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A new locality record of *Calchas anlasi* Yağmur, Soleglad, Fet & Kovařík, 2013 from Hakkari Province, Turkey (Scorpiones, Iuridae, Calchinae)

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Abstract
Purpose: The aim of this study is to determine the distribution limits of the *Calchas anlasi* Yağmur, Soleglad, Fet & Kovařík, 2013.
Method: The specimen was collected from under the stone and preserved in 96% alcohol. After being photographed with a digital camera, image stacking was performed using Helicon Focus software. After the photographic procedures summarized by Yağmur, the specimen is kept in the Celal Bayar University Zoology Museum (AZMM).
Findings: As a result of the examination of the specimen obtained from the Derecik District of Hakkari, it was seen that it has a female and 6-6 pectinal teeth structure.
Conclusion: In the present study, a sixth population of *Calchas anlasi* is recorded, extending its known distribution eastward by approximately 70 km.

Keywords: Anatolia, distribution, fauna, range extension, scorpion

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Hakkari İli'nden *Calchas anlasi* Yağmur, Soleglad, Fet & Kovařík, 2013'nin yeni bir lokalite kaydı (Scorpiones, Iuridae, Calchinae)

Özet
Amaç: Bu çalışmanın amacı, *Calchas anlasi* Yağmur, Soleglad, Fet & Kovařík, 2013'ün dağılım sınırlarını belirlemektir.
Yöntem: Örnek, taşın altından toplanmış ve %96 alkolde muhafaza edilmiştir. Dijital kamera ile fotoğraflandıktan sonra, Helicon Focus yazılımı kullanılarak görüntü istifleme işlemi gerçekleştirilmiştir. Yağmur tarafından özetlenen fotografik işlemlerden sonra, örnek Celal Bayar Üniversitesi Zooloji Müzesi'nde (AZMM) muhafaza edilmektedir.
Bulgular: Hakkari'nin Derecik ilçesinden elde edilen numunenin incelenmesi sonucunda, dişi ve 6-6 pektinal diş yapısına sahip olduğu görülmüştür.
Sonuç: Bu çalışmada, *Calchas anlasi*'nin altıncı popülasyonu kaydedilmiş ve bilinen dağılım alanı doğuya doğru yaklaşık 70 km genişletilmiştir.

Anahtar kelimeler: Anadolu, dağılım, fauna, yayılım alanı genişlemesi, akrep

1. Introduction

The relict scorpion family Iuridae comprises four genera: *Iurus*, *Protoiurus*, *Calchas* and *Neocalchas* [1,2]. The first two genera are placed in the subfamily Iurinae, whereas the latter two belong to the subfamily Calchinae.

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The genus *Calchas* and its type species, *C. nordmanni*, were described [3]. Subsequently, the monotypic subfamily Calchinae was established for C. nordmanni within the family Chactidae [4]. After a long period, *Calchas* and *Iurus* were placed in the subfamily Iurinae within the family Iuridae [5], who considered Calchinae Birula, 1917 a synonym of Iurinae Thorell, 1876. Later, excluded the subfamily Caraboctoninae from Iuridae and revalidated Calchinae [6]. In their classification, Iuridae was restricted to the monotypic genera *Calchas* and *Iurus*.

Subsequently revised the genus *Calchas* and described two additional species, *C. gruberi* and *C. birulai* [7]. Further revised *Calchas*, describing two more species, *C. anlasi* and *C. kosswigi* [2]. In addition, established the monotypic genus *Neocalchas* within Calchinae and transferred *C. gruberi* to this new genus [2].

Neocalchas was separated from *Calchas* primarily based on differences in the morphology of the hemispermatophore. Furthermore, diagnostic differences were demonstrated in the number of denticle rows on the chelal fingers, the position of the subaculear setal pair on the telson, and the position of the external chelae trichobothria [2].

The genus *Calchas* has attracted considerable interest among scorpion taxonomists due to its phylogenetic position. It occupies a basal position within the superfamily Iuroidea and exhibits several unique features [7]. One of the most notable characteristics of *Calchas* (and *Neocalchas*) is the presence of tibial spurs, a feature unique among non-buthid scorpion families. Owing to this plesiomorphic character, Birula [4] referred to *Calchas* as a "missing link." Molecular analyses indicate that *C. nordmanni* is the basal most species of *Calchas*, whereas *Neocalchas gruberi* represents the basal most lineage within Calchinae [8].

