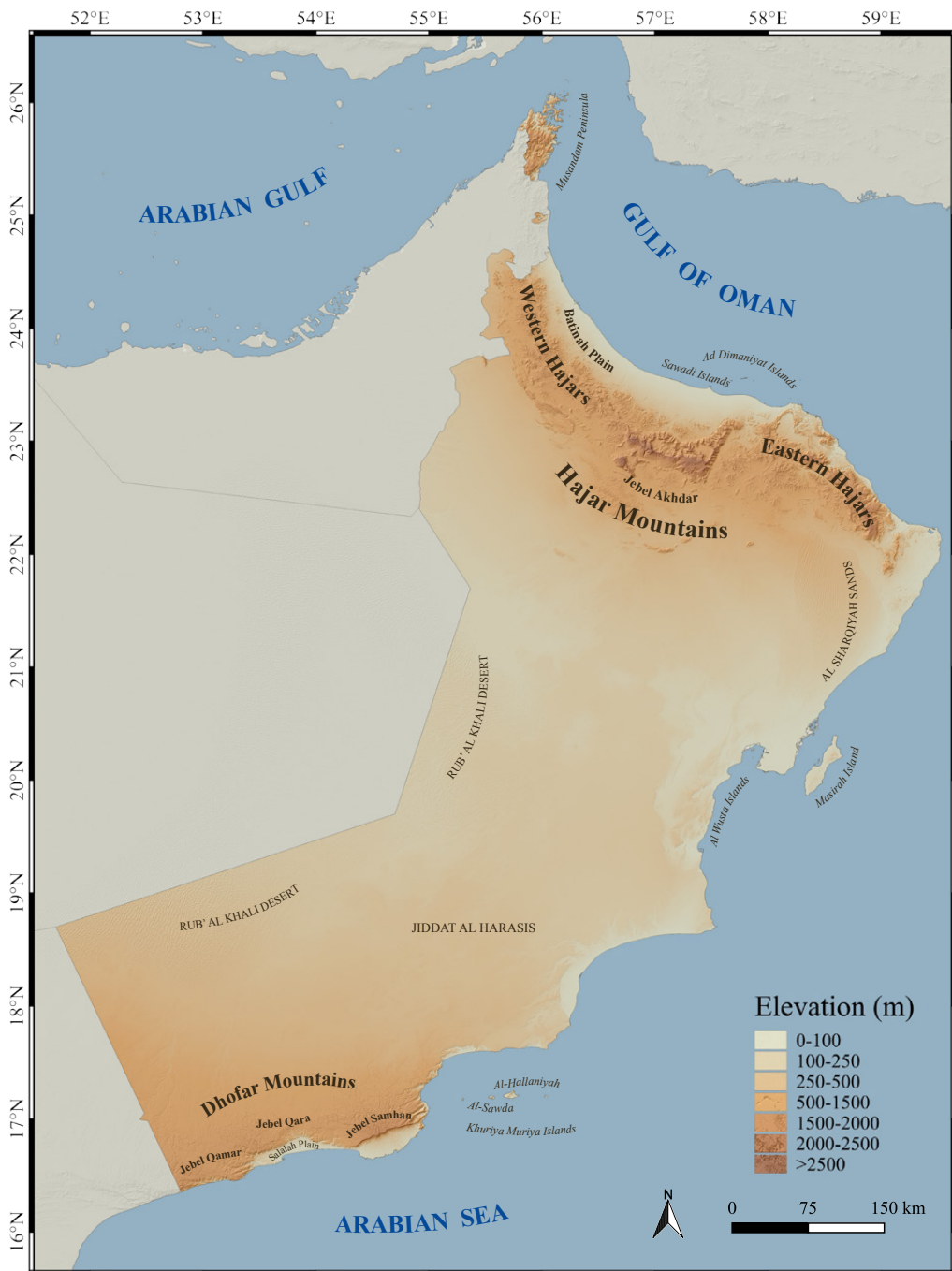


# A Field Guide to the Reptiles of Oman

Salvador Carranza  
Johannes Els  
Bernat Burriel-Carranza

Illustrated by Jhulyana López-Caro

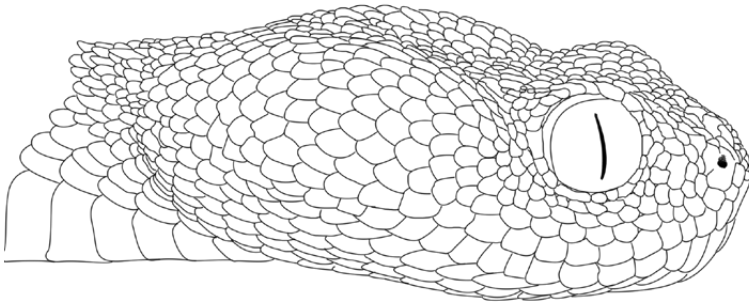






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# Preface

Reptiles are among the most important terrestrial vertebrates. They have inhabited our planet for more than 250 million years, and they are adapted to live in a wide variety of environments. There are more than 11,500 different species of reptiles around the world, divided into turtles, snakes, lizards, and crocodiles, characterized by their scaly outer cover. Despite their glorious past, they are not always well-appreciated by humans, especially when compared to mammals and birds, as they cause many deaths annually around the world.

The Sultanate of Oman is considered the third-largest in the Arabian Peninsula. With its vast landscapes and seascapes, hosts one of the richest biodiversity in the region. Its unique wildlife and vegetation at the north and central parts of the country share species with Iran and Pakistan, while those at the southern parts are of African affinities. The Sultanate of Oman has approximately 50% of the total number of reptile species in the Arabian Peninsula, ranking it as one of the countries with the highest reptile diversity in Arabia. Despite this high diversity, there are still many gaps in the knowledge of the life history, population size, and real distribution of Oman reptiles. In addition to that, climate change is expected to cause more heat stress, changing the natural habitats of many reptile species and making it very difficult to predict how they will be affected.

Therefore, the Environment Authority in Oman devotes great attention to the preservation of all species, including reptiles, through continuous studies and monitoring. The assessment of the conservation of

existing species plays an important role to understand biological diversity and ecological richness, playing a crucial role in the achievement of sustainable management goals.

The present book summarizes the current knowledge of the 111 species of Oman reptiles, including their unique habitat preferences, spatial distribution patterns, and contributes to the provision of a regional baseline dataset. The scientific knowledge summarized in this book ranks among the highest in Asia, with most of the groups having been thoroughly investigated using an integrative approach combining genetic, morphological, and ecological data.

I would like to take this opportunity to express my appreciation to Dr. Salvador Carranza and his research team, who have been working very closely with the Environmental Authority since 2005. Consequently, this fruitful collaboration has resulted in numerous scientific research publications and description of 17 new species of Oman reptiles, 11 of which endemic to the country.

Although there is no doubt that future research studies will reveal new reptile species, this work represents a very important step towards a better understanding of Oman reptiles. This book highlights the beauty and richness of biodiversity in Oman and expands the scope of Omani people towards concerns of environmental conservation on species and ecosystems.

**Dr. Abdullah bin Ali Al Amri**  
Chairman of the Environment Authority  
March 2021, Oman

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This work would not have been possible without the accumulated research and explorations carried out by herpetologist who worked before us, in particular E.N. Arnold, M. Gallagher, J. Gasperetti, and D. Gardner. Special thanks to E.N. Arnold for sharing with the first author his immense knowledge on Arabian reptiles. We are indebted to numerous people for their collaboration on this book by facilitating fieldwork, participating in expeditions, sharing data, providing photographs and information, doing laboratory and morphological work, analyzing data, and many other relevant tasks that are involved in any project like this.

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This book is built upon a collaborative work published in PlosOne in 2018 by 40 authors including 13 Omanis and 27 authors from 12 different countries and is the culmination of many years of research exploration. To all of them we owe a great debt of gratitude. Scientific research in Oman has been funded by grants CGL2015-70390-P (MINECO/FEDER, UE) Spain, PGC2018-098290-B-I00 (MCIU/AEI/FEDER, UE) Spain, and by project 22412027 from the Ministry of Environment and Climate Affairs, Oman to S. Carranza. B. Burriel-Carranza is supported by an FPU grant (FPU18/04742) (MCIU, Spain).

## How to use this book


This guide contains information for all 111 described species of Oman reptiles: 96 terrestrial reptiles and 15 marine reptiles. Although the main species accounts, species richness and conservation analyses are centred on the 96 terrestrial reptiles, the guide also includes relevant information about the 15 marine reptiles (10 sea snakes of the Family Elapidae and 5 marine turtles of the Order Testudines).

The introduction contextualizes Oman reptiles in the Tree of Life, tackles the importance of reptiles for ecosystem functioning, stresses the importance of studying and conserving reptiles, introduces Oman geography and climate, the patterns of reptile species richness in Oman, and their ecology and conservation.

The dichotomous key at the end of the introduction will allow readers to identify the main groups of reptiles: Iguania, Gekkota, Lacertoidea, Scincoidea, Anguimorpha, Serpentes and Testudines. Further information on these groups can be found at the beginning of the species' accounts of each group. For each group, there is a brief introduction, a dichotomous key that will allow identification up to the genus level and illustrations of relevant morphological characters mentioned in the key. For several particular groups that have suffered important taxonomic changes or that are difficult to identify, we have included keys up to the species level.

The guide includes a page for each one of the 111 Oman reptiles. Each page is composed of four main blocks: **A**: General and detailed illustration of the species using photographs; **B**: A descriptive text divided into three sections (Description, Distribution and Natural History); **C**: A distribution map showing the species' localities in Oman in a 10 arc-minutes grid, or in the case of marine species a map with the approximate distribution in the Arabian Gulf, Gulf of Oman and the Arabian Sea; **D**: A brief summary of the following main characteristics of the species: Type of activity (diurnal, nocturnal or crepuscular for terrestrial species); maximum recorded length (snout-vent length in lizards, total length in snakes, and carapace length in Testudines); if the species is endemic, native, introduced or invasive; the species' IUCN conservation category; the species' elevation range in Oman (only for terrestrial species); and, in the case of snakes, if they are medically important venomous snakes.

After the species accounts, we have included a list with the photographic credits. Additionally for clarity, a reduced version of all 111 distribution maps of Oman's reptiles are presented together in a special section at the end of the book, which allows quick reference to the species accounts. The book concludes with a glossary, and a list of selected references and suggested further reading.




**GROUP - FAMILY**

**Species name** Author, year

Species English Name

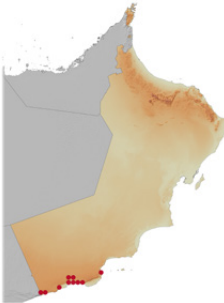
**A**



**B DESCRIPTION**

Species description and main characteristics.

**C**




**DISTRIBUTION**


Species global distribution with especial emphasis in Oman.

**NATURAL HISTORY**


Information about habitat preferences, diet, behavior, reproduction, and other key aspects of its natural history.

**MAIN CHARACTERISTICS**

 Diurnal

 Least Concern

**TL** 1,825 mm

 0 - 900 m

**NATIVE**














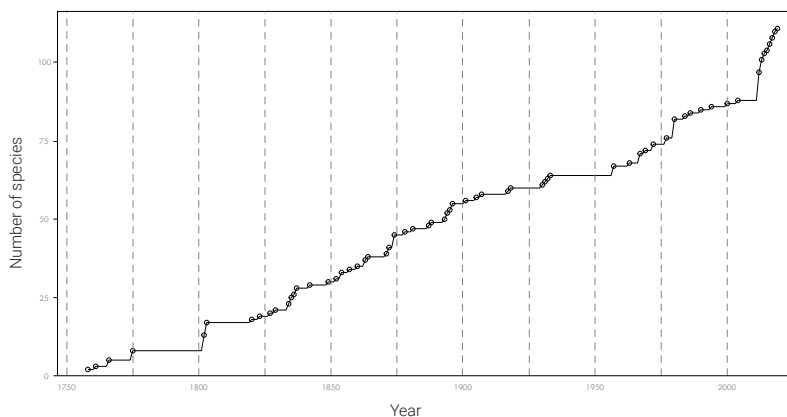
TABLE OF MAIN CHARACTERISTICS			
	Type of activity (diurnal, nocturnal or crepuscular)	CONSERVATION STATUS	
<b>SVL / TL / CL</b>	Maximum recorded length. Snout-vent Length for lizards (SVL), Total Length for snakes (TL), Carapace Length for marine turtles (CL)		Not Evaluated
<b>NATIVE</b>	Species occurs naturally in Oman		Data Deficient
<b>ENDEMIC</b>	Species occurrence restricted to Oman		Least Concern
<b>INTRODUCED</b>	Species occurs in Oman due to human introduction		Near Threatened
	Species' elevation range in Oman		Vulnerable
	Medically important venomous snake		Endangered
<b>WEIGHT</b>	Maximum weight recorded. Only for marine turtles		Critically Endangered

# Introduction

## About the book

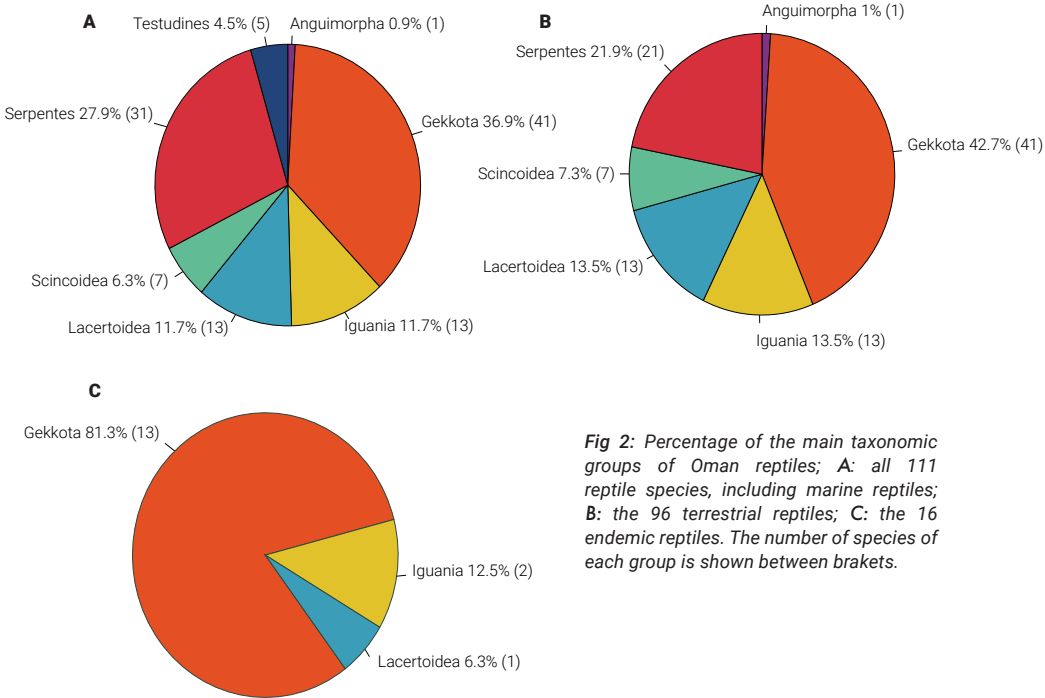
With 111 species of reptiles (96 terrestrial and 15 marine), Oman harbors approximately 50% of the total number of reptile species in the Arabian Peninsula, ranking as one of the countries with the highest reptile diversity. Due to an increased interest in the systematics of Oman's reptiles, the pace of species descriptions and taxonomic knowledge has increased exponentially within the last 10 years and shows no sign of reaching a plateau (Fig 1). Because of the recent interest in Oman's herpetology, the country's current level of taxonomic knowledge ranks among the highest in Asia. Most of the groups have been investigated using an integrative approach, including both morphological and molecular data, analyzed with multivariate, phylogenetic, population genetic, genomic, and geospatial methods. This approach has uncovered considerable levels of undescribed diversity, including several remarkable examples of cryptic diversity.

The main objective of this book is to provide an updated account on the systematics, diversity and distribution of Oman reptiles. This work is based on 16 years of intensive field and laboratory work by the authors, the work of many past and present collaborators (see acknowledgements), and all the previous knowledge compiled by several researchers in books, book chapters, scientific journals and other publications, some of which have been listed in the bibliographic section at the end of the book. Although the book includes accounts for all the 111 currently described species of Oman reptiles, the reptile diversity analyses by governorate and using a 10 arc-minute grid are presented for the 96 described species of Oman terrestrial reptiles. The 15 marine reptiles include 10 sea snakes and 5 marine turtles that visit the Oman territorial waters and the immediate sand beaches sporadically for breeding (marine turtles), or get stranded on the beach after storms or when they are weak, ill or disoriented (sea snakes).



**Fig 1:** Number of species displayed in a cumulative way. Dots represent the years with species descriptions. Dashed lines divide the graph into intervals of 25 years.





*Fig 2: Percentage of the main taxonomic groups of Oman reptiles; A: all 111 reptile species, including marine reptiles; B: the 96 terrestrial reptiles; C: the 16 endemic reptiles. The number of species of each group is shown between brackets.*

The 111 Oman reptiles are classified into seven main groups and the 96 terrestrial reptiles into six main groups. The number and proportion of species within each group for all the Oman reptiles, including endemic species, is shown in Fig 2.

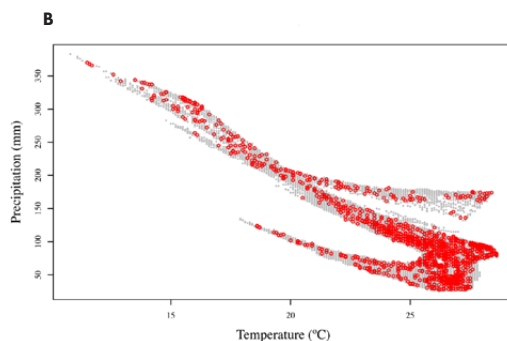
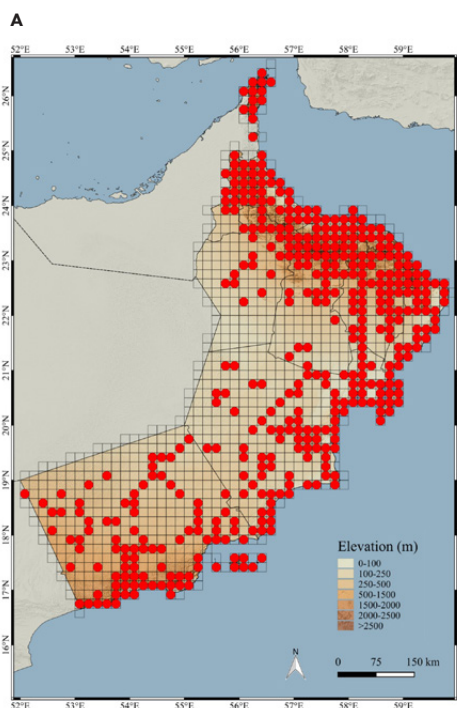
The dataset used for the analyses of species richness, endemism, conservation, ecology, and for the species accounts of all 96 terrestrial reptiles of Oman covered by the book includes 5,986 records. As can be seen in the spatial distribution of the samples using a grid of 10 arc-minutes of latitude and longitude covering the entire country, 429 (38.72%) out of 1,108 grids have information (Fig 3 on page 15). As a result of the origin of our data, it is impossible to differentiate between grids that have been visited without success (no observations) and grids that have not been visited (unsampled grids). In any case, reptiles

are a major component of the vertebrate fauna of Oman and in the records obtained by S.Carranza's research team there was not a single grid that had been visited without success (no observations). This suggests that most of the grids without presence data are the result of the lack of exploration rather than lack of reptile presence. The sampled grids cover the entire Hajar Mountains and adjoining areas (the coastal Batinah plain and the inland areas) and the Dhofar Mountains (including both the lush south-facing side and, to a lesser extent, the dry north-facing side of the mountains) (see Fig 3 on page 15 & Fig 4 on page 16). The eastern coastal area of the Arabian Sea is also well sampled. The less sampled areas are the Rub' Al Khali Desert in the western part of the country, in the border area with Saudi Arabia, and the barren desert areas of Jiddat Al Harasis.

The distribution of all 5,986 observations in the two-dimensional climatic space of Oman (Fig 3B) indicates that the samples are wide-spread across the whole climatic space defined by annual precipitation and mean annual temperature, with no important gaps. The maximum number of observations cluster around the area of the graph defined by high annual mean temperatures and low values of annual precipitation, which is also the most dominant climate in Oman. The area of Oman with lower mean annual temperatures (10–15 °C) and relatively higher values of precipitation (around 350 mm/year), include fewer observations but also have less area available and are, thus, proportionally well sampled.

As shown in Fig 5 on page 17, the observations are also well distributed across the climatic space defined by the Principal

Component Analysis of 12 climatic variables. However, when the area is divided into clusters grouping 10% of the explained climatic variance by PC1 and PC2 (see Fig 5A & B), not all 20 resulting clusters include observations. Some of the clusters, such as clusters 18 and 19, cover very large areas across the whole country (Fig 5C), including the Rub' Al Khali Desert, Jiddat Al Harasis and the Al Sharqiyah Sands. Other clusters are only present in northern or southern Oman (clusters 6 and 13, respectively) and some, such as clusters 15 and 16, are present in both areas of Oman. The highest number of clusters is found in the Hajar Mountains, with 15 clusters, including clusters 1 and 4, both with just 2.52 km<sup>2</sup>, the smallest of all 20 clusters. In the South, the highest number of clusters is found in the Dhofar Mountains and the Salalah Plain.



**Fig 3: A:** Map of Oman indicating the sampling effort. Grids of 10 arc-minutes (~18km) with observations (red dots). Empty grid cells are either due to no observation or no sampling; **B:** Two-dimensional climatic space of Oman (gray dots; 1x1 km) defined by total annual precipitation (BIO12) and mean annual temperature (BIO1). Red dots represent the distribution of the 5,986 observations in this climatic space. From Carranza et al. (2018) with updated number of records.

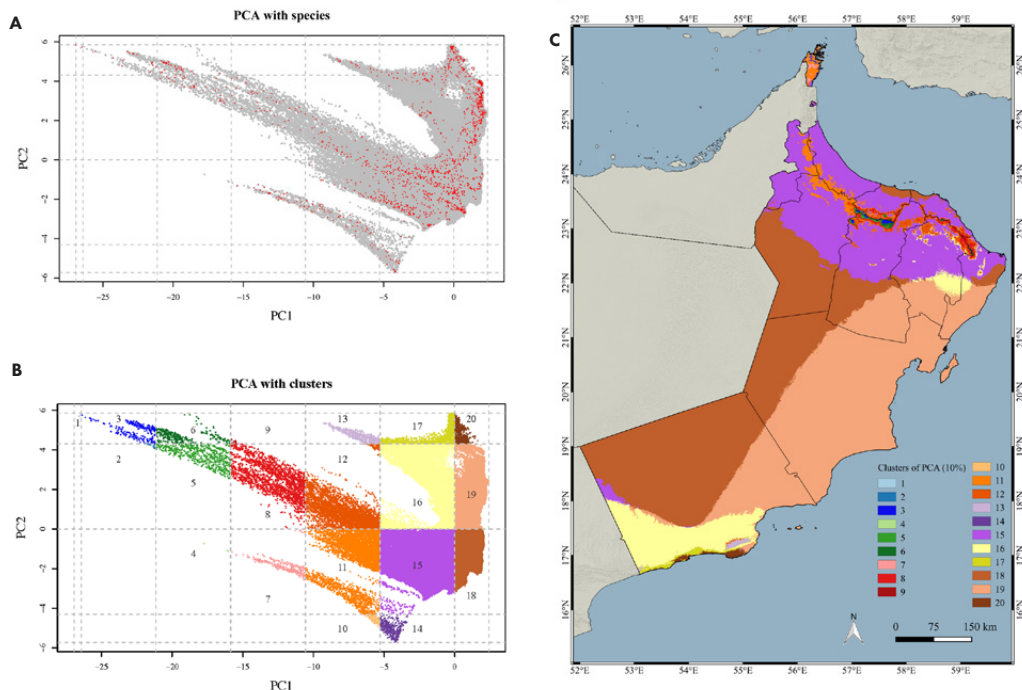


Fig 4: Physical map of Oman showing the topographical relief and names of the most relevant toponymies mentioned in the book.

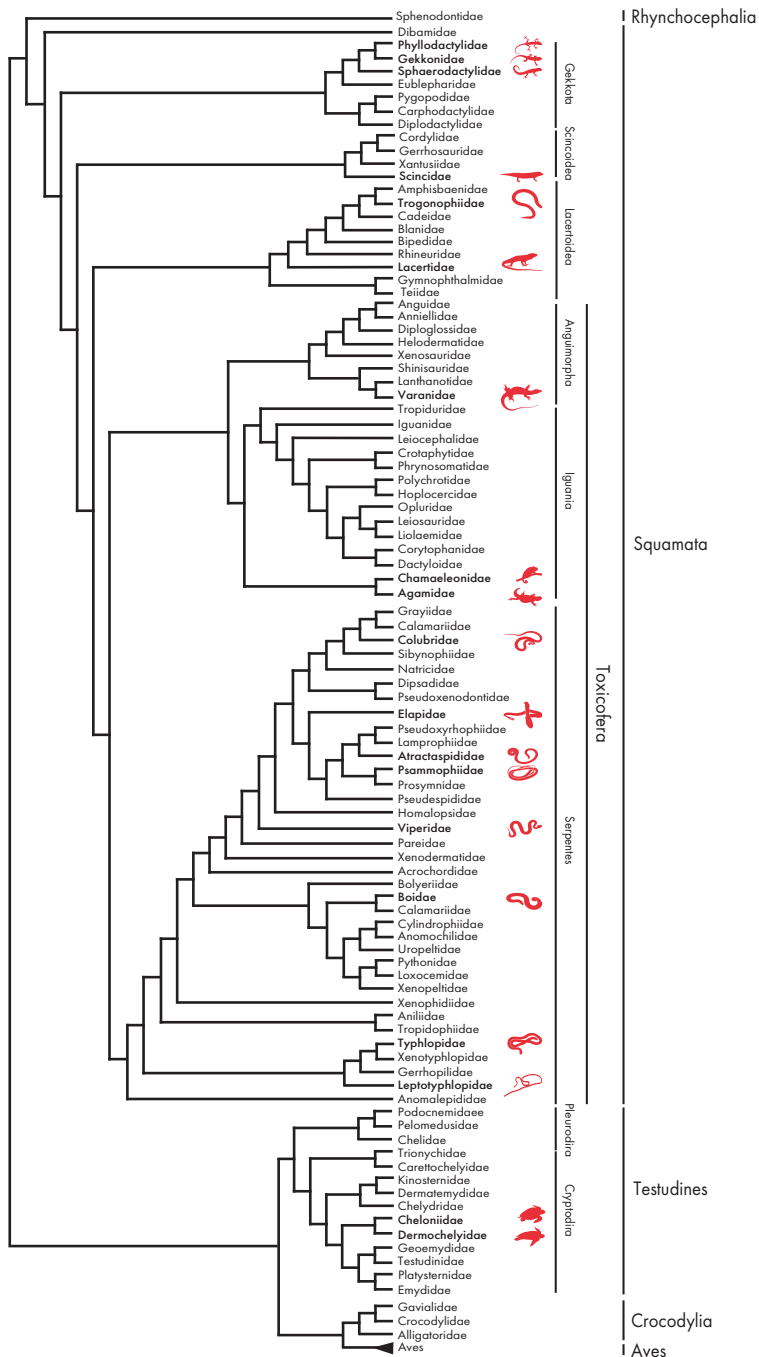
## Reptile diversity and systematics

With 11,570 species (August 2021), reptiles represent the world's most diverse group of terrestrial vertebrates and a major component of the global biodiversity, remarkable from an ecological and evolutionary point of view. Despite their relevance, their evolutionary relationships and their taxonomy have been very contentious and could not be clarified until genetic and, more recently, genomic data have been available. An updated taxo-

nomic hypothesis based on the most recent phylogenetic results is necessary for a correct interpretation of the biogeography, ecology, behavior, and evolution of reptiles and has also played an important role in the organization of the present book. These relationships are summarized in the phylogenetic tree presented in Fig 6 on page 18.



**Fig 5:** A: Principal Component Analysis (PCA) of the climatic space of Oman (gray dots) using 12 BIOCLIM variables. Dashed lines delimit the climatic clusters that group 10% of the explained variance by PC1 and PC2. Red dots represent the distribution of the 5,986 observations in the PCA of the climatic space; B: Principal Component Analysis (PCA) of the climatic space of Oman using 12 BIOCLIM variables showing the 20 climatic clusters that group 10% of the explained variance by PC1 and PC2 painted in different colors and numbered from 1 to 20 with the following order: from left to right and from bottom to top; C Map showing the geographic distribution and extension of the 20 climatic clusters of Oman that group 10% of the explained variance by PC1 and PC2. From Carranza et al. (2018) with updated number of records.



**Fig 6: 4Phylogenetic tree of Sauropsida showing the evolutionary relationships between the different families of Rhynchocephalia, Squamata, Testudines and Crocodilia. Notice that crocodiles (Crocodilia) are more closely related to birds (Aves) than to the rest of reptiles. All the different reptile families with representatives in Oman are indicated in bold and with red silhouettes.**

## Present-day reptiles consist of four major Orders:

1.- Turtles, belonging to the order Testudines, include approximately 361 species. They are one of the easiest groups of reptiles to recognize, because all of their representatives have a shell composed of two parts: the ventral plastron and the dorsal carapace, which protect the animal's trunk. There are turtles living on land (tortoises), in fresh water (freshwater turtles), and a few groups that have conquered the seas (marine turtles).



*Geochelone elegans*, Indian Star Tortoise.

2.- Crocodiles, alligators, and gharials, belonging to the order Crocodilia, include 26 species of aquatic predators, among which is the largest reptile on earth - *Crocodylus porosus*, the saltwater crocodile of southeast Asia and North Australia, which can reach over 6 meters and weigh over 1,200 kg. Crocodiles are oviparous, and their habits are generally crepuscular and nocturnal. Interestingly, they are more related to birds (Class Aves) than to other reptiles (see Fig 6), a relationship that makes reptiles a paraphyletic group. To solve this systematic problem, it has been suggested to abandon the term "reptiles" and use the more inclusive term Sauropsida (sauropsids) to refer to the monophyletic group formed by "reptiles" and birds. Like birds, Crocodilia have a heart divided into four chambers and their



*Crocodylus acutus*, American Crocodile.

cerebral cortex is more developed than that of other reptiles.

3.- Tuataras, with only one extant species belonging to the genus *Sphenodon*, are the only survivors of the order Rhynchocephalia. The order includes diverse families and a great number of genera and species, now extinct, that diversified during the Mesozoic Era. Because the tuataras have changed very little morphologically, they are considered living fossils, which makes them very interesting from an evolutionary point of view. Noteworthy, among the unique characteristics of tuataras are the presence of two or three teeth fused to the bone of the premaxilla, a double row of teeth in the upper mandible (maxillary and palatine teeth) and the absence of a copulatory organ in males.



*Sphenodon punctatus*, the Tuatara endemic to New Zealand.



4.- The order Squamata (squamates) is the most numerous group of reptiles, with 11,182 described species (August 2021). Their taxonomy has changed in recent years and the following groups are now recognized: Dibamidae (25 species), Gekkota (2,095 species), Scincoidea (1,870 species), Lacertoidea (1,029 species), Anguimorpha (239 species), Iguania (2,003 species), and Serpentes (snakes) (3,921 species) (see Fig 6). They are characterized by a diapsid-type skull in which some structures have been lost and others have been modified, converting the skull into a moveable structure with equally moveable joints that help them to capture and better manipulate prey. The skull modifications and especially the appearance of venom more than 100 million years ago in the ancestor of the clade Toxicofera (Fig 6), venom glands, and specialized structures to inject venom and subdue prey without fighting in some snake groups, are considered one of the major factors of their great diversification.

Squamates have lost limbs partially or completely in more than 25 occasions during their evolution, and have developed viviparous reproduction about 100 times independently. In summary, they present a high level of morphological and physiological plasticity that has allowed them to colonize very different habitats. They have a skin with epidermal keratinized scales that is replaced with time. All



*The pit viper Trimeresurus albolabris showing the left pit underneath the preocular scales, in the anterior part of the eye. It connects interiorly to the sensory organ that allows pit vipers to perceive infrared radiations.*

squamate groups present internal fertilization, and are the only group of reptiles in which the males have hemipenes (paired copulatory organs).

There are oviparous, ovoviviparous, viviparous, and parthenogenetic species. Sex-determining mechanisms in reptiles are broadly divided into two main categories: genotypic sex determination (GSD) and temperature-dependent sex determination (TSD). In temperature-dependent sex determination, it is the environmental temperature during a particular point of the embryonic development that determines whether an egg becomes a female or a male. This thermosensitive period occurs after the egg has been laid, so sex determination in these reptiles depend on the thermal conditions affecting the eggs. Moreover, new



*Naja arabica, Arabian Cobra hatching.*



*Naja arabica, Arabian Cobra shedding the skin.*

evidence indicates that both sex chromosomes and temperature can be involved in the sex determination of some reptile species.

The most successful group of squamates, the snakes, is the group of reptiles with more modifications to their general body plan. This group with 3,921 species is an example of adaptive radiation, having conquered nearly all environments. There are marine, freshwater, and terrestrial snakes and they are distributed through all continents with the only exception of Antarctica. All snakes have elongated bodies, absence of limbs, ear canal, outer ear (no eardrum but inner ear) and left lung (due to elongation). Jaws join at the anterior side by an extensible ligament and have a very flexible skull. Their eyelids are fused into a transparent membrane with little eye mobility. They have a forked (bifid) and extensible tongue that carries the captured scent molecules to the vomeronasal organ (Jacobson's organ) located on the roof of the mouth that acts as an organ of smell to complete the olfactory areas of the nose. Some vipers (pit vipers) have sensory organs to perceive infrared radiations from warm bodies, allowing them to locate prey even in the most absolute darkness. Pythons and boas also have infrared receptors on their lips but are thought to be of independent origin than those of vipers. All snakes, like all members of the Toxicofera clade, are thought to have toxins and many groups of snakes have developed teeth specialized in venom inoculation that cause more than a million envenomations and 100,000 deaths worldwide every year.

## The importance of reptiles for ecosystem functioning

Reptiles are major components of current biotas globally. They have successfully colonized all continents of the world (with the exception of Antarctica), including the continental and marine waters and thousands of islands. Reptiles have played a crucial role in the origin and subsequent radiations of amniote vertebrates, and in the function of past and modern day ecosystems. The role of reptiles as main ecological players in our planet started a long time ago, when reptiles acquired water-independent reproduction that resulted in their establishment as the first fully-terrestrial vertebrates, and triggered their diversification during the Mesozoic Era, between the Triassic (245 million years ago) and the end of the Cretaceous (65 million years ago), when reptiles ruled the earth for 150 million years. Within the reptile lineage appeared some of the most incredible animals that have ever lived on our planet, including many different dinosaur species, very large marine reptiles like the mosasaurs and plesiosaurs, and a radiation of flying reptiles, the pterosaurs, which included the largest animal that has ever flown, *Quetzalcoatlus northropi*, with a wing span of 10 m.



One of several specimens of the Jebel Akhdar endemic *Asaccus montanus* Mountain Leaf-toed Gecko found preying on insects on a hotel wall at night.

The 5<sup>th</sup> mass extinction (occurred approximately 65 million years ago) brought the reign of the dinosaurs to a sudden end and also triggered the extinction of all flying reptiles and the large marine reptiles. This catastrophic event, opened a window of opportunity for several groups of small vertebrates. Thanks to the extinction of most large reptiles, mammals (constituted by small, nocturnal species at that time), birds, and small reptiles, had the opportunity to radiate and diversify.

As a result of radiations occurring over hundreds of millions of years, reptiles have accumulated a vast diversity of morphological, behavioral, ecological, life history, and defensive strategies to cope with the selective pressures that they have encountered. Since the last mass extinction, reptiles have consolidated as the most successful lineage among terrestrial vertebrates in terms of species richness, morphological and ecological diversity. Indeed, with 11,570 species, reptiles represent the world's most diverse group of terrestrial vertebrates and include some of the most remarkable examples of vertebrate evolutionary radiations. Particularly notorious cases are the hyper diverse iguanian genus *Anolis*, with



Representative of a highly diverse genera, *Hemidactylus alkiyumii*, Al-Kiyumi's Gecko, Dhofar, Oman.

436 species known from tropical America, the geckos of the genus *Cyrtodactylus*, with 314 species distributed across Southeast Asia, or the geckos of the genus *Hemidactylus*, with 173 species widely distributed across the world, including 14 species in Oman.

Apart from the high number of species, some reptile species also have large populations and therefore play an even more vital role in ecosystems functioning. For instance, the most abundant terrestrial vertebrate in the Hajar Mountains is a very small gecko of the genus *Pristurus* (*P. rupestris*), which preys on



Representative of a highly diverse genus, *Anolis porcatus*, Cuban Green Anole, Cuba.

ants and other small insects that can harm crops, and therefore it is a natural source of pest control. Some snakes can also live close to human settlements, preying on rats and mice, keeping their populations in check. At the same time, reptiles fall prey to a large number of other vertebrates, including birds and small mammals, being a very important food source for them.

Some species of geckos of the genus *Hemidactylus* and other genera live in or around human habitations and are usually seen at night by lights preying on insects, therefore acting as a natural source of pest control and even as a control of vector-borne diseases transmitted by some mosquito species. Other terrestrial groups also consume other insects like grasshoppers that, depending on their abundance, can pose a serious threat to cultivated areas.

Apart from the important role of reptiles in the food web of ecosystems as both predators and prey, there are other less studied and less known roles of reptiles that have a pivotal role for ecosystem functioning, at least in some particular environments where reptiles are one of the major components (or the only component) of the terrestrial vertebrate faunas, as for instance in remote archipelagos. Under these circumstances, reptiles can play a crucial role as both pollinators and seed dispersers for endemic plants. For instance, it has been recently discovered that an endemic gecko, *Hemidactylus dracaenacolus* from Socotra Island, acts as a pollinator of the Dragon's Blood Tree (*Dracaena cinnabari*), a unique tree endemic to the Socotra Archipelago, highly valuable from a natural and economic point of view. Another well-studied example includes the lacertid lizard radiation of the genus *Gallotia* endemic to the Canary Islands, Spain.



The Socotran endemic species *Hemidactylus dracaenacolus*, Dragon Blood Tree's Gecko, on the tree trunk of the endemic Socotran tree *Dracaena cinnabari*, Dragon's Blood Tree.

These large lizards eat plant material on a regular basis, consuming seeds. It has been shown that seeds of some Canary Islands' endemic plants that passed through the guts of lizards had a better chance of germinating, and did so faster, than plants that were not consumed by lizards. One of the main characteristics of islands is that they show low species richness, sometimes being devoid of any terrestrial mammals and with very few bats and birds. That means there are few species that could potentially take the place of lizards. If plants lose a pollinator or a disperser, they probably do not have another species to fall back on.





*Pristurus rupestris*, Rock Semaphore Gecko, one of the most abundant terrestrial vertebrates of the Hajar Mountains. They can be very useful as pest control and, at the same time, they are an important source of food for other animals.

*The snake Echis carinatus sochureki*, Sindh Saw-scaled Viper, eating a mouse in a garden. It can help to keep rodent populations in check.







*Stenodactylus doriae*, Dune Sand Gecko, preying on a grasshopper. These insects sometimes cause important damages to cultivated areas.

*The snake Spalerosophis diadema cliffordii*, Clifford's Diadem Snake, eating a Brown Rat (*Rattus norvegicus*) in a farm. This snake species is usually found close to cultivated areas and helps to control rodent populations.







*Uromastix aegyptia microlepis*, *Small-scaled Spiny-tailed Lizard*. An Arabian reptile species adapted to live in extremely arid conditions, central Oman.

Like islands, extremely arid areas or sand dune deserts show low levels of species richness, not only of terrestrial mammals but also of birds and bats. Under these extreme conditions that constitute a large part of the Arabian Peninsula, reptiles thrive. They have been able to adapt and diversify, pushing to the limits their physiology and modifying their behavior to cope with these extreme conditions. Therefore, reptiles have become the main vertebrate component of the world's arid ecosystems in terms of both species numbers and individuals. Some of these reptiles (the Spiny-

tailed Lizards of the genus *Uromastix*; pictured above) are also plant eaters and therefore their role as seed dispersers remains to be studied.

### Importance of conserving reptile diversity

Reptiles play an important role in natural ecosystems, as predators, prey, grazers, seed dispersers, commensal species, and as natural pest control. This role is even more accentuated in arid environments and islands, with overall low levels of species richness but high levels of reptile diversity.



*Phrynocephalus sakoi*, *Sako's Toad-headed Agama*, is an endemic species of the Sharqiyah Sands, Oman, adapted to live in extremely arid conditions.

Apart from the obvious affectation to the ecosystem, conserving reptile diversity can also have important benefits for our medical health. Modern science gives us the ability to investigate the chemistry of compounds in search of more powerful pharmaceutical drugs, and even build them from scratch, but nature continues to be a huge source of drug discovery. In fact, the World Wildlife Fund says that of all small molecule drugs introduced in the last 25 years, at least 70% were derived from natural sources. For instance,

a hormone in the saliva of the Gila Monster (*Heloderma suspectum*), a venomous lizard from southwestern USA and northwestern Mexico, produces insulin to keep the animal's blood glucose levels in check. A synthetic version of this hormone called exenatide is now used to treat type 2 diabetes in humans. The Gila Monster, meanwhile, is classified as Near Threatened as a result of climate change and habitat loss resulting from development in southwestern USA.

Other pharmaceutical drugs have been developed from snake venoms. Venoms are not composed of single toxins but cocktails of complex chemical mixtures of pharmacologically active components including proteins, peptides, and enzymes with specific biological activities, as well as some non-protein compounds such as carbohydrates, lipids, metal ions and other unidentified substances. Despite their medical interest, less than 0.01% of these toxins have been identified and characterized. For instance, Captopril® (Enalapril), Integrilin® (Eptifibatide), and Aggrastat® (Tirofiban) are drugs used to treat cardiovascular diseases based on snake venoms. Many more compounds beneficial for humans are awaiting to be discovered, reinforcing the necessity of preserving reptile diversity, and especially venomous snakes.

A key factor in conservation are endemic species. Endemic species are species that do not live anywhere else in the world and therefore their protection and global survival falls completely in the hands of the country where they are found. If the country fails to protect them, they can go extinct, meaning that we would lose a branch in the tree of life (see Fig 6 on page 18). Depending on the depth of the branch, we could loose from a few thousand to millions of years of evolutionary change and, with it, many unique adaptations to the particular ecological and environmental conditions. This would consequently affect the ecosystem and the food web, with the added danger of losing compounds of medical relevance.

Reptiles have the highest level of endemism of all Oman vertebrates. As a result of its geographical position in southeastern Arabia, surrounded by sea to the North, East and South, and especially its varied climatic conditions and the presence of very high mountain ranges, Oman presents high levels of reptile diversity and especially endemism. Out of the total of 111 species of reptiles, 16 are endemic. This represents a proportion of 14.4% of species that do not live anywhere else in the world and therefore their conservation falls completely in the hands of Oman.



*Heloderma suspectum*, Gila Monster.



*Crotalus atrox*, Western Diamondback Rattle Snake.

The high level of endemism found in reptiles contrasts with other terrestrial vertebrate groups. In birds, there are about 494 species, but none of them are endemic to Oman, and there are about 60 species of terrestrial mammals of which there is only one endemic species. This highlights the relevant role of reptiles as surrogates for conservation studies in Oman and other arid countries. They can play a very important role in defining priority conservation areas and to evaluate the coverage of the current network of protected areas. As a result of that, more resources should be devoted to study the Oman reptile fauna, especially the 16 endemic species in order to know more about their population structure, biology, ecology and threats.

Reptiles are of paramount importance for the health of the environment. However, their small home ranges, high levels of endemism, thermoregulatory constraints, and morphological specialization, mean that they are especially sensitive to some of the alterations that humans make to their habitats. However, some reptile species are very resilient and can adapt well and even thrive in man-modified environments and man-made structures, such as tunnels and buildings. A study of the threats and conservation status of all the Data Deficient and Not Evaluated species of Oman reptiles (see page 45) would be very important in order to plan the appropriate conservation actions and to tackle any threats, especially threats that might affect the endemic species.

## Oman geography and climate

Oman borders with the UAE to the North and northwest, with Saudi Arabia to the West and with Yemen to the southwest (Fig 7 on page 29). The country is divided into 11 governorates, Musandam being the smallest, with just 1,805 km<sup>2</sup>, and Dhofar the largest, with 104,498 km<sup>2</sup> and covering nearly 33% of the country.

The population in the country is mainly concentrated in the capital, Muscat, and surrounding areas, making Muscat the most populated governorate, with approximately 1,421,409 inhabitants in 2019. The country does not have a large network of tarmac roads and motorways but there is an extensive and excellent network of off-road trails that communicates villages, sometimes across desert areas, and connects oil refineries from the interior of the country with the main harbor in the Al Wusta Governorate. Some of these roads have been used to survey the biodiversity of remote and previously inaccessible areas, sometimes resulting in unexpected discoveries.

About 60% of the approximately 330,000 km<sup>2</sup> of Oman consist of flat arid areas below 250 m (Fig 4). These vast areas are mostly barren, vegetated by small areas of widely spaced low perennial shrubs, interspersed between much broader areas of bare sand, gravel and rocks. The mean annual temperatures are high (28 °C) and annual precipitation is very low (<150 mm).

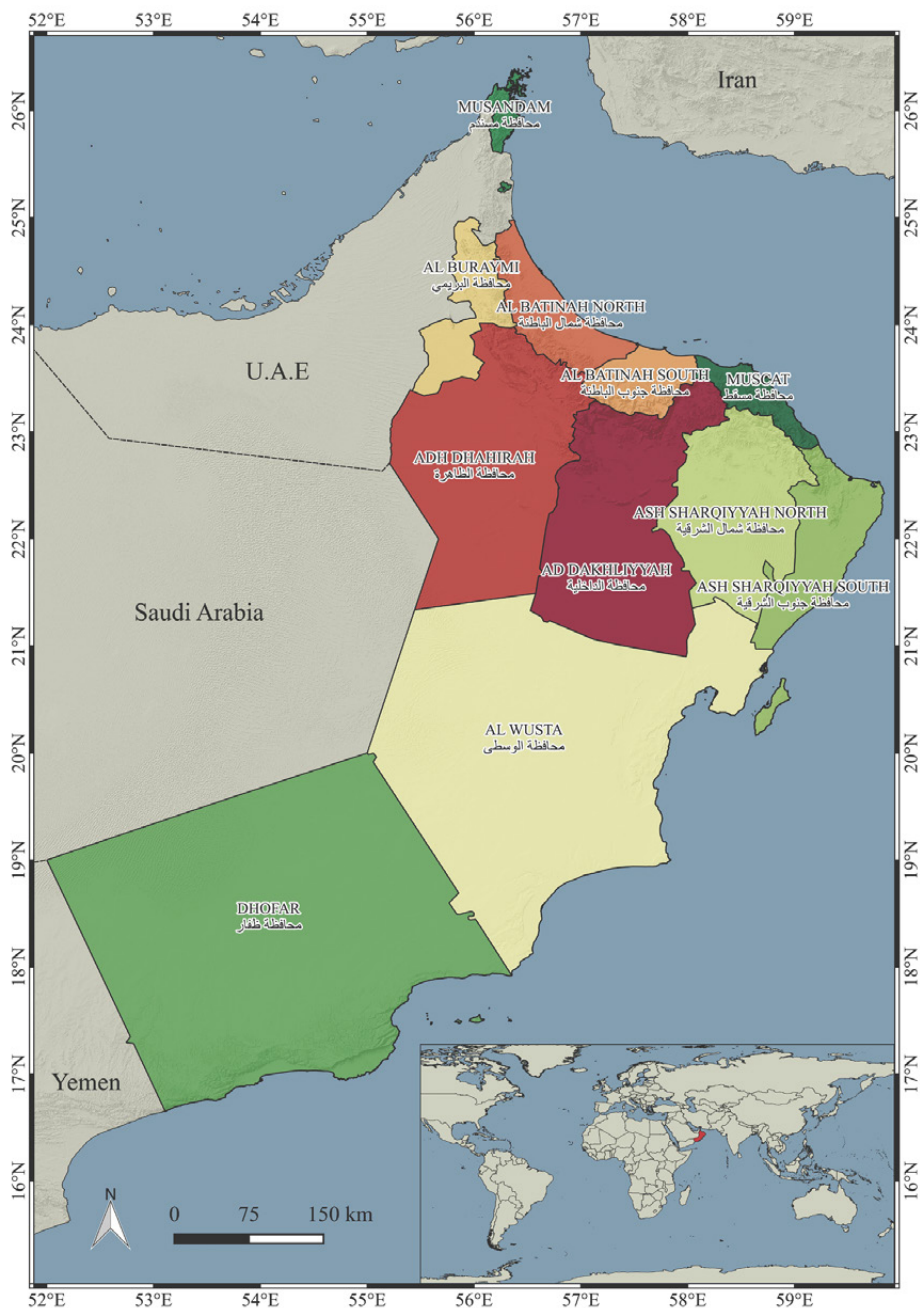


Fig 7: Political map of Oman showing the limits of the 11 governorates.





*Rub' Al Khali Desert, western Oman,  
autumn 2013 expedition.*

## **Sand Dune Deserts**

The hot arid environment of Arabia, with evaporation exceeding rainfall by more than one hundred times, has triggered the origin of several types of deserts. The great sand dune deserts of Arabia are amongst the largest in the world. In Oman there are two sand dune deserts that are very important from a biodiversity point of view:

The Rub' Al Khali (Empty Quarter) is the world's largest continuous sand desert, with sand dunes extending for hundreds of Km and up to 250 m in elevation, covering an area of over 640,000 Km<sup>2</sup>. It is mainly distributed across southern Saudi Arabia and southern UAE. In Oman, the Rub' Al Khali desert occupies a relatively small area in the western side of the country, right next to the western border with Saudi Arabia and the UAE (Fig 4). Despite its extreme aridity, there are several species of sand desert adapted reptiles such as *Scincus mitranus*, *Eryx jayakari*, *Phrynocephalus*

*arabicus*, several species of *Acanthodactylus*, *Trigonodactylus arabicus*, and *Stenodactylus doriae*, among other taxa that thrive in this extreme and hostile environment.



*Rub' Al Khali Desert, western Oman,  
autumn 2013 expedition.*



Northern edge of the Sharqiyah Sands, Oman,  
autumn 2010 expedition.

