1,249	<i>Tarentola mauritanica</i> , <i>Podarcis vaucheri</i> , and <i>Psammodromus algirus</i>
9	Tibrgente	36°24'.20"N. 6°03'.23"E	368	0



(Tassaden Heddada) have the same species composition. *Chamaeleo chamaeleon* and *Chalcides ocellatus* were present only in Site 1(Tadjenanet 1) and Site 5, respectively (Table 3).

## Discussion

This study is the first step in assessing the lizard fauna in the province of Mila and fills the gap in lizard biodiversity in this region of Algeria. Our results facilitate the development of a conservation program for the biodiversity of this lizard. For the species of lizards inventoried in Algeria, our region represents 14% of this fauna, but families contain more than half (57%) of this wealth. The number of lizards inventoried in the region of Mila is less than the ten species described in the region of Oum El Bouaghi (Bezaz *et al.*, 2020). This region has a border with the southern part of our region, which places them in the same bioclimatic status (semi-arid), leading to

the presence of the same species composition. Three species were common in both regions: *Chamaeleo chamaeleon*, *Tarentola mauritanica* and *Psammotromus algirus*. Our result in species composition is the same as presented by Mamou *et al.* 2014. Seven of the ten species inventoried by Mamou *et al.* (2014) are present in our studies. The key to species distribution is temperature and humidity, especially for lizards which are warm-blooded animals. On the other hand, lizards in our region were present in summer due to the availability of insects (Le Berre, 1989; Schleich *et al.*, 1996). Compared to the humid climate regions of Algeria, Dahmana (2006) inventoried 9 species of lizards in Kabylia, six of them were present in our region except *Timmon pater*. Overall, species distribution varies by habitat due to differences in its characteristics. This similarity in species composition between the areas mentioned above was probably due to many factors. Noteworthy in this study is the total absence of lizards at one of the



Fig. 4. Pictures of /important habitats in Mila province, numbers between brackets referred to Figure 2

sites in Tibrguent despite the necessary conditions; we think it is closed with sulfur because this area has a lot of baths. *Psammodromus algirus* was frequently recorded in forest formations and dune scrub and is in great abundance. Mamou *et al.* (2014) explained the dominance of *Psammodromus algirus* by its ability to live in a wide variety of Biotopes where he found it in various locations in the Kabylia region, reaching an altitude of 2000 meters (Dahmana *et al.*, 2006). This is also revealed by our study where *P. algirus* was in locations exceeding the height of 1200 meters. *Psammodromus algirus* is found in reefs and valleys, especially characterized by a super-speed difficult to catch. It is a skilled tree climber. Most specimens were infested with ticks, especially under the armpits the front legs. It is a species that inhabits a wide variety of biotopes (Schleich *et al.*, 1996). In contrast to *P. algirus*, other species have limited spatio-temporally niches. They are subservient and linked to a particular environment like *Timon pater*, and therefore they are the most vulnerable to changes in ecological factors. Other species have average habitat amplitude. They are more responsive, even if their populations are sometimes very low. This is the case of *Tarentola mauritanica*, *Acanthodactylus erythrurus* known as the common fringed toe lizard, was abundant. We found this species in various habitats, including mountains, pine forests, but in particular, it is based

in open and flat places. The same habitat preferences were observed by Rouag (1999). It is also the only fringed-toed lizard to occupy entire Morocco, north and west of the Atlas Mountains. This distribution is drawn towards the east along a large part of the Algerian coast (Bons *et al.*, 1995). Moreover, we found only one individual of *Chalcidescocellatus* under a stone during the surveys at the end of May. This species is distributed around the Mediterranean region, the Arabian Peninsula, and Africa's Horn (Lavin and Papenfuss, 2012). It is a species that frequents various environments, more or less humid (Youcefi, 2011). *Chamaeleo chameleon* was detected during October. The male and female were found not far from each other. They were probably in the breeding period (Cuadrado, 2001). The common chameleon occupies different bioclimatic stratus; subhumid, arid, and Saharan, especially along the southern Moroccan Atlantic coast (Quinba *et al.*, 2014). *Podarcis vaucheri* was the dominant species and inventoried in pine forests adjacent to mountains. According to Rouag (1999), it exists only in altitudinal formations (zeen oak formation and cork oak formation without undergrowth). In our study area, *Tarentola mauritanica* was found in many places we visited. The particularity is that it is only found in the rocky sides of the valleys of the houses (Dahmana *et al.*, 2006). It is a species found in stony environments, old houses, etc. Their biotope is char-

