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Pseudocerastes urarachnoides: the ambush specialist

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RESUMEN: *Pseudocerastes urarachnoides* es una especie recientemente descrita en Oriente Medio, y los datos sobre su ecología y distribución todavía son escasos. Durante un viaje herpetológico a Irán en la primavera de 2014 pudieron observarse dos especímenes de esta especie en su hábitat natural. En este artículo se presentan datos sobre los hábitos de caza y hábitats usados, información importante para la conservación y el manejo de la especie.

Vipers of the genus *Pseudocerastes*, Boulenger 1896 are sometimes known as “false horned vipers” due to the presence of horn-like projections on both sides above the eye. These projections are formed by several small imbricate scales

and their tips end in two tiny scales. In contrast, the “true horned vipers” *Cerastes cerastes* (Linnaeus, 1758) and *Cerastes gasperettii* Leviton & Anderson, 1967 have supraorbital “horns”, each one consisting in a single elongated scale. Three



Figure 1: Members of the *Pseudocerastes* genus. *Pseudocerastes fieldi*: (a) adult of the border between Israel and Egypt (photograph: Gabriel Martínez). (b) Head detail of the same individual (photograph: Gabriel Martínez). (c) Tail detail of the same individual (photograph: Gabriel Martínez). *Pseudocerastes persicus*: (d) Adult of Oman (photograph: Felix Amat). (e) Head detail of the same individual (photograph: Felix Amat). (f) Tail detail of the same individual (photograph: Salvador Carranza). *Pseudocerastes urarachnoides*: (g) adult of the border between Iran and Iraq (photograph: Gabriel Martínez). (h) Head detail of the same individual (photograph: Gabriel Martínez). (i) Tail detail of the same individual (photograph: Javier Gallego).

Figura 1: Miembros del género *Pseudocerastes*. *Pseudocerastes fieldi*: (a) adulto de la frontera entre Israel y Egipto (fotografía: Gabriel Martínez). (b) Detalle de la cabeza del mismo espécimen (fotografía: Gabriel Martínez). (c) Detalle de la cola del mismo espécimen (fotografía: Gabriel Martínez). *Pseudocerastes persicus*: (d) adulto de Oman (fotografía: Felix Amat). (e) Detalle de cabeza del mismo espécimen (fotografía: Felix Amat). (f): Detalle de la cola del mismo espécimen (fotografía: Salvador Carranza). *Pseudocerastes urarachnoides*: (g) adulto de la frontera entre Iran e Iraq (fotografía: Gabriel Martínez). (h) Detalle de la cabeza del mismo espécimen (fotografía: Gabriel Martínez). (i) Detalle de la cola del mismo espécimen (fotografía: Javier Gallego).

species have been described within the genus *Pseudocerastes*: the Persian horned viper *Pseudocerastes persicus* (Duméril, Bibron & Duméril, 1854), the Field's horned viper *Pseudocerastes fieldi* Schmidt, 1930 and the spider-tailed horned viper *Pseudocerastes urarachnoides* Bostanchi, Anderson, Kami & Papenfuss, 2006 (Figure 1). A possible fourth species, *Pseudocerastes bicornis* Wall 1913, is considered by most authors as a synonymy of *P. persicus* (Bostanchi *et al.*, 2006).

From the three recognized species, *P. urarachnoides* is currently known to inhabit in a very small distribution area in extreme west Iran, and it is listed as “Data Deficient” by the IUCN (Anderson & Papenfuss, 2009). The objective of this study is to give new ecological insights on this rare and specialized viper, in order to finally delineate conservation guidelines, actualize its IUCN status, and stimulate its full protection.