The Sharqiyah Sands is a relatively small aeolian sand dune desert situated in the extreme northeast of the country, between the Hajar Mountains and the Arabian Sea (Fig 4). It extends across an area of approximately 12,500 km<sup>2</sup>. The eastern side of the desert lies very close to the coast and therefore this side of the desert receives important amounts of fog that have a positive impact into its biodiversity. The sands are arranged in a mega-ridge sand system on a North-South line believed to have been formed by the monsoons. The largest dunes in the northern part of the desert can reach up to 100 m in elevation. This desert was the subject of a thorough exploration organized by the Royal Geographic Society between 1985 and 1987 and the published reports indicated the existence of a rich reptile fauna. More recent surveys and analyses have resulted in the description of two endemic reptiles to the Sharqiyah Sands (*Phrynocephalus sakoi* and *Trigonodactylus sharqiyahensis*).

Although sand dunes occupy 27% of the Arabian Peninsula and a large part of Oman, vast areas are occupied by gravel plains. One of the largest is the Jiddat Al Harasis.



Northern edge of the Sharqiyah Sands, Oman,  
autumn 2013 expedition.



Gravel plain in the Jiddat Al Harasis, Oman,  
autumn 2016 expedition.

## Gravel Plains and Sabkha

The Jiddat Al Harasis is a limestone plateau ranging between 100 and 150 m in elevation, covering a very large area of approximately 27,000 km<sup>2</sup>. It is situated between the Arabian Sea in the East and the Rub' Al Khali in the West (Fig 4). It is an extremely arid, flat area with very low levels of rainfall. Like the Sharqiyah Sands, the fog plays a very important role in the areas close to the Arabian Sea coast, supporting some vegetated areas with trees. Despite its extreme aridity, it is inhabited by several reptile species, including some endemic species such as *Hemidactylus inexpectatus* endemic to Al Wusta Governorate and *Uromastix thomasi*.

Sabkhas (salt flats) are another important habitat type in Oman and are one of the harshest environments on the planet. They are hypersaline areas of sand or slit often containing layers of gypsum or anhydrite. Crusts of halite and gypsum may be present in some parts.

Sabkhas can occur by the sea or far inland. Despite being an inhospitable habitat, some reptiles have been able to adapt to these conditions and one of them, *Pseudoceramodactylus khobarensis*, has become a specialist and is mainly found in this harsh environment.



Sandy plain near the coast, Jiddat Al Harasis, Oman,  
autumn 2013 expedition.





*Sabkha in the Rub' Al Khali Desert, western Oman, autumn 2013 expedition.*

*Sabkha in the Rub' Al Khali Desert, western Oman, autumn 2013 expedition.*







Area of white sands in southeastern Masirah Island, Oman, autumn 2010 expedition.

## Islands

Islands represent outstanding examples of biodiversity, endemism and species extinctions. Island species are often unique, yet are highly vulnerable to novel disturbances, such as invasive species. As the risk of extinction is highest on islands, it is very important to know their diversity in order to monitor and conserve it. One of the most important islands of Oman is Masirah Island.

**Masirah Island** is the largest island in Oman (approx. 700 km<sup>2</sup>). It is situated in the Arabian Sea, approximately 15 km off the east coast of Barr Al Hikman and has relatively large hills of ophiolitic origin, especially on its eastern side. It is the Oman island with the highest number of reptile species, 21, which represent 21.8% of Oman's terrestrial reptiles. Only two reptile species, *Hemidactylus masirahensis* and *Pristurus masirahensis*, are island endemics and both of them are endemic to Masirah Island. Other islands like Al-Hallaniyah or Al-Sawda, the first and second largest islands of the

**Khuriya Muriya Islands**, off the coast of southeastern Oman, are much smaller (less than 60 km<sup>2</sup> each), and have a remarkable diversity of reptiles, although there are no endemics. The **Ad Dimaniyat Islands**, off the Batinah Plain coast of North Oman, are a group of 9 small islands (1 km<sup>2</sup> of total area) with rather low levels of reptile diversity, although they include a population of the rare skink *Heremites septemtaeniatus*.



Rocky area in southern Masirah Island, Oman, autumn 2010 expedition.



*Al-Hallaniyah Island, Oman, autumn 2013 expedition.*

*Ad Dimaniyat Islands, Oman, spring 2013 expedition.*







*Wadi As Sarin Nature Reserve, Eastern Hajars, Oman, autumn 2014 expedition.*

## **Mountains**

If aeolian deserts, gravel flat plains, sabkhas and islands harbor moderate levels of reptile diversity in arid areas, mountains represent hotspots of biodiversity. Mountains offer essential vertical environmental gradients for life over short areas otherwise only seen over several thousands of kilometers of horizontal distance. A steep diverse topography provides opportunities for species diversification, leading to high levels of biodiversity and endemism. Mountains are at the same time centers of speciation and refugia of diversity and, given the wide spectrum of environmental conditions that they cover, they are key to conservation, containing half of the currently defined biodiversity hotspots in the world. In Oman, there are two mountain ranges with high levels of reptile diversity and endemism. The Hajar Mountains in the North of the country and the Dhofar Mountains in the South.

The Hajar Mountains are the highest in eastern Arabia, forming a spectacular isolat-

ed wall of mountains that rises dramatically from the ocean below. The Hajars run northwest to southeast in a 650 km continuous arc paralleling the Oman and UAE coast of the Gulf of Oman and are surrounded by the sea to the East and by a very large desert to the West. Cut by deep canyons, these arid mountains have a complex topography and can be divided into three distinct areas or blocks, the Western Hajars, the Jebel Akhdar massif, and the Eastern Hajars; separated by some topographical discontinuities (Fig 4). With a maximum elevation of 3,009 m, Jebel Shams in the Jebel Akhdar massif is the highest peak in the Hajar Mountains, although high mountains also occur in the Western (2,087 m at Jebel Harim) and Eastern (2,200 m at Jebel Khadar) Hajars. The Hajar Mountains are the only area in eastern Arabia with habitats above 2,000 m in elevation and with an annual mean temperature of 13 °C at the highest peaks. Despite the altitude, annual rainfall is low (between 250–300 mm), evapotranspiration is high, and the almost treeless, barren nature of the ter-



*Jebel Shams and Wadi Gul canyon, Jebel Akhdar massif, Oman, summer 2017 expedition.*

rain has made some scientists to consider the Hajars a mountain desert. However, recently published analyses using a Principal Component Analysis (PCA) of the climatic space of Oman using 12 environmental variables, indicate that the Hajar Mountains are one of the most climatically variable areas in Oman .

The Hajar Mountains have a complex geological history and have long been known to have more structural and petrological features in common with the Zagros Mountains of southwestern Iran than with neighboring parts of Arabia. They originated around 200 million years ago, with orogeny taking place during the Oligocene and Miocene, triggered due to the tectonic motions that resulted in the opening of the Red Sea and the Gulf of Aden. The final uplift probably occurred approximately 4–6 Mya. Owing to its old geological origin, high elevations, very deep canyons, geographic isolation from other mountains, and relative diversity of ecological niches, high levels of species richness and endemism are recorded

in varied animal and plant groups, including an endemic genus and species of mountain goat (*Arabitragus jayakari*). The Hajar Mountains contrasts sharply with the Dhofar Mountains of southern Oman.



*Wadi Shab, Eastern Hajars, Oman, autumn 2008 expedition.*





*Tawi Attair sink hole, south-facing side of the Dhofar Mountains, Oman, summer 2017 expedition.*

The Dhofar Mountains are bound to the North by the Rub' Al Khali (also known as the Empty Quarter), the largest desert in Arabia, to the South by the Arabian Sea, and are separated from the rest of Oman in the northeast by the gravel desert plain of Jiddat Al Harasis (Fig 4). The summit of the mountain range is a relatively wide (10–25 km) flat plateau that runs for about 150 km, mostly between 700 and 900 m in elevation, from Jebel Qamar in the West, through Jebel Qara in the central part, to Jebel Samhan, an independent massif that can be considered an eastern extension of the Dhofar Mountains. The highest point is over 2,000 m in elevation in Jebel Samhan, where temperatures reach the lowest values in southern Oman. The Dhofar Mountains lie within the monsoon belt, and most rain falls in July and August, during the summer monsoon season. This results in the unique green vegetation on the south-facing (sea) side of the mountain range, where the clouds form a variable belt along the coast from Jebel Qamar to Jebel Samhan that press against the mountain ridges causing frequent fog and light rain that does not surpass 200

mm per year. Clouds only occasionally spill over the top of Jebel Qamar but on the much lower Jebel Qara they ride up to the summit. However, the northern slopes across the whole mountain range are in a rain shadow. As a result, the north-facing (inland) side of the Dhofar Mountains is much drier and less vegetated than the lush south-facing side. These climatic differences have played an important role in shaping the flora and fauna of this interesting biodiversity rich region.



*Wadi Ayun, northern side of the Dhofar Mountains, Oman, autumn 2005 expedition.*

## Patterns of terrestrial reptile species richness in Oman

The 96 species of terrestrial reptiles, including endemic species, are not equally distributed across the whole territory of Oman. If we analyze species richness by governorate, Dhofar has the highest diversity, with 60 species, and is followed by Ash Sharqiyyah South with 48. The remaining governorates have 42 or less species, being Musandam (21), Al Buraymi (29) and Al Batinah North (27) the governorates with the lowest number of species (Fig 8A). When the species richness is analyzed using the 10 arc-minutes grid, the highest number of species appear in the high elevation parts of the Hajar Mountains (Jebel Akhdar), the coastal area and wadis around the capital (Muscat), and in the Dhofar Mountains and the Salalah Plain in the South (Fig 8B).

In total, 16 species are endemic to Oman. The governorate with the highest endemism is Ash Sharqiyyah South, in the extreme northeast part of the country, which has 8 out of the 16 endemic Oman reptiles (50%). It is followed very closely by Ad Dakhliyyah and Al Wusta, with 5 endemic species (31.2%) (Fig 9A on page 40; Table 1 on page 41). However, when the endemism richness is analyzed at a finer scale (10 arc-minutes grid), the areas with the highest values are found in the Hajar Mountains in northern Oman and, more specifically, in the Jebel Akhdar massif, that contains as many as 5 endemic species in some grids. Other grids with relatively high levels of endemism richness are found in the northeast of the country, including Masirah Island. Endemism is not very high in Dhofar, with the highest values of grid endemism being two grids situated in the south-facing sea side of the Dhofar Mountains, and one grid in the north-facing land side of the mountains (Fig 9B on page 40).

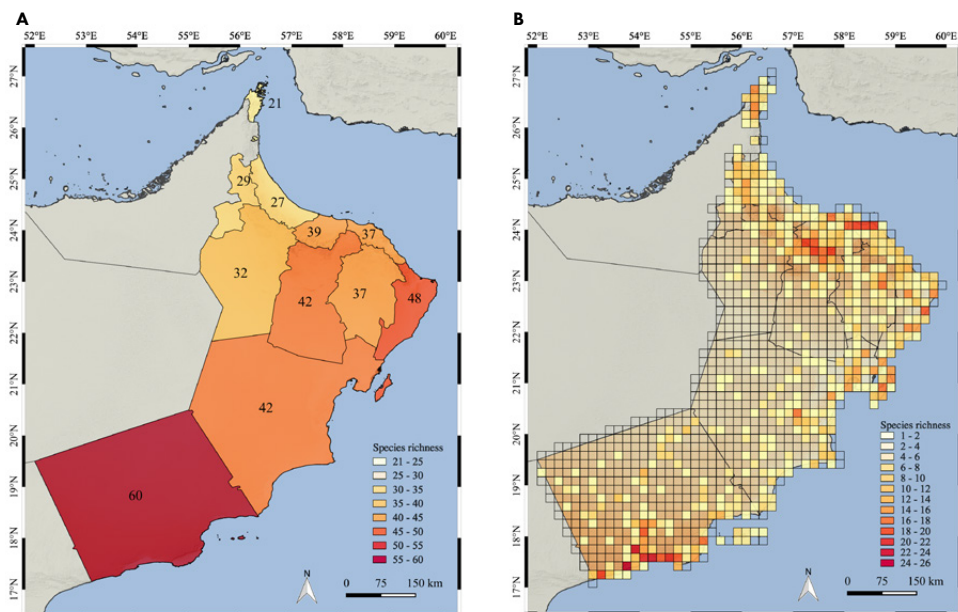


Fig 8: Maps of species richness of the 96 Oman terrestrial reptiles. A: Species richness by governorate; B: Species richness by grids of 10 arc-minutes of latitude and longitude.

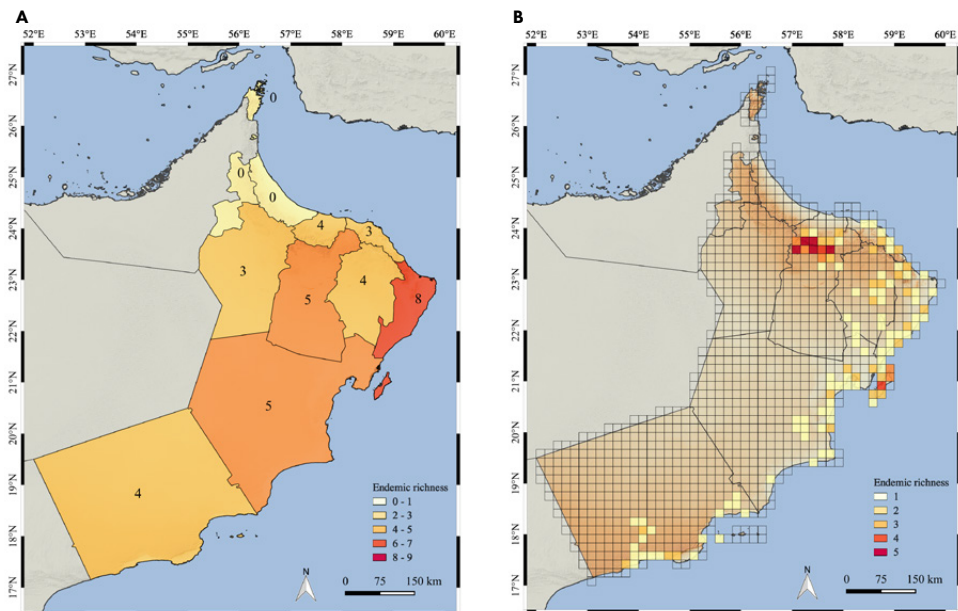


Fig 9: Maps of endemic species richness. A: Endemic species richness by governorate; B: Endemic species richness by grids of 10 arc-minutes of latitude and longitude.

Most of the grids with the highest values of species richness are situated in the Hajar and the Dhofar Mountains. Two very contrasting areas within the same country that highlight the incredible diversity of landscapes in Oman, with very arid mountains in the North and lush tropical mountains in the South.

The Hajar Mountains of Oman and the UAE are one of the most biodiversity rich regions in Arabia and have 19 described endemic species of reptiles and several other species in the process of being described. Of all the species endemic to the Hajar Mountains, six are endemic to Oman (are not found in the UAE).

The highest levels of species richness within the Omani part of the Hajar Mountains concentrate in the Jebel Akhdar massif. Interestingly, some areas of high species

richness are around the capital, Muscat, and most probably result from the combination of two factors: 1) it is a diverse and ecologically rich area, including well preserved beaches, plains, wadis, mountains and wetlands, and 2) as a result of its proximity to the capital, it has been surveyed very thoroughly or many records were assigned generically to Muscat. In the South, the highest diversity is concentrated in the Dhofar Mountains, where the climatic differences between the lush south-facing sea side and the dry north-facing land side of the mountains have played an important role in shaping the flora and fauna of this interesting biodiversity rich region.

The pattern of endemic species richness in Oman changes dramatically and is mainly concentrated in the Jebel Akhdar massif (Fig 9B), with some areas with relatively high endemic species richness in the Eastern

Hajars and especially in Masirah Island. Interestingly, Dhofar has very low levels of endemism. This pattern does not match with the map of species richness, where it's much higher in Dhofar than in the north (compare Figs 8B and 9B). This can be explained by the fact that some species in the Omani side of the Dhofar Mountains extend their range to the Yemeni side of the mountain range, and other species have disjoint distributions in Dhofar and the Western Mountains of Yemen and Saudi Arabia (similar to the situation in the Hajar Mountains, where many species also occur in the UAE side and are therefore not considered endemic to Oman; Fig 9 on

page 40). All these species found in the Dhofar Mountains of Oman that also occur elsewhere in Yemen and Saudi Arabia (and are therefore not endemic) include:

*Acanthocercus adramitanus*, *Chamaeleo arabicus*, *Pseudotrapelus dhofarensis*, *Uromastix benti*, *Hemidactylus alkiyumii*, *H. festivus*, *H. lemurus*, *H. minutus*, *Ptyodactylus dhofarensis*, *Trachydactylus spatulatus*, *Tropicolotes scortecii*, *Acanthodactylus felicitis*, *Mesalina austroarabica*, *M. ayunensis*, *Atractaspis andersonii*, *Bitis arietans*, *Echis coloratus*, *E. khosatzkii*, *Naja arabica*, *Platycephalus thomasi*, and *Rhynchocalamus arabicus*.

**Table 1:** Endemic species by governorate. From left to right ordered from higher to lower diversity. The three governorates without endemic species (Musandam, Al Buraymi, and Al Batinah North) are not represented in the table.

SPECIES	Ash Sharqiyah South	Al Wusta	Adh Dhahirah	Dhofar	Al Batinah South	Ash Sharqiyah North	Ad Dakhliyyah	Muscat
<i>Acanthodactylus masirae</i>	✓	✓		✓				
<i>Asaccus arnoldi</i>	✓					✓		✓
<i>Asaccus montanus</i>			✓				✓	
<i>Asaccus platyrhynchus</i>			✓		✓			
<i>Hemidactylus endophis</i>								✓
<i>Hemidactylus hajarensis</i>	✓		✓		✓	✓		✓
<i>Hemidactylus inexpectatus</i>		✓						
<i>Hemidactylus luqueorum</i>			✓		✓		✓	
<i>Hemidactylus masirahensis</i>	✓							
<i>Hemidactylus paucituberculatus</i>				✓				
<i>Phrynocephalus sakoi</i>	✓	✓				✓		
<i>Pristurus gallagheri</i>			✓		✓		✓	
<i>Pristurus masirahensis</i>	✓							
<i>Tropicolotes confusus</i>				✓				
<i>Trigonodactylus sharqiyahensis</i>	✓	✓				✓		
<i>Uromastix thomasi</i>	✓	✓		✓				



The Dhofar and the Western Mountains of Yemen and Saudi Arabia are partially or totally affected by the moisture-laden southwestern monsoon winds that blow against the sea-facing cliffs between July and August. These are responsible for the unique green vegetation on the coastal side of the mountain ranges, creating an ecosystem similar to a tropical forest with a patchy distribution across more than 2,000 km that has facilitated the dispersal of tropical taxa.

### Ecology of Oman reptiles

The Oman reptiles include some generalist and specialist species. For instance, the skink *Trachylepis tessellata* is distributed across the Hajar and Dhofar Mountains in the North and South of the country, respectively, and in Masirah Island. The species is found from sea level up to 1,900 m in elevation, and covers most of the bioclimatic area defined by the mean annual temperature and annual precipitation. It is the only lizard species with such generalist ecological preferences. Of the 21 species of terrestrial snakes, three show a similar generalist pattern: *Psammophis schokari*,

*Telescopus dhara*, and *Platyceps rhodorachis*, the latter having the greatest elevational range (from sea level up to 2,600 m) and a distribution across the entire climatic space of Oman. The remaining species of reptiles are more restricted in elevation, climatic space, and land cover preferences and are linked to specific areas, such as coastal deserts, inland deserts, arid mountains (high and low elevation), tropical mountains, islands, and coastal plains, among others.

Within Iguania, there are the families Agamidae and Chamaeleonidae. Within Agamidae, the genus *Phrynocephalus* is restricted to the arid areas of Oman with high temperatures and low precipitation and has never been found above 400 m in elevation. The genus *Pseudotrapelus* has two morphologically very similar species with very different bioclimatic and elevation preferences. *Pseudotrapelus dhofarensis* is found in the Dhofar Mountains and some arid areas to the North, mainly at low elevation, while *P. jensvindumi* is mainly restricted to the Hajar Mountains of North Oman, with many



*Trapelus flavimaculatus*, Yellow-spotted Agama.



*Cerastes gasperettii gasperettii*, Arabian Horned Viper burying itself in the desert sand to ambush passing by prey.

records at high elevation. Nevertheless, both species seem to have similar preferences for the land cover type (bare areas with gravel and rocks). The two subspecies *Uromastix aegyptia lepteni* and *U. a. microlepis* also have completely different ecological preferences in Oman, the latter inhabiting the Hajar Mountains between sea level up to 1,000 m in elevation with preference for bare areas with gravel and rocks, and the former inhabiting mainly lowland (up to 500 m in elevation) hot and dry desert areas of the interior, with preference for bare areas with gravel and rocks or sand. The only Chamaeleonidae in Oman, *Chamaeleo arabicus*, is mainly distributed across the monsoon affected areas of Dhofar up to 1,400 m, but it has an introduced population in Masirah Island. This population is within a private fenced area dedicated to water purification with high trees and bushes. The population seems stable.

With 41 species, Gekkota are the most diverse terrestrial reptile group in Oman and include the genera *Hemidactylus* (14 species); *Pristurus* (seven species); *Asaccus*

(six species); *Ptyodactylus* (three species); *Stenodactylus* (two species); *Trigonodactylus* (two species); *Trachydactylus* (two species) and *Tropicolotes* (two species). At the generic level, *Hemidactylus*, *Pristurus*, and *Trachydactylus* independently cover most of the climatic space of Oman, but at the specific level many ecological specializations are found, such as *Pristurus gallagheri* or *P. minimus*, restricted to high elevation areas of the Hajar Mountains and to the lowland hot and dry desert areas, respectively. The genus *Asaccus* is only found in the rocky and arid Hajar Mountains of North Oman and the genus *Tropicolotes* is restricted to the tropical Dhofar Mountains and some arid areas of southern Oman. As a result, both genera show very different ecological preferences. The genus *Stenodactylus* is restricted to low elevation (usually below 800 m in elevation) in hot and dry desert areas, with preference for bare areas with gravel and rocks or sand. The three species of the genus *Ptyodactylus* inhabit mountainous areas in both the North (Hajar Mountains) and the South (Dhofar Mountains). The two species from the North



The introduced gecko *Cyrtopodion scabrum*, Rough Bent-toed Gecko.

(*P. orlovi* and *P. ruusaljibalicus*) and the southern species (*P. dhofarensis*) occupy a very similar habitat, but a rather different climatic space.

The 13 species of Lacertoidea include two families and four different genera: Family Trogonophidae, genus *Diplometopon* (one species), and the Family Lacertidae with *Acanthodactylus* (seven species), *Mesalina* (three species), and *Omanosaura* (two species). *Acanthodactylus* and *Mesalina* are mainly restricted to elevations usually below 1,000 m in hot and dry desert areas, while the two species of *Omanosaura* are restricted to the Hajar Mountains, with some populations reaching up to 2,800 m in elevation in environments with relatively high precipitation and low temperature. *Diplometopon* is a sand-dweller, restricted to low elevation areas in sand dune deserts.

The Scincoidea inhabit the entire ecological space of Oman and, with the exception of the generalist *Trachylepis tessellata* (see above), the other species are restricted to particular areas with different ecological preferences.

*Varanus griseus* is the largest Oman terrestrial lizard (more than 1.2 m including the tail) and exploits a very particular habitat characterized by low elevation (up to 600 m), hot and dry bare and rocky areas with sparse vegetation.

The 21 species of terrestrial snakes compose the most ecologically heterogeneous group. Three of them are generalists (see above); others such as *Cerastes gasperettii* only dwell at elevations below 500 m, in hot and dry sandy areas, and others such as *Pseudocerastes persicus* are only found in the highest parts of the Hajar Mountains (between 500 and 2,500 m in elevation), under relatively cold and humid conditions, and associated with rocky environments.

Finally, of the 96 species of terrestrial reptiles, five have been introduced into Oman. Three originally from India: the Agamidae *Calotes versicolor*, and the Gekkonidae *Hemidactylus flaviviridis* and *H. leschenaultii*. The Gekkonidae *Cyrtopodion scabrum* and the Typhlopidae (snake) *Indotyphlops braminus* are of unknown origin. The introduced snake

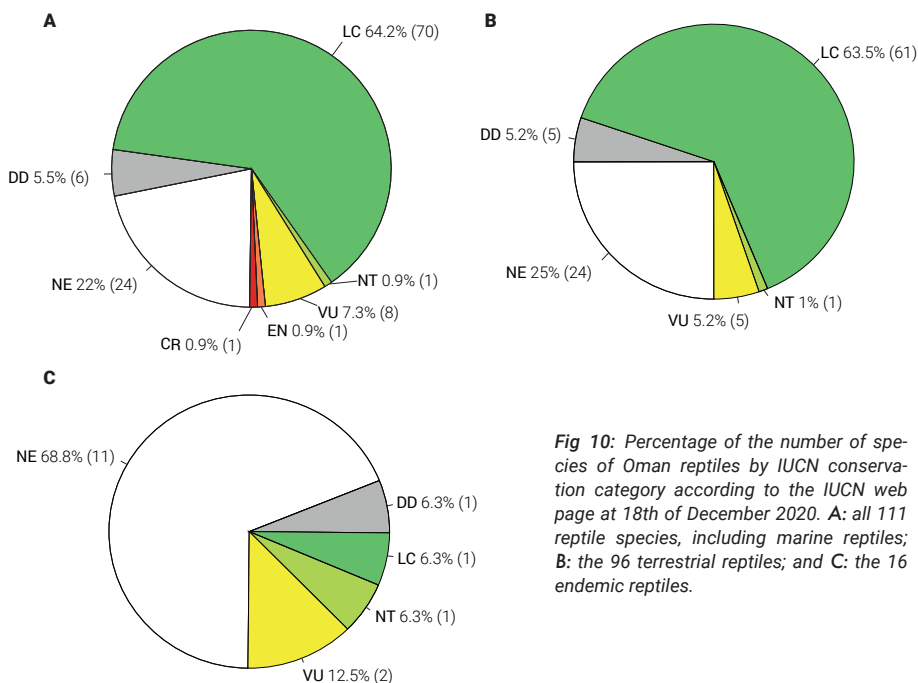


is the most widespread snake species in the world and is parthenogenetic. It is now present in at least 118 countries, in all continents except Antarctica and South America, and in more than 543 islands. It gets transported in the soil of commercial plants all over the world.

### Conservation status of Oman reptiles

The IUCN Red List categories of all 111 Oman reptiles (terrestrial and marine) include species under the following categories (Fig 10): NE (Not Evaluated), DD (Data Deficient), LC (Least Concern), NT (Near Threatened), VU (Vulnerable), EN (Endangered), and CR (Critically Endangered). There are no EW (Extinct in the Wild) or EX (Extinct) species. Therefore, in Oman, the only threatened taxa are eight VU species (the terrestrial reptiles *Uromastix aegyptia leptieni*, *Uromastix*

*aegyptia microlepis*, *Uromastix thomasi*, *Asaccus montanus*, and *Acanthodactylus felcis*, and the marine turtles *Caretta caretta*, *Lepidochelys olivacea*, and *Dermochelys coriacea*), one EN species (the marine turtle *Chelonia mydas*), and one CR (the marine turtle *Eretmochelys imbricata*). The remaining taxa include six DD, 70 LC, one NT (*Pristurus gallagheri*) and 24 NE species. Importantly, 11 endemic species are classified as NE and one endemic species as DD, one LC, one NT, and two VU. Therefore, 12 species out of the 16 (75%) Oman endemics do not have an IUCN category. As a result of the small distribution of most of the endemic NE and DD species, some of them will be assessed in the future as threatened species through the B criteria (geographic range) in the red listing process.



**Fig 10:** Percentage of the number of species of Oman reptiles by IUCN conservation category according to the IUCN web page at 18th of December 2020. **A:** all 111 reptile species, including marine reptiles; **B:** the 96 terrestrial reptiles; and **C:** the 16 endemic reptiles.

Medically important  
venomous snakes of Oman

As shown in the species accounts of both terrestrial and marine snakes, there are 19 medically important venomous snakes in Oman. In other words, snakes that have enough venom that can cause serious medical complications and require immediate medical attention in the unlikely event of being bitten by one of them. Of these 19 species, 10 are sea snakes of the family Elapidae and nine are terrestrial snakes of the Families Elapidae, Atractaspididae, and Viperidae.

Sea snakes

The 10 Sea Snakes that can be found in Omani waters are fully aquatic, which means that they do not need to leave the sea to breed (they are viviparous), drink (they drink from the falling rain), mate (they mate in the water), or eat (they eat fish). In principle, if they are found on the beach it is because they are stranded and will die if not returned to

the sea quickly. They usually get stranded on the beach (sometimes in high numbers) after storms or when they are weak, ill, disoriented, or as a result of changes in water temperature, especially between seasons: April to June and September to November.

This can cause concerns, as sometimes there are several specimens stranded on the beach. Despite all 10 sea snakes that can be found in Omani waters are highly venomous and there is no antivenom available for them, they have never caused a single reported case of envenomation. Globally, sea snake bites are extremely rare with no recorded bites in decades, with the exception of intentional handling by snake catchers. That is because they are very shy and docile, preferring to swim away from humans and other creatures. If they are in the water, they will almost never bite unless you grab them and handle them with bare hands. When they are stranded on the beach they are vulnerable and more likely to bite, so it is very important not to handle them with bare hands.

Table 2: List of medically important venomous snakes of Oman separated by families.  
TS = Terrestrial snakes; SS = Sea snakes.

Family Elapidae	Family Atractaspididae	Family Viperidae
<i>Naja arabica</i> (TS)	<i>Atractaspis andersonii</i> (TS)	<i>Bitis arietans</i> (TS)
<i>Hydrophis cantoris</i> (SS)		<i>Cerastes g. gasperettii</i> (TS)
<i>Hydrophis curtus</i> (SS)		<i>Echis carinatus sochureki</i> (TS)
<i>Hydrophis cyanocinctus</i> (SS)		<i>Echis coloratus</i> (TS)
<i>Hydrophis gracilis</i> (SS)		<i>Echis khosatzkii</i> (TS)
<i>Hydrophis lapemoides</i> (SS)		<i>Echis omanensis</i> (TS)
<i>Hydrophis ornatus</i> (SS)		<i>Pseudocerastes persicus</i> (TS)
<i>Hydrophis platurus</i> (SS)		
<i>Hydrophis schistosus</i> (SS)		
<i>Hydrophis spiralis</i> (SS)		
<i>Hydrophis viperinus</i> (SS)		

## What to do if Sea Snakes are found stranded on the beach

Like in the picture, sea snakes can be removed from the beach using a large bucket and a stick. They hardly move and are very easy to handle. Trash pickers also work very well. Once you have placed the snake in the bucket, it can be safely returned to the sea or transported to a marine rescue center for treatment.



Example on how to manipulate a sea snake, *Hydrophis platurus*, Yellow-bellied Sea Snake, stranded on the beach.

## Terrestrial Snakes

As a result of their relevance from a human health and conservation point of view, the species richness of the nine species of terrestrial venomous snakes of Oman is shown for each governorate and each sampled grid of 10 arc-minutes (Fig 11). At the governorate level, Dhofar has the highest number of venomous species (six species), followed by Al Wusta (four species). With just one species,

*Echis omanensis*, Al Buraymi is the governorate with the lowest number of venomous snakes (Fig 11A). The analyses at a finer scale (10 arc-minutes grid) reveal that species richness is also highest in Dhofar; more specifically in some areas of the eastern Dhofar Mountains (Fig 11B).

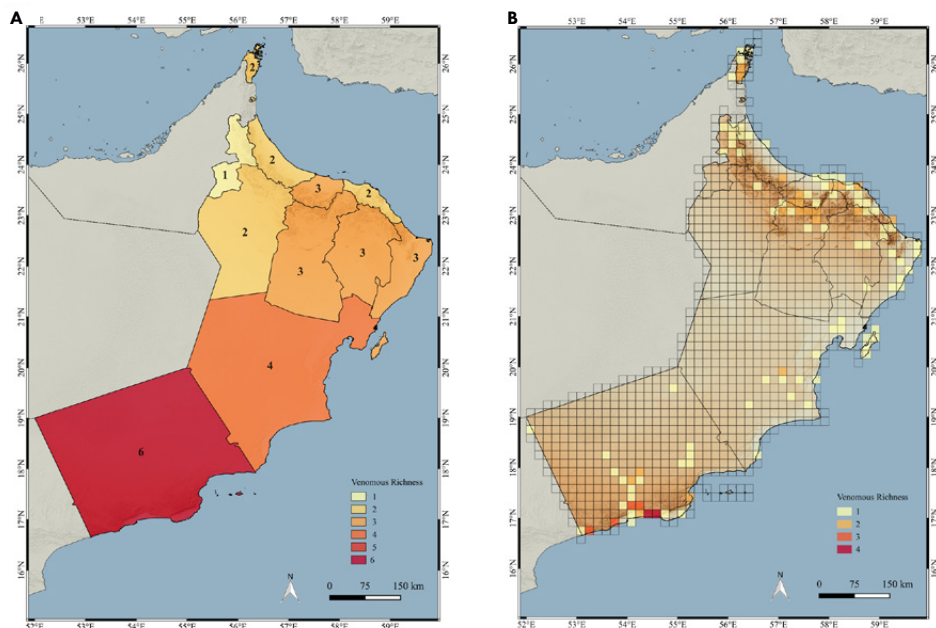


Fig 11: Maps of medically important venomous snake species richness. A: Venomous snake species richness by governorate; B: Venomous snake species richness by grids of 10 arc-minutes of latitude and longitude.



*Defensive behavior of Bitis arietans, Puff adder, Dhalkut, Oman.*

Of the nine terrestrial venomous snakes, *Naja arabica*, *Atractaspis andersonii*, and *Bitis arietans* are only found in Dhofar. *Echis coloratus* and *E. khosatzkii* are found in Dhofar and Al Wusta. *Cerastes gasperettii gasperettii* and *E. carinatus sochureki* have wider distributions. Finally, *E. omanensis* and *Pseudocerastes persicus* are restricted to the Hajar Mountains and immediate surrounding areas.

The venoms of these nine species have different effects. Although terrestrial venomous snakes are more aggressive than sea snakes, they will always try to escape and will warn before striking. It is recommended not to approach them or handle them, especially when they are in defensive (warning) mode. Among venomous snakes, different groups express various defensive behaviors to deter potential threats:



*Defensive behavior of Cerastes gasperettii gasperettii, Arabian Horned Viper, Sharqiyah Sands Oman.*





Defensive behavior of *Naja arabica*, Arabian Cobra, Asir Mountains, Saudi Arabia.

- *Bitis arietans* and *Pseudocerastes persicus* will hiss loudly by exhaling air through the nostrils, as warning before striking.
- *Cerastes g. gasperettii*, *Echis carinatus sochureki*, *Echis coloratus*, *Echis khosatzkii*, and *Echis omanensis* will make a warning rasping hiss with the serrated scales on the flanks of the body.
- *Naja arabica* will expand the sides of the neck if threatened, showing the characteristic cobra hood.
- *Atractaspis andersonii* may try to confuse the attacker with spasmodic movements to direct the attack to the tail.



Defensive behavior of *Atractaspis andersonii*, Arabian Small-scaled Burrowing Asp, Wadi Dharbat, Dhofar, Oman.



## Snake bite first aid

It is very important that the bitten person is transported to a medical facility as quickly as possible. The following guidelines are only essential first-aid procedures.

1. Move the victim to safety from the area where people might be bitten again. It is important to bear in mind that all venomous snakes are capable of biting and envenomating repeatedly. If possible, take a picture of the snake for identification or try to remember some characteristics such as size, head shape and coloration.
2. It is **VERY IMPORTANT** to calm down and reassure the victim, who may be terrified as a result of the snakebite. This step is crucial and is justified as in many occasions venomous snakes give "dry bites", in which venom is not injected and therefore they do not produce any medical complications. Even if the victim is envenomed, there should be enough time to arrive to the nearest medical facility in Oman.
3. Immediately remove constricting clothing, rings, bracelets, bands, socks, shoes, etc. from the bitten limb, as in most occasions swelling occurs after the bite.
4. Immobilize the patient, especially the bitten limb, using a sling and try to keep the bitten limb below the level of the patient's heart. Muscular contractions anywhere in the body, but especially in the bitten limb help to spread the venom from the site of the bite, thus it is very important that the patient does not move excessively.

Transport the patient to a medical facility without any further delay.

### IT IS VERY IMPORTANT THAT AFTER A BITE

- **DO NOT** give the victim any food, water or medication until reaching a medical facility. If there is a considerable delay before reaching medical aid (several hours to days) then give clear fluids by mouth to prevent dehydration.
- **DO NOT** use tourniquets, cut, suck, scarify, press or touch the wound, or apply ice, hot water, chemicals or electric shocks. These measures are useless and potentially dangerous.

## Species accounts

Key to Oman reptile groups		
1.	<b>a</b>	No limbs; ventral scales enlarged or, if not, then body covered with uniform scales or very smooth and shiny cycloid scales (Fig 12). Serpentes (snakes)
	<b>b</b>	No limbs; body scales small, rectangular, arranged in many regular rings separated by shallow groves (Fig 13); Preloacal pores present in both males and females (Fig 14). <i>Diplometopon</i> (Lacertoidea)
	<b>c</b>	Limbs present. <b>2</b>
2.	<b>a</b>	A shell composed of two parts: the ventral plastron and the dorsal carapace, which protect the animal's trunk (Fig 15). Testudines
	<b>b</b>	No shell protecting the animal's trunk present. <b>3</b>
3.	<b>a</b>	Scales on top of the head and on the snout small (Fig 16 left). <b>4</b>
	<b>b</b>	Scales on top of the head and on the snout large (Fig 16 right). <b>6</b>
4.	<b>a</b>	Eye permanently covered by a transparent spectacle and will not close if touched; head often relatively large; skin soft; large eyes, in most groups with vertical pupil. Gekkota
	<b>b</b>	Eyes protruding, can move independently from each other and are almost completely covered by skin, except for a small opening at the center; very characteristic hands and feet with fused opposable fingers (Fig 17). <i>Chamaeleo</i> (Iguania)
	<b>c</b>	Eyelids normal, will close if touched. <b>5</b>
5.	<b>a</b>	The largest terrestrial reptile in Oman (adults may exceed 1 m in total length), slender round body with very elongated head and neck and powerful limbs with strong claws; pointed snout, with nostrils directed backwards, much nearer the eye than the tip of the snout; very long deeply-forked tongue, eyes with round pupils. Anguimorpha
	<b>b</b>	Head short and broad; body often robust; tongue broad and fleshy; nostrils nearer to the tip of the snout than to the eye, eyes with round pupils. Agamidae (Iguania)
6.	<b>a</b>	Femoral pores present (Fig 18); ventral scales bigger than the scales on the back; eyes with round pupils. Lacertidae (Lacertoidea)
	<b>b</b>	No femoral or preanal pores; back and ventral scales about the same size and usually shiny; eyes with round pupils. Scincoidea

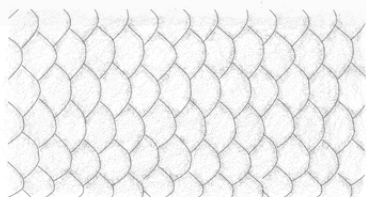


Fig 12: Cycloid scales; *Indotyphlops braminus*.

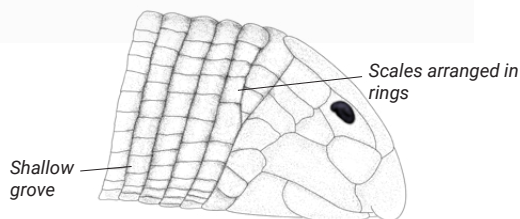
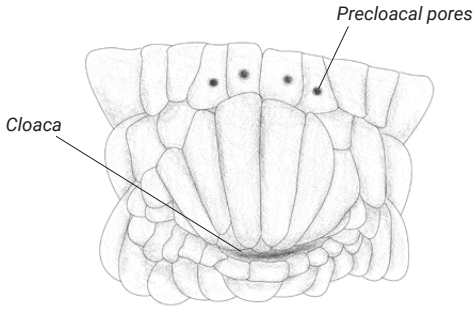
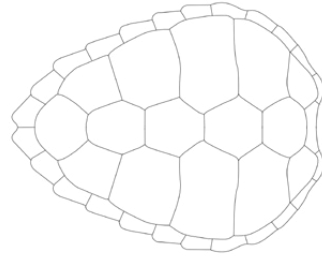


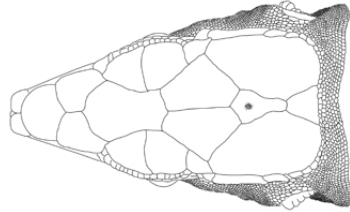
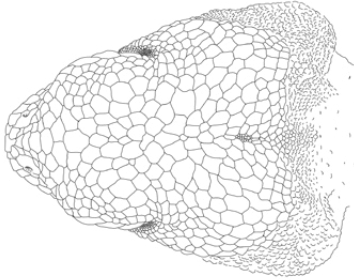
Fig 13: Body scales arranged in regular rings separated by shallow groves; *Diplometopon zarudnyi*.



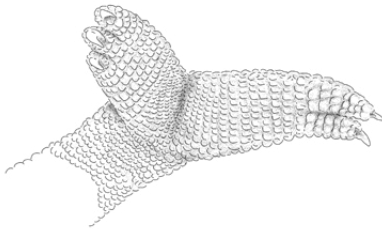
**Fig 14:** Ventral view of *Diplometopon zarudnyi* showing the cloaca and the precloacal pores.



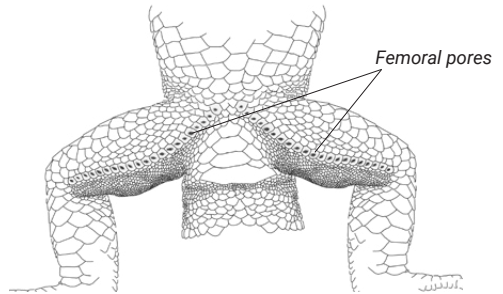
**Fig 15:** Dorsal carapace of the sea turtle *Caretta caretta*.



**Fig 16:** Dorsal view of lizard heads: **Left:** *Pseudotrapelus jensvindumi*, small scales (Agamidae); **Right:** *Omanosaura jayakari*, large scales (Lacertidae).



**Fig 17:** Detail of the left hand of a *Chamaeleo arabicus*.



**Fig 18:** Femoral pores of *Acanthodactylus boskianus* (Lacertidae).



## Terrestrial Reptiles



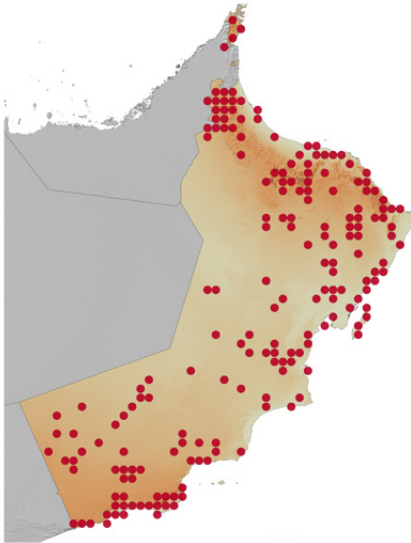


## Iguania

Iguania is an Infraorder that includes the iguanids, agamids, chamaeleonids and some New World groups, like the *Anolis*, one of the vertebrate genera with the highest number of described species (436 species). Iguania consists of more than 2,003 species classified into 123 genera. Its members are distributed

across all warm areas of the world, including hundreds of islands, where they live in a variety of different habitats, from very dense forests to extreme desert areas. One characteristic of the Iguania is their fleshy, muscular tongue. The tongue has been highly modified in chamaeleonids so that it can be ballistically projected for feeding at relatively long distances. There are oviparous, ovoviviparous and viviparous species. Iguania species mainly feed on insects and other invertebrates but some species can also eat vegetables, fruits and other vertebrates such as rodents, birds, and reptiles

Oman has 13 species of Iguania classified into seven genera, and two families. As shown in the distribution map, the 13 species of Iguania are distributed across the whole country and on Masirah Island.





### Key to Iguania genera in Oman

1.	a	Eyes protruding, can move independently from each other and are almost completely covered by skin, except for a small opening at the center; very characteristic hands and feet with fused opposable fingers (Fig 19).	<i>Chamaeleo</i>
	b	Eyes not protruding, cannot move independently from each other; hands and feet with normal, detached toes.	<b>2</b>
2.	a	No external ear opening; toes with lateral fringes of pointed scales; tail often conspicuously marked, especially beneath and frequently waved and curled.	<i>Phrynocephalus</i>
	b	External ear opening present, although sometimes small and partially covered by scales; toes without lateral fringes of pointed scales.	<b>3</b>
3.	a	Tail short, very thick and spiny, arranged in whorls (Fig 20), in one case disc-shaped; dorsal scales very small, uniform and unkeeled.	<i>Uromastyx</i>
	b	Tail not very thick and spiny, cylindrical or tapered and elongated (Fig 21).	<b>4</b>
4.	a	Males and females with enlarged callose scales in front of the cloaca (Fig 22).	<b>5</b>
	b	Males and females without enlarged callose scales in front of the cloaca.	<b>6</b>
5.	a	Head and body flattened; tail scales in whorls (Fig 21 left); ear opening large with exposed tympanum (Fig 23); dorsolateral folds running from the shoulders to above the hind legs.	<i>Acanthocercus</i>
	b	Head and body not especially flattened; tail scales not arranged in whorls (Fig 21 right); ear opening large with exposed tympanum (Fig 24); third hind toe longer than fourth.	<i>Pseudotrapelus</i>
6.	a	Long and narrow head; body compressed laterally; tail with scales not arranged in whorls; ear opening large with exposed tympanum with two thin well separated spines above the tympanum; no dorsolateral folds.	<i>Calotes</i>
	b	Head and body not especially flattened; tail scales not arranged in whorls (Fig 21 right); no dorsolateral folds; ear opening small, with tympanum partially covered by pointed scales from above (Fig 25); fourth hind toe longer than third.	<i>Trapelus</i>

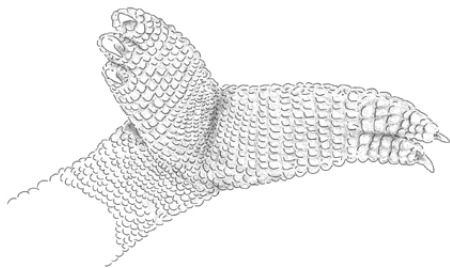


Fig 19: Detail of the left hand of a *Chamaeleo arabicus*.

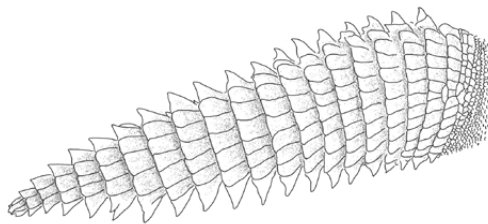
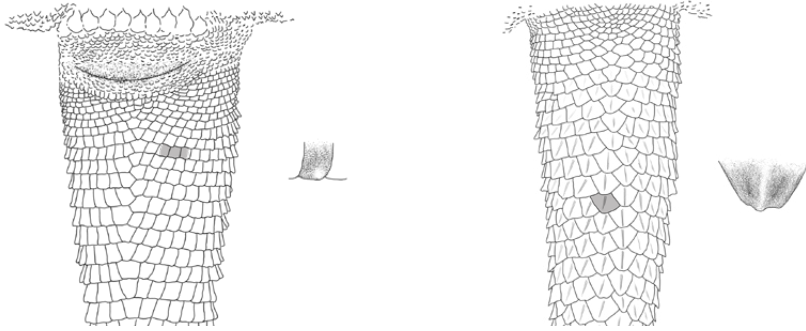
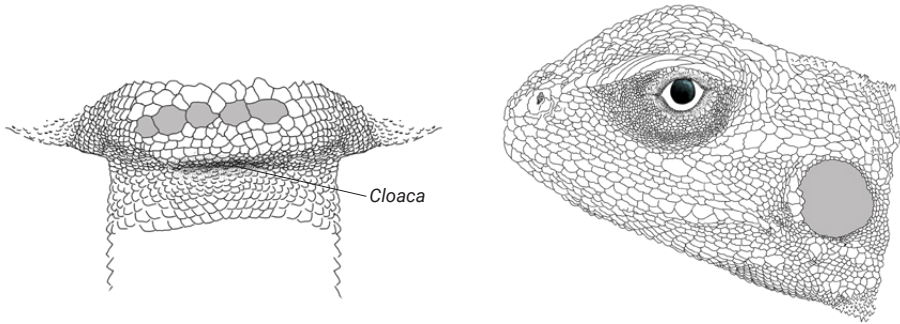


Fig 20: Spiny tail of *Uromastyx aegyptia*.

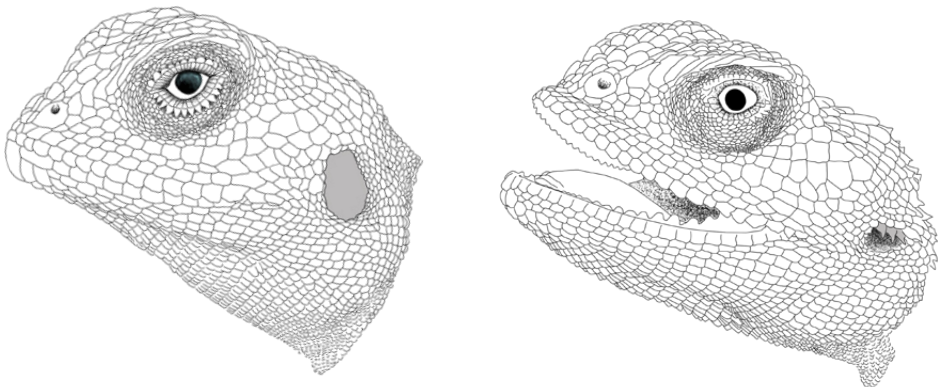


**Fig 21:** Tail underside. **Left:** Tail scales arranged in whorls, *Acanthocercus adramitanus*; **Right:** Tail scales not arranged in whorls, *Pseudotrapelus jensvindumi*.