Neocalchas gruberi is known from the Mediterranean region of Turkey (Antalya and Mersin provinces) and from the Greek islands of Megisti and Samos [2,7]. *Calchas nordmanni* occurs in the Eastern Black Sea region of Turkey (Artvin and Erzurum provinces) and is geographically isolated from other species of *Calchas* [3,9,10]. *Calchas birulai* is distributed in southeastern Anatolia (Adıyaman, Diyarbakır, Gaziantep, Kahramanmaraş, Kilis, Malatya, Mardin, and Şanlıurfa provinces) [2,7]. *Calchas kosswigi* is also distributed in southeastern Anatolia (Siirt and Şırnak provinces) [2]. *Calchas anlasi* is known from eastern Anatolia (Hakkari Province) and northern Iraq [2].

When describing *C. birulai*, included a population from Arbil Province (Geli Ali Beg Waterfall), northern Iraq, within that species [7]. However, this population was tentatively identified, and the examined specimen is now lost. Later, *C. anlasi* was described from the Çukurca District of Hakkari Province, and the Iraqi population was reassigned to this species [2]. More recently, *C. anlasi* was recorded from an additional locality in the Çukurca District and from two further localities in the Central District of Hakkari Province, all situated close to the type locality in the Çukurca District [11]. Therefore, *C. anlasi* is currently known from five confirmed localities (Figure 2).

In the present study, *C. anlasi* is recorded from a sixth locality, further expanding its known distribution.

2. Materials and methods

The specimen was collected under a stone in Derecik District, Hakkari Province, Turkey, in May 2025 and preserved in 96% ethanol. Photographs were taken using a Canon EOS 7D digital camera. Image stacking was performed using Helicon Focus software. Photographic procedures followed the methodology outlined [2]. The specimen was deposited in the Zoology Museum of Alaşehir Vocational School, Manisa Celal Bayar University, Manisa, Turkey (AZMM). Identification of the specimen was conducted according to Yağmur et al. [2].

3. Results

Calchas anlasi Yağmur, Soleglad, Fet & Kovařík, 2013
(Figure 1)

Calchas anlasi Yağmur et al., 2013: 1-2, 6, 8-16, 24, 36. Figs. 7, 10-24, 26. Fig. 45 (map).
Calchas anlasi: Parmakelis et al., 2022: 11-12; Yeşilyurt, F., 2022: 9-11, 27, 29, 54, 55, 57-59, 61. Fig. 4.12. Fig. 4.13 (map).

Examined Material: Turkey, Hakkari, Derecik, Ulaşan Village, 1 km southwest, 37°07'33"N, 44°24'55"E, 1167 m a.s.l., 08.05.2025, 1 ♀, Leg. F. Yeşilyurt, S. Anlaş, S. Örgel, İ. Can, A. Gök (Figure 2).

Description: See [2]. Habitus (Figure 1).

