

# Swimming in the Sahara: a new locality record and range extension of *Natrix maura* (Linnaeus, 1758) (Squamata, Colubridae) from central Algeria

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Bouam, I., Chedad, A., Sadine, S. E., 2024. Swimming in the Sahara: a new locality record and range extension of *Natrix maura* (Linnaeus, 1758) (Squamata, Colubridae) from central Algeria. *Arxius de Miscel·lània Zoològica*, 22: 129–142. DOI: <https://doi.org/10.32800/amz.2024.22.0129>

## Abstract

*Swimming in the Sahara: a new locality record and range extension of Natrix maura* (Linnaeus, 1758) (Squamata, Colubridae) from central Algeria. *Natrix maura*, commonly known as the viperine snake, is a widespread and common semi-aquatic species in the western Mediterranean region. This study reports a new locality record of *N. maura* from central Algeria, significantly extending the species' known range. Additionally, we provide an updated distribution map of *N. maura* in Algeria, compiled from a comprehensive dataset of occurrence records. Our findings emphasize the need for extensive herpetofaunal surveys in the country's underexplored regions.

Dataset published through [GBIF](#) (DOI: [10.15470/fe3689](https://doi.org/10.15470/fe3689))

Key words: Herpetofauna, Viperine snake, Bilineata, North Africa, Wallacean shortfall

## Resumen

*Nadar en el Sáhara: una nueva localización y ampliación de los límites territoriales de Natrix maura* (Linnaeus, 1758) (Squamata, Colubridae) en el centro de Argelia. *Natrix maura*, conocida con el nombre común de culebra viperina, es una especie semiacuática muy extendida y común en la región del Mediterráneo occidental. Este estudio informa de una nueva localización de *N. maura* en el centro de Argelia, lo que amplía significativamente los límites territoriales de la especie. Además, aportamos un mapa de distribución actualizado de *N. maura* en Argelia, realizado a partir de un amplio conjunto de registros. Los resultados ponen énfasis en la necesidad de realizar más estudios sobre la herpetofauna de las regiones poco exploradas del país.

Datos publicados en [GBIF](#) (DOI: [10.15470/fe3689](https://doi.org/10.15470/fe3689))

Palabras clave: Herpetofauna, Culebra viperina, Bilineata, Norte de África, Déficit de Wallace

## Resum

*Nedar al Sàhara: una nova localització i ampliació dels límits territorials de Natrix maura (Linnaeus, 1758) (Squamata, Colubridae) al centre d'Algèria. Natrix maura, coneguda amb el nom comú de serp d'aigua, és una espècie semiaquàtica molt estesa i comuna a la regió de la Mediterrània occidental. Aquest estudi informa d'una nova localització de N. maura al centre d'Algèria, cosa que amplia de manera significativa els límits territorials de l'espècie. A més, aportem un mapa de distribució actualitzat de N. maura a Algèria, elaborat a partir d'un conjunt ampli de registres. Els resultats posen èmfasi en la necessitat de dur a terme més estudis sobre l'herpetofauna de les regions poc explorades del país.*

Dades publicades a GBIF (DOI: [10.15470/fe3689](https://doi.org/10.15470/fe3689))

Paraules clau: Herpetofauna, Serp d'aigua, Bilineata, Nord de l'Àfrica, Dèficit de Wallace

Received: 02/08/2024; Conditional acceptance: 08/10/2024; Final acceptance: 23/10/2024

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## Introduction

Algeria ranks among the most species–rich countries in the Mediterranean Basin and North Africa in terms of terrestrial reptiles, with 101 documented species (Rouag et al., 2024). However, knowledge of the distribution of many reptile taxa remains incomplete due to a scarcity of comprehensive herpetofaunal inventories across many parts of the country (Beddek, 2017; Beddek et al., 2018). Much of the available distributional data relies on historical sources, primarily museum specimens and 19<sup>th</sup> and early 20<sup>th</sup>–century literature (e.g., Gervais, 1836; Guichenot, 1850; Strauch, 1862; Lallemand, 1867; Boulenger, 1891; Olivier, 1894; Doumergue, 1901), which often suffer from spatial inaccuracies. This knowledge gap, referred to as the 'Wallacean shortfall', is particularly pronounced in the Algerian Sahara, due in part to the inaccessibility of remote regions, resulting in many reptilian taxa having poorly defined and documented range maps (Bouam et al., 2022; Chedad et al., 2024). Although the past decade has witnessed a resurgence of scientific interest in Algeria's reptile fauna, resulting in the discovery of previously unreported taxa and significant range extensions for known species across diverse taxonomic groups, including Testudinidae (Boulaouad et al., 2023), Gekkonidae (Mouane et al., 2021), Scincidae (Rouag et al., 2016), Agamidae (Saoudi et al., 2017; El Bouhissi et al., 2022), Lamprophiidae (Bakhouché and Escoriza, 2017; Bakhouché et al., 2019; Böhme et al., 2019), and Viperidae (Bouam et al., 2019).