**Fig 22:** Underside of vent area. Enlarged callose scales (gray) above the cloaca, *Pseudotrapelus jensvindumi*.

**Fig 23:** Large ear opening (gray), with exposed tympanum, *Acanthocercus adramitanus*.



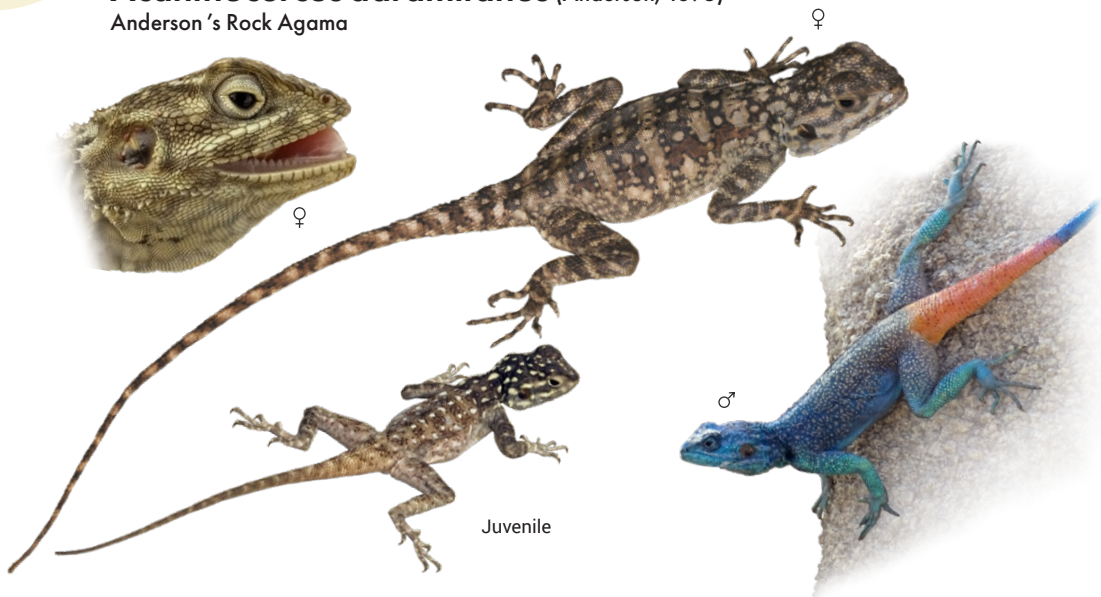
**Fig 24:** Large and oval ear opening (gray), with exposed tympanum, *Pseudotrapelus jensvindumi*.

**Fig 25:** Small ear opening, with tympanum partially covered by scales above (gray), *Trapelus flavimaculatus*.



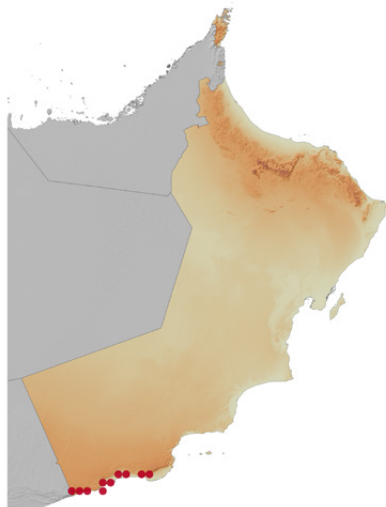
## *Acanthocercus adramitanus* (Anderson, 1896)

Anderson's Rock Agama



### DESCRIPTION

A medium-sized agamid with flat triangular head. Ear openings large and conspicuous, twice as large as the eyes with spines around the ear margins, sides of the head and on the neck. Body flattened with dorsolateral folds and large mid-dorsal scales usually keeled, well differentiated from the smaller lateral scales. Long cylindrical tail about 1.7 to 2.15 times the SVL, with scales arranged in whorls. Between 4–7 enlarged callose scales in front of the cloaca. Body coloration extremely variable. Displaying males bright blue, often with red or orange tail base and the rest of the tail bright blue. Females and juveniles brownish with brownish or yellowish spots on the back.



### DISTRIBUTION

Endemic to Arabia, the species is distributed from around Taif in Saudi Arabia, southwards across the mountains of southwestern Arabia, and eastwards through southern Yemen to Dhofar, Oman. Published phylogenies indicate that the genus *Acanthocercus* is not monophyletic and therefore the two Arabian species (*A. adramitanus* and *A. yemensis*) may belong to a still undescribed new genus.

### NATURAL HISTORY

It lives in rocky habitats in areas with dense vegetation such as the monsoon affected areas of the Dhofar Mountains. Individuals often display using pushups and head bobbing. Mainly insectivorous but can eat other arthropods including ants and plant material. Females lay between 6–8 (rarely up to 12) eggs that hatch in about 7 weeks.



Diurnal



Least Concern

SVL 157 mm



0 – 1,200 m

NATIVE



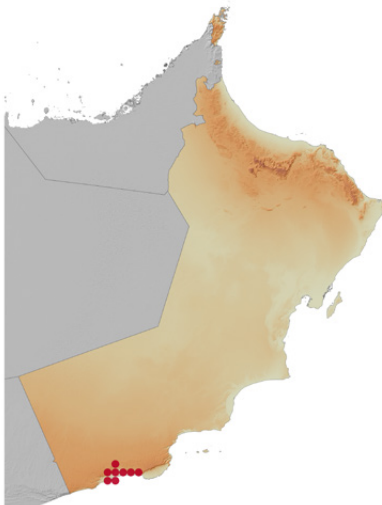
## ***Calotes versicolor versicolor*** (Daudin, 1802) **INTRODUCED/ INVASIVE**

Oriental Garden Lizard



### DESCRIPTION

A medium-sized agamid with long and narrow head. Ear openings round and exposed. Two thin well separated spines above the tympanum. Body compressed laterally, dorsal scales large and distinctly keeled, pointing backwards and upwards. A developed dorsal crest with large spines, gradually decreasing in size from the neck to the tail base. Long cylindrical tail with scales not arranged in whorls. Males and females without enlarged callose scales in front of the cloaca. Dorsal color variable, generally dark-brown, sometimes with pale paravertebral stripes. Dark brown lines radiating from the posterior edge of the orbits. Body color of breeding males reddish-orange anteriorly with black throat.



### DISTRIBUTION

A widespread species known from eastern Iran, Afghanistan and south, southeast and east Asia. Apart from its natural distribution, it has been reported as being naturalized in a number of offshore islands, as well as continental localities, including the monsoon affected areas of Dhofar, Oman. It was introduced in Salalah sometime between 1977 and 1982, most probably with ornamental plants imported from Asia.

### NATURAL HISTORY

Mainly arboreal and diurnal, in Oman it is an invasive species that is dispersing at a fast rate, competing for resources with the native lizards. It preys on insects and other arthropods but can also take small vertebrates, including endemic geckos. Reported predating on nestling birds and toads. Males often display using pushups and head bobbing. Females lay 10–20 eggs that hatch in about 6–7 weeks.



Diurnal



Least Concern

SVL 140 mm



0 – 800 m

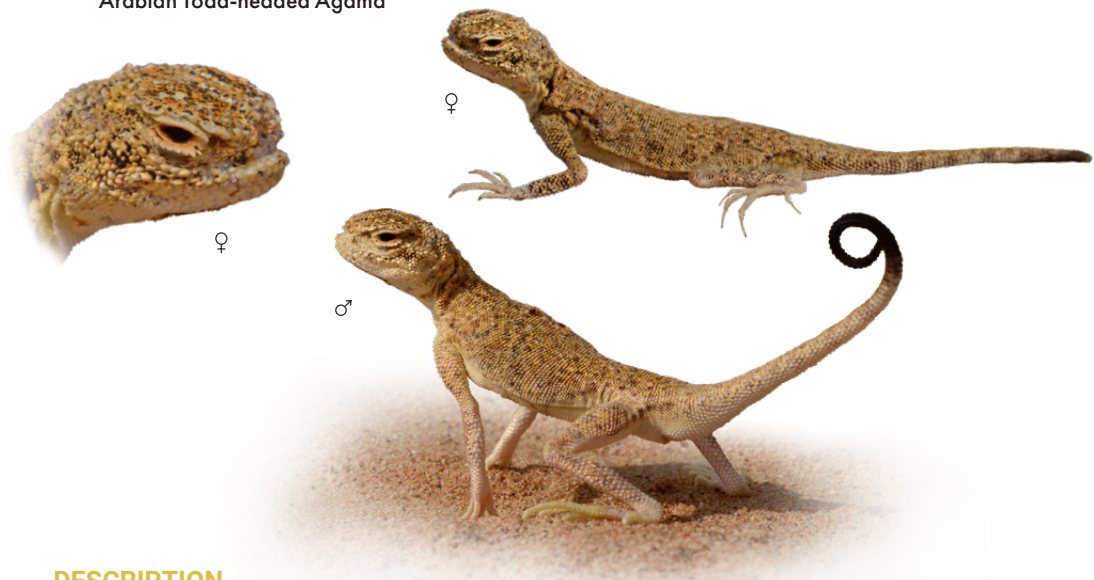
**INTRODUCED/ INVASIVE**





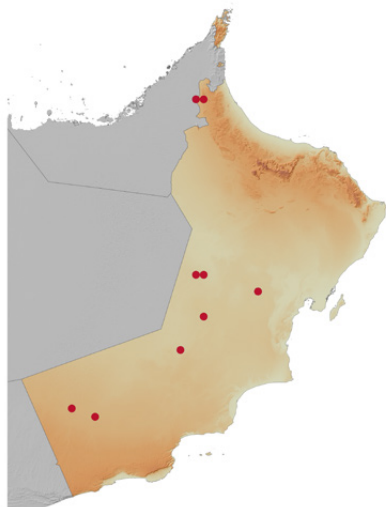
## *Phrynocephalus arabicus* Anderson, 1894

Arabian Toad-headed Agama



### DESCRIPTION

A small agamid with flattened body and head. No external ear opening, scales on the upper temporal region enlarged, often 3–4 rows of scales between the eye and the lip, the scales surrounding the nostrils are typically in contact at the midline. Toes with fringes of long pointed scales and scales underside of the fourth toe each with a single keel. Males and females without enlarged callose scales in front of the cloaca. The tail is about 1.2 times the SVL and is waved and curled for signaling, exposing the black markings towards the distal end. The dorsal color tends to match the substrate. Morphologically very similar to the Sharqiya Sand's endemic *Phrynocephalus sakoi*.



### DISTRIBUTION

Widely distributed across Arabia, including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen. Known from southern Jordan. In Oman, it inhabits the interior sand dunes and sandy plains. Several taxonomic revisions have been carried out in recent years on the *Phrynocephalus* species of Arabia and southwest Asia, but the conclusions are not widely accepted and therefore more detailed revisions are required.

### NATURAL HISTORY

A highly specialized sun-loving agamid adapted to life in extreme desert conditions. It typically stands on the hot sand with its fingertips and heels, with the tail curled exposing its black tip and waiting for passing by insects. If disturbed, it runs very fast and can disappear under the sand using fast lateral vibrating movements. Females burrow in the sand between 2–3 eggs.



Diurnal



Least Concern

SVL 58 mm



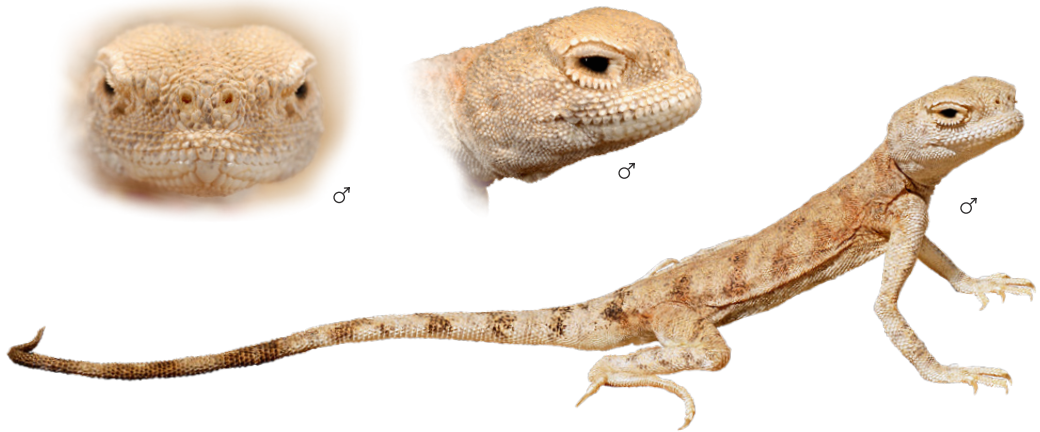
0 – 400 m

NATIVE



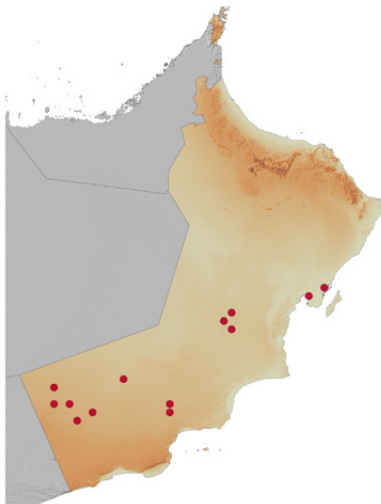
## *Phrynocephalus longicaudatus* Haas, 1957

Long-tailed Toad-headed Agama



### DESCRIPTION

A small agamid with flattened body and head. No external ear opening, scales on the upper temporal region not enlarged, often 5–6 rows of scales between the eye and the lip, the scales surrounding the nostrils separated from each other on the midline. Toes with fringes of pointed scales and scales on the underside of the fourth toe each with several keels. Males and females without enlarged callose scales in front of the cloaca. Tail about 1.6 times the SVL, with the tip dark underneath in adult males. The dorsal color tends to match the substrate color, with most animals predominantly gray above, often with dark cross bars, especially on the tail base.



### DISTRIBUTION

Widespread in Arabia with the exception of Bahrain and Qatar; also present in Jordan and Iraq. In Oman it is found from Barr Al Hikman to the Yemen border, in sabkhas and arid gravelly open areas of the desert interior. Recent molecular phylogenies indicated that the species *Phrynocephalus maculatus* was paraphyletic, with the mainly Arabian subspecies *Ph. maculatus longicaudatus* branching as sister taxon to *Ph. arabicus*. As a result, *Ph. maculatus longicaudatus* has been elevated to species level as *Ph. longicaudatus*.

### NATURAL HISTORY

Like the other Arabian *Phrynocephalus*, this species also stands high on its raised legs under the hot Arabian sun waiting for passing by prey (mainly insects and other arthropods). If detected, it runs very fast for long distances and stops suddenly, laying down on the ground relying on camouflage. Both males and females display by curling the tails.



Diurnal



Not Evaluated

SVL 73 mm



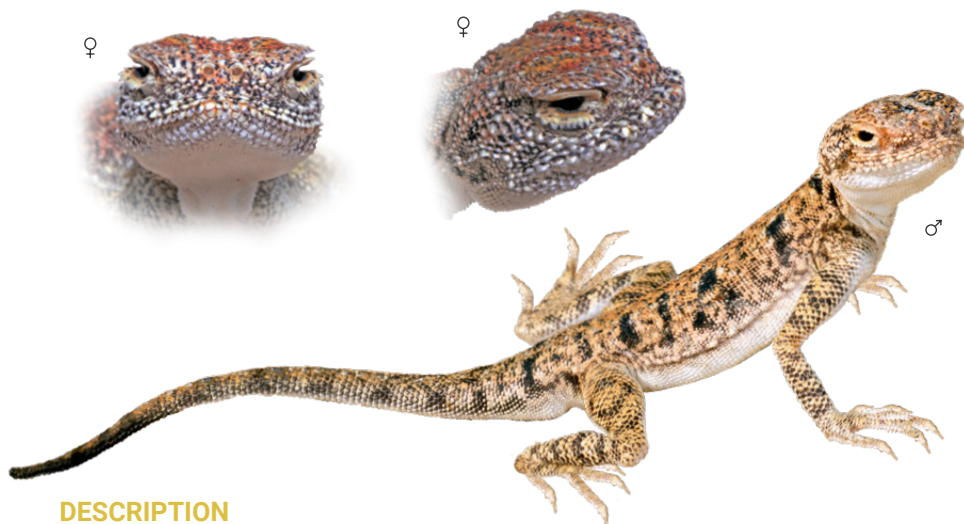
0 – 400 m

NATIVE

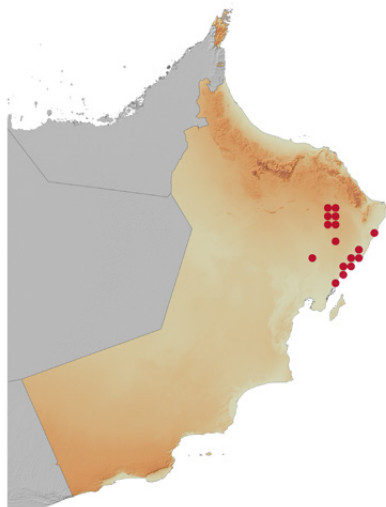
*Phrynocephalus sakoï*

Sako's Toad-headed Agama

Melnikov, Melnikova, Nazarov, Al-Johany &amp; Ananjaeva, 2015

**DESCRIPTION**

A small agamid with flattened body and head. No external ear opening, scales on the upper temporal region enlarged, often 3–4 rows of scales between the eye and the lip, the scales surrounding the nostrils are typically in contact on the midline. Toes with fringes of long pointed scales and scales on the underside of the fourth toe each with a single keel. Males and females without enlarged callose scales in front of the cloaca. The tail is about 1.2 times the SVL and is waved and curled for signaling, exposing the black markings towards the distal part. The dorsal color tends to match the substrate and can change in the breeding season. Females can have bright orange patterns on the head, orange stripes on the neck, and orange patches on the back. Males have a similar pattern but in black.

**DISTRIBUTION**

This species is restricted to the Sharqiyah Sands, northeastern Oman. Given the complex and dynamic geological history of the area and lack of precise genetic information, it is not possible to draw a convincing hypothesis about the origin of this endemic species.

**NATURAL HISTORY**

A highly specialized sun-loving agamid adapted to life in the extreme desert conditions of the Sharqiyah Sands. It typically stands on the hot sand on its fingertips and heels, with the tail curled exposing its black tip and waiting for passing by insects. If disturbed it runs very fast and can disappear under the sand using fast lateral vibrating movements.



Diurnal



Not Evaluated

SVL 57 mm



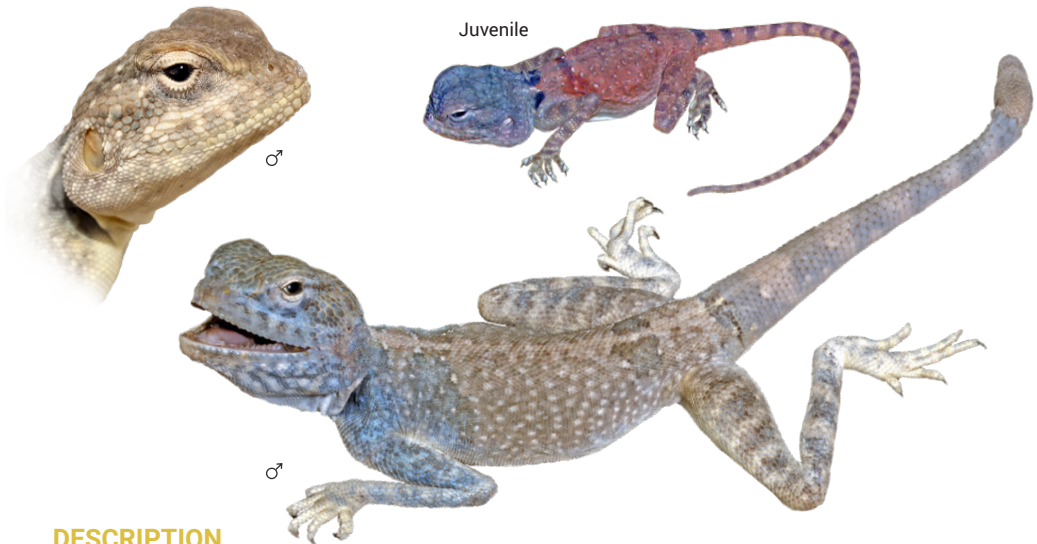
0 – 400 m

**ENDEMIC**



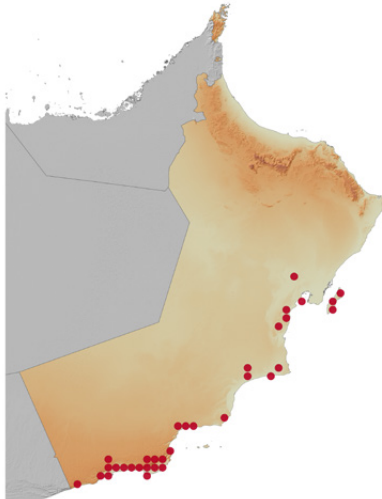
## *Pseudotrapelus dhofarensis* Melnikov & Pierson, 2012

Dhofar Rock Agama



### DESCRIPTION

A medium-sized agamid with large robust convex head and a moderately depressed rounded body. Large, exposed ear opening, dorsal scales small, imbricate and keeled, with lateral and ventral scales small and smooth. Very long and thin limbs, the third toe of the hind leg reaching the nostril when stretched forward and the digits of the forelimb reaching the cloaca when stretched downwards. Third hind toe longer than the fourth. Between 6–8 enlarged callose scales in front of the cloaca in males and 4 in females. Tail very long and banded, about 2 times the SVL, with scales not arranged in whorls. Extremely variable and changeable coloration, breeding males with head, throat, forelimbs and most of the tail bright blue; dark spots on the neck and tail base salmon-pink.



### DISTRIBUTION

In Oman, it is found in Masirah Island and along the mainland coast, from Barr Al Hikman to Dhofar. It is a relatively abundant species across its distribution range. Its distribution outside Oman is not clear but it has been suggested that it could extend across eastern Yemen, up to approximately 300 km east of Aden, where another species, *P. neumanni*, is found.

### NATURAL HISTORY

It is a diurnal sun-loving sit and wait predator that occupies a wide range of open habitats, from rocky areas in well-vegetated wadis, barren rocky hillsides to open gravelly plains. Males usually sit on top of rocks and display using pushups and head bobbing. It escapes at high speed if disturbed. Its diet includes insects and other arthropods. Females lay between 5–9 eggs.



Diurnal



Not Evaluated

SVL 101 mm



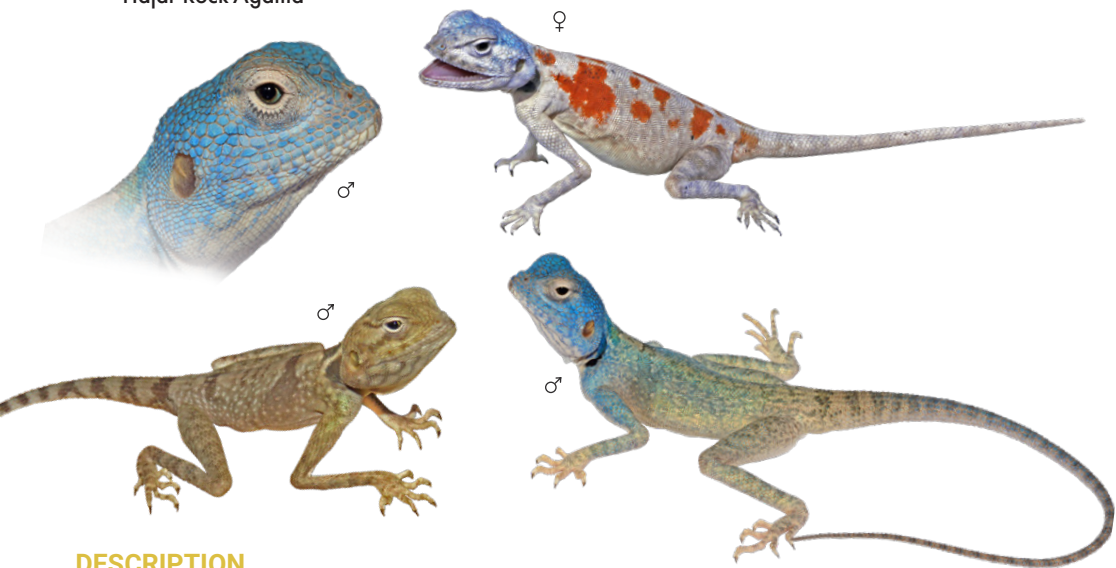
0 – 1,600 m

NATIVE

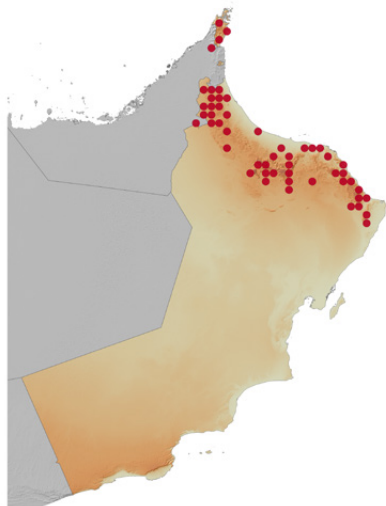


***Pseudotrapelus jensvindumi*** Melnikov, Ananjaeva & Papenfuss, 2013

Hajar Rock Agama

**DESCRIPTION**

A medium-sized agamid morphologically very similar to *Pseudotrapelus dhofarensis* but with relatively shorter limbs. The third toe of the hindlimb reaching the eye when stretched forward and the digits of the forelimb reaching the insertion of the leg when stretched downwards. Large and exposed ear opening, dorsal scales small, imbricate and keeled, and lateral and ventral scales small and smooth. Third hind toe longer than the fourth. Both males and females with 4 enlarged callose scales in front of the cloaca. Tail very long and banded, about 2 times the SVL, with scales not arranged in whorls. Extremely variable and changeable coloration, breeding males with head, throat and forelimbs bright blue, breeding females brownish with several brick red spots.

**DISTRIBUTION**

Endemic to the Hajar Mountains of Oman and the UAE, it is an abundant species continuously distributed across the mountains and the foothills of the Hajars, from Ras Al Hadd in the South to the Musandam Peninsula in the North.

**NATURAL HISTORY**

It is a diurnal sun-loving sit and wait predator that occupies a wide range of open habitats in the Hajar Mountains, from rocky areas in well-vegetated wadis and barren rocky hillsides to open gravelly plains. Males usually sit on top of rocks and display using head bobbing and pushups. It escapes at high speed if disturbed. Its diet includes insects and other arthropods. Females lay between 4–6 eggs.



Diurnal



Not Evaluated

SVL 92 mm



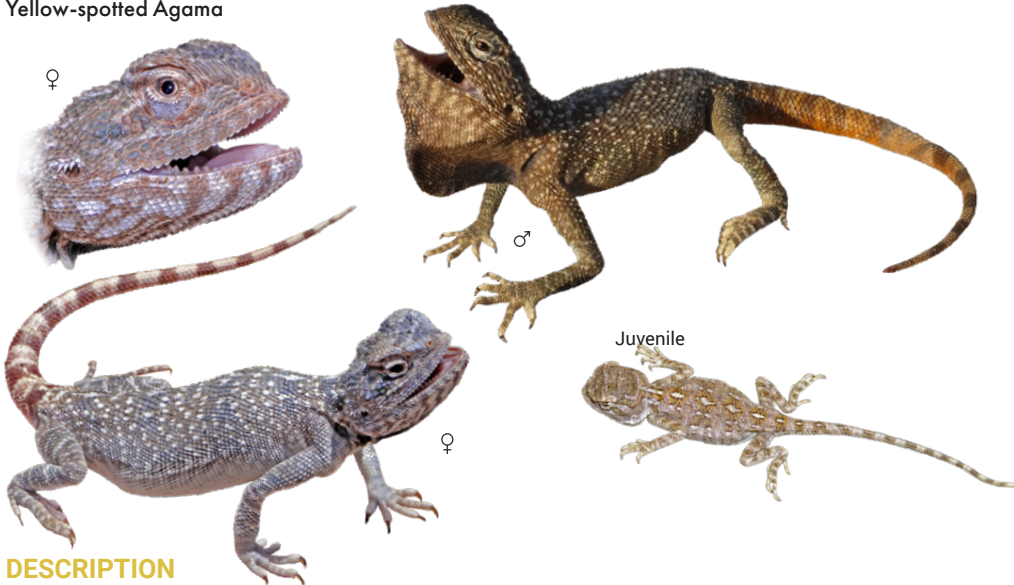
0 – 2,100 m

**NATIVE**



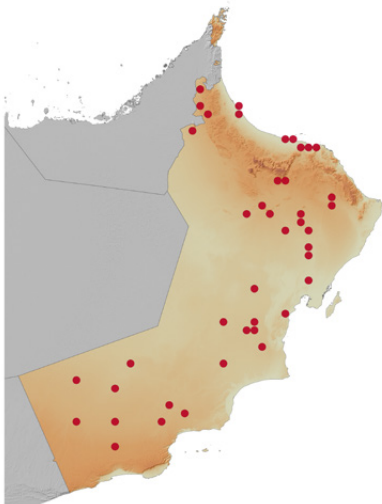
## *Trapelus flavimaculatus* Rüppell, 1835

Yellow-spotted Agama



### DESCRIPTION

A medium-sized agamid with large head and robust rounded body. Ear opening small and partially covered by pointed scales from above. Gular pouch present and enlarged; dorsal spinose scales extending from the back of the head along the mid-dorsum, especially visible in adult males and limited to the back of the head in females. Ventral scales keeled. Relatively short and robust limbs, the third hind toe shorter than the fourth. Males and females without enlarged callose scales in front of the cloaca. Tail banded, about 1.1–1.5 times the SVL, with scales not arranged in whorls. Extremely variable coloration, breeding males with head, throat, forelimbs and anterior belly blue with white spots and orange tail. Juveniles brown with dorsal white spots and dark banded tail.



### DISTRIBUTION

An Arabian endemic, it is widely distributed across Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen. In Oman it is relatively abundant and widely distributed, although it is absent from the Musandam Peninsula, Masirah Island, the monsoon affected areas of Dhofar, and at elevations above 600 m in the Hajar and Dhofar Mountains.

### NATURAL HISTORY

It is a diurnal sun-loving sit and wait predator that occurs mainly on stable sands and gravelly surfaces, usually with scattered trees, bushes and shrubs on which it is often found sunning itself. In disturbed areas, it uses heaps of stones and rubble. Males usually choose high perches on trees, bushes, or rocks and display using pushups and head bobbing. Its diet includes insects and other arthropods. Females lay 6–8 large round soft-shelled eggs, which hatch in about 6–7 weeks.



Diurnal



Least Concern

SVL 130 mm



0 – 600 m

NATIVE



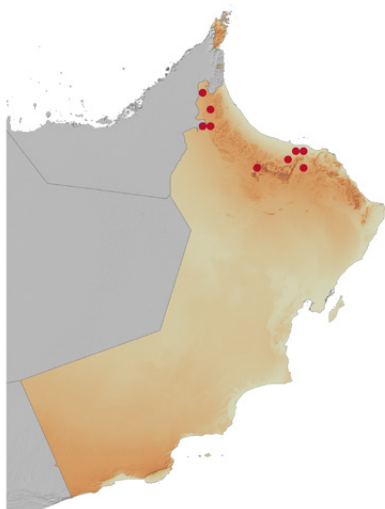
## *Uromastyx aegyptia leptieni* Wilms & Böhme, 2000

Leptien's Spiny-tailed Lizard



### DESCRIPTION

A large and heavily build agamid with round robust head. Ear opening with 3–7 enlarged pointed scales on the anterior margin. Body scales very small and smooth, 238–294 scales around mid-body and 110–150 scales between the gular and the inguinal folds. A row of enlarged tubercular scales on the flanks, from the sacral region to almost the forelegs. Some specimens with enlarged scales along the vertebral column. Dorsal parts of the hind legs covered with enlarged tubercular scales. Males and females with 12–19 preanal-femoral pores on either side. Tail, about 0.7–0.8 times the SVL with 19–24 tail whorls. Coloration variable, warm bodied individuals pale brown, yellow or even white with black head. Cold individuals gray with dark gray to blackish head.



### DISTRIBUTION

An Arabian endemic, it is distributed across the northeastern UAE, parts of the Hajar Mountains, and the Batinah Plain, Oman. Although it has been found up to 1,000 m in elevation in the Jebel Akhdar massif, in the Hajar Mountains it has never been recorded in the Musandam Peninsula or the Eastern Hajars.

### NATURAL HISTORY

It is a diurnal sun-loving agamid, active in the hottest months of the year. It can reach body temperatures of 42 °C, retreating to its deep burrow when it is too hot and during the winter. It is typically found on sandy gravels and wadi beds with vegetation and in rocky areas in the Hajar Mountains. It avoids soft sandy areas. A primarily herbivorous species, it can feed on a large variety of plant species. Like the other *U. aegyptia* subspecies, it is threatened by hunting. Females lay between 10–40 eggs that hatch in about 6–8 weeks.



Diurnal



Vulnerable

SVL 375 mm



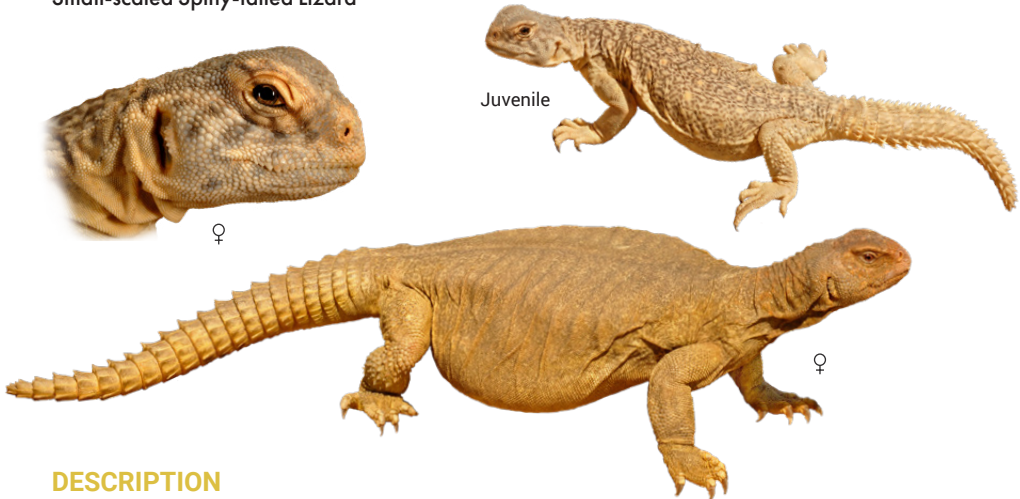
0 – 1,000 m

NATIVE



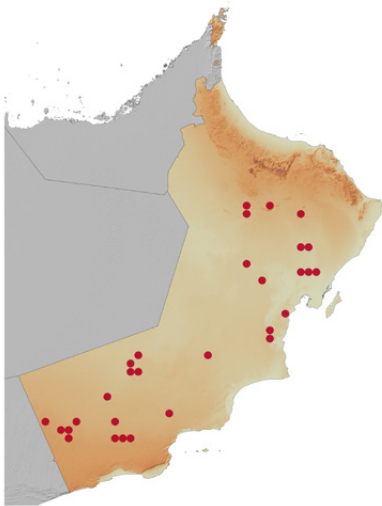
## *Uromastyx aegyptia microlepis* Arnold, 1980

Small-scaled Spiny-tailed Lizard



### DESCRIPTION

A very large and heavily build agamid with round robust head. Ear opening narrow, vertically elongated with 3–7 enlarged pointed scales on the anterior margin. Body scales very small and smooth, 255–391 scales around mid-body and 149–193 scales between the gular and the inguinal folds. No enlarged tubercular scales on the flanks. Dorsal parts of the hind legs covered with enlarged tubercular scales. Males and females with 13–21 preanal-femoral pores on either side. Very distinctive thick and long spiny tail, about 0.6–0.8 times the SVL, with 20–24 tail whorls. Coloration variable depending on temperature. Warm bodied individuals pale brown, yellow or greenish with black throat and black to dark blue head and small dots on the neck and dorsum. Cold individuals are dark gray with dark gray to blackish head. Juveniles grayish brown with transverse rows of yellow to orange ocelli on the back.



### DISTRIBUTION

Widely distributed across all seven Arabian countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen. Outside Arabia, it is also found in Iraq, Jordan, Syria and coastal Iran. In Oman it is distributed across most of the country with the exception of Masirah Island, the Hajar Mountains, the Batinah Plain and the monsoon affected areas of Dhofar.

### NATURAL HISTORY

It is a diurnal sun-loving agamid, active in the hottest months of the year. It can reach body temperatures of 42 °C, retreating to its very deep burrow when it is too hot and during the winter. It is typically found in sparsely vegetated open arid gravel plains, avoiding sandy areas and areas with large stones and rubble on the surface. A primarily herbivorous species, it can feed on a large variety of plant species. It is highly threatened by hunting. Females lay between 10–40 eggs that hatch in about 6–8 weeks.



Diurnal



Vulnerable

SVL 400 mm



0 – 500 m

NATIVE





## *Uromastyx benti* (Anderson, 1894)

Bent's Spiny-tailed Lizard



### DESCRIPTION

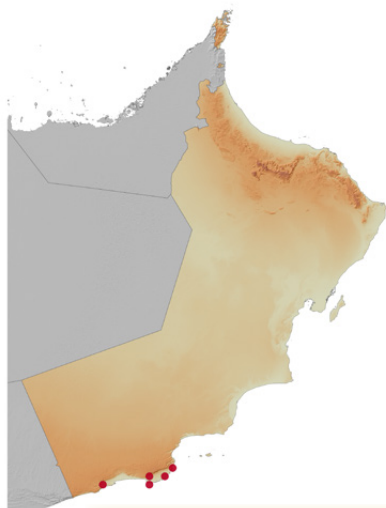
A medium-sized heavily build agamid with round robust head. Ear opening narrow, vertically elongated with 3–6 enlarged pointed scales on the anterior margin. Body scales small and smooth, 143–187 scales around mid-body and 66–86 scales between the gular and the inguinal folds. No enlarged tubercular scales on the flanks or on the dorsal parts of the hind legs. Absence of preanal-femoral pores. Long and narrow spiny tail, about 0.8–0.9 times the SVL with 22–26 tail whorls. Dorsolateral scales of the tail with long, well-developed spines. Colorful animals. Body light brown or yellowish, with transverse rows of ivory ocelli and blotches with dark edges on the back, tinges of blue on the forelegs and flanks, reddish head and neck in warm individuals. Females much paler in coloration than males. Dark brown lines radiating from the eye in adult and young individuals.

### DISTRIBUTION

An Arabian endemic, it is restricted to southern and southeastern Yemen and southern Oman. It presents a patchy distribution with very few known localities including Azzan, Shibam, Mukalla and Ras Fartak in Yemen. In Oman it is known from two nearby localities around Mughsayl and from several localities on the Jebel Samhan, between the cities of Mirbat and Hasik.

### NATURAL HISTORY

It is a diurnal sun-loving agamid. Mating occurs between January and April. It lives in rocky hills and stony slopes with sparse vegetation. A primarily herbivorous species, it can feed on a large variety of plant species. This species is threatened by illegal collection for the pet trade and by development of coastal areas. Females lay 6–10 eggs that hatch after more than 12 weeks.



Diurnal



Least Concern

SVL 196 mm



0 – 1,410 m

NATIVE



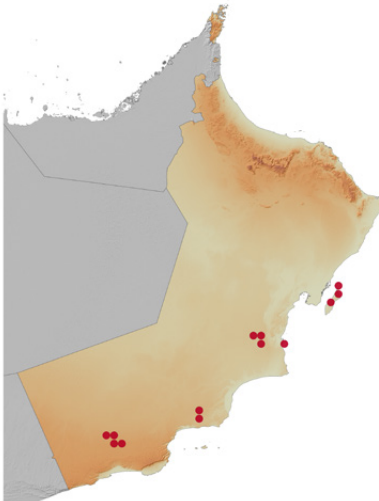
## *Uromastyx thomasi* Parker, 1930

Thomas' Spiny-tailed Lizard



### DESCRIPTION

The smallest sized representative of the genus *Uromastyx* in Arabia, heavily build with short snout and robust head. Ear opening narrow, vertically elongated lacking pointed scales on the anterior margin. Body scales small and smooth, 125–150 scales around mid-body and 72–100 scales between the gular and the inguinal folds. No enlarged tubercular scales on the flanks or on the dorsal parts of the hind legs. Males and females with 12–19 preanal-femoral pores on either side. Short, flattened, disc-shaped spiny tail, about 0.3 times the SVL with 11–13 tail whorls. A colorful agamid with light brown, yellowish green body with dark reticulation. A broad coppery dorsal stripe running from the neck to the first half of the tail. The head can be reddish in some specimens. Juveniles and subadults with conspicuous black streaks on a white background on both sides of the neck and head and 6 dark crossbands on the flanks with small rusty spots on the back and neck.



### DISTRIBUTION

This species is endemic to Oman, where it is found on Masirah Island and across the southeastern part of the country, from the coast of the Arabian Sea up to 80 km into the arid interior. It is absent from the monsoon affected areas of Dhofar

### NATURAL HISTORY

It is a diurnal sun-loving agamid. It lives on a wide range of habitats, from coastal rocky hills with rocky outcrops and sparse vegetation, to arid open areas with hard substrate of the interior where it digs its burrow. A primarily herbivorous species, it is highly threatened by regular illegal collection for the pet trade. Females lay 13–16 eggs that hatch after around 9 weeks.



Diurnal



Vulnerable

SVL 190 mm

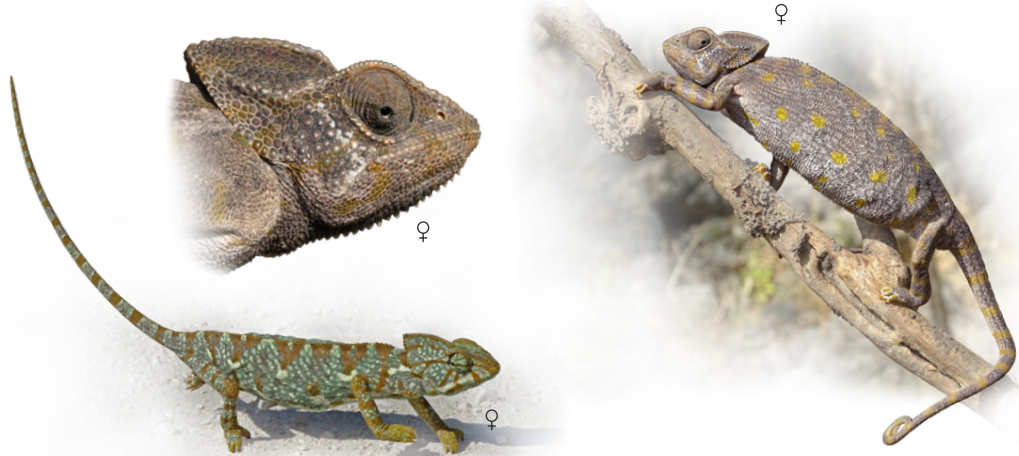


0 – 500 m

ENDEMIC

***Chamaeleo arabicus*** Matschie, 1893

Arabian Chameleon

**DESCRIPTION**

A medium-sized and very distinctive lizard species. Body flattened from side to side, large head with a relatively high crest and large occipital lobes with conical tubercles along the edges. A dorsal and a ventral crest of small conical scales. The two protruding eyes can move independently from each other and are almost completely covered by skin, except for a small opening at the center. External ear opening and tympanic membrane lacking. Long extensible tongue that can be projected for hunting. Very characteristic hands and feet with fused opposable fingers (1–3 and 4–5) and toes (1–2 and 3–5) to grip onto branches. Males have spurs on the hind feet. Long, prehensile tail, about 1.1 times the SVL. Extremely variable coloration, from whitish, yellowish, greenish, to pale brown or almost black. Spots, blotches and streaks on the head and body also of different colors

**DISTRIBUTION**

An Arabian endemic, it is distributed across south Arabia, from around Aden in southwestern Yemen to Dhofar. In Oman it is distributed from the Yemeni border, across the Dhofar Mountains to Jebel Samhan. There are also introduced populations in the North of Masirah island, in a vegetated area with large trees and at the Hilf airbase.

**NATURAL HISTORY**

A diurnal species, it is relatively abundant in the more mesic areas of Dhofar, irrigated plantations and gardens with large bushes and trees. However, it is also adapted to live on grasslands with small bushes, and more open areas with rocks and boulders. Although it spends most of the time in bushes, *C. arabicus* is often seen on the ground. Specimens from open areas do not rely so much on camouflage and can run relatively fast for shelter when disturbed. Females lay eggs, but other details are unknown.



Diurnal



Least Concern

SVL 230 mm



0 – 1,400 m

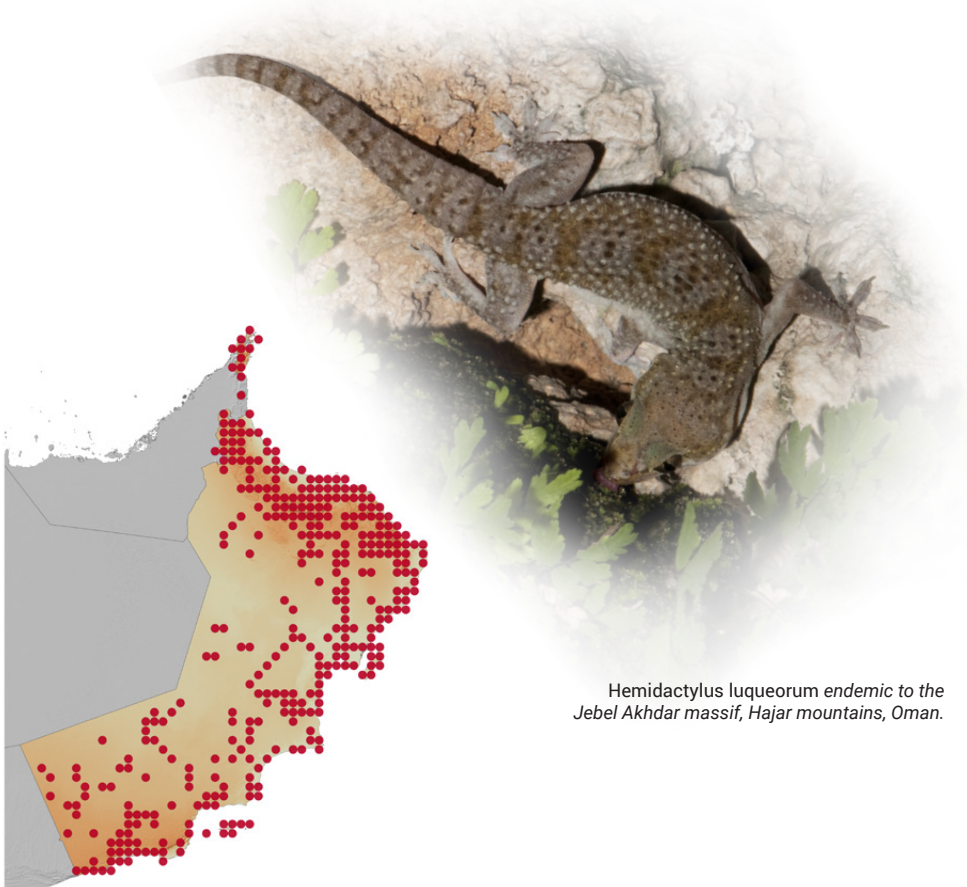
**NATIVE**

## Gekkota

Gekkota is an Infraorder of reptiles commonly known as geckos. It consists of more than 2,095 species classified into 125 genera. Its members are distributed across all warm areas of the world including thousands of islands, where they live in a variety of different habitats, from very dense forests to sand dune deserts. Geckos cannot survive in temperate regions, such as northern Europe, but in southern Europe some species are very common. Almost all species are oviparous; there are only a few ovoviparous species. Species that lay eggs usually produce

only one or two eggs per clutch, differing from other reptiles that usually have larger clutches. Geckos feed on insects and other invertebrates, and for this reason are considered useful animals in most countries within their range.

Oman has 41 species of Gekkota classified into 11 different genera and 3 different families. As shown in the distribution map, the 41 Gekkota species from Oman are distributed across the whole country and in most of the islands.



*Hemidactylus luqueorum* endemic to the Jebel Akhdar massif, Hajar mountains, Oman.



## Key to Gekkota genera in Oman

1.	a	Toes on hind legs simple or with a fringe of pointed scales (Fig 26A to E)	2
	b	Toes with well-developed adhesive pads (Fig 27 A to C)	9
2.	a	Small or very small (maximum SVL about 40 mm); pupil contracts to a vertical slit in good light; tail not laterally compressed or fringed	3
	b	Often SVL larger than 40 mm	4
3.	a	Body round, covered with relatively large overlapping scales; presence of preanal pores (Fig 28 left)	<i>Tropicolotes</i>
	b	Body and head dorsoventrally flattened, not covered by large overlapping scales; feet on the fore limbs totally or partially webbed (Fig 26D and E); cloacal sacs and cloacal tubercles present (Fig 28 right)	<i>Trigonodactylus</i>
4.	a	Back with regular, often conical tubercles or coarse scaling, with some scales enlarged and keeled; presence of preanal pores in males (Fig 28)	5
	b	Back with usually fine uniform scaling, at most a few small tubercles on the flanks;	7
5.	a	Dorsal tubercles prominent, strongly keeled, trihedral (see species pictures); two pairs of clearly enlarged post-mental scales present (Fig 29 left); toes long, laterally compressed and strongly kinked (Fig 26C)	<i>Cryptopodion</i>
	b	At most one pair of postmental scales or no postmental scales at all (Fig 29 right); toes not especially long or laterally compressed (Fig 26A)	6
6.	a	Dorsal tubercles prominent, strongly keeled, trihedral (see species pictures) and well separated; toes not strongly kinked (Fig 26A); absence of enlarged postmental scales (Fig 29 right); not a clear pattern of transverse crossbands on the back; iris often reddish	<i>Bunopus</i>
	b	Dorsal tubercles smaller, not very prominent with some scales enlarged and feebly keeled, or more prominent and keeled, forming near-continuous longitudinal rows (see species pictures); toes kinked; a very characteristic pattern of dark bands across the back and tail	<i>Trachydactylus</i>
7.	a	Pupil contracts to a vertical slit in good light; cloacal sacs present (Fig 28); tail never laterally compressed or fringed	8
	b	Pupil often round or ovoid in good light; cloacal sacs absent; tail often laterally compressed and fringed, especially in males; toes long and strongly kinked (Fig 26C)	<i>Pristurus</i>
8.	a	Enlarged postmental scales present; posterior ventral scales larger than dorsals; nostrils very protuberant; toes not depressed or fringed, with 10–15 longitudinal rows of pointed scales beneath; cloacal sacs present and cloacal tubercles present; preanal pores absent (Fig 28)	<i>Pseudoceramodactylus</i>
	b	No enlarged postmental scales (Fig 29 right); posterior ventral scales not larger than dorsals; cloacal sacs and cloacal tubercles present, usually 2 preanal pores set in enlarged scales present in both sexes	<i>Stenodactylus</i>
9.	a	Adhesive pads on toes confined to tips (Fig 27A and C)	10
	b	Adhesive pads situated underneath the toe, made up of several lamellae, mostly with a central division (Fig 27B); preanal pores in males and in <i>H. lemurinus</i> also in females; cloacal sacs present (Fig 28)	<i>Hemidactylus</i>
10.	a	Adhesive pads on toe tips made up of numerous lamellae beneath (Fig 27C); preanal pores absent; cloacal sacs and cloacal tubercles present (Fig 28)	<i>Ptyodactylus</i>
	b	Adhesive pads on toe tips made up of two lamellae beneath (Fig 27A); preanal pores, cloacal sacs, and cloacal tubercles absent	<i>Asaccus</i>

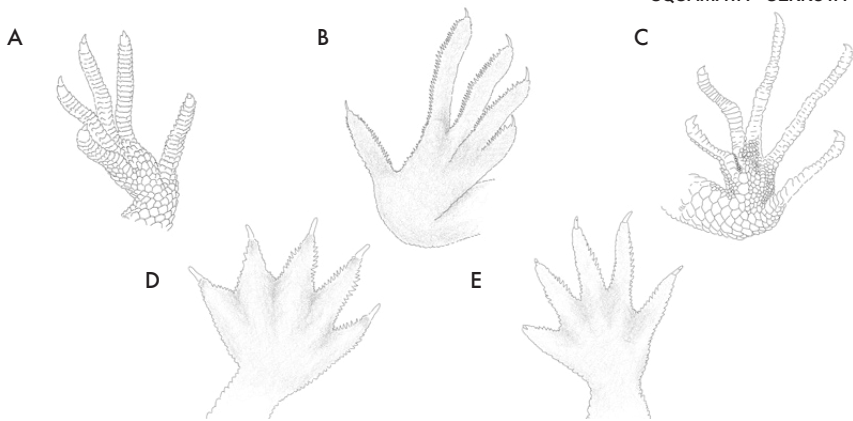


Fig 26: Toes without adhesive pads. A: Toes not strongly kinked; B: Toes with lateral fringes; C: Toes strongly kinked; D: Totally webbed hand, *Trigonodactylus arabicus*; E: Partially webbed hand, *Trigonodactylus sharqiyahensis*.