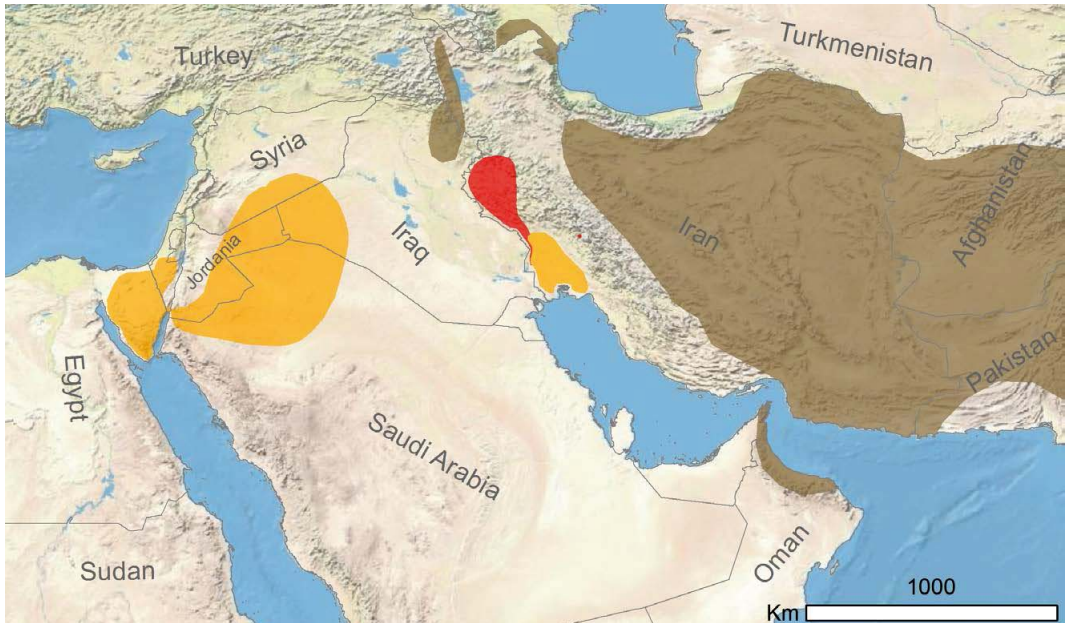


Figure 2: Tentative map with the distribution of the genus *Pseudocerastes* (based on IUCN distribution maps). Brown colour shows the possible distribution of *P. persicus*, orange colour shows the possible distribution of *P. fieldi*, red colour shows the rough known distribution of *P. urarachnoides* and the possible contact area between these three species.

Figura 2: Mapa aproximado de la distribución del género *Pseudocerastes* (basado en los mapas de distribución de la IUCN). El color marrón muestra la posible distribución de *P. persicus*, el color naranja muestra la posible distribución de *P. fieldi*, el color rojo muestra aproximadamente la distribución conocida de *P. urarachnoides* y la posible zona de contacto entre las tres especies del género.

Vipers of the genus *Pseudocerastes* are characterized by: a head distinct from the neck, covered with small scales; vertical eye pupils; nostril directed outwards and upwards, on a large undivided nasal shield (pierced between two small scales), a larger crescentic anterior and a smaller scale-like posterior (nasal aperture in a large circular or crescentic shield), the upper part of the aperture leading into the supranasal sac; supralabials with serrated lower margin and with inner groove to receive lower lip. This structure is a typical modification in desert species to avoid the ingress of sand in the mouth (see a similar morphology in *Eristicophis macmahoni* Alcock & Finn, 1897, previously described as *Pseudocerastes latirostris* Guibé 1957). Body scales are

arranged in 21 – 25 longitudinal rows, none obliquely disposed; keels on body scales do not reach posterior edge of scale but end in swollen knob before outer edge, keels are not serrated; ventrals are rounded, without lateral keels; tail is short and subcaudals are paired (Leviton *et al.*, 1992; Bostanchi *et al.*, 2006).

The genus *Pseudocerastes* occurs in Middle East. While *P. persicus* and *P. fieldi* have wide distributions (Ananjeva *et al.*, 2010; Fathinia & Rastegar-Pouyani, 2010; Uetz & Hosek, 2014), *P. urarachnoides* has been recorded only in a small area in western Iran (Figure 2). The political instability in Iraq and its border with Iran, together with low detection of these vipers hampered the precise knowledge on the distribution of this species. *Pseudocerastes persicus*

and *P. fieldi* have been recorded in or around the distribution area of *P. urarachnoides*, suggesting a possible sympatric area between two or three of these species (Ananjeva *et al.*, 2010; Fathinia & Rastegar-Pouyani, 2010; Gholamifard & Esmaili, 2010).

Differences between *P. persicus* and *P. fieldi* are very vague. According to Fathinia & Rastegar-Pouyani (2010), the most obvious external morphological difference between them are the dorso-lateral scale rows (all strongly keeled in *P. persicus*, whereas in *P. fieldi* several lateral rows are nearly smooth and the outer rows are entirely without keels) and the tail (*P. fieldi* has a significantly shorter tail; Figure 1). Unfortunately, studies exploring the genetic differences within this snake genus only included *P. fieldi* samples from Israel, location far off the contact area (Lenk *et al.*, 2001; Wuster *et al.*, 2008; Fathinia *et al.*, 2014). Thus, in order to clarify the distribution and relationships between these species (e.g. possible strict sympatry or habitat segregation), the status of this genus in the contact areas (Khuzestan, Ilam and Kermansah) needs a more comprehensive study, both morphological and genetically (mitochondrial and nuclear DNA analysis). Since phenomena of hybridization and genetic exchange occur occasionally, secondary contact zones between phylogenetically closely related species have received much attention during the last decades. Therefore, the study of these areas is important as a tool in understanding the processes of speciation that are responsible for the current biodiversity patterns (Martínez-Freiría, 2009).

Caudal luring. Vipers are usually slow animals and their main way to hunt is ambushing. This strategy can be a difficult way to survive in places with low density of preys.