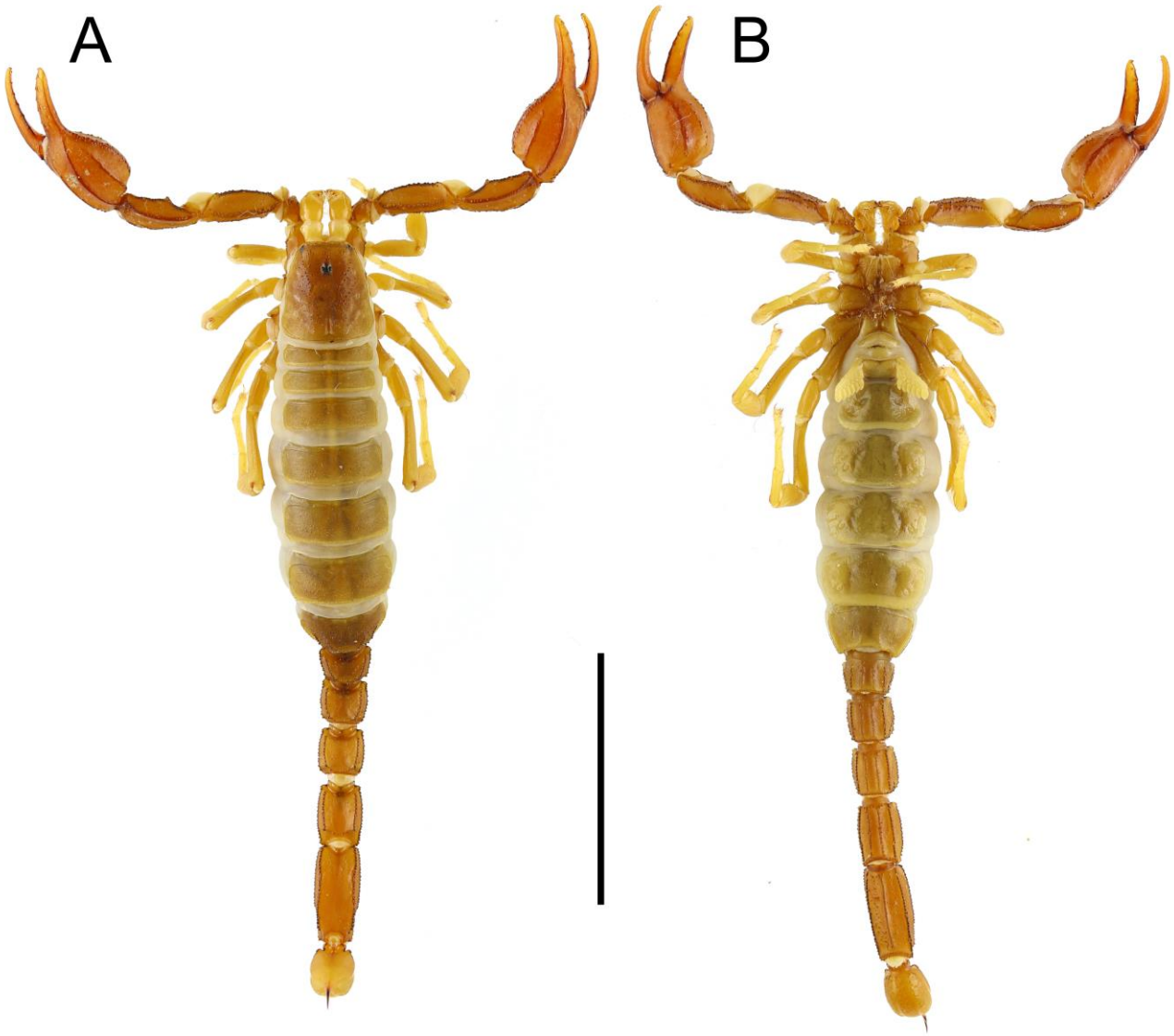


Figure 1. Habitus of *Calchas anlasi* [2]. A. Female dorsal view, B. Female ventral view. Scale bar: 10 mm

Derecik is a mountainous district located in southeastern Türkiye, administratively connected to Hakkâri Province and situated near the Iraqi border. The district is characterized by its high-altitude rugged topography, deep valleys, and steep mountain ranges. A continental climate prevails in the region, with long, harsh, and snowy winters, while summers are generally hot and dry. Due to altitudinal variations, microclimatic differences occur, contributing to the diversification of the natural vegetation. In and around Derecik, steppe formations are common alongside oak communities, mountain meadows, and alpine flora elements at higher elevations. During the spring season, the rich herbaceous vegetation and endemic plant species enhance the biological diversity of the area, while the natural habitats constitute an important ecological environment for wildlife.

Previous field surveys conducted by the researcher in Derecik district did not record the presence of the species in question. This may be due to the relatively narrower ecological tolerance of *C. anlasi* compared to many other scorpion species.