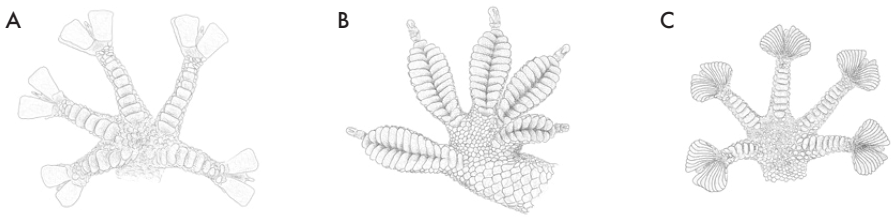


Fig 27: Toes with well-developed adhesive pads. A: *Asaccus*; B: *Hemidactylus*; C: *Ptyodactylus*.

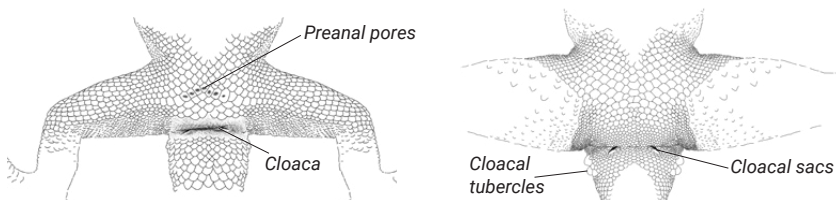


Fig 28: Cloacal region of Gekkota showing different structures. **Left:** Preanal pores and cloaca; **Right:** Cloacal sacs and cloacal tubercles.

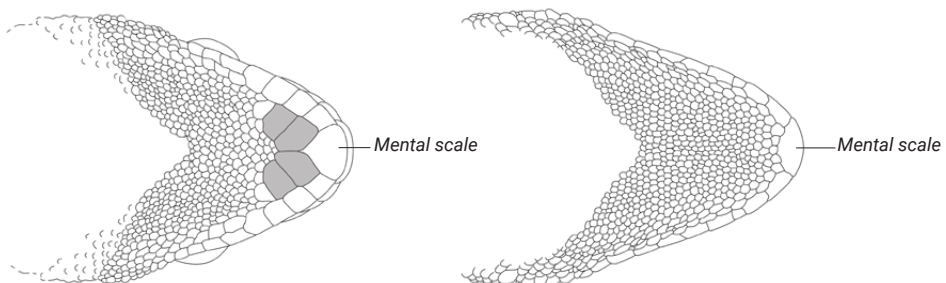
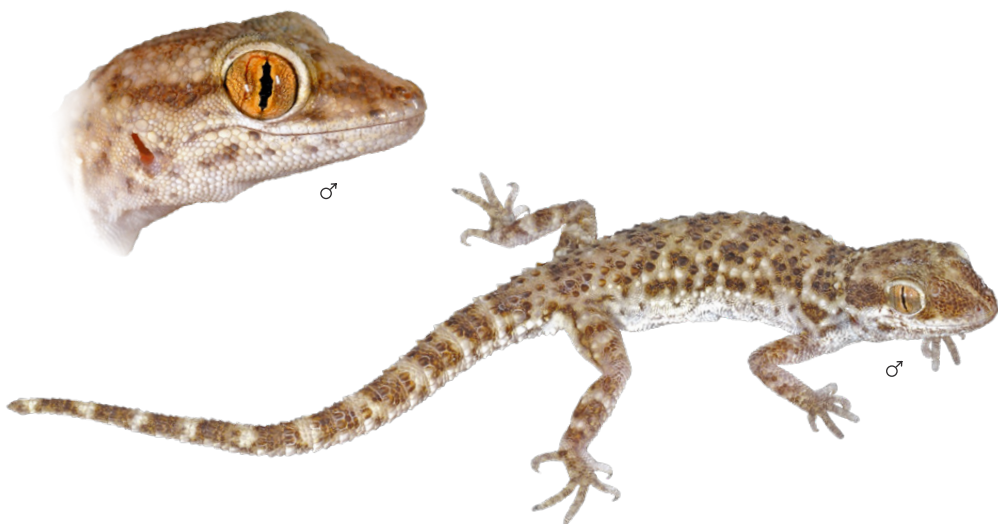


Fig 29: Underneath of Gekkota head. **Left:** Enlarged postmental scales present (gray); **Right:** No enlarged postmental scales.

**Bunopus tuberculatus** *Blanford, 1874*

Baluch Ground Gecko

**DESCRIPTION**

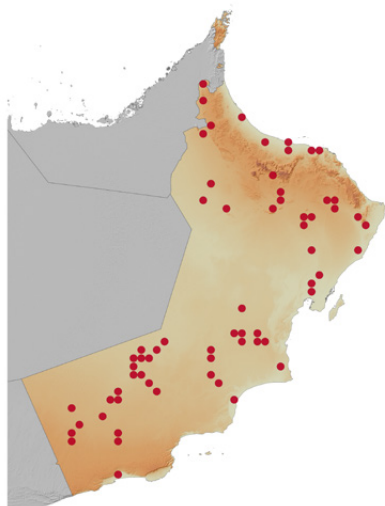
A small gecko with a moderately depressed body and head covered by round protruding granules. No enlarged postmental scales. Large eyes, vertical pupil with irregular borders. Body covered above with small flat scales and about 14 longitudinal rows of large, well-separated, strongly keeled trihedral tubercles. Ventral scales small and smooth. Males with 8–21 preanal pores. Tail slightly flattened, about 1–1.2 times the SVL with rings of enlarged keeled tubercles. Toes slender, without toepads, not strongly kinked. Dorsum from light-brown to grayish, with a series of irregular darker blotches or cross bars. A dark streak from the nostril, through the eye and to the back of the head.

**DISTRIBUTION**

Distributed from Pakistan, through southern Afghanistan and Turkmenistan, Iran, the Levant, and Arabia (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen). In Oman, it is widespread across the interior and coastal regions, but it is absent from the Musandam Peninsula, Masirah and Al-Hallaniyah islands.

**NATURAL HISTORY**

An abundant ground-dwelling, nocturnal, species. It occurs on a variety of substrates, ranging from sandy gravel plains, consolidated sand surfaces, such as sandy sabkhas and fossil dunes, to loose aeolian sand with sparse vegetation. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs under stones or in burrows.



Nocturnal



Least concern

SVL 57 mm



0 – 600 m

NATIVE



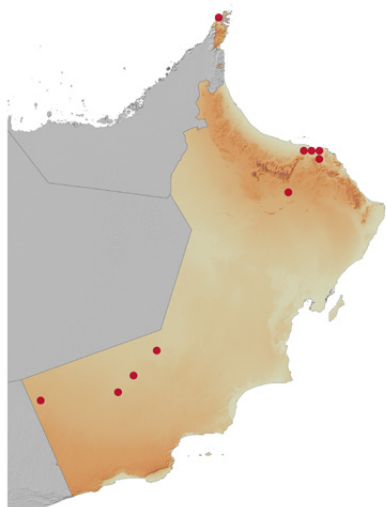
## *Cyrtopodion scabrum* (Heyden, 1827) **INTRODUCED**

Rough Bent-toed Gecko



### DESCRIPTION

A small gecko with a moderately depressed round body. Head covered with convex granules. Two pairs of enlarged postmental scales, the first pair in contact behind the mental scale. Large eyes, vertical pupil with irregular borders. Body covered above with small flat scales and 12–16 longitudinal rows of strongly keeled, trihedral tubercles. Ventral scales large, hexagonal and imbricate. Males with 4–7 preanal pores. Tail slightly flattened, about 1–1.2 times the SVL with enlarged tubercles. Toes long, without toepads, laterally compressed and strongly kinked. Coloration variable but usually the back light-brown or pinkish with a series of longitudinal rows of dark-brown blotches. Tail with a series of transverse dark bars above.



### DISTRIBUTION

It is the most widely distributed species of the genus *Cyrtopodion*, occurring from southeastern Anatolia, Turkey, eastwards through the entire Arabian Peninsula to northwest India, and southwards into Africa, along the Red Sea coast to Eritrea. The species has also been introduced in the USA. In Oman it is considered an introduced species, always associated with human settlements.

### NATURAL HISTORY

A ground-dwelling nocturnal species, it has a peak of activity after sunset. In Oman it is found around human settlements, on walls, piles of rocks, rubbish dumps, gardens and other man-modified environments but not inside houses. It preys on insects and other arthropods. Females lay several clutches of 1 or 2 hard-shelled eggs. Communal nesting is often a common occurrence.



Nocturnal



Least Concern

SVL 55 mm



0 – 500 m

**INTRODUCED**





**Key to the species of the genus *Hemidactylus* in Oman**

Eight new species of *Hemidactylus* (six of them endemic to Oman) have been described within the last nine years. In order to facilitate their identification, we provide a species level key of the genus in Oman. The key has been adapted from Carranza & Arnold (2012).

1.	a	No enlarged tubercles on the dorsum, hind legs and tail or, if present, dorsal tubercles few and weak	2
	b	Numerous enlarged tubercles, usually raised and keeled, on the dorsum, limbs and tail; the dorsal tubercles usually arranged in regular longitudinal rows	8
2.	a	Adults up to about 50 mm of SVL; 3–6 preanal pores in males; hind feet with 4–6 lamellae under the first toe, and 7–11 under the fourth toe	3
	b	Adults over 50 mm of SVL; hind feet with 6–10 lamellae under the first toe, and 9–14 under the fourth	6
3.	a	Adults from Oman up to about 40 mm of SVL but usually smaller; scaling fine, without any tubercles; expanded subcaudal scales beginning some way from the tail base; dorsal pattern spotted	<i>H. minutus</i>
	b	Adults up to about 40 mm or larger (up to 50 mm) of SVL; tubercles present on the body, back of the neck and hind legs; expanded subcaudal scales usually extend almost to the tail base	4
4.	a	Adults up to 45–50 mm of SVL; presence of enlarged tubercles beyond mid-body; 4 preanal pores in males; hind feet with 6 lamellae under the first toe, and 10–11 under the fourth	5
	b	Adults about 40 mm of SVL; usually with flat enlarged tubercles on the sides of the dorsum as far forwards as mid-body that are also present on the sides of the dorsal tail base and on the hind legs, and may also occur on the lower forelimb; expanded subcaudal scales usually extend almost to the tail base; 6 preanal pores in males; hind feet with 4–5 lamellae under the first toe, and 7–9 under the fourth	<i>H. paucituberculatus</i>
5.	a	Low conical or weakly keeled tubercles on dorsum and neck, arranged in 14 regular rows at mid-body, largest on lateral dorsum compared with mid-back and flanks; larger tubercles present on the hind legs and tail; adhesive pads narrow; expanded subcaudal scales extend almost to the tail base; 4 preanal pores in males, hind feet with 6 lamellae under the first toe, and 10–11 under the fourth toe	<i>H. inexpectatus</i>
	b	Presence of flat, enlarged tubercles mainly on the sides of the body and hind legs; very contrasting tail with black bands with pale interstices, even in adults, that extend to the ventral surface; Expanded subcaudal scales extend almost to the tail base; 4 preanal pores in males; hind feet with 6 lamellae under the first toe, and 10–11 under the fourth toe; endemic to Masirah Island	<i>H. masirahensis</i>
6.	a	Enlarged tubercles present on the sides of the tail; tail depressed; males with a series of femoral pores interrupted on the preanal region, 4–16 pores on the underside of each thigh	7

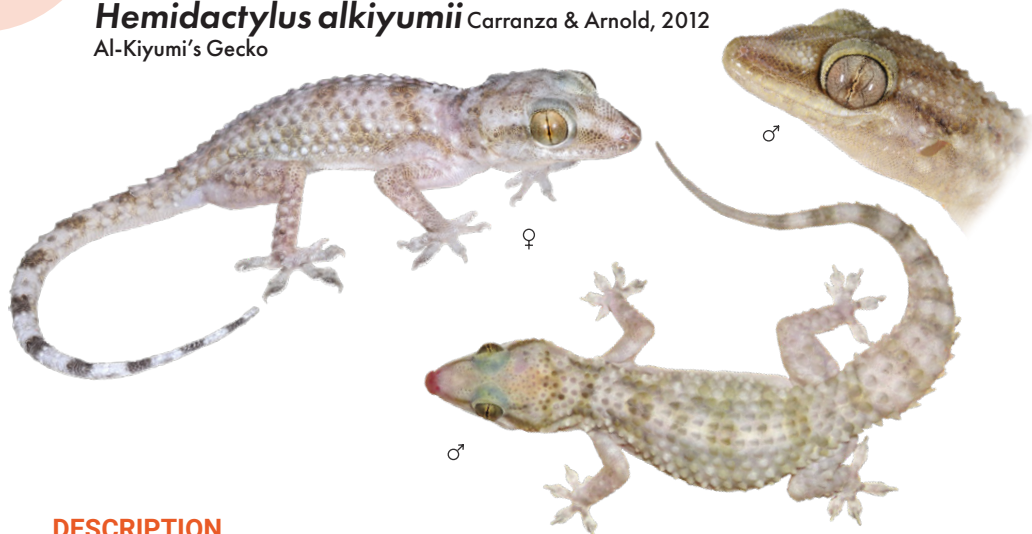


### Key to the species of the genus *Hemidactylus* in Oman

	<b>b</b>	No enlarged tubercles on the sides of the tail; tail round (not depressed); 3–8 pores present in front of vent in both sexes	<i>H. lemurinus</i>
<b>7.</b>	<b>a</b>	Adults up to 95 mm of SVL; tubercles never present on the back; tail with clear regular segments; 4–14 femoral pores on the underside of each thigh; hind feet with 7–10 lamellae under the first toe; dorsal coloration yellowish-gray, pale yellow, or yellowish-green, unmarked or with rather feeble dark wavy transverse bands; underside pale to bright yellow	<i>H. flaviviridis</i>
	<b>b</b>	Adults up to 80 mm of SVL; upper surface of body covered with small granules, uniform or intermixed with more or less numerous scattered round tubercles; 10–20 femoral pores on the underside of each thigh; hind feet with 6–7 lamellae under the first toe, and 9–12 under the fourth; dorsal coloration gray, with darker markings, forming undulating cross bars, rhomboidal spots on the middle of the back, or regular longitudinal bands; a dark stripe from the eye to the shoulder; underside white	<i>H. leschenaultii</i>
<b>8.</b>	<b>a</b>	Femoral pores present, at least in males, 7 under each thigh, broadly separated medially by 6 scales; tubercles on the back large, strongly keeled and trihedral; hind feet with 6 lamellae under the first toe and 9 under the fourth	<i>H. endophis</i>
	<b>b</b>	Preanal pores 4–10 in males, either in a continuous row or separated by one or two scales but never extend on the thighs	<b>9</b>
<b>9.</b>	<b>a</b>	Adults up to 55 mm of SVL; adhesive pads not strongly expanded, not much wider than the toes; dorsal tubercles rather small and not clearly keeled and trihedral; hind feet with 5–7 lamellae under the first toe and 9–11 under the fourth; a very distinctive black streak running from the nostril through the eye to the ear opening	<i>H. robustus</i>
	<b>b</b>	Adults up to 88 mm of SVL, although one species does not exceed 53 mm; adhesive pads on digits strongly expanded; dorsal tubercles of moderate to large size, keeled, and trihedral; hind feet with 6–11 lamellae under the first toe and 10–14 under the fourth	<b>10</b>
<b>10.</b>	<b>a</b>	Hind feet with 7–11 lamellae under the first toe and 11–14 under the fourth; found in North Oman	<b>11</b>
	<b>b</b>	Hind feet with 6–9 lamellae under the first toe and 10–12 under the fourth; found in South Oman	<b>12</b>
<b>11.</b>	<b>a</b>	Adults up to 67 mm of SVL; hind feet with 7–9 lamellae under the first toe; 4–6 preanal pores; endemic to the Jebel Akhdar massif and the Eastern Hajars, North Oman	<i>H. hajarensis</i>
	<b>b</b>	Adults up to 88 mm of SVL; hind feet with 10–11 lamellae under the first toe; 5–6 preanal pores; endemic to the Jebel Akhdar massif, North Oman	<i>H. luqueorum</i>
	<b>c</b>	Adults up to 67 mm of SVL; hind feet with 8–9 lamellae under the first toe; 8–11 preanal pores; known from a single locality in the Western Hajars, North Oman	<i>H. persicus</i>
<b>12.</b>	<b>a</b>	Adults up to about 54 mm of SVL; 6 preanal pores; slender; distinctive pattern of narrow dark bands, one on the neck, three on the back, and one anterior to the sacrum, often suffused with yellow in life; tail very light distally, with a pattern of 7–9 widely separated dark bands, the more distal ones extending to the ventral surface	<i>H. festivus</i>
	<b>b</b>	Adults up to about 90 mm of SVL; 6–10 preanal pores; robust; tail not light distally, with a pattern of 11–14 dark bands	<i>H. alkiyumii</i>

***Hemidactylus alkiyumii*** Carranza & Arnold, 2012

Al-Kiyumi's Gecko

**DESCRIPTION**

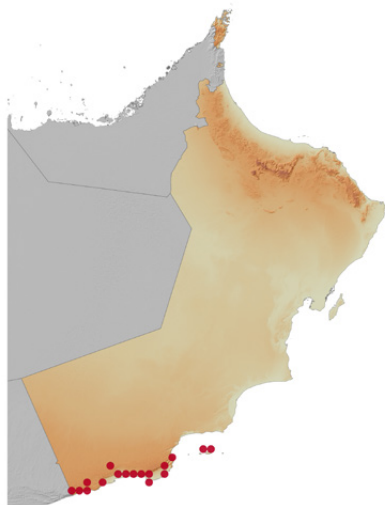
A medium-sized gecko with robust depressed body and relatively wide head covered with granules. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and a series of 11–14 longitudinal rows of strongly keeled, trihedral tubercles. Males with 6–10 preanal pores. Tail relatively slender, about 1–1.2 times the SVL with enlarged tubercles. Toes medium-sized; hind feet with 6–9 lamellae under the first toe and 10–12 lamellae under the fourth toe. Very variable coloration, from light to dark brown, sometimes with a pattern of irregular spots or dark transverse crosses with approximately one on neck, three on body and one or two on anterior sacrum. Tubercles on body sometimes with opaque white pigment. Morphologically similar to *H. festivus*.

**DISTRIBUTION**

Endemic to southern Arabia, it inhabits the monsoon affected side of the Dhofar Mountains, North of Wadi Hasik and westwards to Damqawt in eastern Yemen. It was recently found in Al-Hallaniyah, the largest of the Khuriya Muriya Islands off the southeastern coast of Oman.

**NATURAL HISTORY**

A mainly nocturnal species, it can also be seen during the day in the shadow of densely forested areas and crevices. It is often found in relatively mesic areas, though it also occurs in more open wadis south of Wadi Ayun and in eastern Dhofar, and in gardens within Salalah city. A mainly rock-dwelling species, it is found on rock faces, in caves, on buildings and sometimes on the ground. It can be locally abundant inside large caves and in road tunnels. It is relatively quick and tends to loose its skin when handled. It preys on insects and other arthropods. Females lay clutches of hard-shelled eggs that they glue to stones, rocks or trees.



Nocturnal



Not Evaluated

SVL 90 mm



0 – 1,650 m

**NATIVE**



# *Hemidactylus endophis* Carranza & Arnold, 2012

Snake's Gut Gecko



## DESCRIPTION

A small gecko with head and body not markedly depressed, and rather narrow head. Body covered above with small scales and 16 longitudinal rows of enlarged weekly-keeled tubercles. The only known male has 7 femoral pores under each thigh (14 in total). Tail missing in the only known specimen. Toes medium-sized; hind feet with 6 lamellae under the first toe and 9 lamellae under the fourth toe. Color of the only known specimen (preserved in alcohol) is beige gray above and paler below. No pattern discernible, probably because of partial digestion.



## DISTRIBUTION

This species is only known from a single specimen found in 1976 in the stomach of a preserved snake, *Platycephalus rhodorachis*, that had been deposited in the collections of the Natural History Museum, London, for 91 years. According to the label and data available, the snake (and the gecko inside its stomach) was collected around Muscat, North Oman by Colonel A.S.G. Jayakar and deposited in the museum in London in 1885. Until more data is available, this species is considered endemic to Oman.

## NATURAL HISTORY

No data is available for this species' natural history. It is possible that this enigmatic *Hemidactylus* may have a distinctive habitat of its own, for example trees or bushes. Such situations should be explored in further searches for this form.



Nocturnal



Not Evaluated

SVL 59 mm



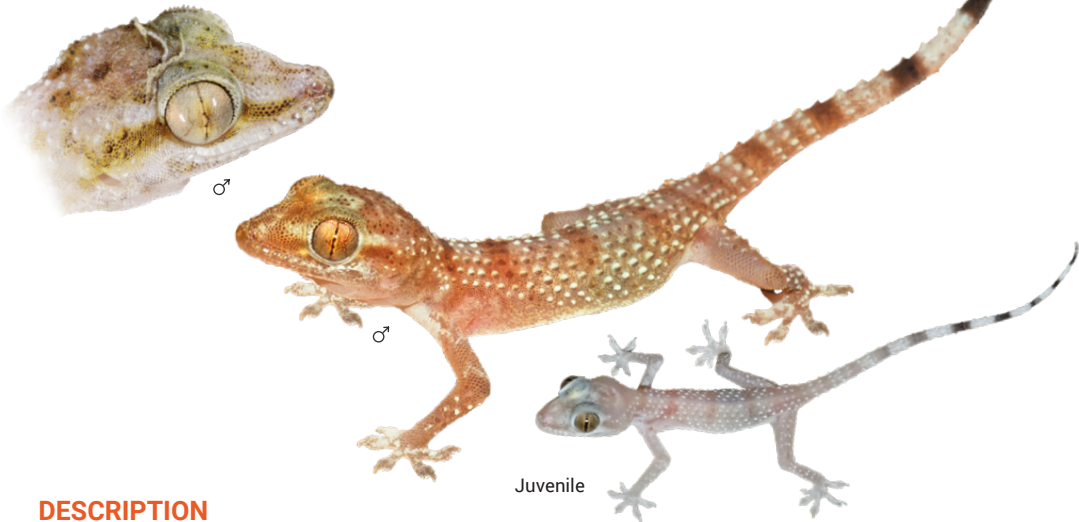
Unknown

ENDEMIC



***Hemidactylus festivus*** Carranza & Arnold, 2012

Festive Gecko

**DESCRIPTION**

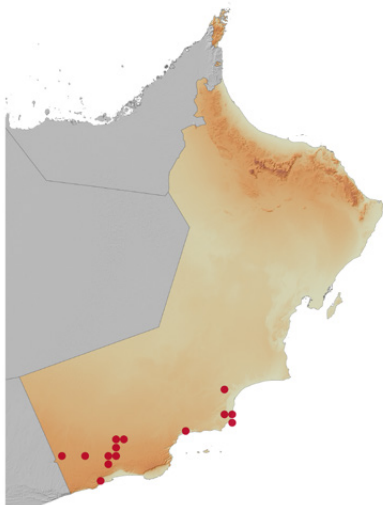
A small slender gecko with head and body not markedly depressed and head with small rounded granules. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and 12–15 longitudinal rows of enlarged, keeled, trihedral tubercles. Males with 6 preanal pores. Tail relatively slender, about 1–1.2 times the SVL, with enlarged tubercles. Toes medium-sized; hind feet with 6–7 lamellae under the first toe and 10–12 lamellae under the fourth toe. Dorsum with a distinctive pattern of narrow dark bands: one on neck, three on body and one on anterior sacrum. Tubercles on body often with white pigment. Tail very light distally, with a pattern of 7–9 widely separated dark bands, the more distal ones extending to the ventral surface. Morphologically similar to *H. alkiyumii*.

**DISTRIBUTION**

Endemic to southern Arabia, it is distributed across 850 km, from the Hadramaut in southeastern Yemen to the southern Dhofar Governorate in Oman, as far East as Sawqirah. *Hemidactylus festivus* mainly occupies the dry landward side of the Dhofar Mountains, with the exception of Wadi Mughsayl, and in general much dryer habitats than *H. alkiyumii*.

**NATURAL HISTORY**

It is a strictly nocturnal species often found in rocky areas and on large boulders. This species is particularly agile, especially subadults who progress in a series of leaps when pursued, with the tail raised to show its conspicuous black and white coloring. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs on the ground.



Nocturnal



Not Evaluated

SVL 54 mm



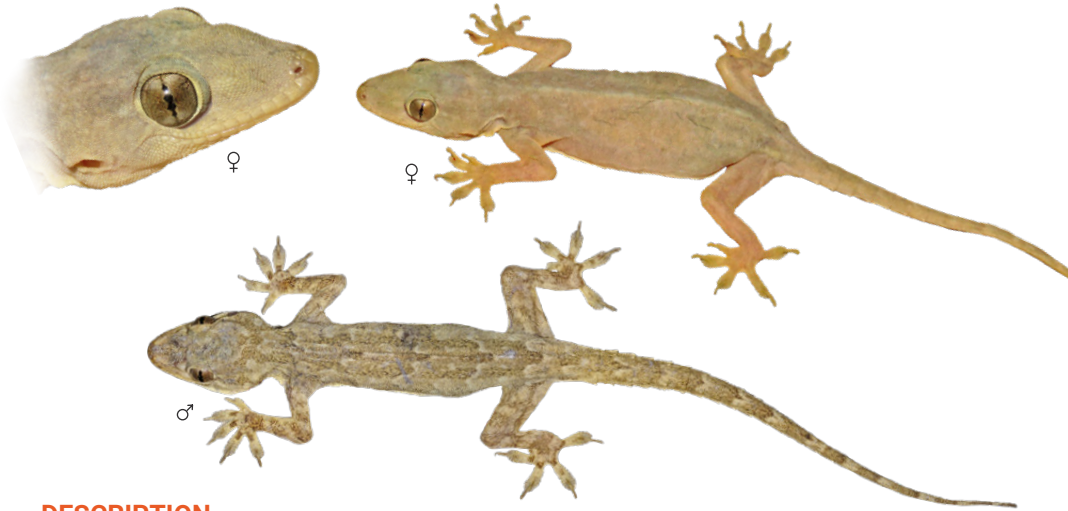
0 – 800 m

**NATIVE**



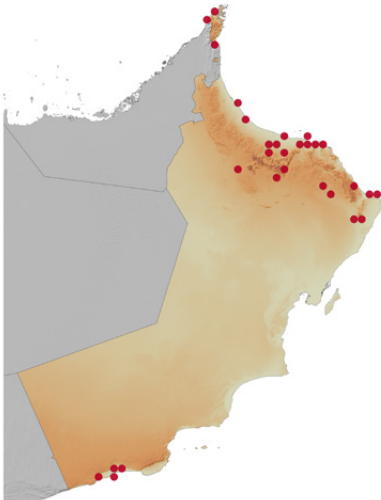
## *Hemidactylus flaviviridis* Rüpell, 1835 **INTRODUCED**

Yellow-bellied House Gecko



### DESCRIPTION

A medium-sized gecko with depressed body and wide head. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and with no enlarged dorsal tubercles. Males with 4–14 femoral pores under each thigh. Tail relatively slender, about 1–1.2 times the SVL with regular segments and a lateral row of pointed tubercles. Toes broad; hind feet with 7–10 lamellae under the first toe and 11–14 lamellae under the fourth toe. Variable and changeable coloration, dorsal part from yellowish-white on animals out at night to darker gray or brown with a pattern of five dark undulating transverse bands on animals found out during the day. Ventral side yellow or whitish. It cannot be confused with any other *Hemidactylus* from Oman.



### DISTRIBUTION

Widely distributed, it extends from northern India, Pakistan, westwards through Iran, Iraq, and around the coastal areas of the Arabian Peninsula, Socotra Island, the coast of Egypt, Sudan, Eritrea, Djibouti, and northern Somalia. Its range in Arabia and Africa is believed to be the result of human introductions. In Oman it is only found on buildings and other man-made structures in cities, mainly in the North and South of the country.

### NATURAL HISTORY

A mainly nocturnal species, it can also be seen during the day. It mainly lives in and around houses. At night it gathers around wall lights catching moths and other insects. It can run fast to seek refuge if disturbed. It preys on insects and other arthropods. Females lay 2 hard-shelled eggs that hatch after 5–7 weeks.



Nocturnal



Least concern

SVL 95 mm



0 – 700 m

**INTRODUCED**

***Hemidactylus hajarensis*** Carranza & Arnold, 2012

Hajar Mountain Gecko

**DESCRIPTION**

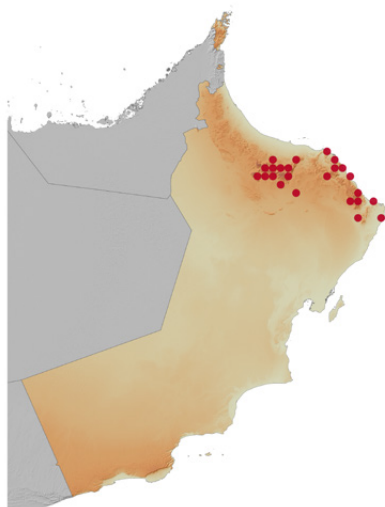
A small gecko with head and body not markedly depressed and broad head with small convex rounded granules. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and 13–15 longitudinal rows of strongly keeled, trihedral tubercles. Males with 4–6 preanal pores. Tail relatively slender, about 1.2–1.4 times the SVL with enlarged tubercles. Toes medium-sized; hind feet with 7–9 lamellae under the first toe and 11–14 lamellae under the fourth toe. Dorsum pale gray with dark blotches or bars. Tail with small irregular dark blotches basally and numerous irregular dark bands more distally. Tubercles on body sometimes with opaque white pigment. Morphologically similar to *H. luqueorum* and *H. persicus*.

**DISTRIBUTION**

The species is widespread in the mountains of North Oman, from the Jebel Akhdar massif to the East. Despite intensive surveys across the Hajar Mountain, it has never been found to the West of Jebel Akhdar. Several localities are known from coastal wadis near Muscat and the Eastern Hajars. The species is therefore endemic to the Hajar Mountains of Oman.

**NATURAL HISTORY**

A strictly nocturnal species often found on the rocky slopes of wadis, lower down on rocks sometimes partly overhung with vegetation. The species is also sometimes seen on gravel floors of wadis. As *H. luqueorum*, it loses the skin very easily when being handled and sometimes specimens have scars of regenerated skin on the back. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 67 mm



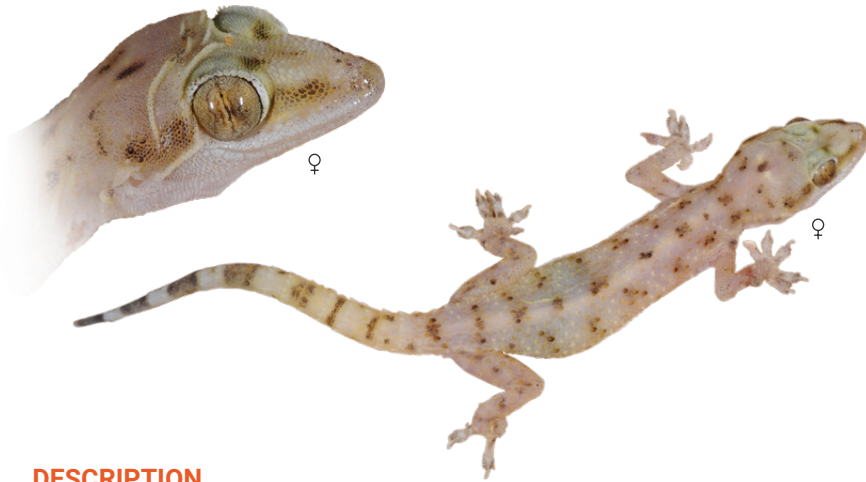
0 – 1,700 m

**ENDEMIC**



# *Hemidactylus inexpectatus* Carranza & Arnold, 2012

Al Wusta Gecko



## DESCRIPTION

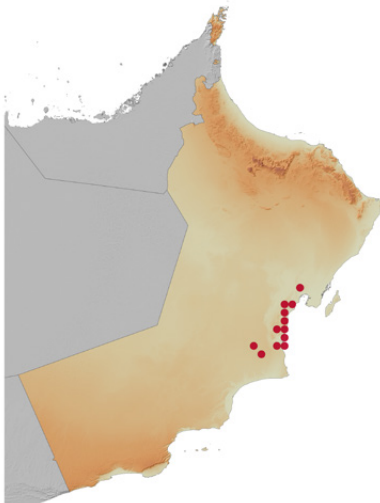
A small slender gecko with head and body markedly depressed and a few small tubercles on the back of the head. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and about 14 longitudinal rows of small conical tubercles. Larger tubercles present on hind limbs and tail. Males with 4 preanal pores. Tail slender, about 1–1.2 times the SVL. Toes narrow; hind feet with 6 lamellae under the first toe and 10–11 lamellae under the fourth toe. Expanded subcaudal scales extend to about 2–4 whorls from tail base. Dorsum with a pattern of irregular dark spots and streaks; tail with 8–9 dark bands that increase in intensity distally contrasting with pale interstices, the final 5–6 dark bands extending to the ventral surface. Morphologically similar to *H. masirahensis*, *H. minutus* and *H. paucituberculatus*.

## DISTRIBUTION

Endemic to Oman, to date it has only been found in the Al Wusta Governorate. It is distributed through a short coastal strip (150 km) and some low altitude inland localities, from West of Barr Al Hikman to Duqm. It is probably also present in the offshore island of Hammar-an-Nafur, 6 km off the Oman coast.

## NATURAL HISTORY

A mainly nocturnal species, it can also be active during the day in road tunnels. Very little is known about this species of *Hemidactylus*. It inhabits bare rock outcrops with very little or no vegetation but it has also been found in more vegetated areas close to water and on man-made structures such as tunnels, houses and even on the walls of relatively new buildings. Like *H. minutus* and *H. paucituberculatus*, it is very agile, often proceeding in a series of leaps when pursued. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 45 mm



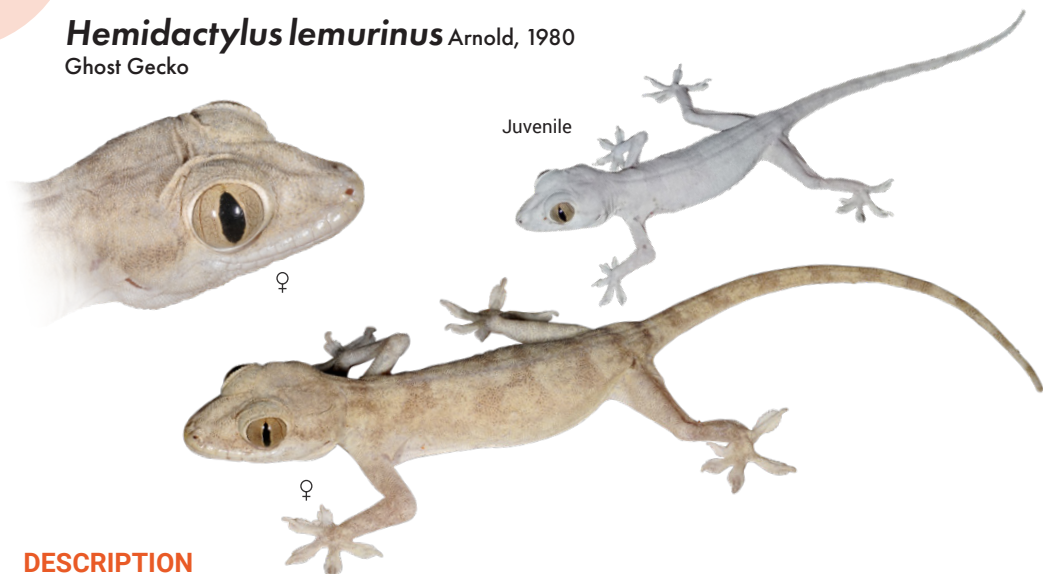
0 – 200 m

**ENDEMIC**



***Hemidactylus lemurinus*** Arnold, 1980

Ghost Gecko

**DESCRIPTION**

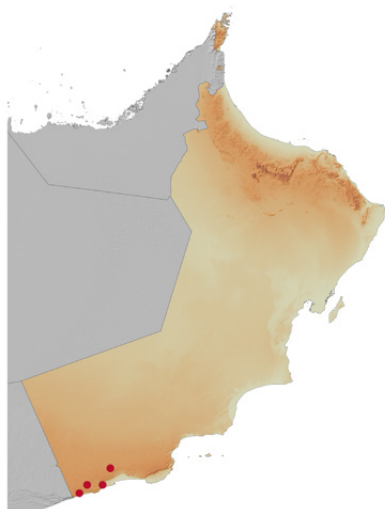
A medium-sized slender gecko with body not markedly depressed, robust head and well-defined neck. Very large eyes; vertical pupil with irregular borders. Very fine scaling all over the body without enlarged tubercles. Males and females with 4–8 preanal pores. Tail round and slender, about the same size as the SVL, without enlarged tubercles. Long and slender limbs. Toes broad, with large adhesive pads; hind feet with 6–7 lamellae under the first toe and 10–12 lamellae under the fourth toe. Pale variable coloration depending on substrate and time of the day, completely white at night on white boulders and light brown with a very weak pattern of dark brown transverse bars on the body and tail on darker rocks and during the day.

**DISTRIBUTION**

A southern Arabian endemic, it is only known from very few localities distributed from about 70 km West of Al Mukalla, along the Yemen coast to Dhofar. In Oman it is known from a few coastal localities in the monsoon affected side of the western Dhofar Mountains and also from some inland places. It has never been found on the eastern Dhofar Mountains and in the Jebel Samhan massif.

**NATURAL HISTORY**

A mainly nocturnal species, it can also be seen during the day in crevices and in road tunnels. The habitat at its type locality and at Wadi Sayq consists of large smooth white boulders but it has also been found on darker rocks and boulders at Marneef Cave and other localities. An excellent climber. It has a particular preference for boulders with cavities and small crevices for hiding. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Data Deficient

SVL 68 mm



0 – 800 m

NATIVE



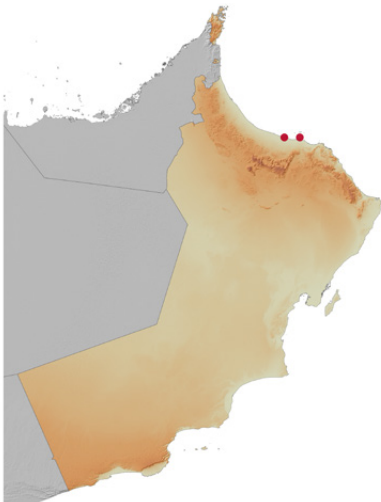
## *Hemidactylus leschenaultii* Duméril & Bibron, 1836 **INTRODUCED**

Leschenault's Gecko



### DESCRIPTION

A medium-sized gecko with robust depressed body and relatively wide head. Large eyes; vertical pupil with irregular borders. Very fine scaling all over the body with scattered feebly keeled tubercles. Males with 10–17 femoral pores under each thigh. Tail with clear segments, dorso-ventrally depressed, about the same size as the SVL and with enlarged tubercles. Toes broad; hind feet with 6–7 lamellae under the first toe and 9–12 lamellae under the fourth toe. Dorsal coloration variable, combining dark gray or black and light gray or brown to provide camouflage against the bark of *Acacia* trees. There are undulating crossbars and spots on the back and two thick lateral dark streaks extending from the back of the eye, over the shoulders and hips and along the tail.



### DISTRIBUTION

Originally from South India, Sri Lanka and Pakistan, its presence in Oman is the result of human introduction. It has been found only in two localities in the Batinah Plain. Within the Omani Mammal Breeding Centre on Bait Al Barakha, and in an *Acacia* woodland South of Al Sawadi.

### NATURAL HISTORY

A mainly arboreal and nocturnal species, it can also be seen during the day in the shadow resting on tree trunks and branches or hiding in tree hollows. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 83 mm

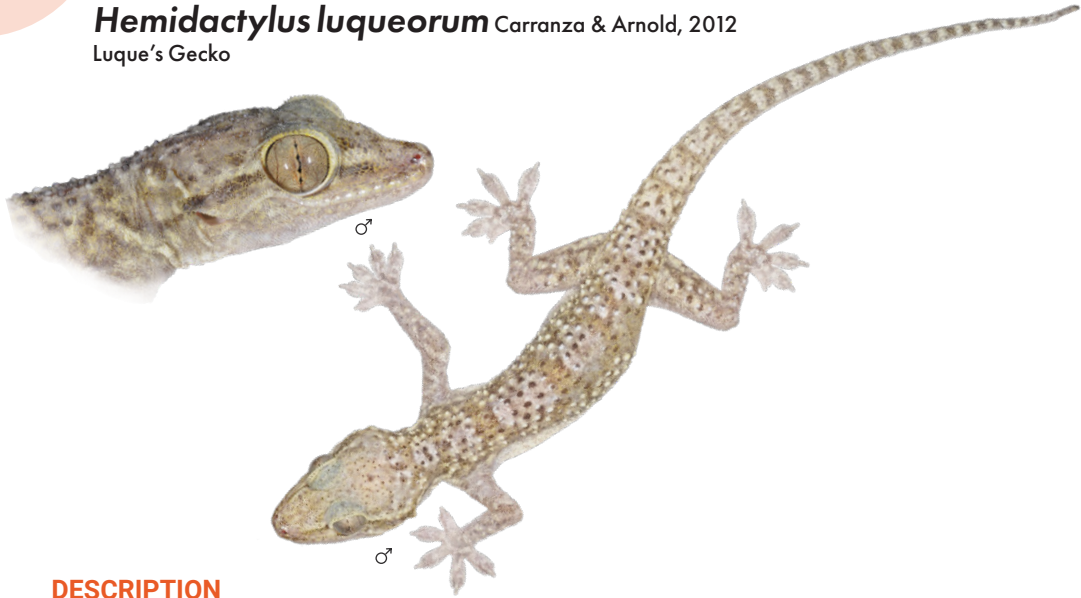


0 – 25 m

**INTRODUCED**

***Hemidactylus luqueorum*** Carranza & Arnold, 2012

Luque's Gecko

**DESCRIPTION**

A medium-sized gecko with robust depressed body and relatively wide head covered with small conical tubercles. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and 13–15 longitudinal rows of strongly keeled, trihedral tubercles, becoming smaller and more pointed on flanks. Males with 5–6 preanal pores. Tail relatively slender, about 1.2 times the SVL, with enlarged tubercles. Toes very broad; hind feet with 10–11 lamellae under the first toe and 13–14 lamellae under the fourth toe. Dorsum somber, sometimes with a pattern of pale brown irregular spots, transverse stripes or crosses. Tail with small irregular dark blotches basally and numerous transverse dark bands more distally. Morphologically similar to *H. persicus* and *H. hajarensis*.

**DISTRIBUTION**

Despite intensive surveys across the Hajar Mountains, *H. luqueorum* has only been found in the Jebel Akhdar massif in north Oman and therefore it is considered endemic to this biodiversity rich mountain massif. It has been recorded from altitudes of 500 m at Wadi Al Khahafa up to 2,200 m at Wadi Bani Habib.

**NATURAL HISTORY**

A mainly nocturnal species, it can also be seen out during the day in the shadow of rock crevices and caves. The species occurs on rocky sides of wadis, buildings, and occasionally on gravely wadi floors. It can be locally abundant inside large caves. It moves relatively slowly and is quite confident. Its skin losses very easily and sometimes specimens have large scars of regenerated skin on the back. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 88 mm



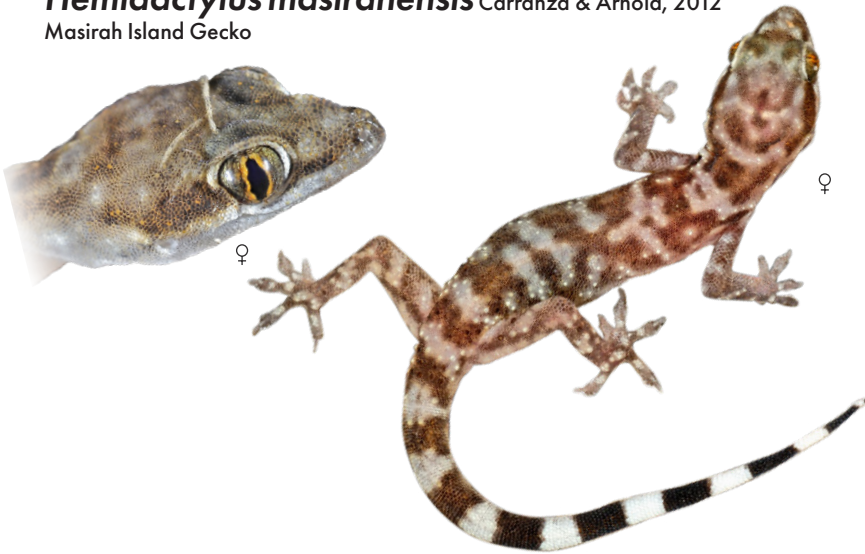
500 – 2,200 m

**ENDEMIC**



## *Hemidactylus masirahensis* Carranza & Arnold, 2012

Masirah Island Gecko



### DESCRIPTION

A small slender gecko with head and body markedly depressed. Large eyes; vertical pupil with irregular borders. Body with small scales and weakly enlarged scales on the sides of dorsum of body that become larger posteriorly, especially on the sacral region, tail base, and hind legs, where they are raised and tuberculated. Males with 4 preanal pores. Tail slender, about 1–1.2 times the SVL. Toes narrow; hind feet with 6 lamellae under the first toe and 10–11 lamellae under the fourth toe. Expanded subcaudal scales extend almost to the tail base. Dorsum with a pattern of irregular dark spots and streaks; tail with 8–9 dark bands that increase in intensity distally, contrasting with smaller pale interstices. The more distal 4–6 bands of the tail extend to the ventral surface. Morphologically similar to *H. inexpectatus*, *H. minutus* and *H. paucituberculatus*.

### DISTRIBUTION

Endemic to Oman, so far it has only been found in Masirah Island, thus it is an important representative of the island vertebrate fauna. It is distributed across the island.

### NATURAL HISTORY

A mainly nocturnal species, it can also be active during the day in road tunnels. Very little is known about this species of *Hemidactylus*. It is found in dry places on rock surfaces near the ground. *Hemidactylus masirahensis* is sympatric with *Trachydactylus hajarensis*, with whom it shares the same spatial niche. It is very agile, often proceeding in a series of leaps when pursued. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 50 mm



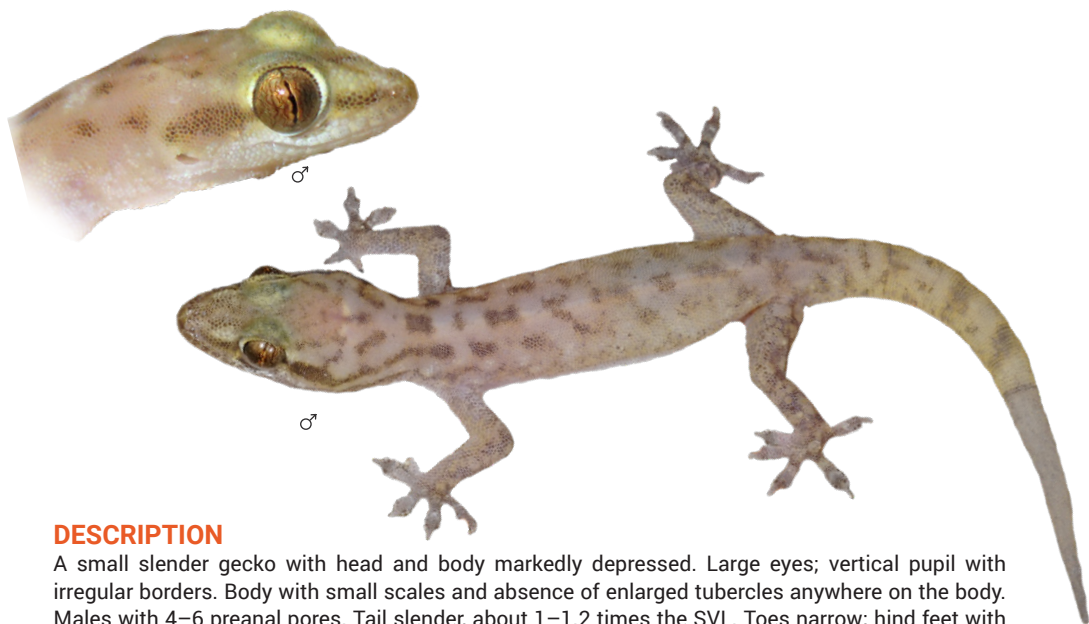
0 – 100 m

ENDEMIC



***Hemidactylus minutus*** Vasconcelos & Carranza, 2014

Dwarf Gecko

**DESCRIPTION**

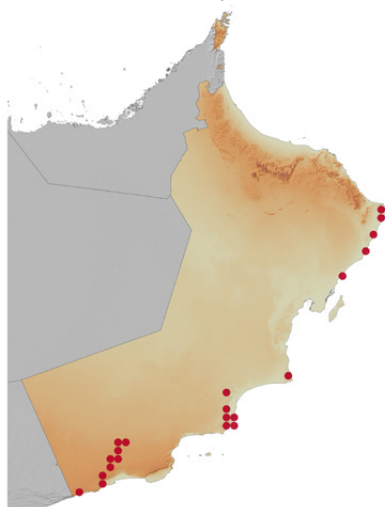
A small slender gecko with head and body markedly depressed. Large eyes; vertical pupil with irregular borders. Body with small scales and absence of enlarged tubercles anywhere on the body. Males with 4–6 preanal pores. Tail slender, about 1–1.2 times the SVL. Toes narrow; hind feet with 4–5 lamellae under the first toe and 7–9 lamellae under the fourth toe. Expanded subcaudal scales beginning some way from the tail base. Dorsum light brown or pinkish with a pattern of irregular dark spots and streaks. Tail with around 8–10 dark bands that increase in intensity distally with weakly contrasted black and white banded pattern underneath. Morphologically similar to *H. inexpectatus*, *H. masirahensis* and *H. paucituberculatus*.