*Natrix Laurenti*, 1768 is a Palearctic genus of colubrid snakes, currently comprising five recognized species (Uetz et al., 2023). Among these, the semiaquatic *Natrix maura* (Linnaeus, 1758) exhibits a West Mediterranean chorotype. It is widespread across the Maghreb and Western Europe, extending from the Iberian Peninsula to northwestern Italy, including France and southwestern Switzerland (Mateo Miras et al., 2009). *N. maura* occurs at elevations ranging from sea level up to 2600 m asl and is commonly encountered in various freshwater habitats, but also tolerates waters with relatively high salt concentrations (Fuentes and Escoriza, 2015; Geniez, 2015). It predominantly preys on fish and amphibians (Rugiero et al., 2000; Santos et al., 2000). This species is a small to medium-sized snake, typically measuring 40–80 cm in total length, though some individuals reach up to 95 cm (Geniez, 2015; Trape, 2023). Notably, this colubrid species exhibits remarkable Batesian mimicry, both morphologically and behaviourally, of European vipers of the genus *Vipera* (Santos et al., 2018), hence its common name, the viperine snake.

In this paper, we present a new locality record for *N. maura* in Algeria, significantly expanding its known geographic distribution. Additionally, to gain a more comprehensive understanding of *N. maura* distribution within the country, we compiled occurrence data from various sources and provide an updated distribution map for Algeria.

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## Material and methods

### Study site

Field observations were conducted at Sebkhet El Melah wetland (30° 28' 06" N, 2° 55' 35" E; 370 m a.s.l.; fig. 1A), El Menia Province (formerly El Goléa), central Algeria. This shallow, saline lake covers about 8 km<sup>2</sup> and is bordered by sand dunes and rocky hills. It receives water from surrounding palm grove drainage, El Menia city domestic wastewater, and rainfall (Hacène et al., 2004; Alioua et al., 2016). Designated as a Ramsar Site (<https://rsis Ramsar.org/ris/1429>), Sebkhet El Melah is a critical habitat for Saharan biodiversity, particularly waterbirds (Bouazid et al., 2009, 2019, 2023; Chedad et al., 2021). Based on data from the WorldClim database with a resolution of ~1 km<sup>2</sup> (Fick and Hijmans, 2017), the site falls within the inferior Saharan bioclimatic zone, characterized by temperate winters and a mean annual precipitation of 30 mm.

### Data collection

To comprehensively update *N. maura* distribution in Algeria, we conducted a thorough literature review and searched online museum and institutional collections for occurrence records. Additionally, occurrence data were obtained from the Global Biodiversity Information Facility (GBIF: <https://doi.org/10.15468/dl.pp3aen>) and iNaturalist (<https://inaturalist.org>). Following Chowdhury et al. (2024), data were also sourced from Facebook (<https://facebook.com>), specifically from the group named World of Wildlife in Algeria – "عالم الحياة البرية في الجزائر" (<https://www.facebook.com/groups/1641684429224291/>). The species identification of data obtained from both iNaturalist and Facebook was double-checked and confirmed by the authors. To ensure data accuracy, all records included precise locality description and/or GPS coordinates with a minimum precision of two decimal degrees, while excluding records with coordinates referring to the centroids of large geographic areas. Duplicate records from the same locality were merged into single entries. The final dataset comprised 139 unique presence locations visualized using ArcGIS v. 10.8 (annex 1; dataset published through GBIF: DOI: [10.15470/fe3689](https://doi.org/10.15470/fe3689)).