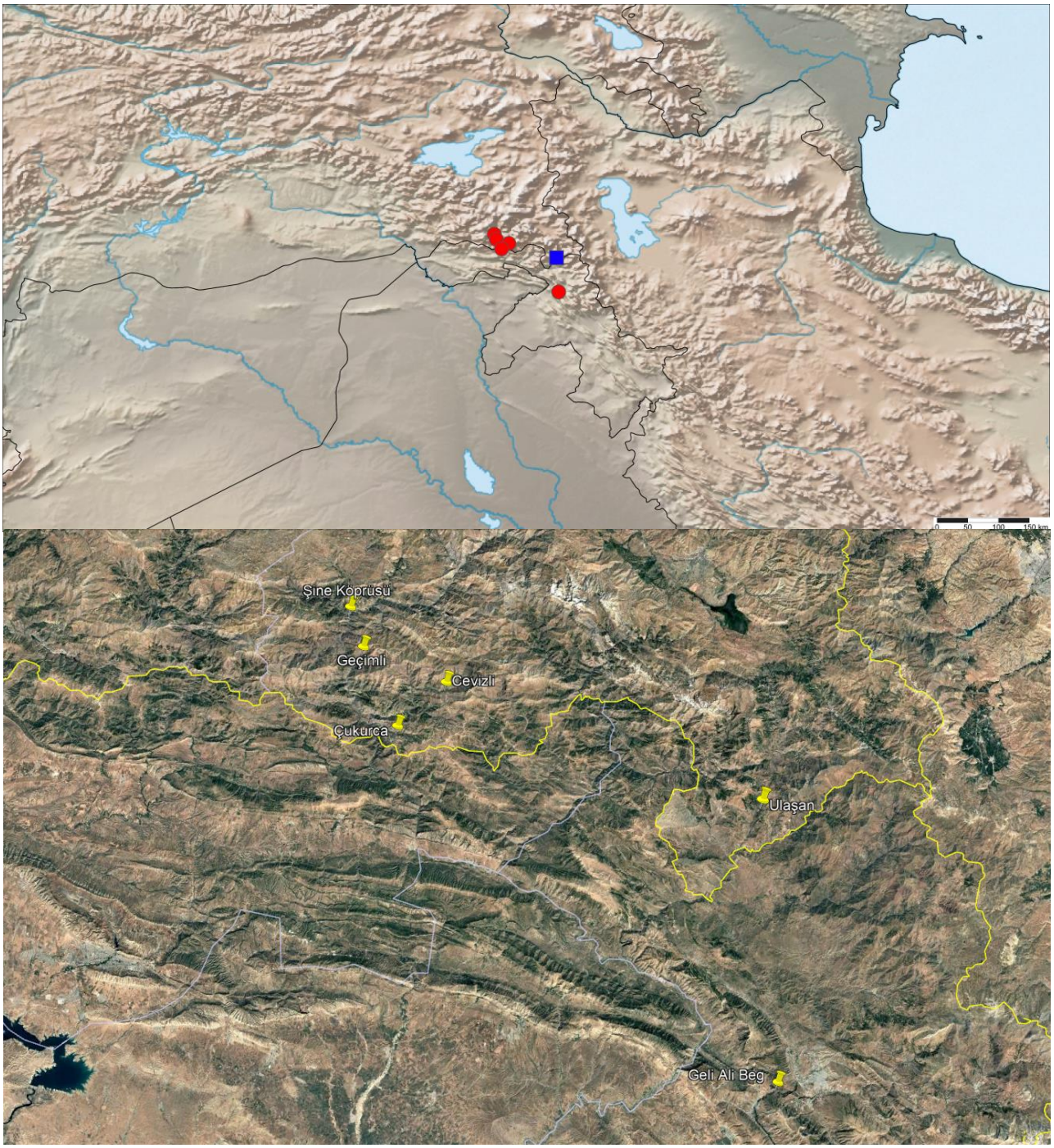


Figure 2. A map showing the distribution of *Calchas anlasi* [2]. Known localities in Hakkari Province (Turkey) and Arbil Province (Iraq) (circle), new locality (square) (Top). Close up views of the localities in Google Earth (Bottom).