**DISTRIBUTION**

An Arabian endemic, it is distributed across the Arabian Sea coast, from Damqawt, in southeastern Yemen to Ras Al Had in northeastern Oman. Apart from its coastal distribution, it is also found on some inland localities, especially North of the Dhofar Mountains.

**NATURAL HISTORY**

A nocturnal ground-dwelling species, it is usually found in dry places with stony, gravely or even sandy substrates with rocky outcrops. It is abundant in many parts of its distribution range. It is very agile, escaping in a series of leaps when pursued. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 40 mm



0 – 1,100 m

**NATIVE**



## *Hemidactylus paucituberculatus* Carranza & Arnold, 2012

Dhofar Coastal Gecko



### DESCRIPTION

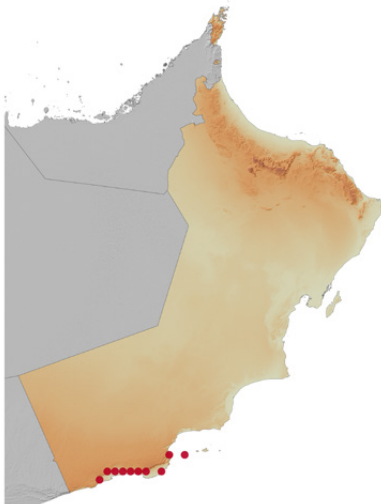
A small slender gecko with head and body markedly depressed. Large eyes; vertical pupil with irregular borders. Body with small scales and with flat enlarged tubercles on the sides of dorsum as far forwards as mid-body on the sides of the dorsal tail base, on the hind legs, where they are raised, and sometimes also on the lower forelimb. Males with 6 preanal pores. Tail slender, about 1–1.2 times the SVL. Toes narrow; hind feet with 4–5 lamellae under the first toe and 7–9 lamellae under the fourth toe. Expanded subcaudal scales usually extend almost to the tail base. Dorsum light brown or pinkish with a pattern of irregular dark spots and streaks. Tail with around 8–10 dark bands that increase in intensity distally and with a weakly contrasted black and white banded pattern underneath. Morphologically similar to *H. inexpectatus*, *H. masirahensis* and *H. minutus*.

### DISTRIBUTION

Endemic to Oman, it has a very small distribution range restricted to the Dhofar coastal areas comprised between Mughsayl in the West to Hasik in the East. Although it is sympatric with *H. minutus* in Wadi Mughsayl, the two morphologically very similar species are allopatric across their ranges, with *H. paucituberculatus* inhabiting more mesic habitats close to the sea. The population of small *Hemidactylus* from the Al-Hasikiyah Island, the westernmost of the Khuriya Muriya Islands, most probably belongs to this species but a detailed study is need to confirm this.

### NATURAL HISTORY

A nocturnal ground-dwelling species, found usually in dry places on rocky surfaces near the ground, and on the beach on sandy substrates with rocks present. It is very agile, often proceeding in a series of leaps when pursued. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 40 mm

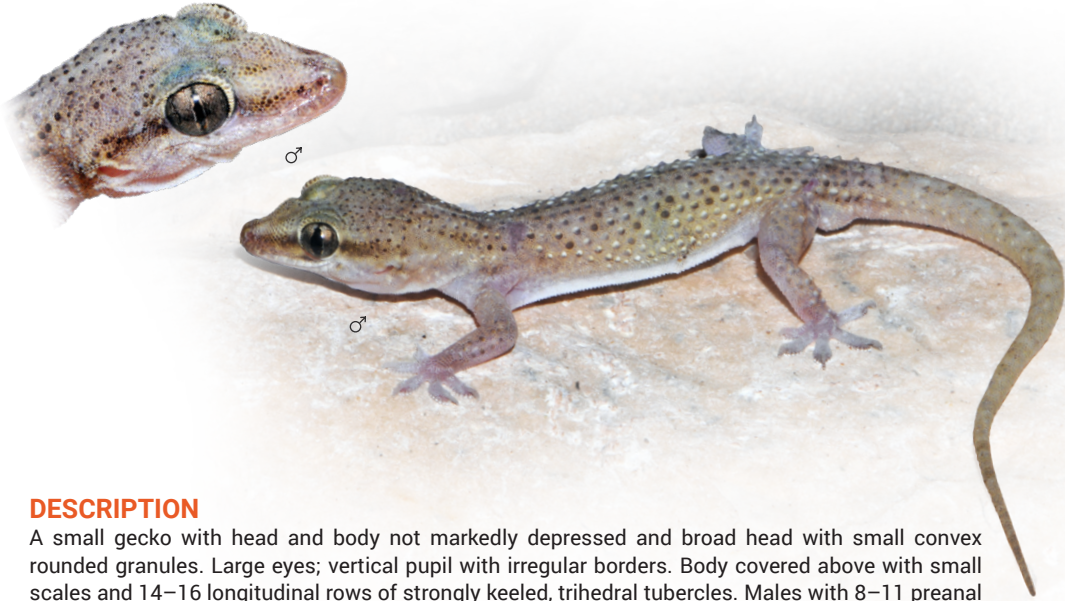


0 – 900 m

ENDEMIC

***Hemidactylus persicus*** Anderson, 1872

Persian Gecko

**DESCRIPTION**

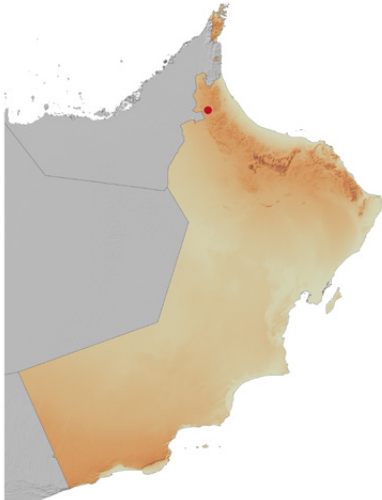
A small gecko with head and body not markedly depressed and broad head with small convex rounded granules. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and 14–16 longitudinal rows of strongly keeled, trihedral tubercles. Males with 8–11 preanal pores. Tail relatively slender, about 1.2 times the SVL, with enlarged tubercles. Toes medium-sized; hind feet with 8–9 lamellae under the first toe and 11–14 lamellae under the fourth toe. Dorsum pale gray with dark blotches or bars. A dark streak on the sides of the head, extending from behind the nostrils to the ear openings. Tail with small irregular dark blotches basally and numerous irregular dark bands more distally. Body tubercles sometimes with opaque white pigment. Morphologically similar to *H. hajarensis* and *H. luqueorum*.

**DISTRIBUTION**

Widespread across southwestern Asia, from North India, across Pakistan, coastal South Iran, Iraq, Kuwait, the eastern coast of Saudi Arabia, Bahrain, Qatar and UAE. In Oman, the species is only known from a single locality, Dhahr, in the Hajar Mountains, where it was found in an underground water channel (falaj).

**NATURAL HISTORY**

A strictly nocturnal species, it is often found on cliffs, boulders, on rocky ground, and in shrubs. It is very active, jumping and running at speed when pursued. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 67 mm



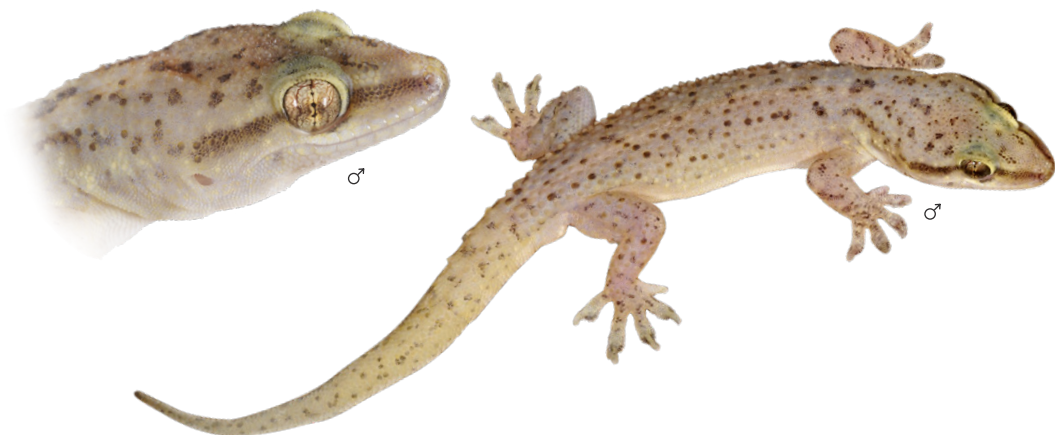
660 m

**NATIVE**



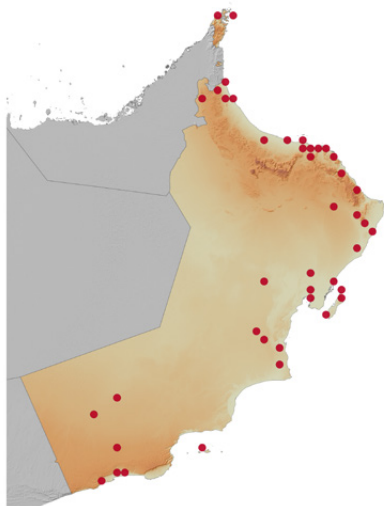
## *Hemidactylus robustus* Heyden, 1827

Red Sea House Gecko



### DESCRIPTION

A small, morphologically very variable gecko, with head and body rather depressed and relatively narrow head with small granules. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and 14–17 longitudinal rows of small moderately keeled tubercles. Males with 6–7 preanal pores. Tail relatively slender, about 1.1 times the SVL, with small tubercles. Toes narrow; hind feet with 5–7 lamellae under the first toe and 9–11 lamellae under the fourth toe. Dorsum pale gray or pink, with a series of dark blotches or transverse bars. A very distinctive dark streak on the sides of the head, running from behind the nostrils to the ear openings. Tail with numerous, sometimes irregular, dark bands. Body tubercles sometimes with opaque white pigment.



### DISTRIBUTION

Widespread across southwestern Asia and the eastern African coast, from Pakistan in the East, through coastal Iran, Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, UAE, Oman, Yemen (including Socotra Island), and through the eastern coast of Egypt to the Horn of Africa. In Oman it is very abundant and widespread across the country, including Masirah Island, Ad Dimaniyat, and in Al-Hallaniyah, the largest of the Khuriya Muriya Islands. Some of the localities are the result of human introductions.

### NATURAL HISTORY

A nocturnal species often found in or around human habitations, walls, gardens, palm plantations, and other man-modified environments. Populations outside inhabited areas can be found on the ground on sandy areas with sparse vegetation, on rocks, boulders and on trees. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 57 mm



0 – 1,050 m

**NATIVE**





### Unidentified *Hemidactylus* from the Sharqiyah Sands

A single specimen of *Hemidactylus* was found by some collaborators under large stones in a very sandy area outside the Al Areesh Desert Camp (22.495457N, 58.684040E). The animal was not collected but a photograph was taken together with a tissue sample that was stored for further genetic analyses. The animal is morphologically similar to *H. robustus* but the DNA sequence of the mitochondrial gene 12S rRNA suggests that it is an independent lineage, more closely related

to the small *Hemidactylus* from Dhofar (*H. paucituberculatus*, *H. minutus*, *H. inexpectatus*, and *H. masirahensis*) than to *H. robustus*.

This specimen was referred to as *Hemidactylus* sp 1 in the Atlas of Oman by Carranza et al. 2018. The area has been visited in several occasions since 2013, but without any success. Until more material is available it will be difficult to clarify the taxonomic status of this specimen.

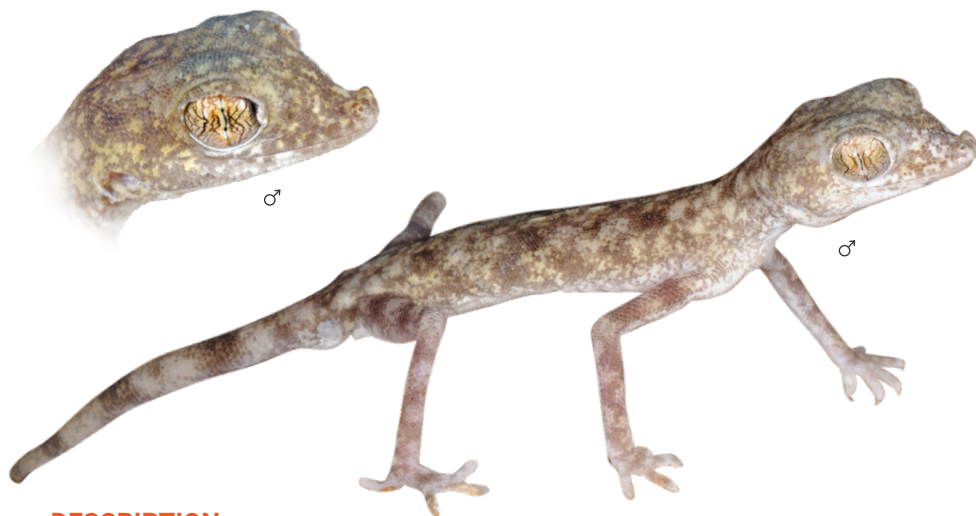


Habitat where the unidentified individual of *Hemidactylus* was found.



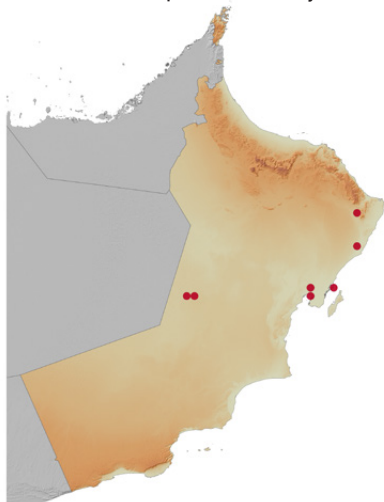
## *Pseudoceramodactylus khobarensis* Haas, 1957

Gulf Sand Gecko



### DESCRIPTION

A medium-sized slender gecko with rounded body, broad head and very long extremities. Very protuberant nostrils and presence of enlarged postmental scales. Nostril in contact with the rostral scale but not with the first upper labial. Large eyes; vertical pupil with irregular borders. Limbs relatively long and slender. Body covered above with small scales; posterior ventral scales larger than dorsals. Preanal pores absent and cloacal tubercles usually in two or three rows. Tail round, short and rather thin, about 0.8 times the SVL. Tail autotomy not restricted to the tail base. Toes not depressed or fringed, with 10–15 rows of sharply pointed scales beneath. Dorsal coloration usually pale yellow or even translucent pink, overlaid by a variable pattern of dark markings. Tail with dorsal bars.



### DISTRIBUTION

Distributed across parts of the Arabian Gulf, including Bahrain, Kuwait, Oman, Qatar, Qeshm Island (Iran), Saudi Arabia and UAE. Although initially it was thought to be restricted to coastal areas, it has been recently found deep in the interior of UAE and Oman, at the margins of the Rub' Al Khali Desert.

### NATURAL HISTORY

A nocturnal ground-dwelling species, it is found on moist, salt-impregnated to solid, salt-encrusted flats (sabkhas), where it is often the sole reptile dweller of such extreme environments. The rows of pointed scales beneath the toes are an adaptation to walk over the sabkhas, avoiding touching the substrate with the skin. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 70 mm

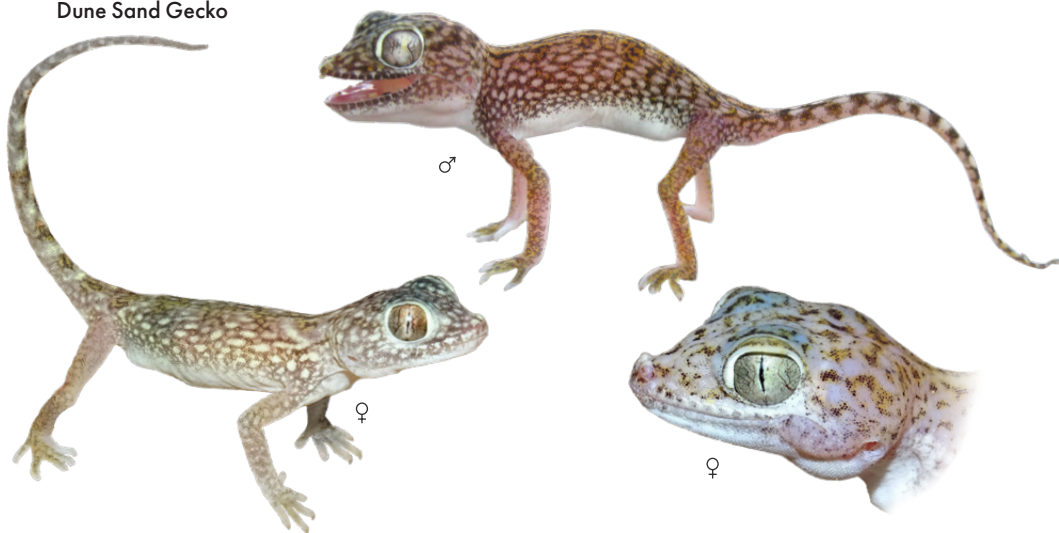


0 – 200 m

**NATIVE**

***Stenodactylus doriae*** (Blanford, 1874)

Dune Sand Gecko

**DESCRIPTION**

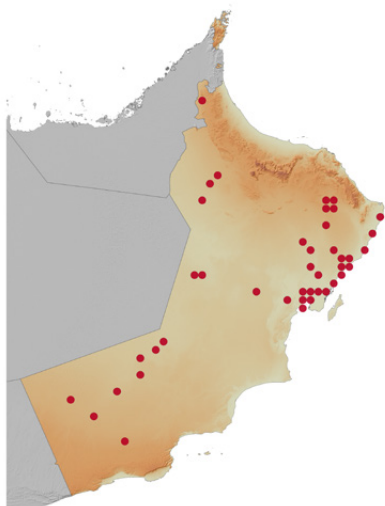
A medium-sized robust gecko with very large, broad head. Moderately protuberant nostrils, in contact with the rostral scale and usually with the first upper labial. Very large eyes; vertical pupil with irregular borders. Body covered above with small scales. Two preanal pores set in enlarged scales usually present in both sexes; cloacal tubercles usually in two rows. Tail round and slender, about 0.8–1.1 times the SVL. Tail autotomy restricted to the tail base. Toes strongly depressed with a prominent fringe of elongate, pointed scales, especially on the fore-feet, and 5–13 rows of pointed scales beneath. Dorsal coloration variable, pinkish, light or dark brown with yellow spots and blotches. Tail with dorsal bars. Morphologically similar to *S. leptocosymbotes*.

**DISTRIBUTION**

Widely distributed across all Arabian countries and surrounding areas, including southwestern Iran, Iraq, Israel and Jordan. In Oman it is an abundant species, found in the Sharqiyah Sands, sandy areas of the interior of the country, and in the Rub' Al Khali. It has never been recorded from the Batinah Plain and the eastern coast, from South of Bar Al Hikman to the Yemen border.

**NATURAL HISTORY**

A nocturnal ground-dwelling species, it is found in extremely arid conditions, on soft sandy areas with sand dunes and scattered vegetation. Sometimes it is spotted standing high on its raised legs and with the tail also raised. It can run fast if pursued and stops suddenly, laying down on the ground relying on camouflage. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 83 mm



0 – 500 m

**NATIVE**



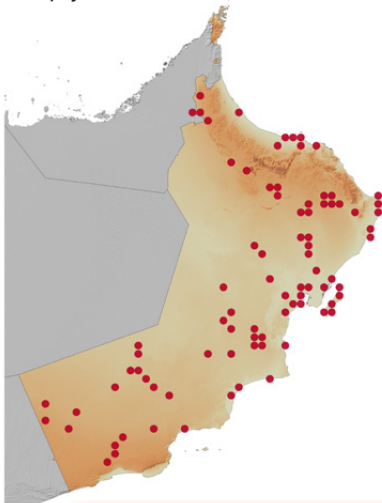
## *Stenodactylus leptocosymbotes* Leviton & Anderson, 1967

Eastern Sand Gecko



### DESCRIPTION

A medium-sized robust gecko with large broad head. Weakly or moderately protuberant nostrils, in contact with the rostral scale but usually separated from the first upper labial. Large eyes; vertical pupil with irregular borders. Body covered above with small scales. Two preanal pores set in enlarged scales usually present in both sexes; cloacal tubercles typically in two rows. Tail round and short, about 0.6–0.8 times the SVL. Tail autotomy restricted to the tail base. Toes not depressed or fringed, with usually 5 rows of sharply pointed scales beneath. Coloration variable, dorsum pinkish or light brown with a pattern of small dark brown spots and larger blotches or bands. Tail with 3–5 bands not extending to the tip; juveniles have dark tail with white tip. Morphologically similar to *S. doriae*.



### DISTRIBUTION

A southeastern Arabian endemic, it is distributed across Oman, UAE and southeastern Yemen. In Oman it is very abundant and widespread across the whole country including Masirah Island, with the exception of the high mountains, the Musandam Peninsula, deep in the Sharqiyah Sands, the Rub' Al Khali Desert, and the Dhofar coast.

### NATURAL HISTORY

A nocturnal ground-dwelling species, it is found on hard surfaces of consolidated sand, alluvial and gravel plains. Contrary to its close relative, *S. doriae*, it avoids soft sandy areas with sand dunes. They dig burrows for hiding during the day. It preys on insects and other arthropods. Females lay clutches of 2 hard-shelled eggs.



Nocturnal



Least Concern

SVL 80 mm



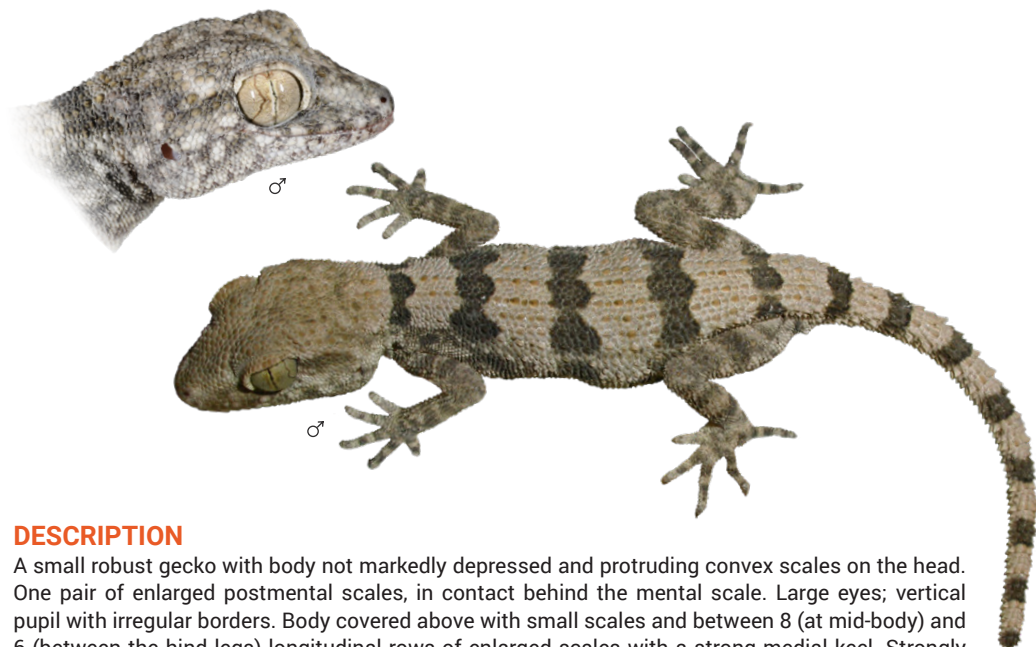
0 – 800 m

NATIVE

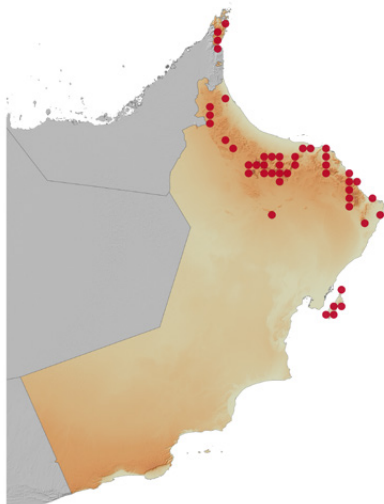


*Trachydactylus hajarensis* (Arnold, 1980)

Hajar Banded Ground Gecko

**DESCRIPTION**

A small robust gecko with body not markedly depressed and protruding convex scales on the head. One pair of enlarged postmental scales, in contact behind the mental scale. Large eyes; vertical pupil with irregular borders. Body covered above with small scales and between 8 (at mid-body) and 6 (between the hind legs) longitudinal rows of enlarged scales with a strong medial keel. Strongly keeled scales also on the dorsal part of the hind legs. Males with 4–6 preanal pores. Tail cylindrical, ending in a rounded tip, with strongly keeled pointed scales, about 0.8 times the SVL. Toes without toepads, laterally compressed. Dorsum light-brown with a series of 5 dark bands sometimes divided into three blotches. Tail with 8 or more transverse dark bars.

**DISTRIBUTION**

A very abundant gecko, it is widely distributed across the Hajar Mountains of Oman and UAE. It is also found on Masirah Island. Preliminary genetic analyses indicate that the species is divided into three highly divergent lineages. Further analyses are necessary to reach a taxonomic conclusion.

**NATURAL HISTORY**

A nocturnal ground-dwelling species, it is found on rocky mountain slopes, wadi beds, and gravel plains with sparse or no vegetation. It hides under stones and deep into rock crevices during the day. It can make sounds. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 50 mm



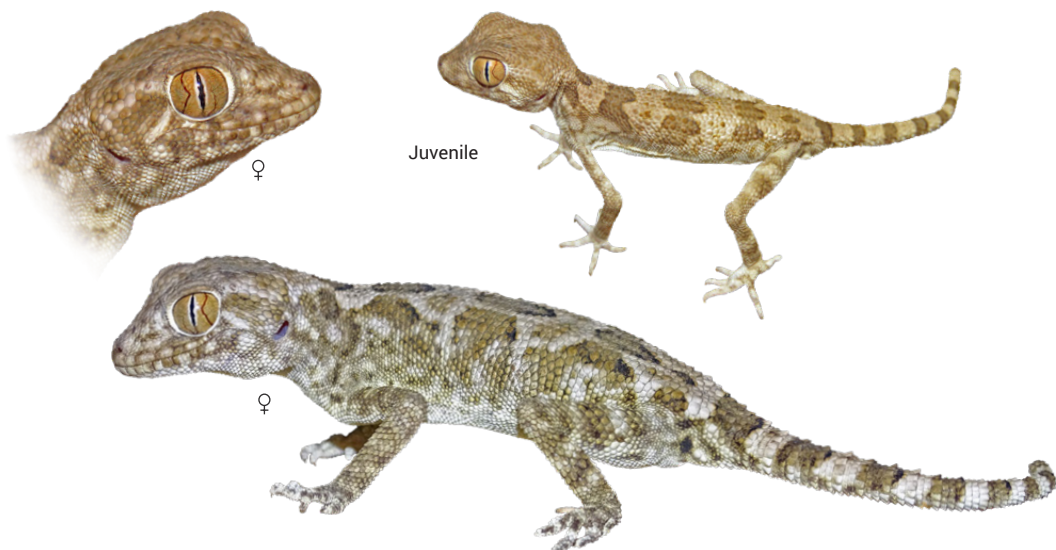
0 – 2,100 m

**NATIVE**



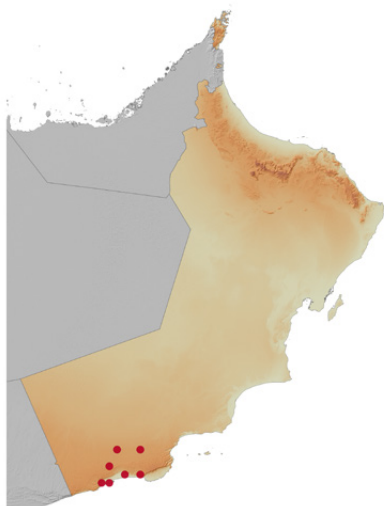
## *Trachydactylus spatulurus* (Anderson, 1901)

Dhofar Banded Ground Gecko



### DESCRIPTION

A small robust gecko with body not markedly depressed and head with flat scales above. Absence of enlarged postmental scales. Large eyes; vertical pupil with irregular borders. Body and dorsal part of hind legs covered above with unkeeled or feebly keeled scales. Males with 4–6 preanal pores. Tail cylindrical, ending in a rounded tip, about 0.8 times the SVL. Toes without toepads, laterally compressed. Dorsum light-brown with a series of irregular dark bands sometimes divided into blotches. Tail with 8 or more transverse dark bars.



### DISTRIBUTION

A secretive gecko, it is distributed from Dhofar in Oman to western and central Yemen. Its distribution within the Dhofar Governorate includes both the mesic, seaward monsoon affected area and the dry landward side of the Dhofar Mountains

### NATURAL HISTORY

A nocturnal ground-dwelling species, it is found on stony areas, wadi beds and gravel plains, sometimes with very sparse or no vegetation. It can make sounds resembling a scream. It preys on insects and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs.



Nocturnal



Not Evaluated

SVL 67 mm



0 – 600 m

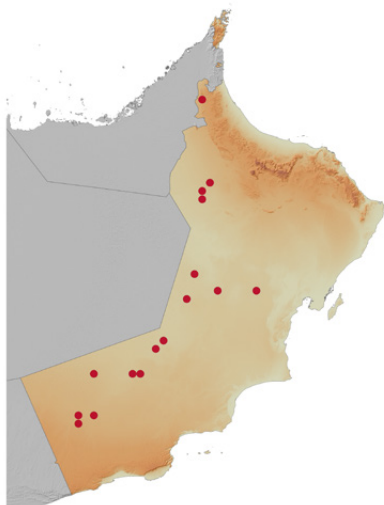
NATIVE

*Trigonodactylus arabicus* (Haas, 1957)

Arabian Web-footed Sand Gecko

**DESCRIPTION**

A very small gecko with body and head markedly depressed. Narrow head and pointed snout with strongly protuberant nostrils, in contact with the rostral scale and with the first upper labial. Very large eyes; vertical pupil with irregular borders. Limbs relatively long and slender. Body covered above with small homogeneous scales without tubercles. Preanal pores absent and 2–3 cloacal tubercles typically in a single row. Tail round, about 0.8–1.1 times the SVL with autotomy not restricted to the tail base. Feet with extensive webbing between fingers. Toes depressed with a lateral fringe of pointed scales and many scales beneath. Dorsum very pale and rather translucent, with faint dark mottling and a dark bar joining the eyes across the snout, sometimes continuing through the sides of head and body. White underneath. Tail with several dark bands. Morphologically similar to *T. sharqiyahensis*.

**DISTRIBUTION**

It is widely distributed across the sandy deserts of all Arabian countries, where it is relatively abundant. It has recently been reported from Jordan. In Oman it is found from North to South in the sandy areas of the interior.

**NATURAL HISTORY**

A strictly nocturnal ground-dwelling species, it is found on soft windblown sandy areas with dunes and scattered vegetation. If disturbed, it usually hides in bushes, or it runs fast for a few meters and stops suddenly, laying down on the ground relying on camouflage. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 38 mm



0 – 400m

**NATIVE**



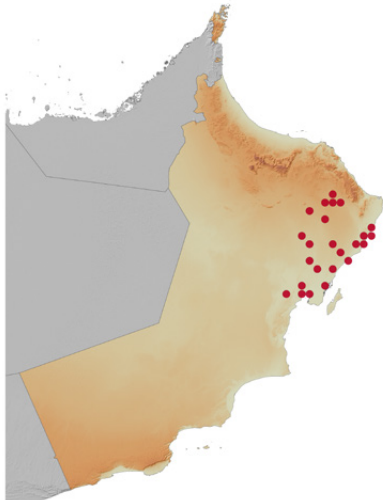
## *Trigonodactylus sharqiyahensis* (Metallinou & Carranza, 2013)

Sharqiyah Sand Gecko



### DESCRIPTION

A very small gecko with body and head markedly depressed. Narrow head with moderately protuberant nostrils, in contact with the rostral scale and with the first upper labial. Very large eyes; vertical pupil with irregular borders. Limbs relatively short. Body covered above with small homogeneous scales without tubercles. Preanal pores absent and 2–3 cloacal tubercles typically in a single row. Tail round, about 0.8–1.1 times the SVL with autotomy not restricted to the tail base. Feet with very reduced webbing between fingers. Toes depressed with a lateral fringe of pointed scales and many scales beneath. Dorsum orange-yellow, with a dark band between the eyes that continues through the head and down the sides of the back, entering the tail base. Another lateral dark stripe separating the body from the white belly. Tail with several transverse dark bands. Morphologically similar to *T. arabicus*.



### DISTRIBUTION

Confined to the Sharqiyah Sands, a sand sea of 12,500 km<sup>2</sup>, in northeastern Oman. It has been found deep in the sandy desert and it is considered a relatively abundant species.

### NATURAL HISTORY

A strictly nocturnal ground-dwelling species, it is found on soft windblown sand areas with dunes and scattered vegetation of the Sharqiyah Sands. It usually hides in bushes if disturbed. In open areas, it runs fast for a few meters and stops suddenly, laying down on the ground relying on camouflage. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Not Evaluated

SVL 35 mm



0 – 400m

ENDEMIC



***Tropicolotes confusus***

Dhofar Dwarf Gecko

Machado, Smid, Mazuch, Sindaco, Shukaili &amp; Carranza, 2018

**DESCRIPTION**

A very small slender gecko with rounded body, relatively broad head and round short snout. Medium size eyes; vertical pupil with irregular borders. Limbs relatively short but slender. Dorsal and ventral scales on head, body, extremities, and tail imbricate and strongly keeled (one keel on each scale), dorsal scales larger than ventrals. Males with 2–3 preanal pores. Tail thick and round, about same size as the SVL. Toes relatively short and round, covered below by a series of transverse tricarinated subdigital scales. Dorsal coloration usually light brown with five wide dark brown transverse bands: one on neck, three on trunk, and one just behind the hind legs. A wide dark brown temporal stripe from the nostrils, through the eyes to the level of the forelimbs. Tail with 6–8 dark brown transverse bands. Morphologically similar to *T. scoretcii*.

**DISTRIBUTION**

Restricted to Dhofar, Oman. The distribution within the Dhofar Governorate includes both the mesic seaward monsoon affected area and the dry landward side of the Dhofar Mountains. Genetic analyses indicate that the coastal and inland populations are highly differentiated.

**NATURAL HISTORY**

A secretive and nocturnal ground-dwelling species, it is found on rocky mountain slopes, wadi beds, and sandy and gravel plains with sparse vegetation. It moves very slowly and preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Not Evaluated

SVL 26 mm



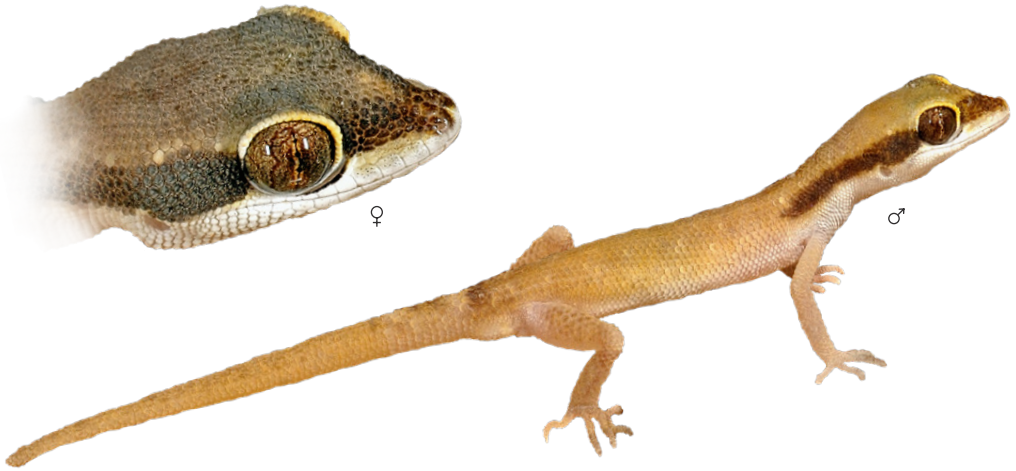
0 – 1,400 m

**ENDEMIC**



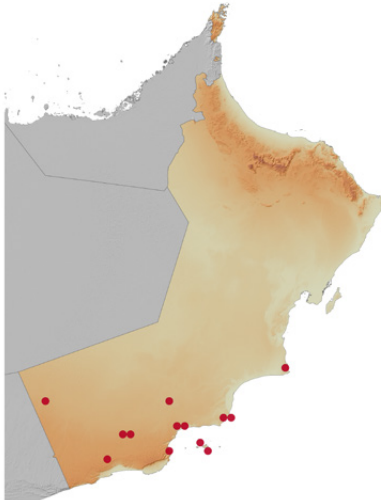
## *Tropicolotes scorteccii* Cherchi & Spano, 1963

Scortecci's Dwarf Gecko



### DESCRIPTION

A very small slender gecko with thin rounded body, normal-sized head and pointy snout. Medium-sized eyes; vertical pupil with irregular borders. Limbs relatively long and slender. Dorsal and ventral scales on head and body unkeeled or weakly keeled, dorsal scales larger than ventrals. Males with 2–3 preanal pores. Tail rather thin and round, about the same size as the SVL. Toes relatively short and round, covered below by a series of transverse tricarinated subdigital scales. Dorsal coloration normally light brown with small yellow dots and a temporal stripe from the nostrils, through the eyes, to the level of the forelimbs. Sometimes one dark brown transverse band on the neck and/or behind the hind legs. Tail with dark brown transverse bands. Morphologically similar to *T. confusus*.



### DISTRIBUTION

A southern Arabian endemic, it is distributed from near Ras Madrakah in Oman along the Arabian coast to western Yemen. In Dhofar and Al Wusta Governates of Oman, it is found in coastal and inland localities. Also known from Al-Hallaniyah island, the largest of the Khuriya Muriya Islands. It has never been found in the mesic, seaward monsoon affected area of the Dhofar Mountains.

### NATURAL HISTORY

A nocturnal ground-dwelling species, adapted to very arid conditions. It is found on rocky mountain slopes, wadi beds, and sandy and gravel plains with sparse or no vegetation. It moves very slowly and preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 31 mm



0 – 800 m

NATIVE



Key to the species of the genus *Asaccus* in Oman

Three new species of *Asaccus* endemic to the Hajar Mountains have been described within the last five years. In order to facilitate their identification, we provide a species level key of the genus in Oman with illustrations of some diagnostic characters. *Asaccus* species do not have preanal pores and cloacal sacs. They have lost the left oviduct and therefore the clutch size is always one.

1.	a	Tail tip uncompressed (Fig 30 left); dorsal tubercles small or absent; tail yellow in males, black and white in females	2
	b	Tail tip laterally flattened and often expanded vertically (Fig 30 right); dorsal tubercles relatively large; tail not sexually dimorphic	4
2.	a	Adults less than 40 mm of SVL; no enlarged tubercles on back; lamellae of adhesive toe pads do not extend beyond claws (Fig 31 left)	3
	b	Adults more than 50 mm of SVL; enlarged tubercles on back small; lamellae of adhesive toe pads extend beyond claws (Fig 31 right)	<i>A. platyrhynchus</i>
3.	a	Restricted to the Eastern Hajar Mountains of Oman. Adults usually smaller than 35 mm	<i>A. arnoldi</i>
	b	Distributed across the Hajar Mountains and adjacent foothills, from the Jebel Akhdar massif to the Musandam Peninsula in the West. Adults usually larger than 35 mm	<i>A. gallagheri</i>
4.	a	Adults small (less than 45 mm of SVL); extremely tuberculated; lamellae of adhesive pads do not extend beyond claws	<i>A. montanus</i>
	b	Adults larger than 50 mm of SVL; dorsal tubercles moderate; tail with a light tip preceded by one or more broad dark bars extending to the ventral surface; lamellae of adhesive pads extend beyond claws	5
5.	a	Adults smaller than 65 mm of SVL; absence of tubercles on the upper arms (to distinguish it from the UAE endemic <i>A. caudivolvulus</i> ), relatively short limbs; dorsum pinkish, with orange-brown transverse bars. Adult tails whitish with wide orange transverse bars and 2–3 distal black bands. Juveniles with orange-coppery tails with dark brown crossbands	<i>A. margaritae</i>
	b	Adults larger than 65 mm of SVL; very long, slender limbs; absence of tubercles on the upper arms (to distinguish it from the UAE endemic <i>A. caudivolvulus</i> ); dorsum pinkish, with orange-brown transverse bars. Tails whitish with wide orange transverse bars and 1–2 distal black bands. Juveniles with black and white barred tails	<i>A. gardneri</i>

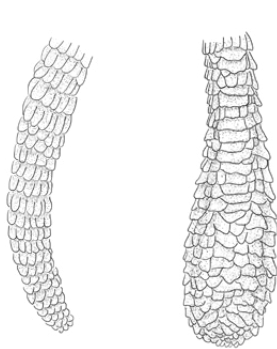


Fig 30: Left: Tail tip uncompressed; Right: Tail tip laterally flattened and expanded vertically.

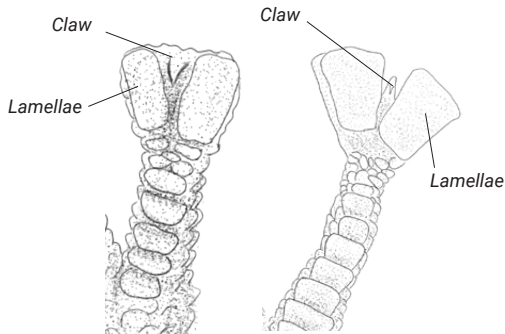


Fig 31: Left: Lamellae of adhesive toe pads do not extend beyond claws; Right: Lamellae of adhesive toe pads extend beyond claws.



## ***Asaccus arnoldi*** Simó-Riudalbas, Tarroso, Papenfuss, Al-Sariri & Carranza, 2017

Arnold's Leaf-toed Gecko



### DESCRIPTION

A very small gecko with body and head markedly depressed. Very large eyes; vertical pupil with irregular borders. Hind legs relatively long and slender. Body, head, upper arms and elsewhere without tubercles. Cloacal tubercles minute or absent. Tail round, about 1.25 times the SVL with the tail tip not laterally compressed. Toes with paired terminal scansors not extending beyond the claws. Dorsum pinkish, with a pattern of narrow dark transverse bars. Tail color sexually dimorphic, being white barred black in females and yellow in males. Tail not coiled. Morphologically similar to

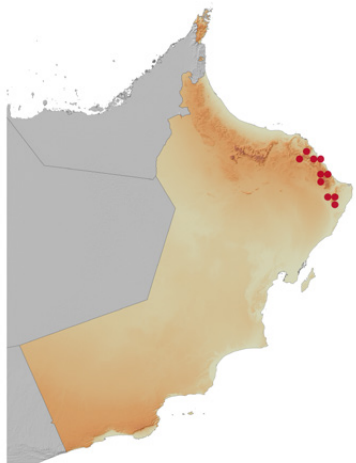
*A. gallagheri*.

### DISTRIBUTION

Endemic to the Eastern Hajar Mountains of Oman, between Wadi Sareen in the West to Jebel Qahwan in the East. It is separated from *A. gallagheri* (phylogenetically its sister taxon) by the Semail Valley.

### NATURAL HISTORY

A rare nocturnal rock-dwelling species, it moves swiftly among the rocky terrain in mountain and coastal wadis, small cliffs, boulders, open hillsides, caves, and large crevices. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Not Evaluated

SVL 34 mm



0 – 1,700 m

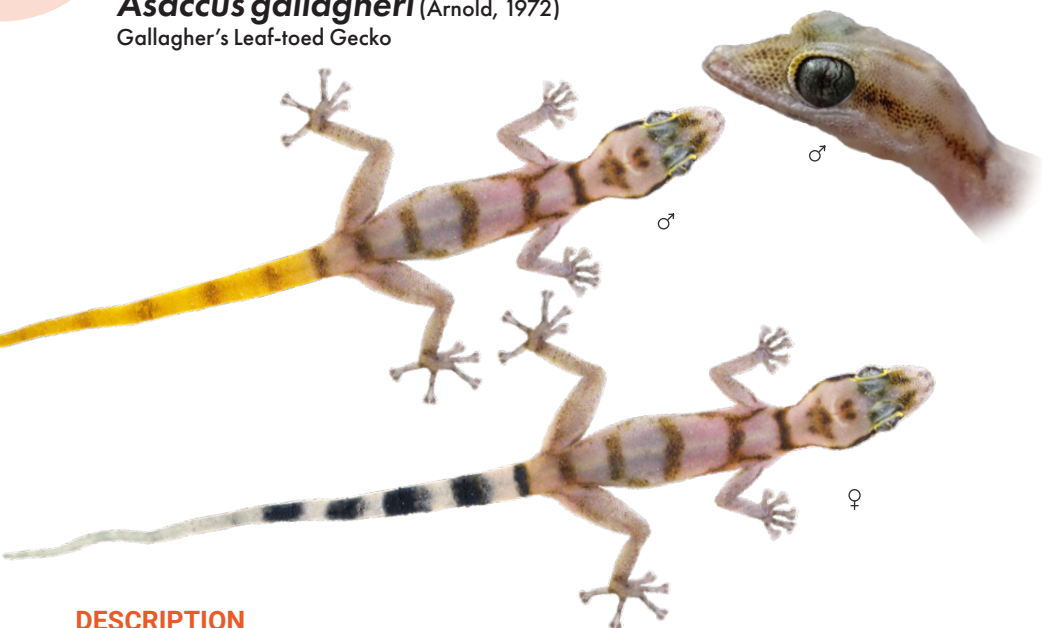
ENDEMIC





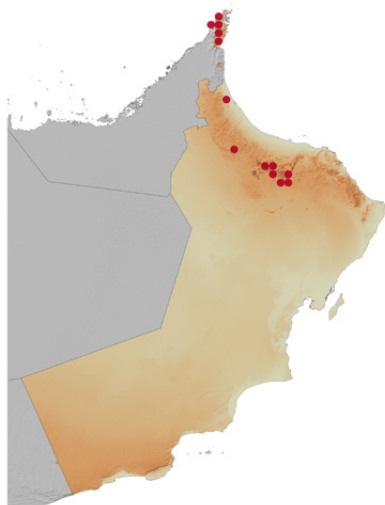
## ***Asaccus gallagheri*** (Arnold, 1972)

Gallagher's Leaf-toed Gecko



### DESCRIPTION

A very small gecko with body and head markedly depressed, broad snout and narrow neck. Very large eyes; vertical pupil with irregular borders. Hind legs relatively long and slender. Body, head, and upper arms without tubercles. Cloacal tubercles minute or absent. Tail round, about 1.25 times the SVL, with the tail tip not laterally compressed. Toes with paired terminal scansors not extending beyond the claws. Dorsum pinkish, with a pattern of narrow dark transverse bars. Tail color sexually dimorphic, being white and black barred in females and uniformly yellow in males. Tail not coiled. Morphologically similar to *A. arnoldi*.



### DISTRIBUTION

Endemic to the Hajar Mountains of Oman and UAE. It is distributed across the mountains and adjacent foothills, from the Jebel Akhdar massif to the Musandam Peninsula. There is a data gap in the distribution between the Jebel Akhdar massif and Sohar, where only an old record exists and therefore more research is needed. The population from the Jebel Akhdar massif are genetically very distinct.