**Table 4.** Geographical context and habitat features of stations in Mila province.

Station	Geographical context and habitat features
Tadjenanet 1	A mountainous area known as the Tafrant Mountains, with an altitude of 1,200 meters, these mountain ranges have a dense vegetation cover ranging from two main species: <i>Quercus ilex</i> and <i>Pinus halepensis</i> . There are also other species: <i>Juniperus oxycedrus</i> , <i>Anacyclus clavatus</i> , <i>Centaurea melitensis</i> , <i>Cichorium intybus</i> , <i>Silybum marianum</i> , <i>Sonchus asper</i> , <i>Grepis vesicaria</i> .
Tadjenanet 2	This site includes a large valley up to the top of the mountain, this valley includes a very dense but short vegetation consisting mainly of a plant and the presence of small water communities, but the foot of the mountain is pastures and orchards for fruit trees mainly almonds while the top of Mount Sidi Massoud was a small forest of pine trees
Tadjenanet 3	The third location is within the city on the walls of the houses.
Chelghoum El Aid	Its located within the city on the walls of the houses.
Bouhatem	It has almost the same characteristics as the site; Tajenanet 2.
Telaghma 1	It has almost the same characteristics as the Tajenanet region. It's mainly made up of pine forests with no grass under these trees, and the special thing here is the presence of rocky-edged valleys.
Telaghma 2	About 10 kilometers from the first site, a mountain more than 1,000 meters high with no vegetation.
Tassadane Haddada	It's one of the largest forests in the state, located in the northern part, not far from the sea. The Zouagha forest consists mainly of stands of Zean oak ( <i>Quercus canariensis</i> ), afares oak ( <i>Quercus afares</i> ) and cork oak ( <i>Quercus suber</i> ).
Tiberguent	Located in the North-West of Mila region. It is the lowest point in the state compared to its vicinity. Limestone rock valleys containing water communities originating from hot springs.

acterized by an important superposition of rocks and tree trunks. *Timon pater* has only been found in two areas close to dense communities and bushes, facilitating its disappearance. This large lizard was frequently recorded in wooded environments (Rouag and Benyacoub, 2006), with a Mediterranean distribution characterized by a gigantic size (Corti and Lo Cascio, 2002). Therefore, it can be noted that *T. pater* is a distinct species, distributed exclusively in North Africa, where it is endemic to Morocco, Algeria, and Tunisia. Limitations of this study may be that we focussed only on summer and only about 10 sites, so sites should be expanded and diversified and study time to reveal the overall biodiversity of lizards in this region.

### Conclusion

This pioneering study allowed us to report for the first time the composition of the herpetological fauna of the Mila region (north-eastern Algeria). The results of our inventory in the most representative environments of the region of Mila showed the existence of seven species of lizards. The degradation of habitats and the drought that has affected the whole country for many years have led to the rarefaction of several taxa. However, our results are still insufficient, so it would be desirable to increase the number of surveys by considering all types of habitats in Algeria. Finally, we hope that this report will encourage future research.

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### Declaration conflict of interest

There are no conflicts of interest.

### Author contribution statement

All authors participated in the study design. MB planned the research. DL collected species and conceived the manuscript. BB investigation.

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### Data availability statement

All data and materials are available in this study's supporting materials.

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