The morphometric measurements of the examined female specimen are largely consistent with the type material measurements reported for *Calchas anlasi* [2]. In particular, the total body length of 32.35 mm falls within the approximately 31-34 mm range reported for females in the original description. The nearly square carapace (4.20 × 4.19 mm), the total metasomal length of 17.20 mm, and the distinctly elongated segment V of the metasoma (4.30 mm) support the slender and elongated metasomal morphology regarded as diagnostic for the species. The pedipalp measurements are also close to the published values; notably, the chela length of 7.20 mm and movable finger length of 4.06 mm correspond well with the relatively robust but short-fingered chelal morphology characteristic of the species. Furthermore, the length (4.76 mm) and narrow structure of the telson confirm the slender telson morphology described in the original publication. Overall, the examined specimen shows a high degree of morphometric similarity to the female type material of *Calchas anlasi* reported in the original description [2] and exhibits measurement-based characters supporting its identification as this species.

Table 1. Measurements of *Calchas* anlasi Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D)

		Calchas anlasi
Dimensions (mm)		♀
Carapace	L / W	4.20 / 4.19
Mesosoma	L	10.95
Tergite VII	L / W	2.22 / 3.62
Metasoma + telson	L	17.20
Segment I	L / W / D	1.51 / 2.34 / 1.88
Segment II	L / W / D	1.94 / 2.09 / 1.86
Segment III	L / W / D	2.03 / 2.02 / 1.58
Segment IV	L / W / D	2.66 / 2.00 / 1.62
Segment V	L / W / D	4.30 / 1.98 / 1.59
Telson	L / W / D	4.76 / 1.94 / 1.60
Pedipalp	L	14.14
Femur	L / W	3.46 / 1.40
Patella	L / W	3.48 / 1.43
Chela	L	7.20
Manus	L / W / D	3.51 / 2.61 / 2.30
Movable finger	L	4.06
Total	**L**	**32.35**

4. Discussion

Calchas anlasi is an enigmatic and poorly known species with a currently limited and fragmented distribution. To date, the species has been recorded from only five confirmed localities, indicating that its distribution range is likely restricted to the mountainous and semi-arid regions of southeastern Türkiye and adjacent areas. The record reported from Arbil Province in northern Iraq remains uncertain and requires additional sampling and detailed morphological examination for confirmation. Therefore, the actual distribution limits of *C. anlasi* are still insufficiently understood.

In the present study, a sixth locality record of *C. anlasi* is documented from Derecik District, Hakkâri Province, representing an eastward extension of the known distribution range by approximately 70 km. This finding suggests that the species may be more widely distributed throughout the border regions between southeastern Türkiye and northern Iraq than previously assumed. Considering the similar ecological and topographical conditions across this region, additional undocumented populations may occur in adjacent mountainous habitats.

The study area is located within the Irano-Turanian phytogeographical region and is characterized by semi-arid mountain-steppe ecosystems. Steppe vegetation and sparse oak communities are widespread in the region, and topographic heterogeneity is pronounced [12,13]. The habitat consists of rugged terrain, valley systems, steep slopes, and shallow stony soils that are highly susceptible to erosion. Sparse oak formations and steppe vegetation dominate the landscape, while local microclimatic conditions may contribute to habitat heterogeneity. Such environmental conditions appear to provide suitable microhabitats for *C. anlasi*, particularly beneath stones and within rocky substrates.

The examined female specimen possessed 6-6 pectinal teeth, consistent with the diagnostic counts previously reported in the literature [2]. In addition to the pectinal tooth count, the general morphological characteristics of the specimen correspond well with the original species description. The present record therefore contributes not only to the biogeographical knowledge of the species but also to a better understanding of its ecological preferences and potential distribution pattern.

5. Conclusions

This study provides the sixth confirmed locality record of *Calchas anlasi* and extends its known distribution approximately 70 km eastward into Derecik District, Hakkâri Province, southeastern Türkiye. The new record contributes to a better understanding of the species' geographic distribution and habitat preferences and suggests that *C.*

anlasi may be more widespread in the mountainous border regions between southeastern Türkiye and northern Iraq than previously recognized.

Further field surveys in southeastern Türkiye and northern Iraq are necessary to clarify the true distribution range, population status, ecological requirements, and conservation significance of *C. anlasi*.

Artificial Intelligence Statement
This article did not use artificial intelligence.

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Ethical statement: This study does not require ethical approval.

Data Availability Statement: The raw data supporting the findings of this study are available from the corresponding author [F.Y.] upon reasonable request and within ethical boundaries.

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