### NATURAL HISTORY

A nocturnal rock-dwelling species. Like *A. arnoldi* it moves swiftly among the rocky terrain in mountains and coastal wadis, small cliffs, boulders, open hillsides, caves and large crevices. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 40 mm



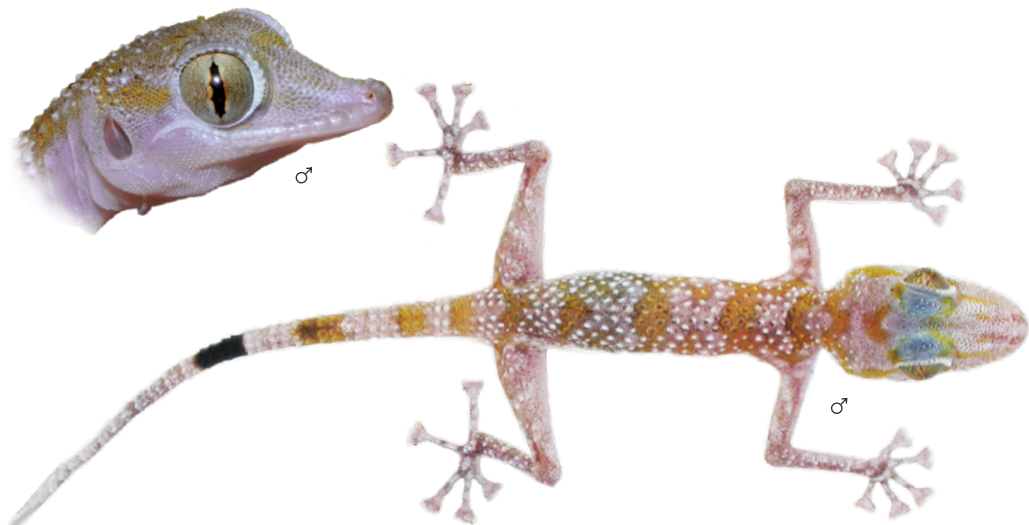
0 – 1,900 m

NATIVE



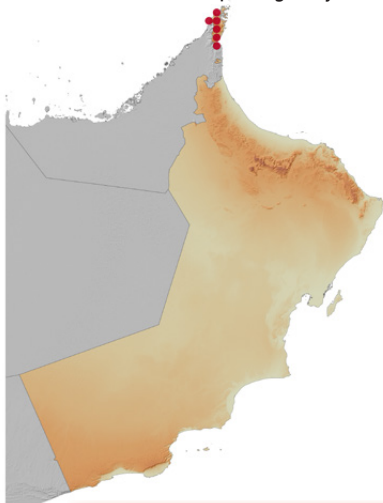
## ***Asaccus gardneri*** Carranza, Simó-Riudalbas, Jayasinghe, Wilms & Els, 2016

Gardner's Leaf-toed Gecko



### DESCRIPTION

A medium-sized gecko with body and head markedly depressed, broad snout and narrow neck with small pointed tubercles. Very large eyes; vertical pupil with irregular borders. Very long, slender limbs. Body covered above with small scales and a series of 11–16 longitudinal rows of keeled, trihedral tubercles. Tubercles also present on forearms, hind legs and tail but absent on the upper arms. Cloacal tubercles small. Tail about 1.3 times the SVL, with the tail tip laterally compressed. Toes with paired terminal scansors extending well beyond the claws. Dorsum pinkish, with orange-brown transverse bars. Whitish tail with wide orange transverse bars and 1–2 distal black bands. Tail can be coiled. Morphologically similar to *A. margaritae* and the UAE endemic *A. caudivolvulus*.



### DISTRIBUTION

Endemic to the Hajar Mountains of Oman and UAE. In Oman it is only found in the Musandam Peninsula, from Dibba in the South to Harf Ghabi in the North.

### NATURAL HISTORY

A nocturnal rock-dwelling species, it can be very common in some areas. It has been found on rocky sides of wadis, stony substrates, on large boulders, and in caves. If disturbed, it flees across boulders with incredible agility and ease. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 71 mm



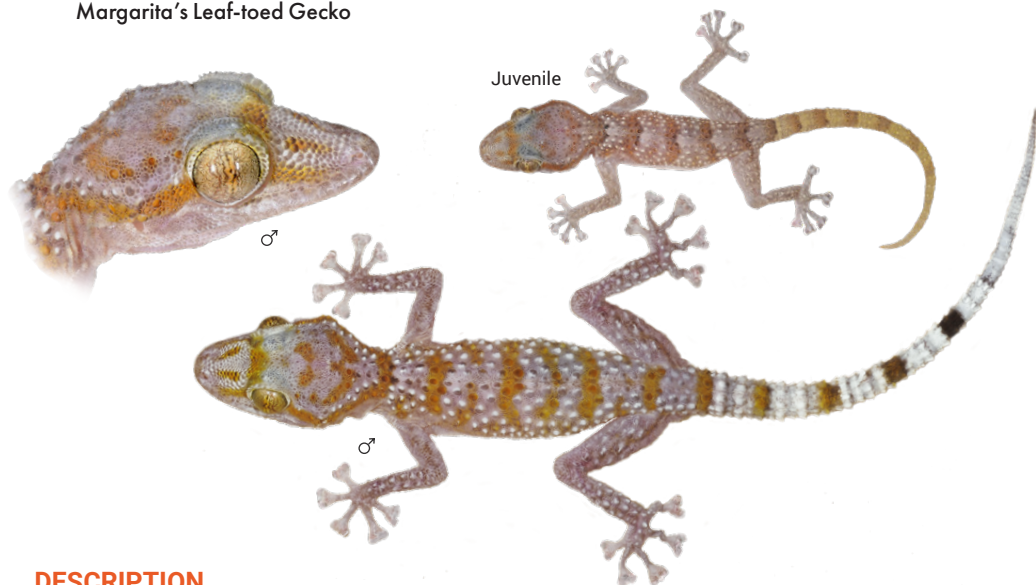
0 – 1,000 m

NATIVE



## *Asaccus margaritae* Carranza, Simó-Riudalbas, Jayasinghe, Wilms & Els, 2016

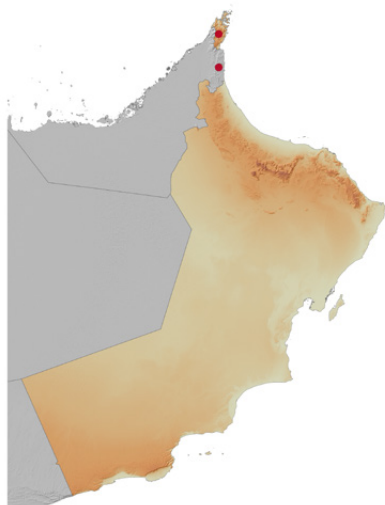
Margarita's Leaf-toed Gecko



### DESCRIPTION

A medium-sized gecko with body and head markedly depressed, broad snout and narrow neck with large pointed tubercles. Very large eyes; vertical pupil with irregular borders. Relatively short limbs. Body covered above with small scales and a series of 12–16 longitudinal rows of keeled, trihedral tubercles. Tubercles also present on forearms, hind legs and tail but absent on the upper arms. Cloacal tubercles small. Tail, about 1.3 times the SVL, with the tail tip laterally compressed. Toes with paired terminal scensors extending well beyond the claws. Dorsum pinkish, with orange-brown transverse bars. Adult tails whitish with wide orange transverse bars and 2–3 distal black bands.

Juveniles with orange-coppery tails with dark brown crossbands. Tail can be coiled. Morphologically similar to *A. gardneri* and the UAE endemic *A. caudivolvulus*.



### DISTRIBUTION

Endemic to the Hajar Mountains of Oman and UAE. In Oman it is only known from a locality at 127 m in elevation near Madha and three other localities at about 1,400–1,500 m in elevation in the highlands of the Musandam Peninsula. Further studies might reveal new populations.

### NATURAL HISTORY

A nocturnal rock-dwelling species, very rare in Oman. It has been found on rocky sides of wadis, stony substrates, and on large boulders. If disturbed, it flees across boulders with less agility than *A. gardneri*. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 59 mm



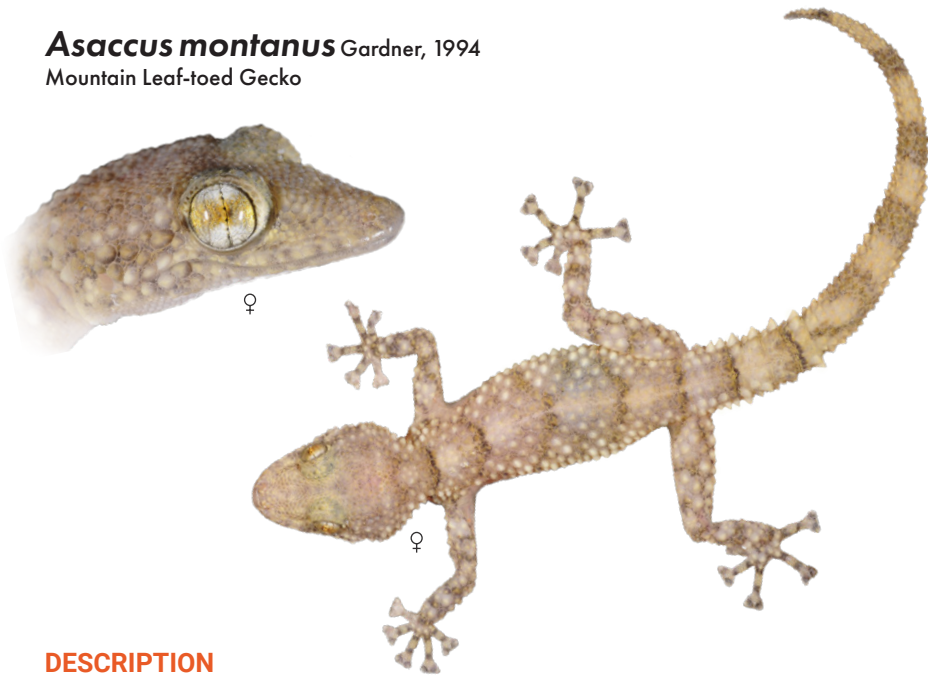
100 – 1,500 m

NATIVE



## ***Asaccus montanus*** Gardner, 1994

Mountain Leaf-toed Gecko



### DESCRIPTION

A small robust gecko with body and head markedly depressed. Broad head and narrow neck with large pointed tubercles. Large eyes; vertical pupil with irregular borders. Hind legs relatively long and slender. Body covered above with small scales and about 14 longitudinal rows of large keeled, trihedral tubercles. Tubercles also present on limbs and tail, scaling coarse. Cloacal tubercles small. Tail about 1.3 times the SVL, with the tail tip laterally compressed and strongly expanded vertically. Toes with paired terminal scansors that do not extend beyond claws. Dorsum light brown with faint dark brown transverse bars that extend to the tail.



### DISTRIBUTION

Endemic to the Jebel Akhdar massif of Oman. It is widely distributed across the southern part of the massif. The populations from the Sayq plateau, East of Jebel Shams, are genetically very different from populations on Jebel Shams and Jebel Kawr and therefore the latter populations may represent a new species.

### NATURAL HISTORY

A nocturnal rock-dwelling species found in wadis with stony substrates and large boulders, where it can be common. Also found on walls and other man-made structures. It can be active at very low temperatures (12 °C) at high altitude. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Vulnerable

SVL 40 mm



1,800 – 2,400 m

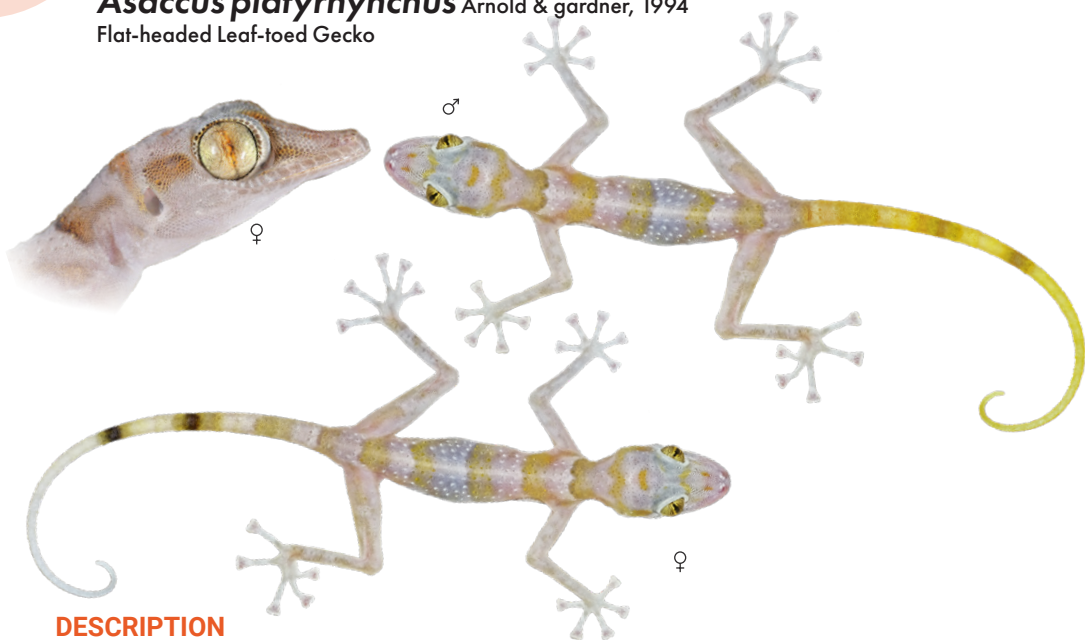
ENDEMIC





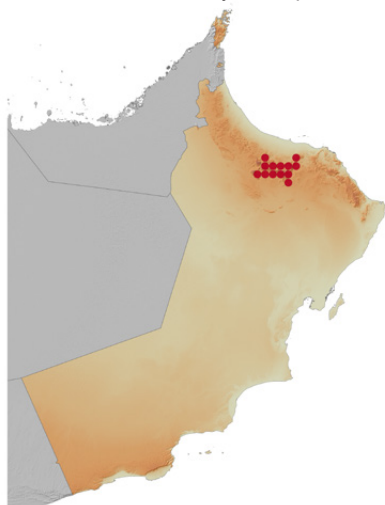
## *Asaccus platyrhynchus* Arnold & gardner, 1994

Flat-headed Leaf-toed Gecko



### DESCRIPTION

A medium-sized slender gecko with rather round body, flattened head, broad snout and narrow neck. Very large eyes, vertical pupil with irregular borders. Long and slender limbs. Body covered above with small scales and about 12 longitudinal rows of small tubercles. Small flat tubercles also present on forearms, hind legs and tail but absent on the upper arms. Cloacal tubercles minute or absent. Tail round, about 1.3 times the SVL, with the tail tip not laterally compressed. Toes with paired terminal scansors extending well beyond claws. Dorsum pinkish, with a pattern of narrow orange transverse bars. Tail color sexually dimorphic, being white barred black in females and yellow in males. Tail coiled.



### DISTRIBUTION

Endemic to the Jebel Akhdar massif of Oman where it is widely distributed across a wide range of elevations (300–1,700 m). Preliminary results indicate that, contrary to *A. montanus*, it presents low levels of genetic variability.

### NATURAL HISTORY

A nocturnal rock-dwelling species, it can be very abundant on rock faces and especially on large boulders in gorges. Also found in caves. If disturbed, it flees across boulders with incredible agility and ease. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Nocturnal



Least Concern

SVL 63 mm



300 – 1,700 m

ENDEMIC



*Asaccus platyrhynchus* endemic to the Jebel Akhdar massif photographed at Wadi Tanuf, Hajar Mountains, Oman. A very good climber, it can be found in relatively high numbers on large rocks, boulders, and caves. Left, female; Right, male.

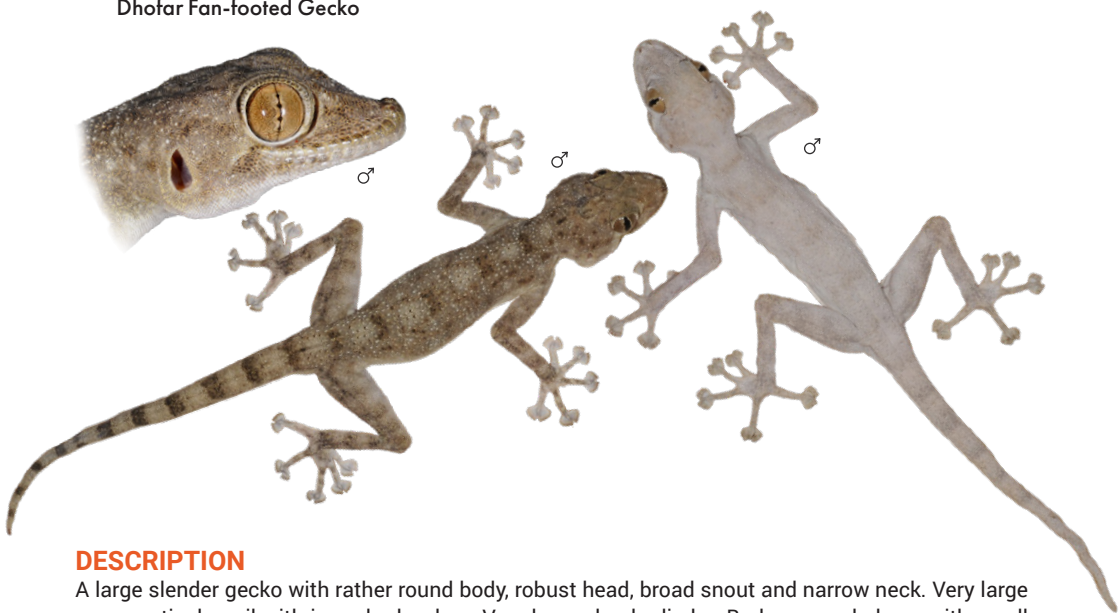


*Ptyodactylus orlovi* is endemic to the Hajar Mountains of Oman and UAE, where it can be found in relatively large numbers on large rocks, boulders, and caves. It can change its background coloration depending on the substrate. Left, male, Western Hajars, Oman; Right, male, Jebel Akhdar massif, Oman.



## *Ptyodactylus dhofarensis* Nazarov, Melnikov & Melnikova, 2013

Dhofar Fan-footed Gecko



### DESCRIPTION

A large slender gecko with rather round body, robust head, broad snout and narrow neck. Very large eyes; vertical pupil with irregular borders. Very long, slender limbs. Body covered above with small scales and 9–14 irregular longitudinal rows of medium-sized, feebly keeled trihedral tubercles. Absence of enlarged tubercles on the extremities. Tail round, about as long as the SVL. Color pattern very variable, with a tendency to match the substrate but in general light gray or light brown dorsum with a pattern of dark brown transversal bands and faint markings. Tail with dark crossbars that do not extend to the ventral surface. Morphologically similar to *P. orlovi* and *P. ruusaljibalicus*.

### DISTRIBUTION

A southern Arabian endemic, it is distributed from extreme southwestern Yemen to Dhofar, Oman. The distribution within the Dhofar Governorate includes the mesic, seaward monsoon affected area of the Dhofar Mountains near the coast, and the dry landward side of the mountains, North to the level of Thumrait.

### NATURAL HISTORY

A nocturnal rock-dwelling species common within its range. It is found on cliffs, rocks, boulders, caves and man-made structures. It can be out during the day in the shadow of rocks and inside old buildings and tunnels. If disturbed, it flees with incredible agility, jumping between rocks with ease. It preys on insects and other arthropods. Females lay several clutches of 2 hard-shelled eggs and communal nesting is often a common occurrence.



Nocturnal



Not Evaluated

SVL 95 mm



0 – 800 m

NATIVE





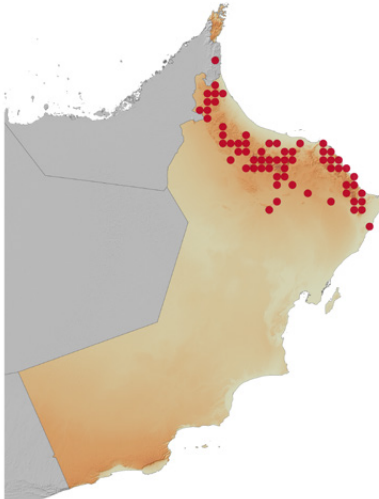
## *Ptyodactylus orlovi* Nazarov, Melnikov & Melnikova, 2013

Orlov's Fan-footed Gecko



### DESCRIPTION

A large slender gecko with rather round body, robust head, broad snout and narrow neck. Very large eyes; vertical pupil with irregular borders. Long, slender limbs. Body covered above with small scales and 11–14 irregular longitudinal rows of medium-sized, feebly keeled trihedral tubercles. Absence of enlarged tubercles on the extremities. Tail round, about as long as the SVL. Color pattern variable with a tendency to match the substrate but in general, light gray or light brown, mottled or barred with yellowish and dark brown markings on the back. Tail with dark crossbars that do not extend to the ventral surface. Morphologically similar to *P. dhofarensis* and *P. ruusaljibalicus*.



### DISTRIBUTION

Endemic to the Hajar Mountains. It is widely distributed from the eastern coast of the Arabian Sea to North of Khor Fakkan in the UAE. It is not present in the Musandam Peninsula, which is inhabited by its sister taxon, *P. ruusaljibalicus*.

### NATURAL HISTORY

A nocturnal rock-dwelling species common within its range. It is found on rock faces and especially on large rocks and boulders in gorges, caves and man-made structures. It can be out during the day in the shadow of rocks and inside old buildings and tunnels. If disturbed, it flees with incredible agility jumping between rocks with ease. It preys on insects and other arthropods. Females lay several clutches of 2 hard-shelled eggs and communal nesting is often a common occurrence.



Nocturnal



Least Concern

SVL 89 mm



0 – 1,900 m

**NATIVE**

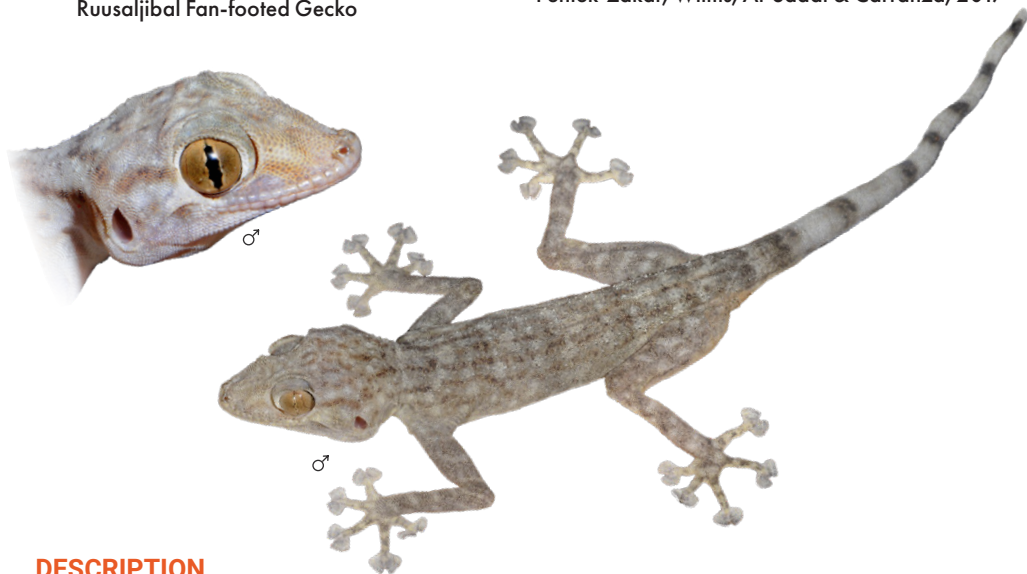




## *Ptyodactylus ruusaljibalicus*

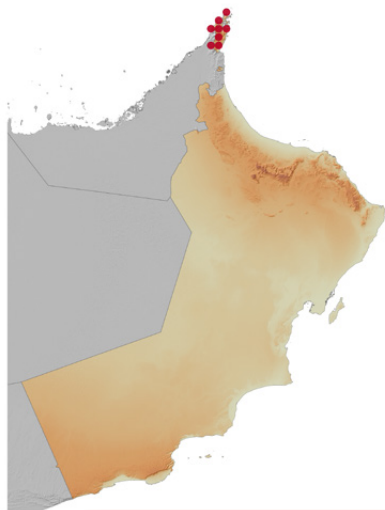
Ruusaljibal Fan-footed Gecko

Simó-Riudalbas, Metallinou, Pous, Els, Jayasinghe, Pentek-Zakar, Wilms, Al-Saadi &amp; Carranza, 2017



### DESCRIPTION

A large slender gecko with rather round body, robust head, broad snout and narrow neck. Very large eyes; vertical pupil with irregular borders. Long, slender limbs. Body covered above with small scales and 9–11 irregular longitudinal rows of medium-sized, feebly keeled trihedral tubercles. Absence of enlarged tubercles on the dorsal side of the extremities. Four prominent and visible cloacal tubercles (2 on each side) at the tail base. Tail round, about as long as the SVL. Color pattern variable with a tendency to match the substrate but in general dorsum light gray or light brown with a faint pattern of dark brown bars and spots. Tail with dark crossbars that do not extend to the ventral surface. Morphologically similar to *P. dhofarensis* and *P. orlovi*.



### DISTRIBUTION

Endemic to the carbonated mountains of the Musandam Peninsula (Ruus Al Jibal) in Oman towards Dibba within the UAE. In Oman it is widely distributed across the Musandam Peninsula from sea level up to 1,500 m in elevation.

### NATURAL HISTORY

A poorly known, not very abundant nocturnal rock-dwelling species. It has been found on large rocks and boulders and man-made structures. It preys on insects and other arthropods. Further studies are necessary to know more aspects about its biology.



Nocturnal



Least Concern



SVL 90 mm



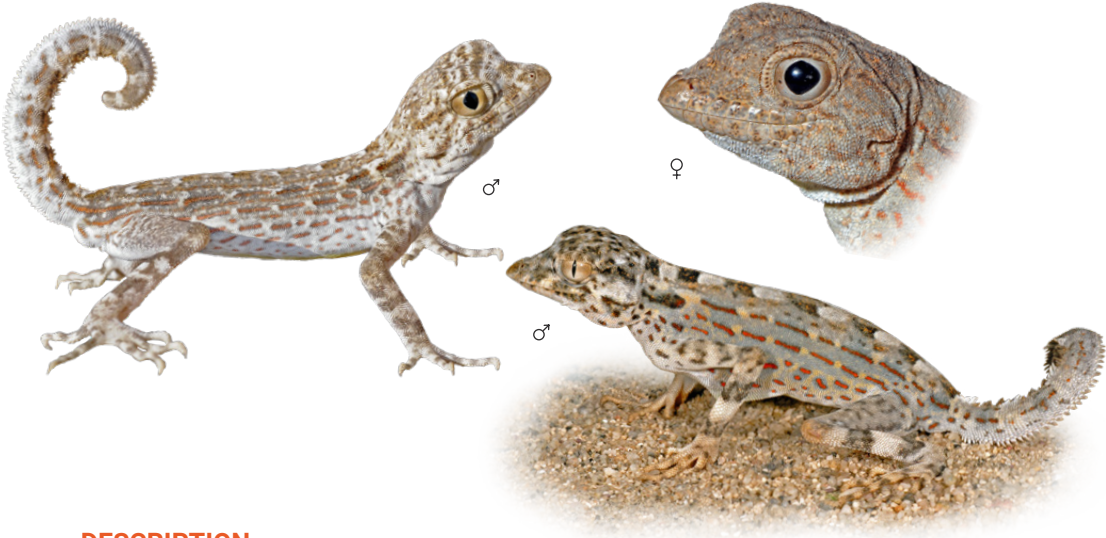
0 – 1,500 m

NATIVE



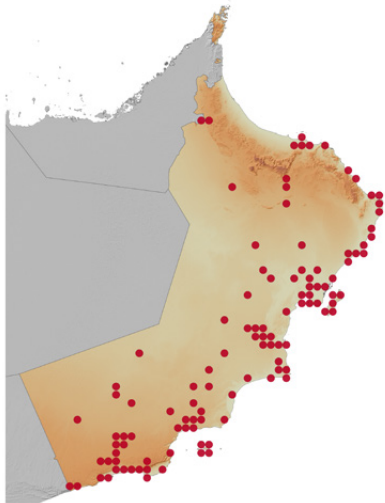
## ***Pristurus carteri*** (Gray, 1863)

Carter's Semaphore Gecko



### DESCRIPTION

A medium-sized to large gecko with round body and robust high head with a distinctly pointed beak-like snout. Nostrils separated from the rostral scale. Eyes with pupils narrower than high when contracted and regular borders. Relatively long, slender limbs. Body and limbs covered with small dorsal granular scales. Tail about 0.9 times the SVL, laterally compressed in males, with a rounded tip and a dorsal crest of heterogeneous pointed scales and a smaller ventral uniform fringe. Color pattern variable, with a tendency to match the substrate, but in general dorsum light brown or light gray with several darker cross bars. Flanks with narrow longitudinal broken lines, bright red in males and darker in females. Underside white with two elongated yellow patches on the belly.



### DISTRIBUTION

A southern Arabian endemic, most of its distribution is restricted to Oman, with a single locality along the UAE-Oman border in Al Ain, and two isolated localities around Shibam, in central Yemen. In Oman, it is distributed nearly across the whole country, including Masirah island and Al-Hallaniyah, the largest of the Khuriya Muriya Islands.

### NATURAL HISTORY

An abundant and very distinctive ground dwelling gecko known to be active both by day and night. It is usually found on open, dry, flat areas with hard gravelly substrate or compacted sand and scattered vegetation. Males often signal by raising and waving their tails and by inflating while laterally compressing the body and throat. It preys on ants and other arthropods. Females lay clutches of 1 or 2 hard-shelled eggs through the year.



Diurnal/Nocturnal



Least Concern

SVL 80 mm

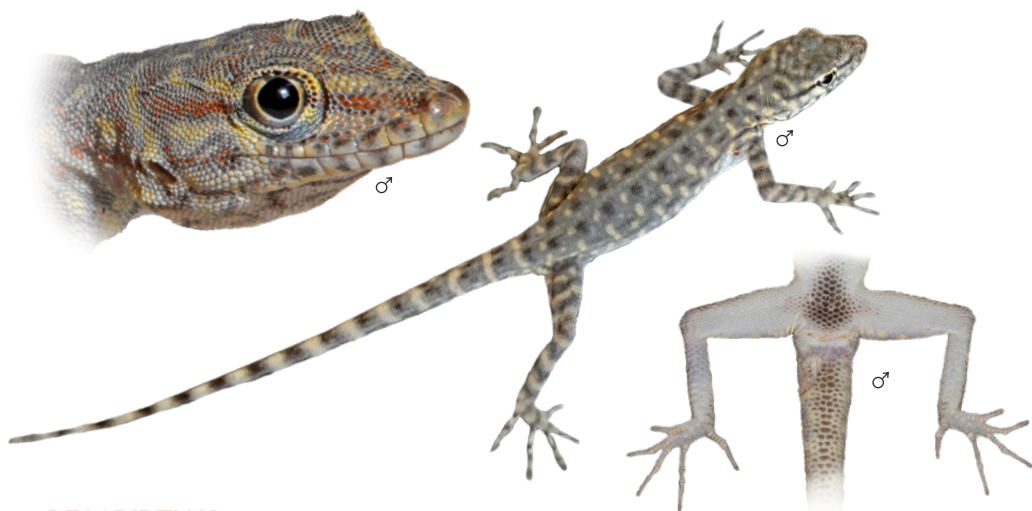


0 – 1,700 m

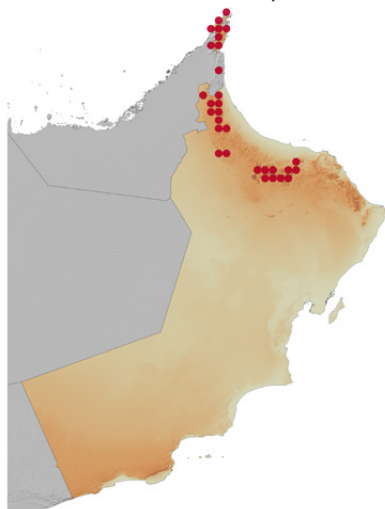
**NATIVE**

***Pristurus celerrimus*** Arnold, 1977

Bar-tailed Semaphore Gecko

**DESCRIPTION**

A small slender gecko with distinctly depressed head and body, and with relatively large head. Nostrils in contact with the rostral scale. Eyes with round pupils. Relatively long, slender limbs. Body covered with small dorsal granular scales. Tail long and slender, about 1.7–2 times the SVL, laterally compressed without a fringe of elongated scales. Dorsal color light brown or gray, sometimes rather uniform but usually with yellowish spots on the head and limbs. A reddish line running from the nostril, through the eye and posteriorly above the ear. Flanks sometimes with reddish-dark narrow longitudinal broken lines. Underside white with patches of dark pigment anterior and posterior to the vent in males. Tail with conspicuous dark bars.

**DISTRIBUTION**

Endemic to the Hajar Mountains of Oman and UAE. Found from the tip of the Musandam Peninsula to the Jebel Akhdar massif. It has never been recorded from the Eastern Hajars.

**NATURAL HISTORY**

A diurnal rock-dwelling species relatively common within its northernmost range. It is found on rocks, boulders and occasionally on old houses. Individuals signal by raising the body (with the hind parts higher), inflating and laterally compressing the body and throat and raising and lowering the tail held straight several times. It preys mainly on ants but also on other arthropods. Females lay a single hard-shelled egg, multiple times through the year.



Diurnal



Least Concern

SVL 40 mm



0 – 2,600 m

**NATIVE**



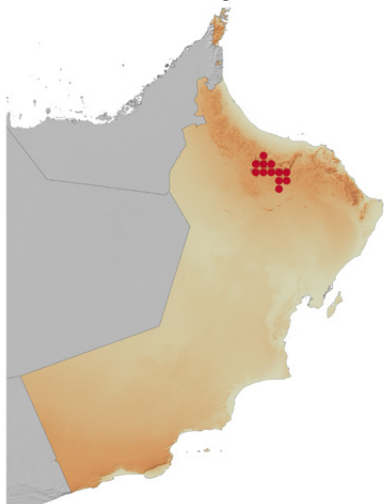
## *Pristurus gallagheri* Arnold, 1986

Gallagher's Semaphore Gecko



### DESCRIPTION

A small rather robust gecko with round body and narrow head. Nostrils in contact with the rostral scale. Eyes with round pupils. Relatively long limbs. Body covered with small dorsal granular scales. Tail long and slender, about 1.8 times the SVL, laterally compressed, males with a dorsal crest of pointed scales that does not extend forward the level of the vent and a very weak ventral crest. Dorsal color light brown or gray, usually with a very characteristic wide creamy mid-dorsal line running from the back of the head to the tail base for camouflage on tree bark. It has a characteristic dark line running from the nostril, through the eye and posteriorly above the ear. There are pale and dark spots on the flanks and the digits have dark bars. Similar to *P. rupestris*.



### DISTRIBUTION

Endemic to the Jebel Akhdar massif of Oman. It is widely distributed across the whole massif, and immediate surrounding areas at a wide range of elevations (400–2,100 m).

### NATURAL HISTORY

A diurnal arboreal species found on wooded mountain wadis and hillsides but also on cultivated areas and on old houses, as for instance in the old city of Manah. It communicates by complex signaling, including push-ups, inflating and laterally compressing the body and throat, and tail curling and waving. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Diurnal



Near Threatened

SVL 40 mm



400 – 2,100 m

ENDEMIC



***Pristurus masirahensis***

Masirah Island Semaphore Gecko

Tamar, Mitsi, Simó-Riudalbas, Tejero-Cicuéndez, Al-Sariri &amp; Carranza, 2019

**DESCRIPTION**

A very small gecko (the smallest Arabian vertebrate) with round body and small head. Nostrils not in contact with the rostral scale. Eyes with pupils narrower than high when contracted and with regular borders. Relatively short limbs. Body covered with small dorsal granular scales. Large, flat imbricated scales on limbs. Tail long and robust, about 1.5 times the SVL, laterally compressed in males, with a ridge on the ventral side and a dorsal crest of two longitudinal rows of elongated scales. Tail in females round. Dorsal color light brown or pale gray, usually with a very characteristic paler mid-dorsal line with darker blotches on each side. A dark stripe from the nostril, through the eye and body to the hind legs, interrupted by 6 whitish spots. Flanks light-brown with thin reddish-dark narrow longitudinal broken lines. Very similar to *P. minimus* but smaller.

**DISTRIBUTION**

Endemic to Masirah Island, Oman. It is distributed from North to South across the island but has only been found on coastal areas at low elevation.

**NATURAL HISTORY**

A mainly diurnal ground-dwelling species, found on sandy plains always close to low shrubs or grass clumps where it hides if disturbed. It communicates using push-ups, inflating and laterally compressing the body and throat, and tail waving. It preys on insects and other arthropods. Like in *P. minimus*, most probably, females lay a single hard-shelled egg but further studies on this recently described species are needed.



Diurnal



Not Evaluated

SVL 21.5 mm



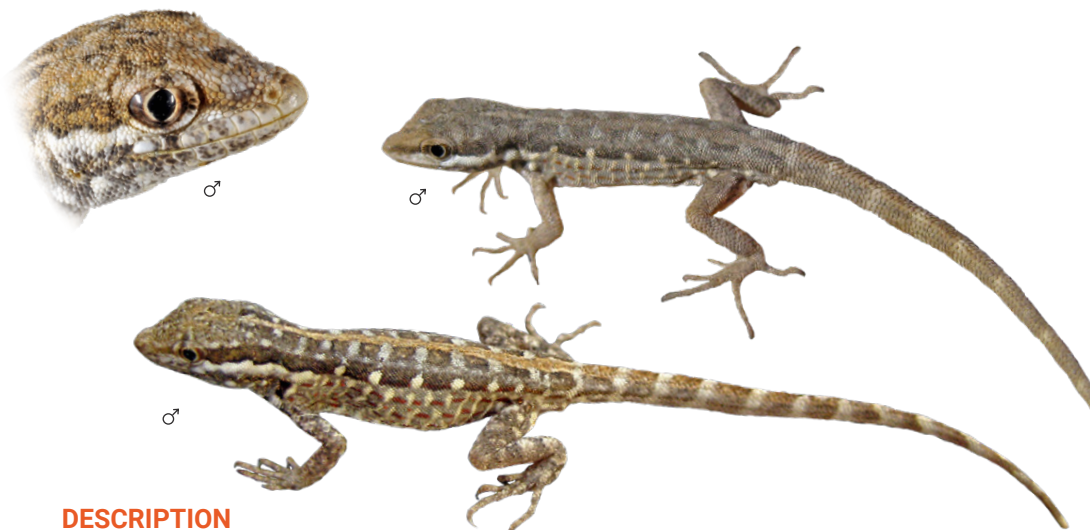
0 – 100 m

**ENDEMIC**



## *Pristurus minimus* Arnold, 1977

Small Semaphore Gecko



### DESCRIPTION

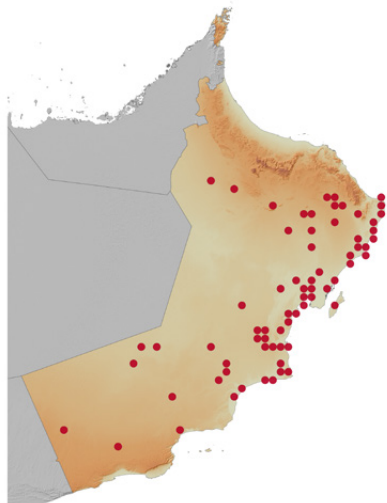
A very small gecko with round body and small head. Nostrils not in contact with the rostral scale. Eyes with pupils narrower than high when contracted and with regular borders. Relatively short limbs. Body covered with small dorsal granular scales; large flat imbricated scales on limbs. Tail long and robust, about 1.5 times the SVL, laterally compressed in males with a ridge on the ventral side and a dorsal crest of two longitudinal rows of elongated scales. Tail in females round. Dorsal color light brown or pale gray, usually with a very characteristic paler mid-dorsal line with darker blotches on each side. A dark stripe from the nostril, through the eye and body to the hind legs, interrupted by 6 whitish spots. Flanks light-brown with thin reddish-dark narrow longitudinal broken lines. Very similar to *P. masirahensis* but larger.

### DISTRIBUTION

A southern Arabian endemic, it is distributed from extreme eastern Yemen, through Oman to eastern UAE. In Oman it is widely distributed across the country, with a single (probably introduced) locality in Masirah Island, where *P. masirahensis* is present. It has never been recorded from the Batinah and Salalah Plains as well as the Hajar and Dhofar Mountains.

### NATURAL HISTORY

A mainly diurnal ground-dwelling species. It is found on sandy plains, always close to low shrubs or grass clumps where it quickly retreats if disturbed. It communicates including push-ups, inflating and laterally compressing the body and throat, and moving the tail. It preys on insects and other arthropods. Females lay a single hard-shelled egg.



Diurnal



Least Concern

SVL 29 mm



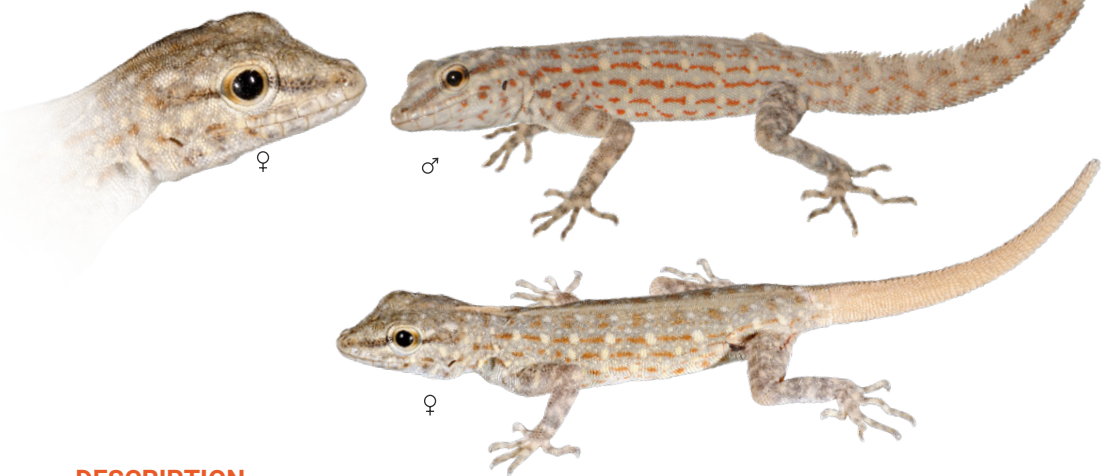
0 – 600 m

NATIVE



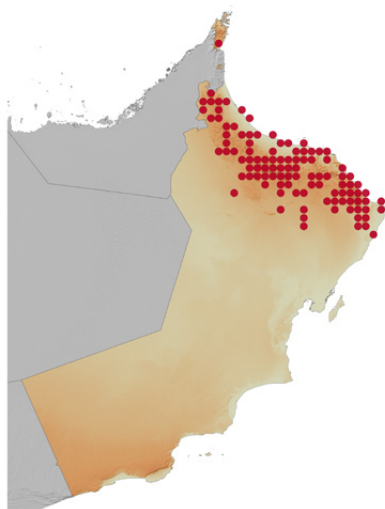
## *Pristurus rupestris* Blanford, 1874

Rock Semaphore Gecko



### DESCRIPTION

A very small gecko with round body and robust head. Nostrils in contact with the rostral scale. Eyes with round pupils. Relatively short limbs. Body covered with small dorsal granular scales. Tail long and robust, about 1.2 times the SVL, laterally compressed in males, with a dorsal crest of pointed scales that does not extend forward to the level of the vent and a very weak ventral crest. Tail in females round with a weak crest. Color pattern very variable, with a tendency to match the substrate but in general from light brown to dark gray, with reddish-dark narrow longitudinal broken lines separated by yellowish spots on the back and flanks. A more or less prominent stripe from the nostril, through the eye and to the back of the head. Very similar to *P. sp. 1* and similar to *P. gallagheri*.



### DISTRIBUTION

Distributed across the Hajar Mountains and surrounding lowland areas of North Oman and eastern UAE and the southern coast of Iran. In Oman it is continuously distributed from Ras Al Hadd in the east, to the southern parts of the Musandam Peninsula. It is present in Ad Dimaniyat and other offshore islands of the Gulf of Oman.

### NATURAL HISTORY

A mainly diurnal rock dwelling species, it can also be seen active after sunset. It is the smallest and the most abundant gecko in the Hajar Mountains, easily found on rocks, boulders, tree trunks, and man-made structures, such as walls, houses, gardens and even in the middle of large cities like Muscat. They do complex signaling, including push-ups, inflating and laterally compressing the body and throat, and curling and waving the tail up over the back. It preys on ants and other arthropods. Females lay a single hard-shelled egg.



Diurnal



Least Concern



SVL 30 mm



0 – 2,350 m

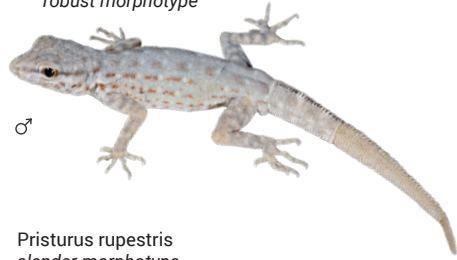
NATIVE



## Undescribed diversity in the *Pristurus rupestris* species complex

Recent genetic analyses indicate that *P. rupestris* is a species complex that started diversifying 15 million years ago, producing at least four new undescribed species that are morphologically very similar. Although two different morphotypes (robust and slender) have been identified, these are not related to the speciation process and reflect environmental adaptation, with the populations living at high altitude being robust and the lowland populations being slender. One of the putative new species (*Pristurus* sp. 4) is the reptile with the smallest distribution range in Arabia and, as a result of that, it is of high conservation concern.

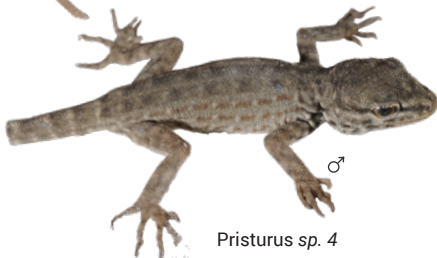
*Pristurus rupestris*  
robust morphotype



*Pristurus rupestris*  
slender morphotype



*Pristurus* sp. 2



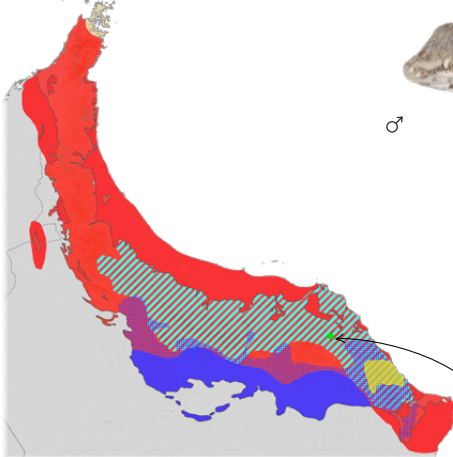
*Pristurus* sp. 4








*Pristurus* sp. 3



*Pristurus* sp. 5



-  *Pristurus rupestris*
-  *Pristurus* sp. 2
-  *Pristurus* sp. 3
-  *Pristurus* sp. 4
-  *Pristurus* sp. 5





## **Pristurus sp. 1**

**Arabian Semaphore Gecko** Two names are available for this species: *Pristurus migiurtinicus* Scortecci, 1933 from Somalia, and *Pristurus guweirensis* Haas 1943 (*Pristurus rupestris guweirensis* Haas, 1943), from Jordan. Genetic analyses indicate that *P. guweirensis* is genetically very similar to *Pristurus* sp. 1 but a taxonomic conclusion is pending until the Holotype or at least specimens from the type locality of *Pristurus migiurtinicus* (oldest available name) are analyzed.



### **DESCRIPTION**

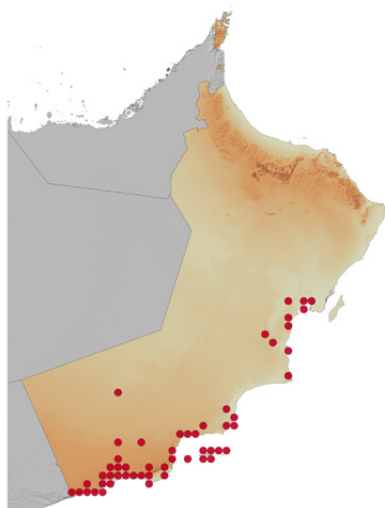
A very small gecko with round body and robust head. Nostrils in contact with the rostral scale. Eyes with round pupils. Relatively short limbs. Body covered with small dorsal granular scales. Tail long and robust, about 1.2 times the SVL, laterally compressed in males, with a dorsal crest of pointed scales that does not extend forward the level of the vent and a very weak ventral crest. Tail in females round with a weak crest. Color pattern very variable, with a tendency to match the substrate but in general from light brown to dark gray, with reddish-dark narrow longitudinal broken lines separated by yellowish spots on the back and flanks. Presence of black blotches on neck (above the shoulders). Females in forested areas present a vertebral stripe from the back of the head to the tail base. Very similar to *P. rupestris*.

### **DISTRIBUTION**

It is the most widely distributed species of the genus *Pristurus*, occurring across the southern and southwestern edge of the Arabian Peninsula, from southern Jordan to central Oman. Although it has not been corroborated by genetic analyses, the same species probably also occurs in East Africa (Eritrea, Ethiopia, Djibouti, and northern Somalia). In Oman it is distributed from Barr Al Hikman to Dhofar. Introduced populations in Masirah Island may belong to this species.

### **NATURAL HISTORY**

A mainly diurnal rock dwelling species, it can also be seen active after sunset. It is very abundant on rocks, boulders, on tree trunks, and man-made structures such as walls, houses, and gardens. They do complex signaling including push-ups, inflating and laterally compressing the body and throat, and curling and waving the tail up over the back. It preys on ants and other arthropods. Females lay single hard-shelled eggs through the year.



Diurnal



Not Evaluated

SVL 29 mm



0 – 1,650 m

**NATIVE**

## LACERTOIDEA

Lacertoidea is a Superfamily of reptiles that includes the families Lacertidae, Teiidae, Gymnophthalmidae, Alopoglossidae, and the burrowing Amphisbaenia. Lacertoidea consists of more than 1,029 species classified into 138 genera. Its members have a wide distribution

across the world, including hundreds of islands and high latitude regions with low average temperatures from Europe, Russia and China. There are oviparous, ovoviviparous and viviparous species, as well as sexually reproducing and parthenogenetic (unisexual) species. Lacertoidea feed on insects and other invertebrates but some species can also eat vegetables, fruits, nectar, pollen and other vertebrates such as rodents, birds, and reptiles.

Oman has 13 species of Lacertoidea classified into four genera and two families (Lacertidae and Trogonophidae). As shown in the distribution map of the 13 Lacertoidea species, this group is distributed across the whole country and on most of the islands.