Fig. 1. A, landscape view of Sebkheth El Melah, El Menia Province, central Algeria; B, adult *Natrix maura* specimen with typical coloration; C, adult *N. maura* exhibiting the bilineata pattern; D, adult *N. maura* with the bilineata pattern feeding on *Coptodon zillii*. (All *Natrix maura* specimens were observed and photographed at Sebkheth El Melah by A. Chedad).

Fig. 1. A, vista del paisaje de Sebkheth El Melah, provincia de El Menia, Argelia central; B, ejemplar adulto de *Natrix maura* con coloración típica; C, ejemplar adulto de *N. maura* con la estructura bilineata; D, ejemplar adulto de *N. maura* con la estructura bilineata, alimentándose de *Coptodon zillii*. (Todos los ejemplares de *Natrix maura* fueron observados y fotografiados en Sebkheth El Melah por A. Chedad).

## Results and discussion

While conducting a waterbird survey on 10/05/2016 at Sebkheth El Melah wetland, A.Chedad observed and photographed three *Natrix maura* individuals (fig. 1B, 1C, 1D). Subsequent observations by the same author in following years confirmed the continued presence of the species at this locality. This record represents a substantial range extension of approximately 370 km southeastward from the nearest documented occurrence in Arbaouat, El Bayadh Province (fig. 2). Notably, previous herpetofaunal surveys conducted in the Sahara of central Algeria failed to report the species (Hartert, 1913; Chabanaud, 1920; Angel, 1923; Johann, 1981). Given the prevalence of hyper-aridity and scarcity of aquatic habitats in the surrounding plains, we hypothesize that this new record might represent an isolated population, likely sustained by the presence of a hydric microclimate and prey availability within the wetland.

Among the observed specimens, one displayed the typical brownish ground colouration with alternating dark blotches on the dorsal and lateral sides (fig. 1B). In contrast, the remaining individuals exhibited the bilineata pattern, characterized by a darker ground colour and two distinct golden dorso-lateral bands (fig. 1C, 1D). Our findings are consistent with previous

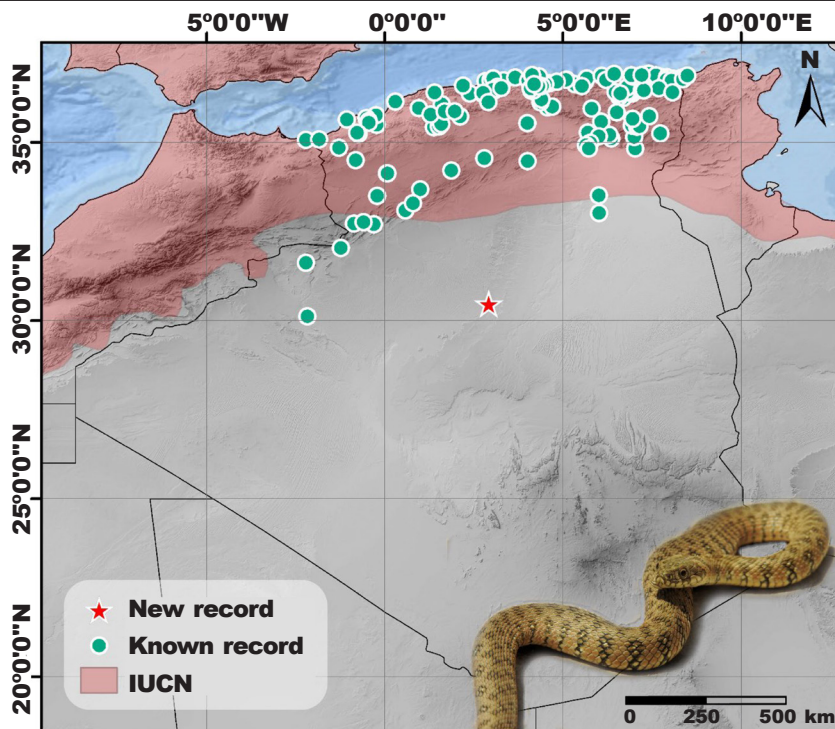


Fig. 2. Distribution map of *Natrrix maura* in Algeria. (Species photograph by I. Bouam): IUCN, IUCN distribution range.