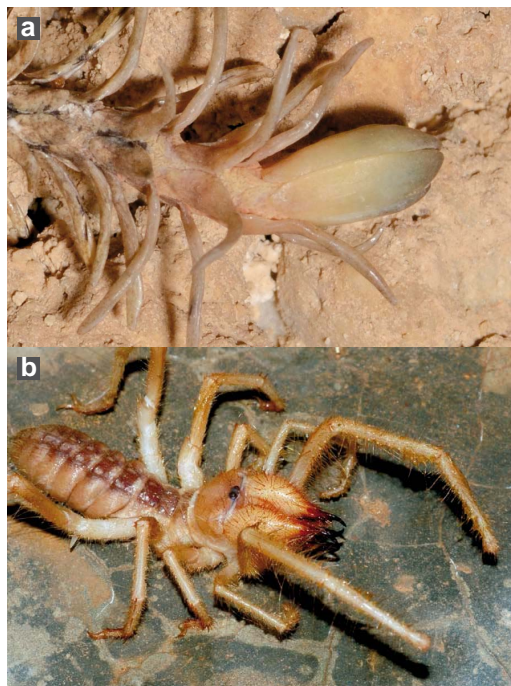


Figure 3: Comparison between the tail of *P. urarachnoides* (a) and a Solifugae spider (b). It is an example since this spider is nocturnal and the viper's bird-prey are diurnal.

Figura 3: Comparación entre la cola de *P. urarachnoides* (a) y un solífugo (b). Se trata de un ejemplo porque los solífugos son nocturnos y probablemente los pájaros-prea de las víboras no los conocen.

Vipers show behavioral adaptations to get -sometimes extremely- close to their prey. For example, burying most of the body in the sand like *Cerastes* sp. in most of their distributional ranges, ambushing around streams in extreme desert places like for example *Echis coloratus* in Ein Gedi (Israel) (Tsairi & Bouskila, 2004), climbing trees like *Macrovipera schweizeri* (Werner, 1935) in Milos (Greece) (Nilson *et al.*, 1999), or climbing to a rock fissure for ambushing geckos like *Echis omanensis* (authors, unpublished data). Moreover, some species of vipers have developed a striking strategy to attract preys to them, as for example the caudal luring. Although it is not only used by snakes, this hunting mechanism consists in moving a

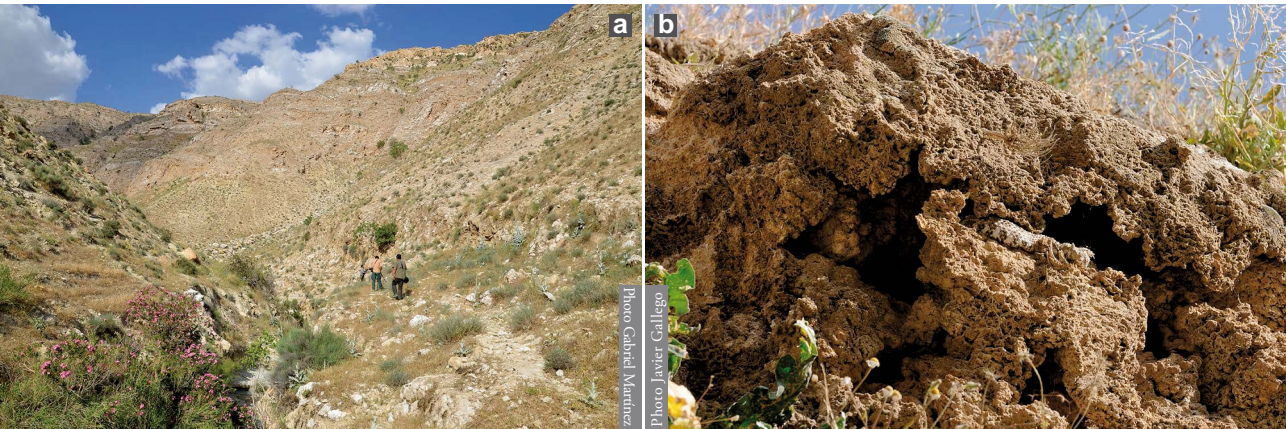


Figure 4: (a) Habitat of *P. urarachnoides*. (b) Microhabitat where a *P. urarachnoides* individual was found.
Figura 4: (a) Hábitat de *P. urarachnoides*. (b) Microhabitat donde se encontró un espécimen de *P. urarachnoides*.

(usually) colored tail resembling a vermiform invertebrate in the presence of a prey (Heatwole & Davison, 1976). Many viper species use this way to capture their prey. Conspicuously colored tails and luring behaviour are exhibited mostly by juveniles, and in most cases both are lost before sexual maturation (Heatwole & Davison, 1976; Neill, 1960). However, both *P. persicus* and *P. fieldi* adults show a tail with different coloration of the rest of the body (Figure 1c, 1f), so, it is very likely that both species make caudal luring to capture birds, their common prey (Ananjeva *et al.*, 2010; Bar & Haimovitch, 2012).