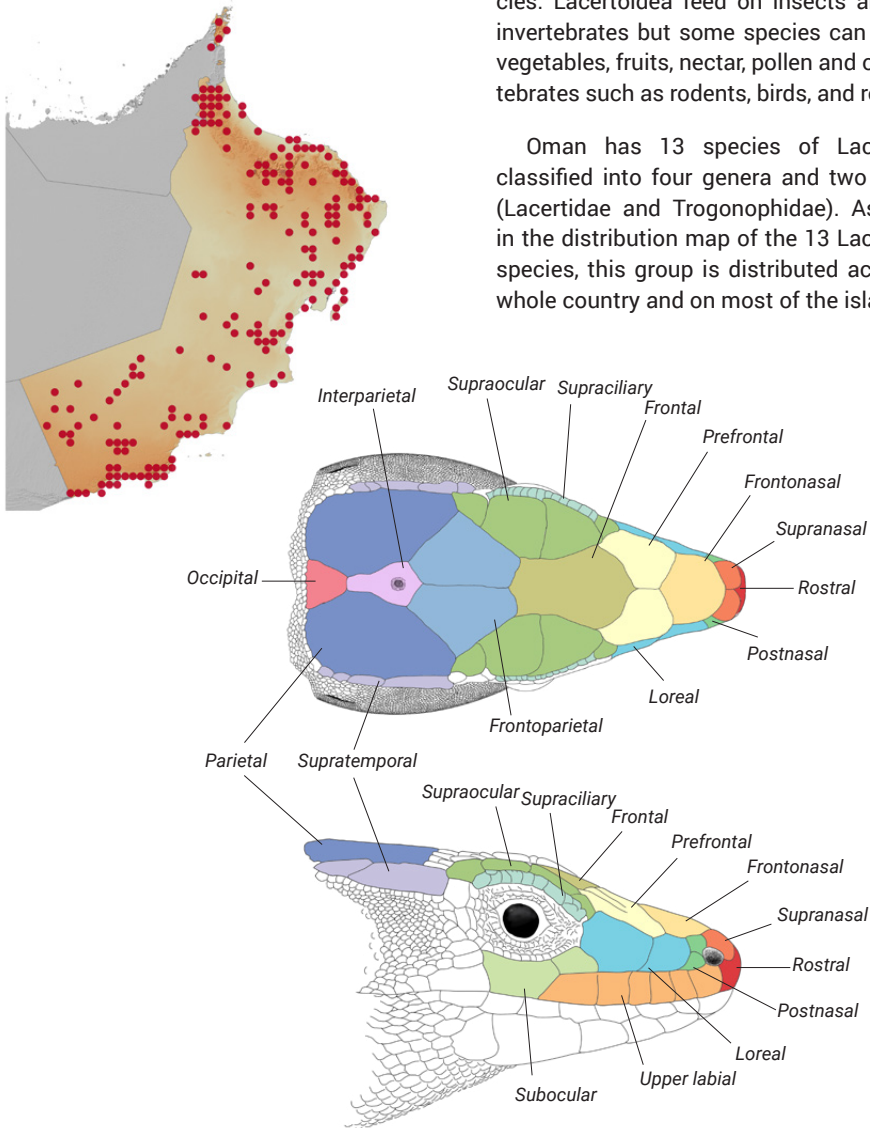
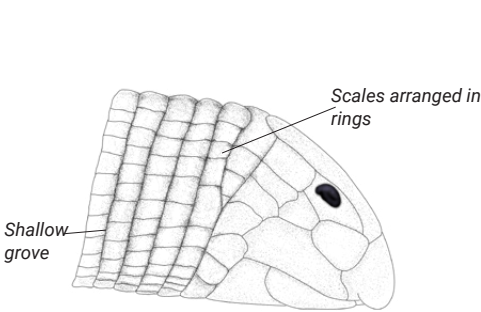


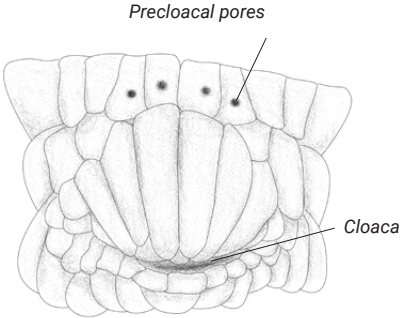
Fig 32: Dorsal (above) and lateral (below) views of the head of *Omanosaura jayakari* (Lacertidae) showing the main scales used in the species accounts of Lacertoidea.

**Key to Lacertoidea in Oman**

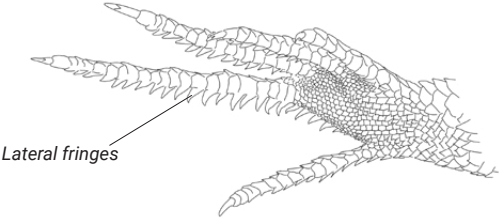
<b>1.</b>	<b>a</b>	No limbs; body scales small, rectangular, arranged in many regular rings separated by shallow groves (Fig 33). Preanal cloacal pores present in both males and females (Fig 34)	<i>Diplometopon</i>
	<b>b</b>	Four well-developed limbs	<b>2</b>
<b>2.</b>	<b>a</b>	Nostrils in contact with the first upper labial scale or very close to it (Fig 36A and B)	<b>3</b>
	<b>b</b>	Nostrils well-separated from the first upper labial scale (Fig 36C)	<i>Mesalina</i>
<b>3.</b>	<b>a</b>	First upper labial not much broader above than below (Fig 36B); toes without lateral fringes; two postnasal scales, one above the other (Fig 32 & Fig 36B)	<i>Omanosaura</i>
	<b>b</b>	First upper labial much broader above than below, in broad contact with the nostril (Fig 36A); toes with at least slight lateral fringes of pointed scales (Fig 35)	<i>Acanthodactylus</i>



**Fig 33:** Body scales arranged in regular rings separated by shallow groves. *Diplometopon zarudnyi*.

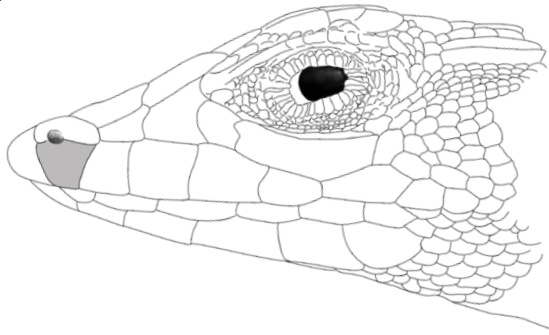


**Fig 34:** Ventral view of *Diplometopon zarudnyi* showing the cloaca and the precloacal.

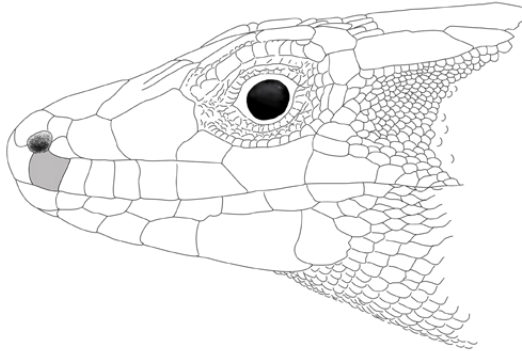


**Fig 35:** Toes with lateral fringes of pointed scales.

A



B



C

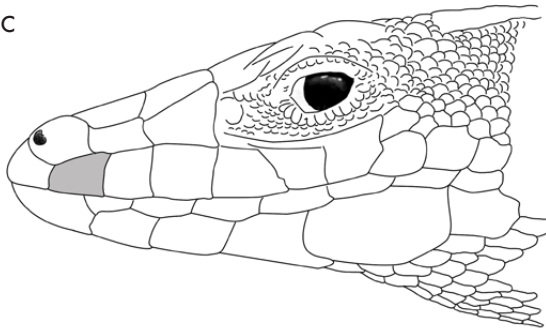


Fig 36: Snouts of lacertid lizards (*Lacertidae*) from Oman. first upper labial scale highlighted in gray. A: *Acanthodactylus*; B: *Omanosaura*; C: *Mesalina*.



### Key to the species of the genus *Acanthodactylus* in Oman

The genus *Acanthodactylus* includes seven morphologically similar described species in Oman. These species are, in general, difficult to differentiate. To facilitate their identification, we provide a species level key of the genus in Oman with illustrations of some diagnostic characters. The key has been adapted from Arnold (1986).

1.	a	Three continuous longitudinal rows of scales along the third and fourth toes	2
	b	Four continuous longitudinal rows of scales along the third and fourth toes	4
2.	a	Often striped dorsum (especially juveniles), the mid-dorsal dark stripe not dividing (Fig 37 left); tail color in juveniles reddish; moderately robust body and pointed snout; dorsal scales coarse, keeled and imbricate posteriorly; 25–38 across mid-body, the middle ones the largest. 10–11 ventral scales across the mid-belly; occasionally an irregular fourth row of scales is present in along the third and fourth toes	<i>A. opheodurus</i>
	b	Often striped dorsum (especially juveniles), the mid-dorsal dark stripe dividing anteriorly, sometimes enclosing a central dark stripe (Fig 37 right). Tail color in juveniles bluish	3
3.	a	Large lizard with robust head and body, up to 95 mm of SVL; dorsal scales very coarse, keeled and imbricate posteriorly, 18–30 across mid-body; 10–12 ventral scales across mid-belly	<i>A. boskianus</i>
	b	Medium-small lizard, up to 65 mm of SVL, with robust head and body and short pointed snout; dorsal scales, coarse, keeled and imbricate posteriorly, 34–42 across mid-body, the middle ones larger than the lateral ones. Usually 8 ventral scales across mid-belly	<i>A. felcis</i>
4.	a	Small lizard with slender body and a very narrow and long pointed snout; subocular scale in contact with the lip (Fig 38 left); dorsal scales coarse, keeled and imbricate, 31–36 across mid-body; usually 10–12 ventral scales across mid-belly	<i>A. masirae</i>
	b	Subocular scale separated from the lip (Fig 38 right); snout not very narrow and pointed	5
5.	a	Upper part of eardrum hidden by a fold of skin (Fig 39 left); body slender; dorsal scales feebly keeled, 36–44 across mid-body, the middle ones larger than the lateral one; usually 12 ventral scales across the belly; a yellow lateral stripe on each side, bordered by two dark stripes, running right above the limbs from the head to the tail. Tail color and underneath hands and feet yellow, especially strong in juveniles	<i>A. haasi</i>
	b	Ear drum fully exposed above, with some fringed scales at the anterior part (Fig 39 right); robust body	6
6.	a	Dorsolateral body scales in front of hind legs usually enlarged; dorsal scales keeled and imbricate posteriorly, 33–51 across mid-body; 13–18 ventral scales across the belly; dorsal color light brown or reddish brown, with small light spots larger on the flanks; tail and limbs also spotted; juveniles with the same dorsal color pattern as adults, without longitudinal stripes but with greenish-blue tails	<i>A. schmidtii</i>
	b	Dorsolateral body scales in front of hind legs not enlarged; dorsal scales keeled, 27–38 across mid-body; 11–13 ventral scales across the belly; dorsal color brown or reddish, with several rows of longitudinal pale spots or stripes, especially on the neck	<i>A. blanfordii</i>

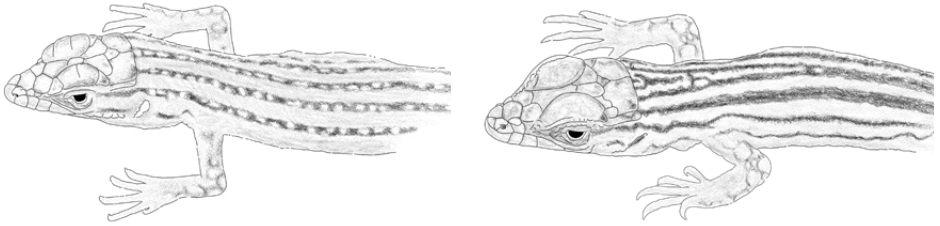


Fig 37: Dorsal patterns of **Left:** *Acanthodactylus opheodurus*; **Right:** *Acanthodactylus boskianus*.

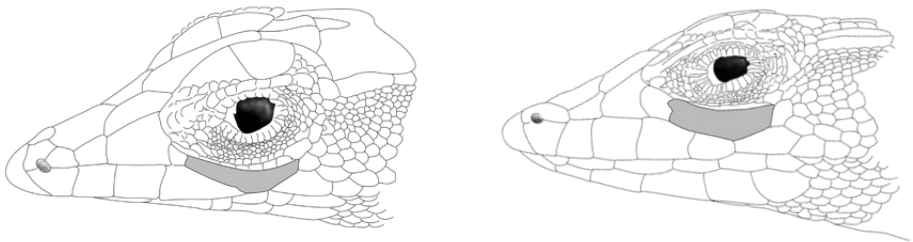


Fig 38: **Left:** Subocular scale (gray) in contact with the lip, *Acanthodactylus masirae*; **Right:** Subocular scale (gray) not in contact with the lip, *Acanthodactylus blanfordii* and most other species of *Acanthodactylus*.

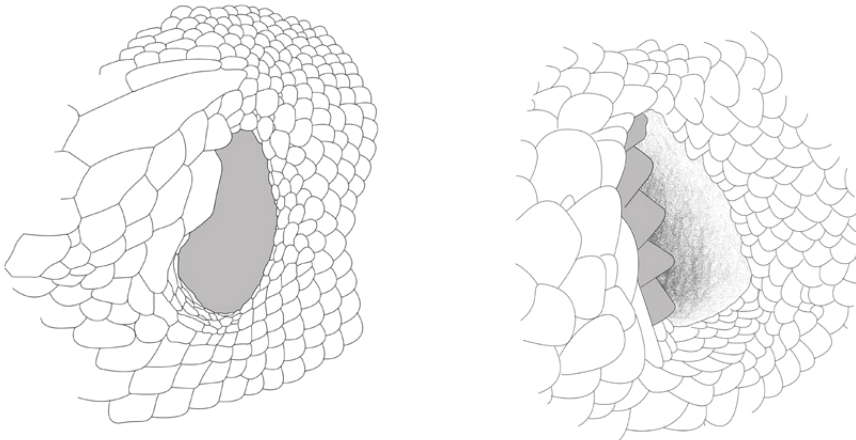
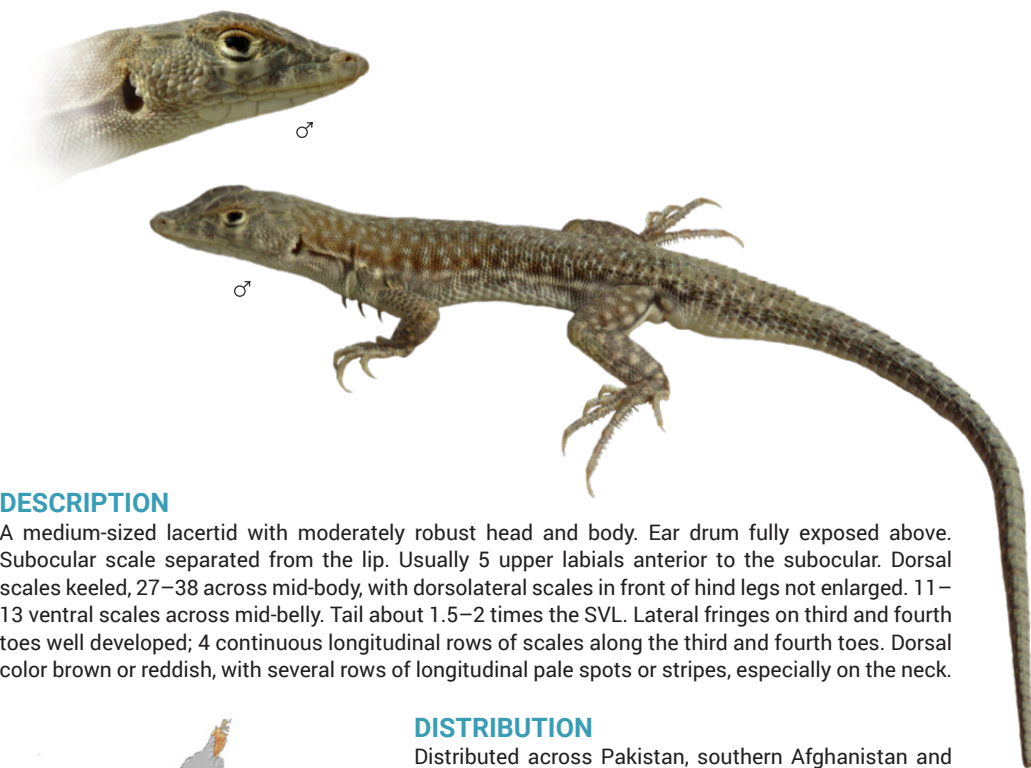


Fig 39: *Acanthodactylus* ear openings. **Left:** Upper part of eardrum hidden by a fold of skin without fringed scales on the anterior part; **Right:** Ear drum fully exposed above, with some fringed scales on the anterior part.

***Acanthodactylus blanfordii*** Boulenger, 1918

Blanford's Fringe-toed Lizard

**DESCRIPTION**

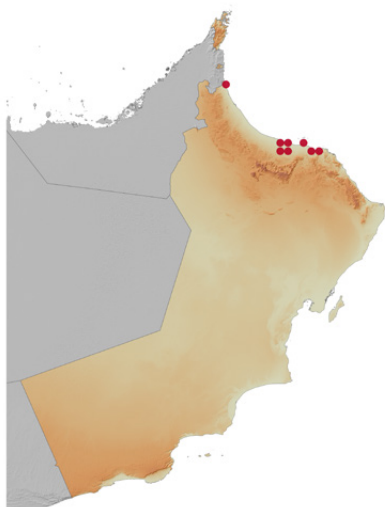
A medium-sized lacertid with moderately robust head and body. Ear drum fully exposed above. Subocular scale separated from the lip. Usually 5 upper labials anterior to the subocular. Dorsal scales keeled, 27–38 across mid-body, with dorsolateral scales in front of hind legs not enlarged. 11–13 ventral scales across mid-belly. Tail about 1.5–2 times the SVL. Lateral fringes on third and fourth toes well developed; 4 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color brown or reddish, with several rows of longitudinal pale spots or stripes, especially on the neck.

**DISTRIBUTION**

Distributed across Pakistan, southern Afghanistan and southeastern Iran, with the only Arabian populations being in Oman and UAE. In Oman, it is restricted to the Batinah Plain, with several populations around Muscat, Seeb, Billa, and an isolated population close to the UAE border. This large data gap in its distribution range should be investigated.

**NATURAL HISTORY**

A diurnal ground-dwelling lizard, found directly on the beach or more inland in sandy coastal plains with sparse low vegetation. It runs very fast between bushes if disturbed and can hide inside the bushes or into small burrows excavated at the base of the shrubs. It usually hunts actively for insects and other arthropods. There is no data on the clutch size.



Diurnal



Least Concern

SVL 75 mm



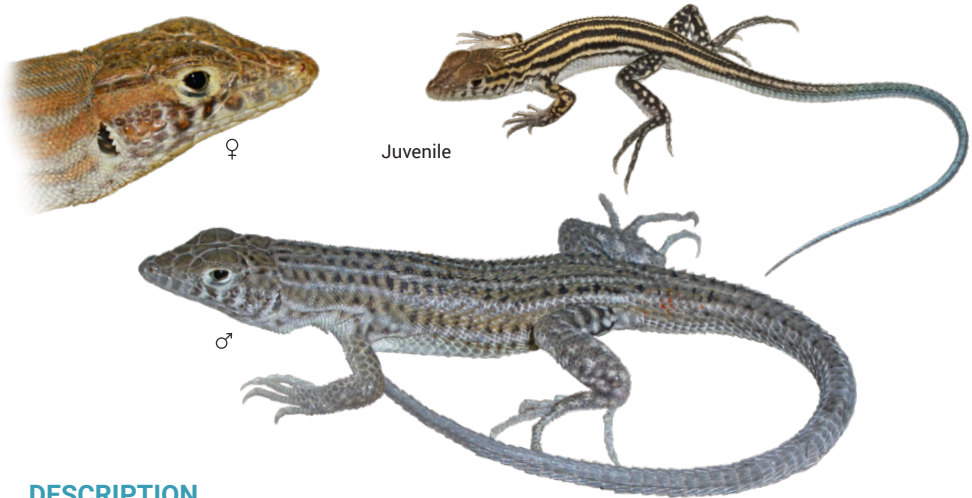
0 – 200 m

**NATIVE**



## *Acanthodactylus boskianus* (Daudin, 1802)

Bosc's Fringe-toed Lizard



### DESCRIPTION

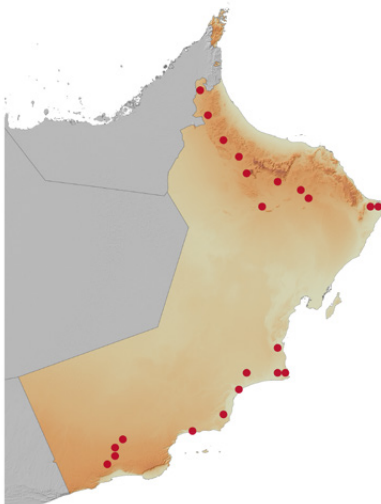
A large lizard with robust head and body. Ear drum fully exposed above. Subocular scale separated from the lip. 4–5 upper labials anterior to the subocular. Dorsal scales very coarse, keeled and imbricate posteriorly, 18–30 across mid-body. 10–12 ventral scales across mid-belly. Tail about 1.5–2 times the SVL, with large keeled scales on its dorsal surface. Lateral fringes on third and fourth toes not strongly developed; 3 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color of juveniles with several longitudinal stripes, the mid-dorsal dark stripe dividing anteriorly, sometimes enclosing a central dark stripe. Tail color in juveniles bluish. Adults brown, reddish or dark olive, with a less apparent pattern. Similar to *A. felicis* and *A. opheodurus*.

### DISTRIBUTION

A very widely distributed species, widespread from the northwestern African coast, across North Africa, through the Middle East to Arabia (Kuwait, Oman, Saudi Arabia, UAE), and southwestern Iran. In Oman, it is found on Ras Al Hadd, the southern slopes of the Hajar Mountains, the northern side of the Dhofar Mountains and the southeastern coast. It is not found on the Batinah, Salalah Plains, Musandam Peninsula, high mountain areas, and Masirah Island.

### NATURAL HISTORY

A diurnal ground-dwelling lizard, found on gravel plains, dry wadis and on more vegetated areas. It is not found on loose sand. It is a very strong lizard and runs very fast disappearing into the bushes if disturbed. It usually hunts actively for insects and other arthropods. Females lay 2–8 eggs that hatch after 8–12 weeks of incubation.



Diurnal



Least Concern

SVL 95 mm



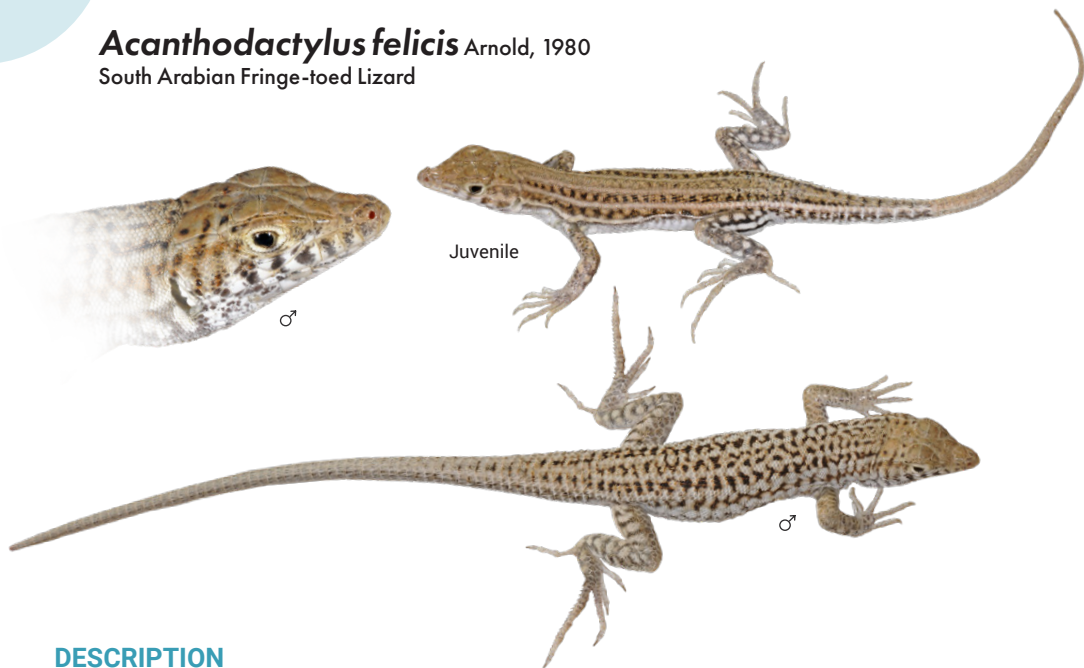
0 – 900 m

NATIVE



## *Acanthodactylus felicis* Arnold, 1980

South Arabian Fringe-toed Lizard



### DESCRIPTION

A medium-small lizard with short pointed snout, robust head and body. Ear drum fully exposed above. Subocular scale separated from the lip. Usually 4 upper labials anterior to the subocular. Dorsal scales coarse, keeled and imbricate posteriorly, 34–42 across mid-body, the middle ones larger than the lateral ones. Usually 8 ventral scales across mid-belly. Tail about 2–2.4 times the SVL. Lateral fringes on third and fourth toes not strongly developed. 3 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color light brown, usually with a bold pattern of dark longitudinal stripes, the mid-dorsal stripe dividing anteriorly. Tail color in juveniles bluish. Similar to *A. boskianus* and *A. opheodurus*.

### DISTRIBUTION

A southern Arabian endemic, it is distributed from western Yemen to Dhofar in South Oman. The distribution within the Dhofar Governorate includes the inland side of the Dhofar Mountains and several coastal localities, from Mirbat East to Ash Shuwaymiyyah.

### NATURAL HISTORY

A diurnal ground-dwelling lizard, found on sandy habitats with some vegetation, including sandy wadi beds and sandy coastal plains. It runs very fast between bushes if disturbed and can hide inside the bushes or into small burrows excavated at the base of the shrubs. It usually hunts actively for insects and other arthropods. There is no data on the clutch size.



Diurnal



Vulnerable

SVL 65 mm



0 – 1,100 m

NATIVE



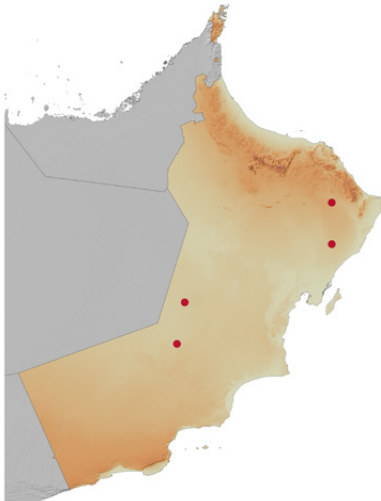
## *Acanthodactylus haasi* Leviton & Anderson, 1967

Haas' Fringe-toed Lizard



### DESCRIPTION

A medium-small lizard with slender body and moderately pointed snout. Ear drum partly hidden above. Subocular scale separated from the lip. Usually 5 upper labials anterior to the subocular. Dorsal scales feebly keeled, 36–44 across mid-body, the middle ones larger than the lateral ones. Usually 12 ventral scales across mid-belly. Tail about 2–2.4 times the SVL. Lateral fringes on third and fourth toes poorly developed. 4 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color cream or light brown with dark mottling. A yellow lateral stripe on each side bordered by two dark stripes running right above the limbs from the head to the tail. Tail color yellow, especially strong in juveniles.



### DISTRIBUTION

An Arabian endemic, it is found in Bahrain, Oman, northern and southeastern Saudi Arabia, and UAE. In Oman, it is only known from a few localities in the Sharqiyah Sands, and in central Oman (Al Wusta Governorate), at the southern edge of the Rub' Al Khali Desert.

### NATURAL HISTORY

A very rare diurnal ground-dwelling lizard, found on vegetated sandy plains and sand dunes. It runs with the body held high and the tail curved upwards to avoid the heat of the sand. It spends most of the time inside small bushes where it climbs with agility hunting insects and other arthropods. It can also hide in burrows at the base of the shrubs. There is no data on the clutch size.



Diurnal



Least Concern

SVL 65 mm

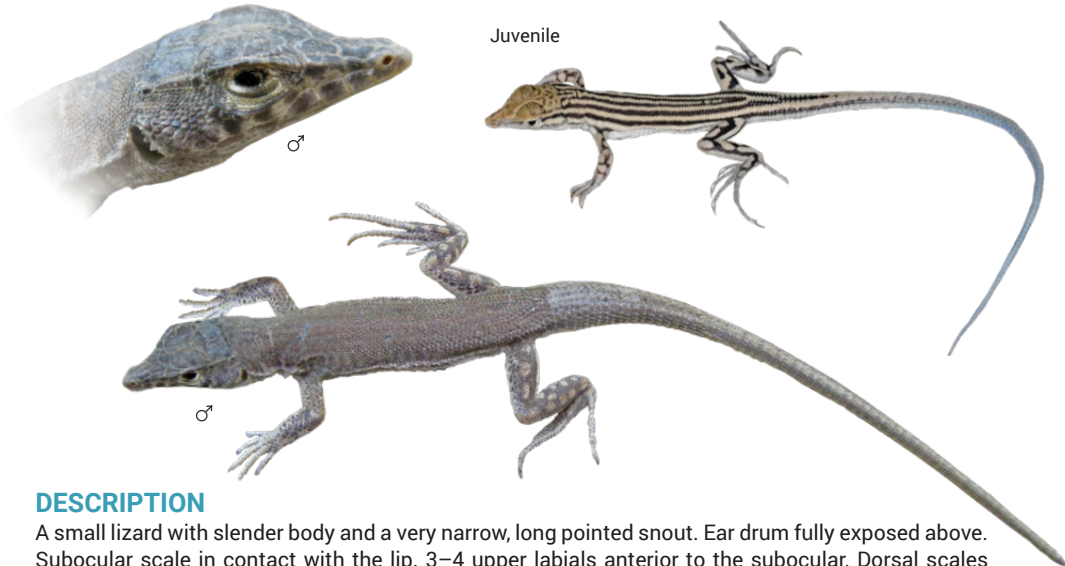


100 – 400 m

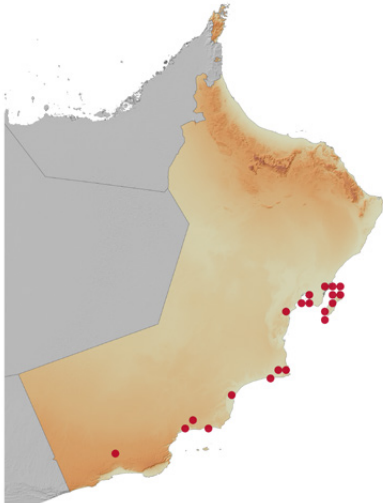
NATIVE

***Acanthodactylus masirae*** Arnold, 1980

Masirah Fringe-toed Lizard

**DESCRIPTION**

A small lizard with slender body and a very narrow, long pointed snout. Ear drum fully exposed above. Subocular scale in contact with the lip. 3–4 upper labials anterior to the subocular. Dorsal scales coarse, keeled and imbricate, 31–36 across mid-body. Usually 10–12 ventral scales across mid-belly. Tail about 2–2.4 times the SVL. Lateral fringes on third and fourth toes well developed. 4 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color of juveniles with several longitudinal stripes, the mid-dorsal dark stripe dividing anteriorly or posteriorly through its length, sometimes enclosing a central dark stripe on the neck. Tail color in juveniles bluish. Adults with less marked stripes or uniform.

**DISTRIBUTION**

Endemic to Oman, it is found on Masirah Island and on the adjacent mainland, from Barr Al Hikman South to Dhofar along the coast, with an isolated locality on the inland side of the Dhofar Mountains.

**NATURAL HISTORY**

A diurnal ground-dwelling lizard, found in vegetated sandy plains, on the beach, on low dunes and hummocks. It runs very fast between bushes if disturbed and hide in small burrows excavated at the base of the shrubs. It usually hunts actively for insects and other arthropods. There is no data on the clutch size.



Diurnal



Data Deficient

SVL 52 mm



0 – 700 m

**ENDEMIC**



## *Acanthodactylus opheodurus* Arnold, 1980

Snake-tailed Fringe-toed Lizard

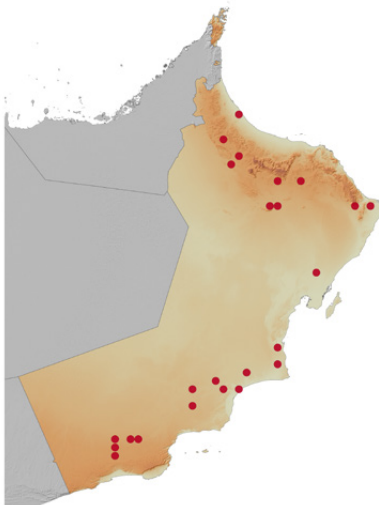


### DESCRIPTION

A medium-small lizard with moderately robust body and pointed snout. Ear drum fully exposed above. Subocular scale separated from the lip. 4–5 upper labials anterior to the subocular. Dorsal scales, coarse, keeled and imbricate posteriorly, 25–38 across mid-body, the middle ones the largest. 10–11 ventral scales across mid-belly. Tail about 2–2.4 times the SVL. Lateral fringes on third and fourth toes not strongly developed; 3 continuous longitudinal rows of scales along the third and fourth toes but occasionally an irregular fourth row is present. Dorsal color of juveniles with several longitudinal stripes, the mid-dorsal dark stripe not dividing. Tail color in juveniles reddish. Adults light brown with darker stripes that can become progressively more mottled. Similar to *A. boskianus* and *A. felicis*.

### DISTRIBUTION

Widely distributed across Arabia (Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen) and adjacent regions (Israel, Jordan, and Iraq). In Oman, it is distributed from the Batinah Plain to Dhofar, being absent from the high mountains, the Musandam Peninsula, the interior of the country, Masirah Island, and the seaside of the Dhofar Mountains.



### NATURAL HISTORY

A diurnal ground-dwelling lizard, found on vegetated areas of hard sand substrate, gravel plains and dry wadis. It avoids sand dunes. It runs very fast between bushes if disturbed and hides inside the bushes. It often wriggles its bright red tail laterally. It usually hunts actively for insects and other arthropods. There is no data on the clutch size of the Arabian populations.



Diurnal



Least Concern

SVL 62 mm



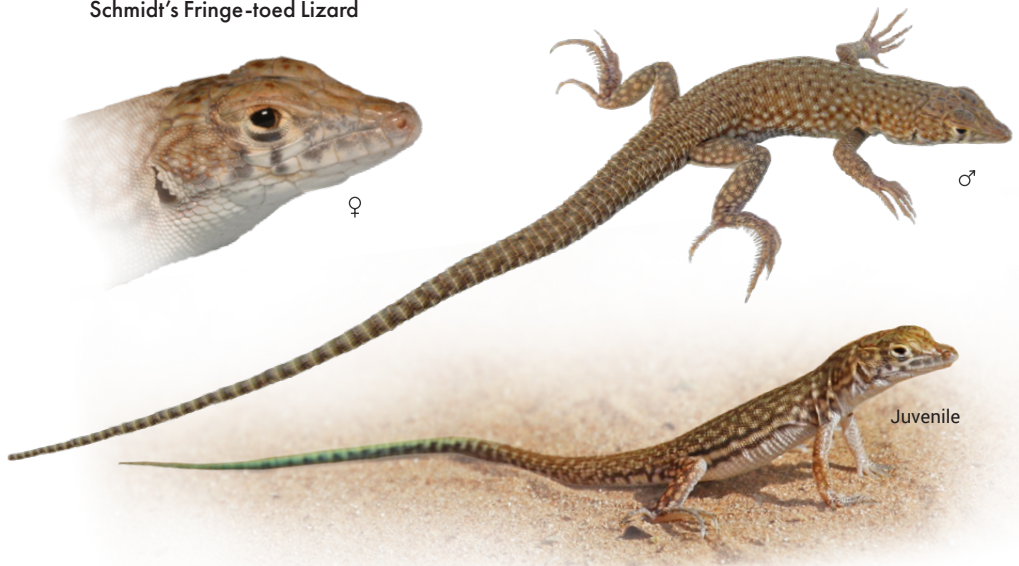
0 – 700 m

NATIVE



***Acanthodactylus schmidtii*** Haas, 1957

Schmidt's Fringe-toed Lizard

**DESCRIPTION**

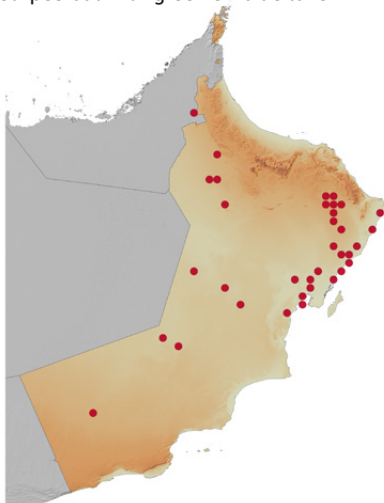
A medium-small lizard with moderately robust body and pointed snout. Ear drum fully exposed above. Subocular scale separated from the lip. 5 upper labials anterior to the subocular. Dorsal scales keeled and imbricate posteriorly, 33–51 across mid-body; dorsolateral body scales in front of hind legs enlarged. 13–18 ventral scales across mid-belly. Tail about 2 times the SVL. Lateral fringes on third and fourth toes strongly developed; 4 continuous longitudinal rows of scales along the third and fourth toes. Dorsal color light brown or reddish brown, with small light spots larger on the flanks. Tail and limbs also spotted. Juveniles with the same dorsal color pattern as adults, without longitudinal stripes but with greenish-blue tails.

**DISTRIBUTION**

Widely distributed across all seven Arabian countries and adjacent regions (Jordan, southeast Iraq, and southwestern Iran). In Oman, it is distributed across the Sharqiyah Sands and in other sandy areas of the interior, close to the Rub' Al Khali Desert. It is absent from the Batinah Plain, the Hajar and Dhofar Mountains, Masirah Island, and the southeastern coast.

**NATURAL HISTORY**

A diurnal ground-dwelling lizard, found in vegetated soft aeolian sandy habitats, including sandy plains and sand dunes. It runs very fast between bushes if disturbed and can hide inside the bushes or into small burrows excavated at the base of the shrubs. It usually hunts actively for insects and other arthropods. There is no certain data on the clutch size.



Diurnal



Least Concern

SVL 66 mm



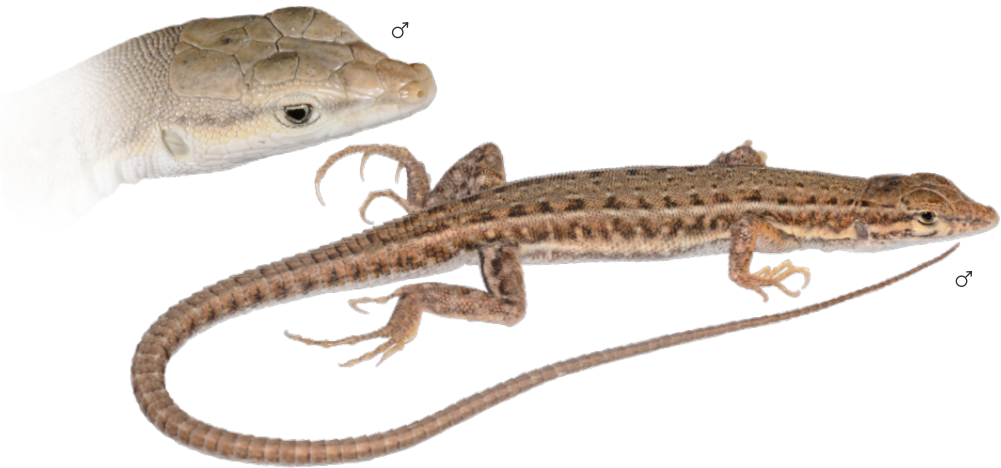
0 – 400 m

**NATIVE**



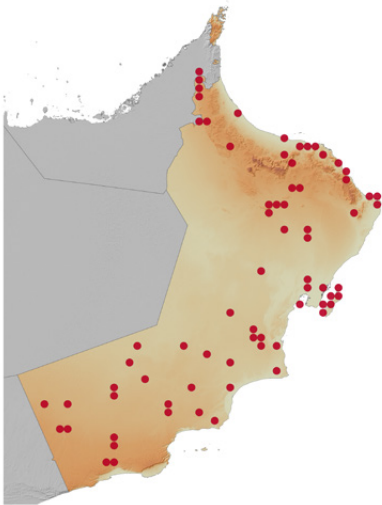
## *Mesalina adramitana* (Boulenger, 1917)

Hadramaut Sand Lizard



### DESCRIPTION

A small slender lizard with strongly depressed body and head, snout pointed. Occipital scale absent or very small and not in broad contact with the interparietal scale. Body covered with small granular dorsal scales, 29–37 across mid-body. Scales on the upper surface of the lower leg generally smooth or only obliquely keeled. Ventral scales not all about the same width; usually 10 (8+2 small) ventral scales across mid-belly. 10–14 femoral pores under each thigh. Relatively sort slender limbs. Tail long, about 2 times the SVL. Dorsal color light brown, often with small brown spots disposed on longitudinal series on the back, with or without small whitish spots. Tail in adults or juveniles never blue.



### DISTRIBUTION

Endemic to Arabia, it is found in Qatar, Oman, Saudi Arabia and UAE. In Oman, it is widely distributed across the whole country, including Masirah Island, except in the high Mountains, the Musandam Peninsula, deep in the Sharqiyah Sands and the Rub' Al Khali Desert, in the seaside of the Dhofar Mountains, and in Jebel Samhan.

### NATURAL HISTORY

An abundant diurnal ground-dwelling lizard, found in several different habitats, but usually in arid sparsely vegetated gravel plains and in more sandy areas close to the beach. Not found on continuous sand dunes in extreme desert conditions. It runs very fast between bushes if disturbed and can hide inside the plants or into small excavated burrows. It is active under extremely hot conditions (body temperature rising up to 46 °C). It usually hunts actively for insects and other arthropods. Females lay clutches of 2–4 eggs.



Diurnal



Least Concern

SVL 42 mm



0 – 800 m

NATIVE



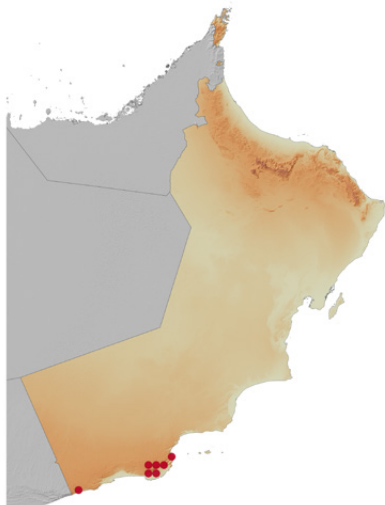
## *Mesalina austroarabica* Sindaco, Simó-Riudalbas, Sacchi & Carranza, 2018

South Arabian Sand Lizard



### DESCRIPTION

A small slender lizard with depressed body and head, snout pointed. Well-developed occipital scale in broad contact with the interparietal scale. Lower eyelid with a window made up of two large scales edged with black. Body covered with small granular dorsal scales, 39–47 across mid-body. Scales on the upper surface of the lower limbs keeled. Ventral scales not all about the same width; usually 10 (8+2 small) ventral scales across mid-belly. 11–15 femoral pores under each thigh. Relatively short slender limbs. Tail long, about 2.3 times the SVL. Dorsal color light brown with shades of gray, often with small brown spots disposed in longitudinal series on the back, with or without small whitish spots. Distal half of the tail is distinctly cyan blue in young specimens.



### DISTRIBUTION

Endemic to southern Arabia, it is distributed from Farasan Islands in extreme southwestern Saudi Arabia, through Yemen to Dhofar. In Oman, it is restricted to a small area comprised between Jebel Qamar in the West to around Wadi Hasik in the East, with several records in Jebel Samhan.

### NATURAL HISTORY

A diurnal ground-dwelling lizard. In Jebel Samhan it is found on rocky-mountainous terrain covered by small shrubs. If disturbed it runs fast between bushes and can also hide under the stony terrain. It can occupy other habitats in Farasan Island and other places. It usually hunts actively for insects and other arthropods. There is no information about clutch size.



Diurnal



Not Evaluated

SVL 47 mm



300 – 1,700 m

NATIVE



## *Mesalina ayunensis* Arnold, 1980

Ayun Sand Lizard



### DESCRIPTION

A small slender lizard with round body, narrow head with a rather long pointed snout and well-defined neck. Occipital scale absent or very small and not in broad contact with the interparietal. Body covered with small granular dorsal scales, 44–47 across mid-body. Scales on the upper surface of the lower limbs smooth and small. Ventral scales not all about the same width; usually 10 (8+2 small) ventral scales across mid-belly. 16–18 femoral pores under each thigh. Relatively long slender limbs. Tail long, about 2.3–2.6 times the SVL. Dorsal color uniform light brown or darker with scattered small whitish spots. Tail bright blue even in adult specimens.



### DISTRIBUTION

Endemic to extreme southern Arabia, it is only known from an isolated locality on the coast in central Yemen (North of Riyan) and a few localities in Dhofar, including some around Wadi Ayun and two close to Ash Shuwaymiyyah. More research is needed to know its real distribution.

### NATURAL HISTORY

A very scarce diurnal ground-dwelling lizard, found on coarse gravel surfaces with sparse vegetation, wadis with more abundant vegetation and even on the beach at the easternmost localities. It has been seen predated over the gecko *Tropicolotes scorzeccii*. Nothing is known about other aspects of the biology of this secretive lizard.



Diurnal



Data Deficient

SVL 44 mm



0 – 1,000 m

NATIVE



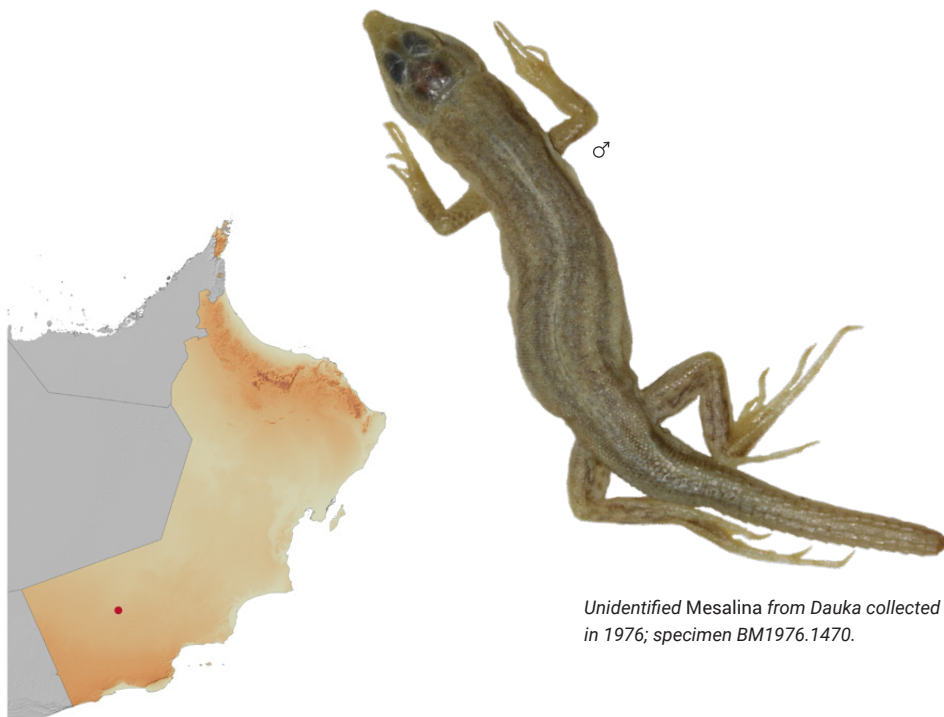
## Unidentified *Mesalina* from Dauka

A single male specimen of *Mesalina* collected by M. O. Gallagher in 1976 south of Dauka, at 18.5000N, 54.0666E. *Mesalina adramitana* was also found in that locality. As a result of the morphological differences of the new specimen with *M. adramitana* and *M. ayunensis*, E. N. Arnold considered this specimen a possible new species in his 1980 monograph on the lizards of Dhofar. However, he decided not to name it as a new species until more material was collected and studied. After 44 years and despite several attempts, no more specimens have been collected.

The collected specimen is in the collections of the Natural History Museum, London under accession number BM 1976.1470. It is a single poorly preserved male specimen.

It differs from *M. adramitana* in its finer dorsal scaling (53 instead of 35-37 across mid-body), more gulars (34 instead of 27-31), ventrals not clearly separated from dorsals, more femoral pores (16/15 compared with 12-14), upper tibial scales not clearly larger than dorsals between hind legs, and a striped dorsal pattern. In some of these features, it resembles *M. ayunensis* but does not agree with it in its ventrals, number of femoral pores, lack of large scales beneath lower fore limbs and dorsal pattern.

This specimen was referred to as *Mesalina* sp. by Arnold 1980, *Mesalina* sp. B. by Arnold 1986, and *Mesalina* sp. 2 in the Atlas of Oman by Carranza et al. 2018.

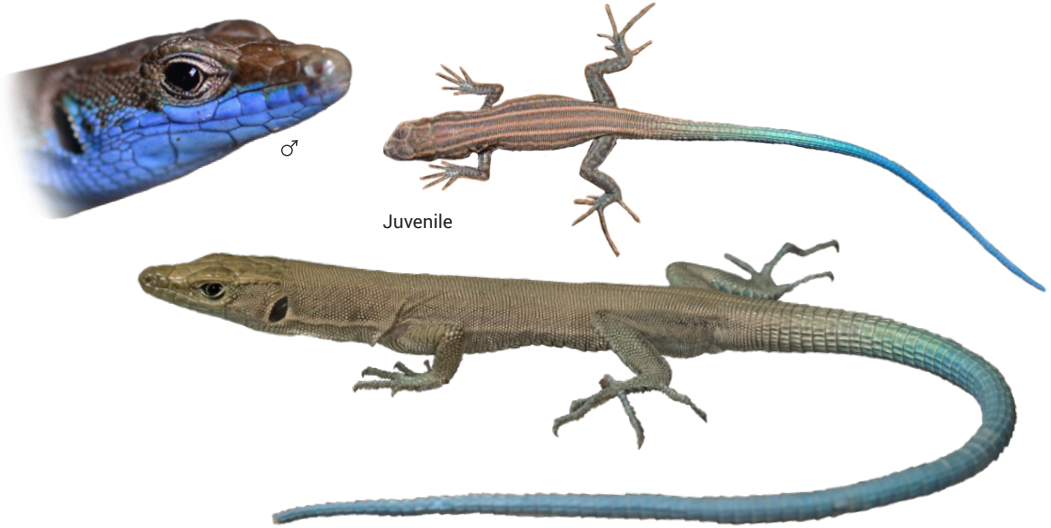


Unidentified *Mesalina* from Dauka collected in 1976; specimen BM1976.1470.