Fig. 2. Mapa de distribución de *Natrrix maura* en Algeria. (Ejemplar fotografiado por I. Bouam): IUCN, rango de distribución según la UICN.

observations, as the bilineata morph frequently co-occur with other *N. maura* individuals (Geniez, 2015). Historically, Algerian specimens with the bilineata pattern were regarded as the 'variety' *aurolineatus* and have been reported from various locations in Algeria, including Algiers, Annaba (Gervais, 1836), Constantine, Skikda (Werner, 1895), Mascara (Doumergue, 1901), and El Bayadh (Werner, 1914). However, analysis of mitochondrial markers revealed no genetic differentiation between the bilineata morph and other *N. maura* individuals. The bilineata pattern appears to be habitat-dependent rather than geographically structured, with a higher prevalence in open environments (Santos et al., 2018).

Our updated distribution map (fig. 2) shows a widespread presence of *N. maura* in Algeria, extending northward along the Saharan Atlas and encompassing virtually all northern provinces. The distribution also reaches as far south as the Saharan provinces of Béni Abbes (Gauthier, 1967), Touggourt (Olivier, 1894; Werner, 1895), and El Menia. This extensive range aligns with historical accounts suggesting *N. maura* as a common snake species in Algeria (Guichenot, 1850; Boulenger, 1891; Olivier, 1894; Werner, 1895; Doumergue, 1901; Werner, 1914). This ubiquity is partially attributed to its eurytopic nature, which allows it to tolerate a wide range of habitats and ecological conditions (Escoriza and Ben Hassine, 2017).



The new data presented in this paper, along with recent reports of previously undocumented reptile species from central Algeria (Sadine et al., 2021; Bouam et al., 2022; Chedad et al., 2024), highlight significant knowledge gaps in reptile distribution within this region. These findings underscore the need for systematic herpetofaunal surveys to achieve a comprehensive understanding of the reptilian fauna of central Algeria.

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Annex 1. Province, coordinates, and source of available records of *Natrix maura* in Algeria. NHMUK, Natural History Museum, London, UK; MVZ, Museum of Vertebrate Zoology, University of California, Berkeley; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge; MNHN, Muséum National d'Histoire Naturelle, Paris; ZFMK, Zoologisches Forschungsmuseum Alexander Koenig [Zoological Research Museum Alexander Koenig], Bonn; CAS, California Academy of Sciences, San Francisco; CM, Carnegie Museum of Natural History, Pittsburgh. (Acronyms follow Sabaj, 2020).

*Anexo 1. Provincia, coordenadas y fuente de los registros disponibles de Natrix maura en Argelia. NHMUK, Museo de Historia Natural, Londres, Reino Unido; MVZ, Museo de Zoología de Vertebrados, Universidad de California, Berkeley; MCZ, Museo de Zoología Comparada, Universidad de Harvard, Cambridge; MNHN, Museo Nacional de Historia Natural, París; ZFMK, Museo de Investigación Zoológica Alexander Koenig, Bonn; CAS, Academia de Ciencias de California, San Francisco; CM, Museo Carnegie de Historia Natural, Pittsburgh. (Las siglas se basan en Sabaj, 2020).*

Province	Latitude	Longitude	Source
Aïn Defla	36.37	2.39	NHMUK 1891.5.4.145; Anderson (1892)
Algiers	36.71	2.83	iNaturalist (109302347)
Algiers	36.74	2.96	iNaturalist (125962174)
Algiers	36.73	3.34	iNaturalist (40879022)
Algiers	36.79	3.04	Strauch (1862)
Annaba	36.87	7.42	Beddek et al. (2018)
Annaba	36.83	7.53	Escoriza and Ben Hassine (2017)
Annaba	36.84	7.72	Escoriza and Ben Hassine (2017)
Annaba	36.93	7.41	Escoriza and Ben Hassine (2017)
Annaba	36.78	7.62	MVZ 235725-235726
Annaba	36.88	7.61	Werner (1893)
Batna	35.20	6.30	Barata et al. (2008)
Batna	35.58	6.07	Barata et al. (2008)
Batna	35.11	6.36	Chirio and Blanc (1997)
Batna	35.28	5.70	Chirio and Blanc (1997)
Batna	35.17	6.00	iNaturalist (213258561)
Béchar	32.04	-1.23	Foley (1922)
Béchar	31.62	-2.21	MCZ R-27492-27494; Werner (1929)
Béjaïa	36.76	5.10	Bellairs and Shute (1954)
Béjaïa	36.63	5.34	Escoriza and Ben Hassine (2017)
Béjaïa	36.66	4.61	iNaturalist (146130059; 146130060)
Béjaïa	36.75	5.08	MNHN-RA-1902.196
Béjaïa	36.70	4.83	ZFMK HERP 049635