Pseudocerastes urarachnoides has developed a more complex tail ornamentation, more similar to a spider than a simple worm (Figure 3), that is used to attract the insectivore birds in habitats with many competitors.

Ecological insights of *Pseudocerastes urarachnoides*. During a fieldtrip in spring 2014, we visited the Ilam areas of Chakar, Bina and Bijar (Western Iran) following Fathinia *et al.* (2009). With the help of a local person (M.M.) native of Ilam, we visited a valley composed by a stream with few water, and vertical rocky slo-

pes mostly composed of rocks (gypsum), bushes and just few trees (Figure 4a), and we found two individuals of *P. urarachnoides*. The first viper was resting in a gypsum hole, more than 4 m above the ground, in an extreme vertical surface, maintaining a total cryptic effect brought about by its pattern, coloration and immobility with the spider-tail just close to the head. The hole was at some centimetres from a small tree. The snake was ambushing at 17:00h, approximately at 27°C and receiving directly the sunbeams, and maintained in the same position at 20.00 h (Figure 4b). Both behaviour and position in relation to the tree suggest the species was waiting for



Figure 4: Defensive position of a *P. urarachnoides* viper.
Figura 4: Posición defensiva de *P. urarachnoides*.

birds (confirming the hypothesis of Bostanchi *et al.* (2006) and Fathinia *et al.* (2009)). The second viper was found receiving the sunbeams and totally immobile in a vertical surface, 2.5 - 3 m above the ground, with some gypsum holes and close to a small tree. Once captured, the viper made a hissing sound and adopted the typical viper defensive position, ready to attack, raising head and neck from the ground and abruptly striking at its target without warning (behaviour already described by Fathinia *et al.* (2009)) (Figure 5). After taking some photos, the viper was released in the hole where it was captured.

According to M.M., during spring and autumn, *P. urarachnoides* expend most part of the sun hours ambushing close to the small trees, and in the hottest months they enter in the deepest parts of the holes to avoid the extreme hot weather (up to 50°C according to Fathinia *et al.* (2009)). This is suggesting that its diet is likely exclusively based on birds in the case of adults. Sexual activity is nocturnal, as well as probably displacements (M.M. personal observation). Although based on few field observations, the tail morphology, habitat use, and hunting behaviour suggest that *P. urarachnoides* is a very specialized predator, and consequently, vulnerable to several human-related threats.

Conservation remarks. Collection from the wild for the pet trade is known for both *P. persicus*

and *P. fieldi*, as well as for other ends, causing locally extinction of some populations (Ananjeva *et al.*, 2010; Amr *et al.*, 2012). The unique characteristics and the recently description of *P. urarachnoides* made this species as potentially threatened by future overcollection for the international pet trade (Anderson & Papenfuss, 2009). According to T. Mazuch, it is already possible to find this species in European terrariums. This factor, together with its small distribution range, makes prevention actions extremely necessary to avoid this snake becoming a critically endangered species in the next few years.

The most realistic preventives are to keep the records of this snake in secret (specially the valleys with the highest densities of this viper), make a strict law to protect this species against the collection, and include the areas where it occurs in Nature Reserves against any kind of hunting practice. Although the IUCN guidelines by Anderson & Papenfuss (2009) listed *P. urarachnoides* as Data Deficient, further investigations aimed at uncovering its life-history traits and actualizing its distribution are necessary to better protect this endangered species.

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Predation of an adult of *Agama impalearis* by *Falco tinnunculus* in eastern Morocco

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RESUMEN: Se presenta un caso de depredación de cernícalo común (*Falco tinnunculus*) sobre un adulto de agama común (*Agama impalearis*) en el este de Marruecos.

Despite being the most widespread reptile species (Bons & Geniez, 1996), omnipresent and probably the most abundant in Morocco, the natural history of *Agama impalearis* is still partially known. Several studies have shed light on its diet (Znari & El Mouden, 1997a, and references cited therein), reproduction (e.g., Znari & El Mouden, 1997b), ontogeny (El Mouden *et al.*, 1997) or demography (Znari *et al.*, 1998). The list of species which prey and feed on this saurian, given its

wide distribution, abundance, phenology and ecology, must be – presumably – rather long. Nevertheless, references in that regard are lacking or scarce. Pleguezuelos & Fahd (2004) mention *Hemorrhhois hippocrepsis* among ophidians which feed on this agamid. In Schleich *et al.* (1996) only ophidians are listed (*Hemorrhhois algirus*, *Malpolon monspessulanus*, *Psammophis schokari* and *Rhageris moilensis*) and two raptor species (*Buteo rufinus* and *Falco biarmicus*).