## Annex 1. (Cont.)

Province	Latitude	Longitude	Source
Béni Abbès	30.12	-2.17	Gauthier (1967)
Biskra	34.99	5.77	Chirio and Blanc (1997)
Biskra	34.92	5.65	Chirio and Blanc (1997)
Biskra	34.83	5.73	Chirio and Blanc (1997)
Blida	36.56	3.17	Boulenger (1891)
Blida	36.35	2.76	CAS 138788-138797
Blida	36.46	3.08	Escoriza and Ben Hassine (2017)
Blida	36.47	3.03	iNaturalist (140981895)
Blida	36.48	3.04	iNaturalist (164966366)
Blida	36.52	3.27	iNaturalist (49027809)
Blida	36.39	2.76	Werner (1914)
Bordj Bou Arreridj	36.19	4.39	Barata et al. (2008)
Bordj Bou Arreridj	36.00	4.70	iNaturalist (111420395)
Bordj Bou Arreridj	36.12	4.37	iNaturalist (122833355; 122833357)
Bordj Bou Arreridj	35.98	4.57	iNaturalist (148683783)
Bordj Bou Arreridj	36.20	4.40	iNaturalist (159935965; 159935967)
Bouira	36.45	4.10	Beddek et al. (2018)
Bouira	36.46	4.18	iNaturalist (111295466; 148240786; 148240787; 149306707; 159619681; 159619684; 166781042)
Bouira	36.44	4.12	iNaturalist (74719211)
Boumerdès	36.82	3.66	Beddek et al. (2018)
Chlef	36.07	1.60	Ferrer et al. (2016)
Chlef	36.40	1.40	Ferrer et al. (2016)
Constantine	36.33	6.73	Escoriza and Ben Hassine (2017)
Constantine	36.39	6.66	Escoriza and Ben Hassine (2017)
Constantine	36.54	6.80	iNaturalist (108975654)
Constantine	36.39	6.66	iNaturalist (118346345)
Constantine	36.24	6.69	iNaturalist (156556200)
Constantine	36.40	6.87	iNaturalist (15892455)
Constantine	36.36	6.93	iNaturalist (16385424)
Constantine	36.35	6.54	iNaturalist (164386529)
Constantine	36.41	6.80	iNaturalist (17600828)
Constantine	36.40	6.47	iNaturalist (46224495)
Constantine	36.27	6.58	iNaturalist (47037052)
Constantine	36.37	6.61	Werner (1895)

## Annex 1. (Cont.)

Province	Latitude	Longitude	Source
Djelfa	34.55	2.79	Beddek et al. (2018)
El Bayadh	33.68	1.00	Doumergue (1901)
El Bayadh	34.13	0.07	Escoriza and Ben Hassine (2017)
El Bayadh	33.09	0.58	Facebook
El Bayadh	34.12	0.07	iNaturalist (18408665)
El M'Ghair	33.51	6.01	Olivier (1894)
El Tarf	36.78	8.11	Beddek et al. (2018)
El Tarf	36.78	8.37	Beddek et al. (2018)
El Tarf	36.79	7.91	Beddek et al. (2018)
El Tarf	36.81	8.33	Beddek et al. (2018)
El Tarf	36.82	7.92	Beddek et al. (2018)
El Tarf	36.84	8.43	Beddek et al. (2018)
El Tarf	36.71	7.95	CM 58391
El Tarf	36.75	7.91	CM 58404
El Tarf	36.73	8.05	CM 58424-58425
El Tarf	36.77	8.37	Escoriza and Ben Hassine (2017)
El Tarf	36.87	8.49	Gherib and Lazli (2016)
Guelma	36.47	7.21	iNaturalist (157791203)
Guelma	36.52	7.69	iNaturalist (32228685)
Guelma	36.45	7.26	NHMUK 1969.2184-2186
Jijel	36.79	5.66	Beddek et al. (2018)
Jijel	36.87	6.09	Escoriza and Ben Hassine (2017)
Jijel	36.70	5.62	Facebook
Jijel	36.75	6.20	iNaturalist (107552143)
Jijel	36.57	5.53	iNaturalist (22989993)
Khenchela	34.83	7.03	MNHN-RA-1997.5004
Khenchela	35.15	7.00	MNHN-RA-1997.5011
Khenchela	35.47	6.93	MNHN-RA-1997.5012
Khenchela	35.44	7.08	MNHN-RA-1997.5013
Khenchela	35.45	7.15	MNHN-RA-1997.5014
Laghouat	34.20	1.87	iNaturalist (3350620)
Mascara	35.49	-0.22	Beddek et al. (2018)
Médéa	36.13	2.91	MCZ R-19658
Mostaganem	36.14	0.30	Beddek et al. (2018)
M'sila	35.54	4.00	Barata et al. (2008)
M'sila	34.47	4.01	Facebook

## Annex 1. (Cont.)

Province	Latitude	Longitude	Source
Naâma	32.70	−0.30	Doumergue (1901)
Naâma	32.72	−0.86	Doumergue (1901)
Naâma	33.50	−0.21	Doumergue (1901)
Naâma	33.29	0.80	Escoriza and Ben Hassine (2017)
Naâma	32.76	−0.59	MCZ R-27490-R-27491
Oran	35.63	−1.06	Beddek et al. (2018)
Oran	35.76	−0.24	Doumergue (1901)
Oran	35.68	−0.51	MNHN-RA-1986.2019
Oran	35.59	−0.44	MNHN-RA-1986.2020
Oran	35.55	−0.44	NHMUK 1888.6.5.1-2; NHMUK 1888.6.5.3
Oum El Bouaghi	35.84	6.51	CM 58431
Oum El Bouaghi	35.73	7.42	iNaturalist (16604035)
Oum El Bouaghi	35.65	6.95	Samraoui and Samraoui (2007)
Relizane	35.96	0.96	Facebook
Sétif	35.95	5.81	Trape (2023)
Sidi Bel Abbès	35.23	−0.73	Beddek et al. (2018)
Sidi Bel Abbès	35.27	−0.77	Beddek et al. (2018)
Sidi Bel Abbès	34.50	−0.81	MNHN-RA-2009.110; Doumergue (1901)
Skikda	36.92	6.44	Escoriza and Ben Hassine (2017)
Skikda	36.88	7.20	iNaturalist (112504288)
Skikda	36.84	6.95	iNaturalist (36425556)
Skikda	36.87	6.92	iNaturalist (52404090)
Souk Ahras	36.40	8.07	Beddek et al. (2018)
Tébessa	35.25	7.73	Facebook
Tiaret	35.42	1.38	Ferrer et al. (2016)
Tiaret	35.44	1.52	Ferrer et al. (2016)
Tiaret	35.51	1.59	Ferrer et al. (2016)
Tipaza	36.59	2.20	Clary et al. (2001)
Tissemsilt	35.86	1.68	Beddek et al. (2018)
Tissemsilt	35.86	1.96	Escoriza and Ben Hassine (2017); Beddek et al. (2018)
Tissemsilt	35.78	1.29	Facebook
Tissemsilt	35.73	2.12	Facebook
Tizi Ouzou	36.73	4.03	Amrouche–Larabi et al. (2015)
Tizi Ouzou	36.88	4.13	Amrouche–Larabi et al. (2015)

## Annex 1. (Cont.)

Province	Latitude	Longitude	Source
Tizi Ouzou	36.51	4.10	Amrouche–Larabi et al. (2015)
Tizi Ouzou	36.63	4.24	Amrouche–Larabi et al. (2015)
Tizi Ouzou	36.62	4.50	Beddek et al. (2018)
Tizi Ouzou	36.85	4.33	Escoriza and Ben Hassine (2017)
Tizi Ouzou	36.89	4.14	Escoriza and Ben Hassine (2017)
Tizi Ouzou	36.58	4.41	iNaturalist (110989868)
Tizi Ouzou	36.57	4.31	Werner (1914)
Tizi Ouzou	36.63	4.19	Werner (1914)
Tlemcen	35.07	−2.21	Escoriza and Ben Hassine (2017)
Tlemcen	34.85	−1.28	GBIF (2024)
Tlemcen	35.08	−1.84	Trape (2023)
Touggourt	33.01	6.01	Olivier (1894)

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