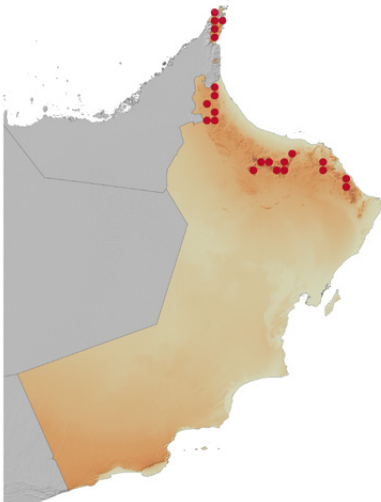
## *Omanosaura cyanura* (Arnold, 1972)

Hajar Blue-tailed Lizard



### DESCRIPTION

A medium-small slender lizard with strongly depressed head and body, a rather long pointed snout and narrow head. 2 postnasal scales, one above the other. Body covered with small smooth dorsal scales, 44–51 across mid-body. A series of strongly expanded plates on the forelimbs. Ventral scales rectangular in shape, 6 across mid-belly. 16–17 femoral pores under each thigh. Relatively long slender limbs. Tail long, about 2.5 times the SVL, with very strongly keeled scales. Dorsal color uniform copper-brown, gray or blue in adults, always with turquoise-blue tail and sometimes also with extensive blue underneath the body and head. Juveniles with several longitudinal light stripes.



### DISTRIBUTION

Endemic to the Hajar Mountains of Oman and UAE, it is widely distributed across the mountain range. There is a data gap of around 140 km between the Jebel Akhdar massif and Al Buraymi where more surveys are needed. A recent genetic study has shown that the populations in the UAE and the Musandam Peninsula are very different to all the other populations, suggesting that there may be a new species of *Omanosaura* in the Hajar Mountains.

### NATURAL HISTORY

A diurnal rock-dwelling lizard. It is found close to water pools on vegetated rocky mountain areas, wadis with large rocks and boulders, and other similar areas. An extremely good climber, it moves very quickly between rocks hunting for insects and other arthropods. Females lay several clutches of 3 eggs.



Diurnal



Least Concern

SVL 60 mm

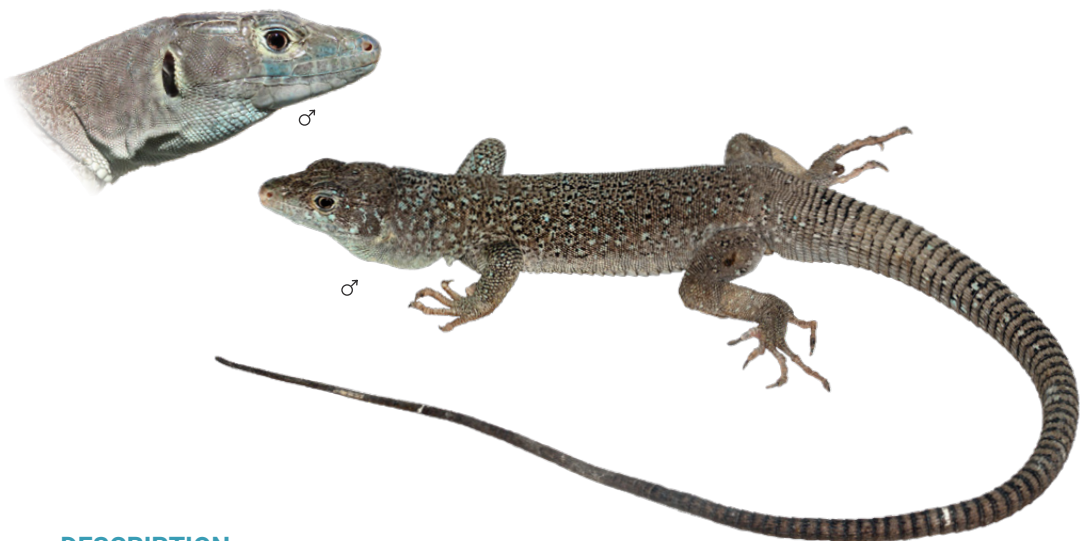


100 – 2,400 m

NATIVE

***Omanosaura jayakari*** (Boulenger, 1887)

Jayakar's Lizard

**DESCRIPTION**

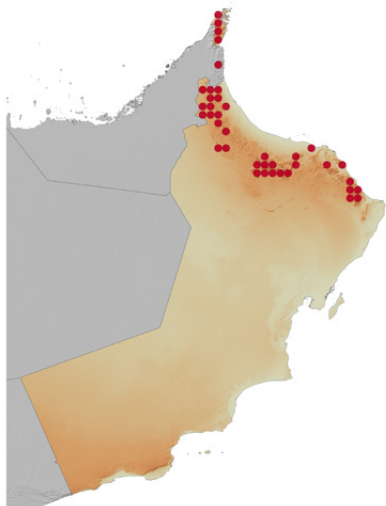
A very large lizard (the largest lacertid in Arabia), with a very robust head and body. 2 postnasal scales, one above the other. Body covered with smooth or feebly keeled dorsal scales, 66–92 across mid-body. Ventral scales rectangular in shape, 8 across mid-belly. 25–30 femoral pores under each thigh. Relatively short robust limbs. Tail very long, about 2.8 times the SVL, with very strongly keeled scales. Dorsal color very variable, from uniform gray brown or light brown to rather colorful animals with blue-green spots and darker markings all over the body. Some animals with blue on the head region. Underside of body white and tail uniform gray or brown but never blue, turning black towards the tip in old specimens.

**DISTRIBUTION**

Endemic to the Hajar Mountains of Oman and UAE, it is widely and continuously distributed across the whole mountain range, without any major distribution gaps. Contrary to *O. cyanura*, it is a genetically very uniform species.

**NATURAL HISTORY**

A diurnal lizard, it is usually found in fairly vegetated mountain areas on the ground, on large rocks and boulders, on trees, and on walls and other man-made structures in mountain oases. It is usually not shy to humans and can be approached within short distances. It has a varied diet consisting of insects, small geckos, as well as a relatively large amount of plant food. Females can lay several clutches of 7–10 eggs that hatch in about 8 weeks at 27–30 °C.



Diurnal



Least Concern

SVL 200 mm



0 – 2,800 m

**NATIVE**

## *Diplometopon zarudnyi* Nikolsky, 1907

Zarudnyi's Worm Lizard

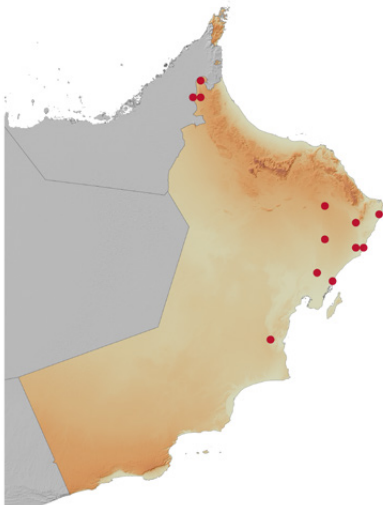


### DESCRIPTION

A very characteristic elongated, round legless lizard with many adaptations to fossoriality. Small robust wedge-shaped head, indistinct from the body, with compact skull and fused cephalic scales into 4–5 large plates. Rudimentary eyes protected underneath a translucent scale. No external ear openings. Body scales small, rectangular, twice as long as wide, arranged in 165–178 rings separated by shallow grooves. 46–54 scales on each ring. Between 4–6 precloacal pores in both males and females. Tail extremely short, about 0.08 times the SVL, composed of 13–17 rings. Body color light pink, with dark brown uniform spots on the back and head.

### DISTRIBUTION

Distributed across western Iran, South Iraq and all Arabian countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE) with the exception of Yemen. In Oman, it is restricted to the Sharqiyah Sands and surrounding sandy areas to the North and South. More exploration on the edge of the Rub' Al Khali Desert is necessary to confirm its absence from this ecologically favorable area.



### NATURAL HISTORY

An abundant nocturnal fossorial lizard. It inhabits aeolian sand deposits with extensive sand dunes and scattered vegetation and sandy beaches. It emerges to the surface for breeding and feeding, traveling considerable distances across the sand and leaving a very characteristic track. It forages very frequently, taking mainly small invertebrate larvae that localizes by the scent using its tongue. There is no data on its reproduction.



Nocturnal



Least Concern

SVL 236 mm



0 – 400 m

NATIVE

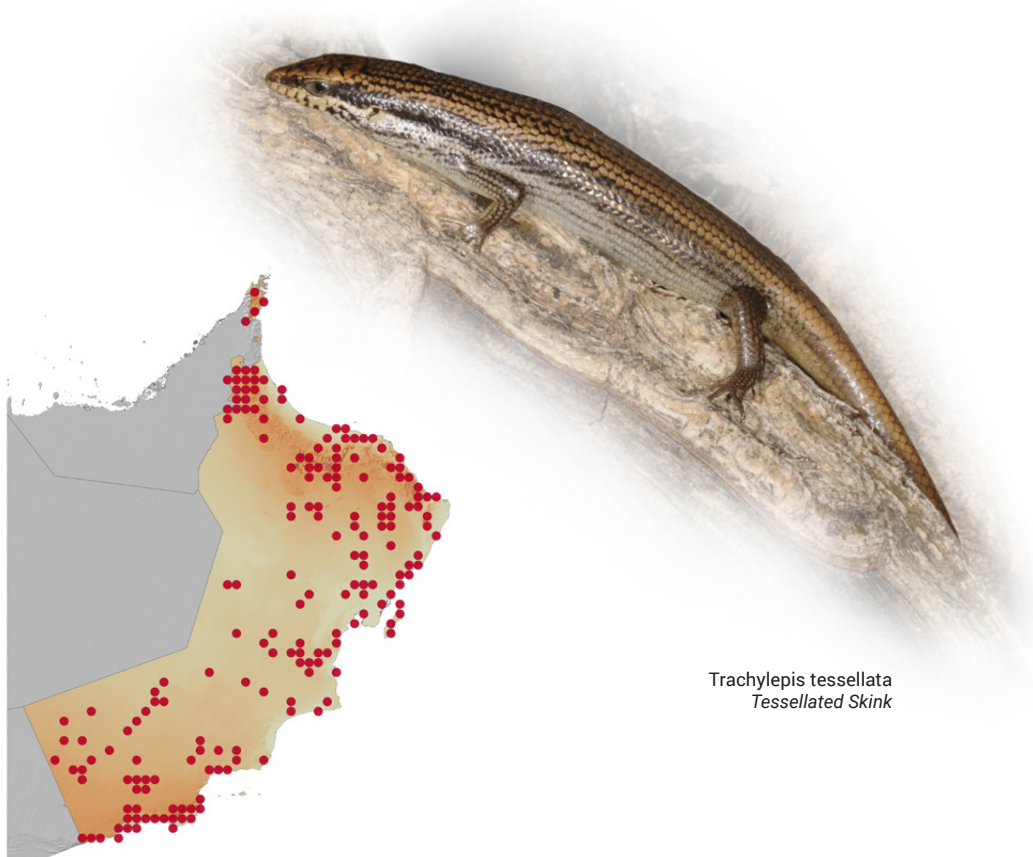


## SCINCOIDEA

Scincoidea is a Superfamily of reptiles that includes the skinks (Scincidae) apart from the other three families of reptiles (Xantusiidae, Gherrosauridae, and Cordylidae). Scincoidea consists of more than 1,870 species classified into 181 genera. Its members are distributed across all warm areas of the world including thousands of islands, where they live in a variety of different habitats, from very dense forests to extreme desert areas. There are oviparous, ovoviviparous and viviparous

species. Scincoidea feed on insects and other invertebrates but some species can also eat vegetables and fruits and other vertebrates, such as rodents, birds, and reptiles.

Oman has only seven species of Scincoidea classified into five genera, and one family (Scincidae). As shown in the distribution map, the seven Scincoidea species from Oman are distributed across the whole country and on most islands.



*Trachylepis tessellata*  
Tessellated Skink

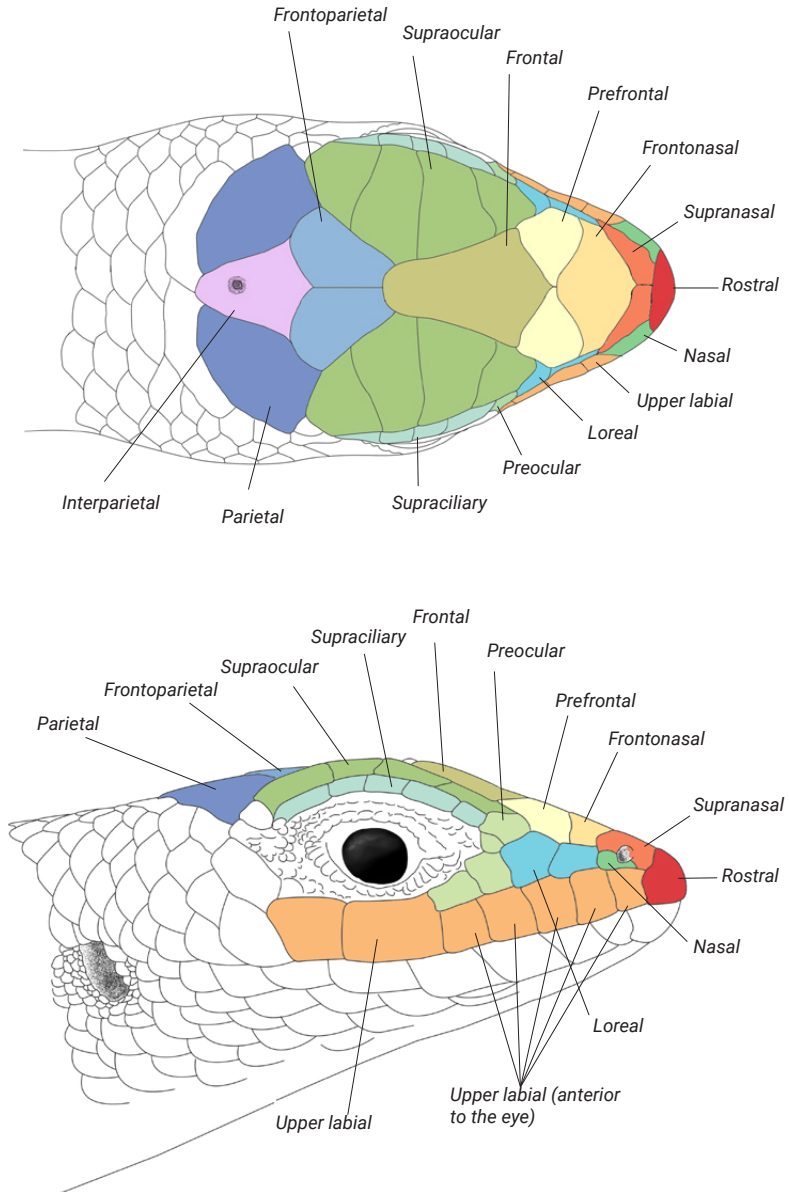


Fig. 40: Dorsal (above) and lateral (below) views of the head of *Trachylepis brevicollis* (Scincidae) showing the main scales used in the species accounts of Scincoidea.

**Key to Scincoidea in Oman**

1.	a	Very small, only up to about 55 mm of SVL; eye covered by a transparent spectacle and therefore will not close when touched	<i>Ablepharus</i>
	b	Eyelids normal, will close when touched	<b>2</b>
2.	a	Toes flattened with the scales projecting to form serrated fringes; countersunk lower jaw (Fig 42); ear opening not visible, covered by serrated scales (Fig 41)	<i>Scincus</i>
	b	Toes not flattened and without fringes; lower jaw not countersunk; ear opening visible	<b>3</b>
3.	a	Nostril in broad contact with rostral scale (Fig 43 left)	<i>Chalcides</i>
	b	Nostril separated from the rostral scale by the supranasal scale (Fig 43 right)	<b>4</b>
4.	a	Large and very robust, up to 145 mm of SVL; neck, back and flanks mostly covered by scales with two keels (rarely three) (Fig 44 left), usually 5 upper labial scales anterior to the eye; first supraocular scale contacts the frontal scale; young specimens dark with yellow spots	<i>Trachylepis brevicollis</i>
	b	Medium-sized; dorsal scales virtually smooth or with three keels (Fig 44 right), often dark-edged; usually 4 upper labial scales anterior to the eye; first supraocular scale does not contact the frontal scale or only contacts it slightly; a dark streak along the sides of the head and neck	<i>Trachylepis tessellata</i>
	c	Medium-sized; dorsal scales with three keels (Fig 44 right), usually 4 upper labial scales anterior to the eye; first supraocular scale contacts the frontal scale; dorsal color brown with a pattern of longitudinal dark stripes on foreparts	<i>Heremites</i>

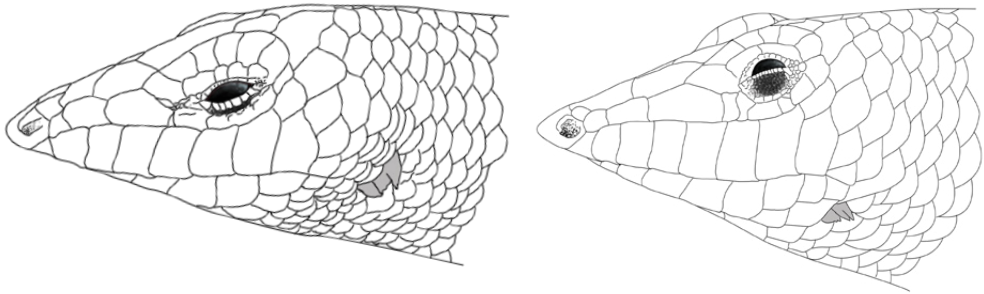


Fig 41: *Scincus* showing the scales covering the ear opening (gray) and the relative position of the ear opening respect to the mouth. **Left:** *Scincus conirostris*; **Right:** *Scincus mitranus*.

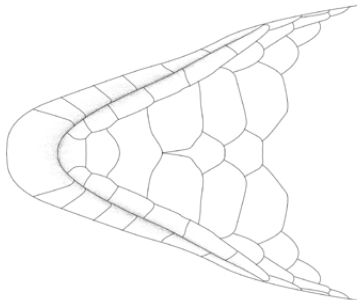
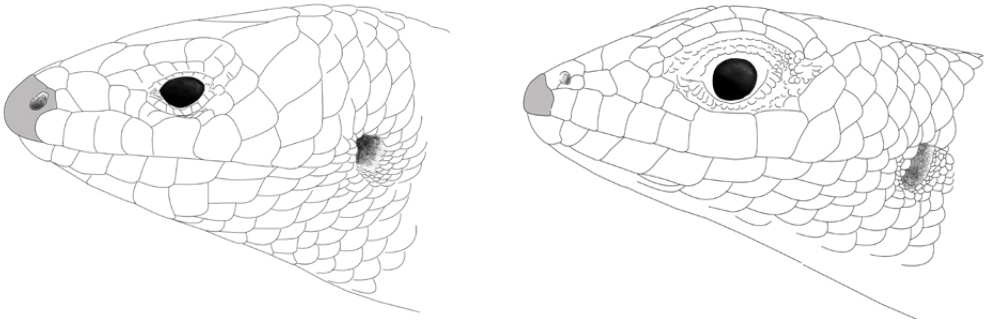
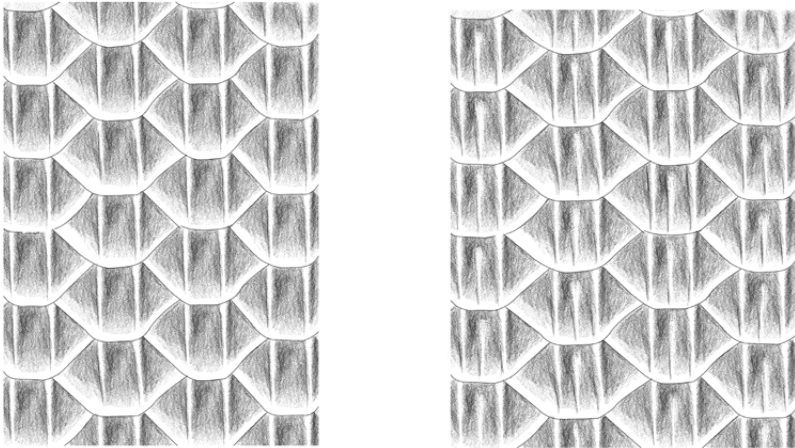


Fig 42: Ventral view of *Scincus* head showing the countersunk mouth.



**Fig 43:** Relative position of the rostral scale (gray) and the nostril. **Left:** Nostril in broad contact with the rostral, *Chalcides ocellatus*; **Right:** Nostril separated from the rostral, *Trachylepis* and *Heremites*.



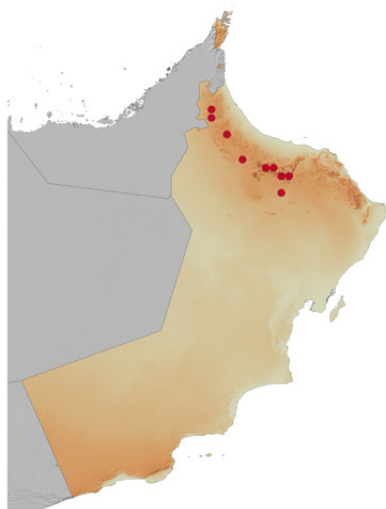
**Fig 44:** Dorsal body scales of *Trachylepis* and *Heremites*. **Left:** Scales with two keels, *Trachylepis brevicollis*; **Right:** Scales with three keels, *Heremites septemtaeniatus* and *Trachylepis tessellata*.

***Ablepharus pannonicus*** (Lichtenstein, 1823)

Asian Snake-eyed Skink

**DESCRIPTION**

A small slender skink with elongated cylindrical body, small head not broader than neck, and very short limbs. Eye covered by a transparent spectacle and therefore does not close when touched. There is some variability across its range but the Hajar Mountains populations have 18 scales around mid-body (20 scales elsewhere), and the two mid-dorsal longitudinal scale rows are distinctly expanded (different arrangement elsewhere). Tail very thick and long, about 2 times the SVL. Dorsal color brownish, often with two light dorsolateral stripes and a dark stripe from the nostril, through the eye and along the flank. Underside of tail and hind limbs brick-red or orange during the breeding season.

**DISTRIBUTION**

Widely distributed across the Caucasus, Iraq, Iran and Afghanistan, adjoining central Asia, Pakistan and northwestern India. In Arabia it is restricted to Kuwait, the Asir Mountains of southwestern Saudi Arabia and northwestern Yemen, and the Hajar Mountains of Oman and UAE. In Oman, it is distributed from the Jebel Akhdar massif to the UAE border. It is absent from the Musandam Peninsula and the Eastern Hajars. The Hajar Mountains populations may represent a new species.

**NATURAL HISTORY**

A very elusive diurnal ground-dwelling skink. It is often found in quite moist places, especially among leaf litter in wadis, particularly cultivated ones. Also reported from drier habitats. It can press the short limbs against the body and use serpentine locomotion. It usually hunts actively for insects and other arthropods. Females lay clutches of 3–4 eggs.



Diurnal



Least Concern



SVL 55 mm



400 – 2,400 m

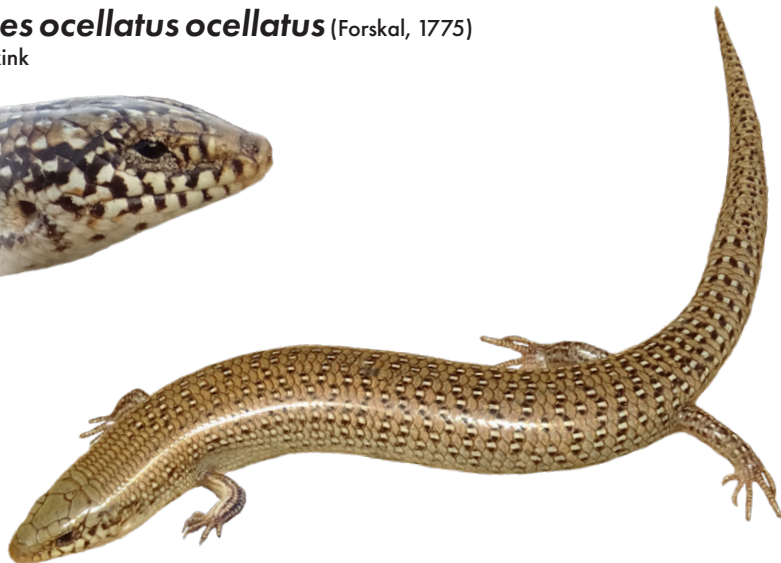
**NATIVE**





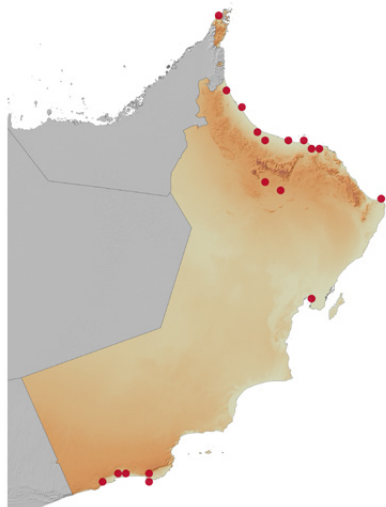
## *Chalcides ocellatus ocellatus* (Forsk., 1775)

Ocellated Skink



### DESCRIPTION

A medium-large skink with elongated cylindrical body, small head not broader than neck, and relatively short limbs. Nostrils in broad contact with the rostral scale. Lower eyelids with a transparent disc. Ear opening slightly triangular, without enlarged scales on its anterior border. Between 28–34 scales around mid-body. Tail very thick, about 1 time the SVL. Dorsal color brown, with numerous small black and white ocelli, each occupying a single scale, scattered or arranged in transverse or oblique bands across the body. There is quite a lot of variation, with some animals being uniformly pale. Underside of body white.



### DISTRIBUTION

Widely distributed across parts of southern Europe, the whole of North Africa from the Atlantic to the Red Sea, the Levant, Arabia (Oman, Saudi Arabia, UAE and Yemen), and further East through coastal Iran and Pakistan to India and Sri Lanka. In Oman, it has populations both in the North and in the South, with a recent population found in the coastal town of Filim in the middle of the country.

### NATURAL HISTORY

A rather common diurnal ground-dwelling skink, it is usually found in farms, cultivated oases, gardens, parks inside cities, and other man-modified environments. This strict association to human settlements in Oman suggests that it might have been introduced or that it has colonized the area very recently. It usually hunts actively for insects and other arthropods but can also eat small geckos. Females give birth to 2–6 young through viviparity.



Diurnal



Least Concern

SVL 120 mm



0 – 600 m

NATIVE

***Heremites septemtaeniatus*** (Reuss, 1834)

Southern Grass Skink

**DESCRIPTION**

A medium-sized skink with round body, small head not broader than neck, and normal size limbs. Nostrils separated from the rostral scale. First supraocular scale contacts the frontal scale. 4 upper labial scales anterior to the eye. Lower eyelids with a rather small transparent disc. Ear opening elongated with pointed scales on its anterior border. Between 32–38 scales around mid-body. Dorsal scales with three keels. Tail thicker at the base and thinner towards the tip, about 1.1–1.3 times the SVL. Dorsal color brown, with a pattern of longitudinal dark stripes on its foreparts and light dorsolateral streaks along the body.

**DISTRIBUTION**

A wide distribution range from Turkey, Syria, Armenia, Azerbaijan, Iraq, through Arabia (Bahrain, Qatar, Oman, Saudi Arabia, UAE), to Iran, Turkmenistan and Afghanistan. Eritrea is the type locality but it is most probably an introduction or a mislabeled specimen. In Oman, it is restricted to Ad Dimaniyat Islands and a single record from Muscat.

**NATURAL HISTORY**

A diurnal skink. In Ad Dimaniyat it was found climbing on large rocks and boulders with very sparse vegetation close to the sea. An agile climber, it hunts actively for insects and other arthropods. There is no data on its reproduction.



Diurnal



Least Concern



SVL 102 mm



0 – 100 m

**NATIVE**



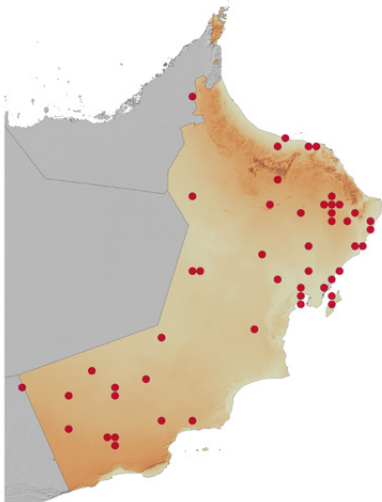
## ***Scincus mitranus*** Anderson, 1871

Arabian Sand Skink



### DESCRIPTION

A medium-large skink with robust rectangular body, a very characteristic chisel-shaped head, not obviously broader than neck, and elongated snout. Relatively short limbs, toes flattened with the scales projecting to form serrated fringes. Countersunk lower jaw and valvular nostrils to avoid sand. Ear opening situated well below the level of the back of the mouth, usually covered by two serrated scales. Lower eyelid with a transparent disc. Rostral scale in broad contact with the frontonasal. Between 26-30 scales around mid-body. Tail short, very thick at the base, about 0.8 times the SVL. Dorsal color often matches the sand and may be whitish to reddish, finely dappled with lighter and darker spots. Sides of the body lighter, usually with vertical bars or spots.



### DISTRIBUTION

An Arabian endemic, it is widely distributed across all seven Arabian countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE and Yemen). In Oman, it is found in sandy areas across the whole country, including Masirah Island. It is absent from the mountains, rocky areas and the monsoon affected Salalah Plain.

### NATURAL HISTORY

A diurnal ground-dwelling skink. It is typically found on very soft wind-blown sand, often on the slip faces of mobile dunes and in areas bordering them, frequently away from bushes and other plants. Often active very early in the day and in the late afternoon. If disturbed, it dives rapidly into the sand to escape. It spends its resting hours under the sand. It hunts actively for insects and other arthropods, but can also eat small vertebrates. Females lay 2–3 eggs.



Diurnal



Least Concern

SVL 135 mm



0 – 500 m

NATIVE

***Scincus conirostris*** (Blanford, 1881)

Blanford's Sand Skink

**DESCRIPTION**

A medium-sized skink with robust rectangular body, a very characteristic chisel-shaped head, broader than neck. Snout shorter than in *S. mitranus*. Relatively short limbs, toes flattened with the scales projecting to form serrated fringes. Countersunk lower jaw and valvular nostrils to avoid sand. Ear opening situated at the same level of the back of the mouth, usually covered by two serrated scales. Lower eyelid with a transparent disc. Rostral scale separated from the frontonasal by the supranasals in nearly all cases. Between 24-30 scales around mid-body. Tail short, very thick at the base, about 0.8 times the SVL. Dorsal color often matches the sand and may be whitish to reddish, with lighter and darker spots and sometimes with orange or yellow irregular transverse rows. No dark vertical bars on the sides of the body.

**DISTRIBUTION**

It has been considered for a long time as a subspecies of *Scincus scincus* and therefore its geographical limits are not very well defined but it is mainly restricted to Arabia (Bahrain, Kuwait, Oman, Saudi Arabia, UAE and Yemen), Iraq and the southern coast of Iran. In Oman, it is only known from a single locality on the inland side of the Hajar Mountains. More research is needed to know its real distribution.

**NATURAL HISTORY**

A diurnal ground-dwelling skink. It is typically found in sandy places. It is often associated with rather firmer ground than *S. mitranus*, without big shifting dunes, and may be more secretive. Presumably in connection with rather more abrasive soils on which it lives, its claws grow much faster than those of *S. mitranus*. No information on its diet and reproduction is available. More studies are needed.



Diurnal



Not Evaluated



SVL 112 mm



600 m

**NATIVE**

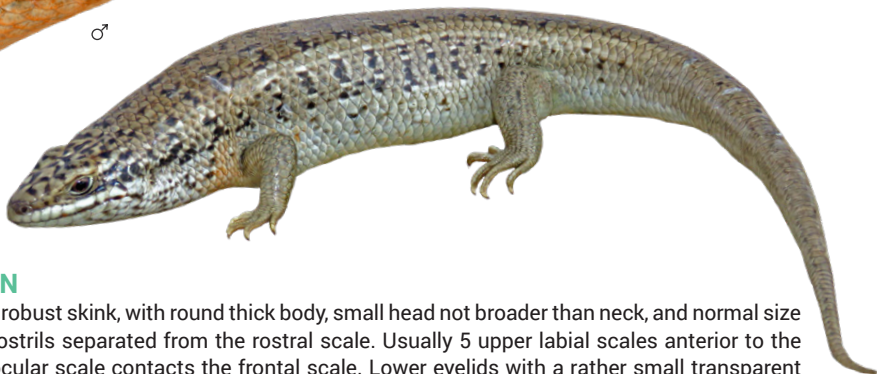


## *Trachylepis brevicollis* (Wiegmann, 1837)

Short-necked Skink



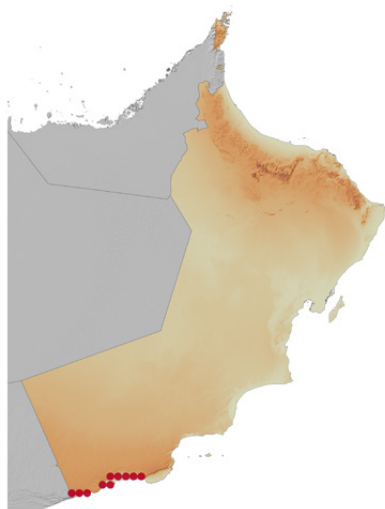
♂



### DESCRIPTION

A large and very robust skink, with round thick body, small head not broader than neck, and normal size robust limbs. Nostrils separated from the rostral scale. Usually 5 upper labial scales anterior to the eye, first supraocular scale contacts the frontal scale. Lower eyelids with a rather small transparent disc. Ear opening elongated, with pointed scales on its anterior border. Between 28–37 scales around mid-body in Arabian specimens. Dorsal scales and scale on the neck and flanks with two keels (rarely three). Tail long, about 1.2–1.6 times the SVL. Dorsal color very variable with geography, age, and sex. In Dhofar, newborns are dark with yellow spots, diminishing in contrast with age. Adult males with dark or light brown uniform body, with scattered light spots and black head with light spots and reddish throat. Females are more patterned, with a series of dark blotches on the dorsum.

### DISTRIBUTION



It is distributed across Arabia (Oman, Saudi Arabia, and Yemen) and Africa, from Tanzania in the South to Kenya, Uganda, Sudan, Ethiopia, Somalia, and Eritrea in the North. Preliminary data suggest that *Trachylepis brevicollis* is a species complex and therefore a taxonomic revision should be carried out. In Oman, *T. brevicollis* is restricted to the monsoon affected areas of Dhofar.

### NATURAL HISTORY

A diurnal ground-dwelling skink. It is typically associated with vegetation on rocky slopes with grass and bushes, where it basks on rocks, in irrigated plantations, and gardens among leaf litter and dense herbage near Salalah. Also found in more open habitats such as on rock outcrops near the beach. It is relatively abundant but shy. It usually hunts actively for insects and other arthropods, but may also eat plant material and small vertebrates. Females give birth to 3–11 young through viviparity.



Diurnal



Least Concern

SVL 140 mm



0 – 900 m

NATIVE





## *Trachylepis tessellata* (Anderson, 1895)

Tessellated Skink



### DESCRIPTION

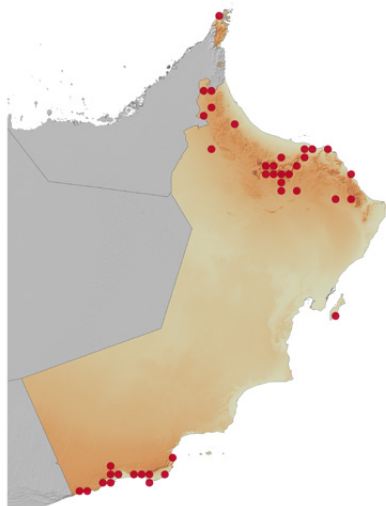
A medium-sized skink, with round thick body, small head not broader than neck, and normal size limbs. Nostrils separated from the rostral scale. First supraocular scale does not contact the frontal scale or only contacts it slightly. 4 upper labial scales anterior to the eye. Lower eyelids with a rather large transparent disc. Ear opening elongated, with pointed scales on its anterior border. Between 29–33 scales around mid-body. Dorsal scales virtually smooth or with three keels. Tail thicker at the base and thinner towards the tip, about 1.5 times the SVL. Dorsal color fairly uniform, light brown or copper, with the dorsal scales often dark-edged. A dark streak along the side of the head and neck or beyond. Unspotted white upper lips and sometimes yellowish tail.

### DISTRIBUTION

A southern Arabian endemic, it is distributed across Oman, UAE and Yemen. In Oman, it is found in the Hajar Mountains (where it occurs up to 1,900 m in elevation), the Dhofar Mountains, Jebel Samhan, and on Masirah Island. Despite their geographic isolation, all Oman populations are genetically homogeneous.

### NATURAL HISTORY

A diurnal ground-dwelling skink. It is typically found in well vegetated wadi areas, often near water, where it climbs on rock faces with agility. It is also often found on cultivated areas around human settlements, on man-made stone walls with abundant crevices and other man-made structures. More studies are needed to know more about its behavior, diet and reproduction. Preliminary data suggest that unlike *H. septemtaeniatus* and *T. brevicollis*, females lay eggs.



Diurnal



Least Concern

SVL 100 mm



0 – 1,900 m

NATIVE

## ANGUIMORPHA

Anguimorpha is a Superfamily of reptiles with 8 families, including the Helodermatidae and the Varanidae (a family of large lizards that includes the Komodo Dragon). Anguimorpha belongs to the venom clade Toxicofera (see Fig 6 on page 18), from where the highly specialized venomous snakes evolved. Anguimorpha consists of more than 239 species classified into 19 genera. Its members have a wide distribution across all warm areas of the world, including hundreds of islands. There are oviparous, ovoviviparous and viviparous species; parthenogenetic

reproduction has been reported. Anguimorpha feeds on invertebrates and vertebrates such as rodents, large mammals, birds, reptiles and even carrion. Some species are also known to eat plants and fruits.

Oman has only one species of Anguimorpha of the genus *Varanus* from the family Varanidae. For the distribution map of the only Anguimorpha of Oman, refer to its species account on next page.



***Varanus griseus*** (Daudin, 1803)

Desert Monitor



♂



♂

**DESCRIPTION**

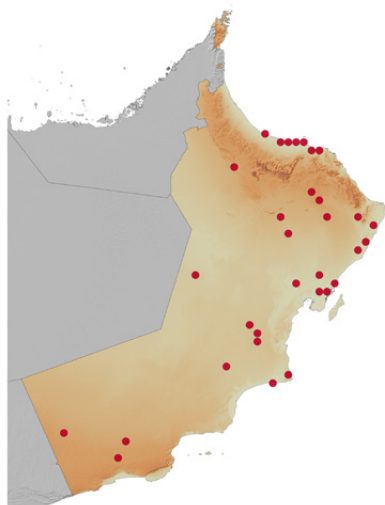
The largest Arabian lizard. It has a rather slender round body with powerful limbs and strong claws. Head and neck very elongated. Pointed snout, with nostrils directed backwards, much nearer the eye than the tip of the snout. Very long deeply-forked tongue that retracts into a sheath. Dorsal scales granular, those on the sides of the neck larger, keeled and trihedral. Tail long, about 1.2–1.6 times the SVL, with 19–28 black bands, rounded in cross section and without autotomy. Dorsal color variable with age. Adult specimens usually uniform yellowish, light brown or gray, with a reddish tail and yellow or reddish head, sometimes extending to the gular region and belly. Usually two dark streaks extending from the side of the head to the side of the neck. Some animals with several dark crossbands on the back. All animals with conspicuous barred tails.

**DISTRIBUTION**

A very widespread species, from the African Atlantic coast, through the whole of North Africa to the Red Sea coast, the Levant, all seven Arabian countries, Iran, Central Asia and northern India. In Oman, it is well distributed in the arid interior, the Sharqiyah Sands, the eastern coast, and the Batinah Plain.

**NATURAL HISTORY**

A diurnal lizard. It inhabits a wide variety of habitats but it is mostly found in sandy deserts with sand dunes, harder desert plains, large wadis with some vegetation, and in coastal areas close to the sea. A very active predator, it can travel long distances searching for food. It eats a wide range of prey, including mammals, birds, reptiles such as Spiny-tailed Lizards and snakes, and large arthropods like scorpions. Females lay large clutches of 5–25 eggs that can take up to 10 months to hatch.



Diurnal



Least Concern

SVL 560 mm



0 – 600 m

**NATIVE**

## SERPENTES

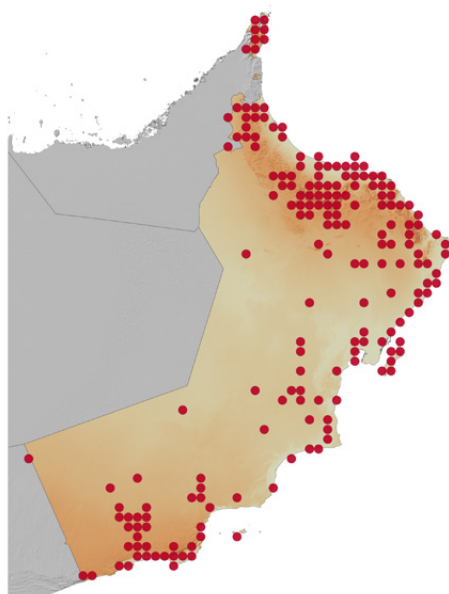
Serpentes is a Suborder of reptiles commonly known as snakes. It consists of more than 3,921 species classified into 531 genera. Its members are distributed across all continents (except Antarctica), including hundreds of islands and high latitude regions of Scandinavia and Chile. They live in a variety of different habitats, from very dense forests to extreme desert areas. Their characteristic trait is the lack of extremities and very elongated body.

Like the Scincoidea and Anguimorpha, they belong to the venom clade Toxicofera (see Fig 6 on page 18). Several groups have evolved the capacity of producing, storing and injecting very elaborate chemical venomous cocktails of proteins and peptides which they use to subdue their prey. There are oviparous, ovoviviparous and viviparous species and

also an obligate parthenogenetic species (*Indotyphlops braminus*). Snakes feed mainly on other vertebrates, such as rodents, large mammals, birds, and other reptiles such as snakes. Some species feed on invertebrates.

Oman has 31 species of snakes classified into 17 genera and seven families. Of these, 21 are terrestrial snakes and 10 are sea snakes. All sea snakes of Oman belong to the genus *Hydrophis* of the Family Elapidae. As shown in the distribution map, the 21 terrestrial snake species from Oman are distributed across the whole country and most of the large islands. The map does not include the distribution of the 10 sea snakes of Oman.

Of the 21 terrestrial snakes present in Oman, 12 have specialized venom-injecting fangs and venom glands. However, only nine can cause serious medical complications. All 10 species of sea snakes that can be found in Omani waters are venomous, but accidents are very rare as they are non-aggressive gentle snakes that hardly ever bite.



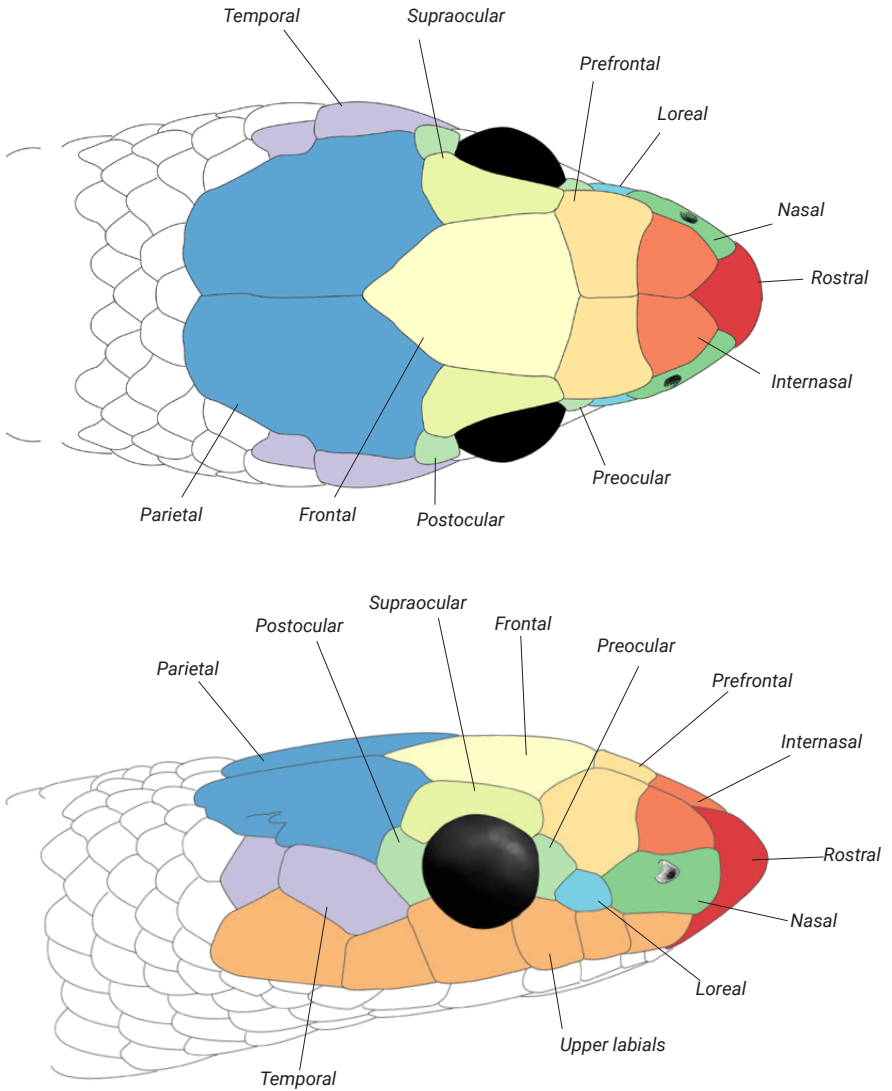


Fig 45: Dorsal (above) and lateral (below) views of the head of *Rhynchocalamus arabicus* (Colubridae) showing the main scales used in the species accounts of *Serpentes*.



## Key to Serpentes in Oman

1.	a	Paddle shaped tail, strongly compressed vertically; small, crescentic shaped nostrils on the upper surface of the snout, with interior valves that can be closed; proteroglyphous fangs (Fig 53C); ventral scales generally narrow, more or less indistinct from dorsal scales.	<i>Hydrophis</i>
	b	Tail round, not paddle shaped or compressed vertically	2
2.	a	Dorsal and ventral scales indistinguishable (no ventral plates), smooth shiny and cycloid (Fig 12 and Fig 50A); eyes vestigial, discernible under head plates; countersunk mouth	3
	b	Dorsal and ventral scales well differentiated, ventral scales much larger (ventral plates) (Fig 50B and C)	4
3.	a	Teeth only in the upper jaw; rudimentary eyes at the upper portion of the translucent ocular scale, right at the junction with the supraocular scale, the ocular scale does not reach the lip (Fig 47B). Tail almost inexistent, as long as wide, about 0.2% of the total length, ending in a spike	<i>Indotyphlops</i>
	b	Teeth only in the lower jaw; rudimentary eyes protected under the translucent ocular scale that extends to the lip (Fig 47C); tail very short, about 7–13% of the total length, ending in a spike	<i>Myriopholis</i>
4.	a	Ventral scales narrower than the body width (Fig 50C); eyes situated on the dorsal part of the head; a spur on each side of the cloacal opening, larger in males (Fig 52); aglyphous teeth (Fig 53A)	<i>Eryx</i>
	b	Ventral scales as broad as the body width (Fig 50B); eyes not situated on the dorsal part of the head; absence of spurs on each side of the cloaca	5
5.	a	Head covered with small keeled or feebly keeled scales (Fig 48); solenoglyphous fangs (Fig 53D)	14
	b	Head covered with large, smooth scales (Fig 45)	6
6.	a	Vertical or elliptical pupil in bright light	7
	b	Round pupil in bright light	8
7.	a	Elliptical pupil in bright light, very characteristic large shield-like projecting rostral scale; countersunk lower jaw; head only slightly distinct from neck; anal plate and subcaudal sales divided (Fig 51A); adult specimens small (total length up to 520 mm); aglyphous teeth (Fig 53A)	<i>Lytorhynchus</i>
	b	Vertical pupil in bright light; large protruding eyes; flat head distinct from the narrow neck; adult specimens rather large (total length up to 1,200 mm); opisthoglyphous fangs (Fig 53B)	<i>Telescopus</i>
8.	a	Can expand the sides of the neck if threatened, spreading a medium-sized or a large hood	9
	b	Cannot flatten the neck and spread a hood	10

Key to Serpentes in Oman			
9.	a	Very large and robust (the largest terrestrial snake in Oman; total length of up to 1,800 mm); it lifts its forebody at a right angle and can flatten the head very wide if threatened (cobra hood); loreal scale absent, 2–3 subocular scales separating the upper labial scale from the eye (Fig 49C); black colored head and tail; proteroglyphous fangs (Fig 53C)	<i>Naja</i>
	b	Large and robust (total length up to 1,500 mm); It lifts its forebody maximum at an angle of 45° and expands the sides of the neck into a narrow hood if threatened; wedge-shaped head; countersunk lower jaw; Supraocular scales projecting above the eye; A very characteristic large dark spot between the eye and the neck; opisthoglyphous fangs (Fig 53B)	<i>Malpolon</i>
10.	a	Tail extremely short, about 8% of the total length, ending in a spike, with undivided subcaudal scales and undivided anal plate (Fig 51C); loreal scale absent (Fig 49A); solenoglyphous needle-like straight fangs (Fig 53E)	<i>Atractaspis</i>
	b	Tail medium-sized or long, about 17–35% of the total length, not ending into a spike; divided subcaudal scales; anal plate divided or undivided; loreal scale present; aglyphous or opisthoglyphous fangs (Fig 53A or B)	11
11.	a	Anal plate undivided; a series of subocular scales separating the upper labial scales from the eye (Fig 49B); dorsal scales keeled (Fig 46 left); aglyphous teeth (Fig 53A)	<i>Spalerosophis</i>
	b	Anal plate divided (Fig 51B), upper labial scales reach the eye (Fig 45); dorsal scales smooth (Fig 46 right); aglyphous or opisthoglyphous fangs (Fig 53A or B)	12
12.	a	Completely black, including the eyes; rostral scale wide, extending backwards on the upper surface of the head, halfway between the internassals (Fig 45); tail medium-sized, about 17% of the total length; aglyphous teeth (Fig 53A)	<i>Rhynchocalamus</i>
	b	Color variable but hardly ever totally black with black eye; rostral scale not extending backwards on the upper surface of the head, halfway between the internassals; tail long, between 26–35% of the total length; aglyphous or opisthoglyphous fangs (Fig 53A or B)	13
13.	a	Very thin body and narrow head distinct from neck; large eyes; tail very long, about 35% of the total length; it may have longitudinal bands; opisthoglyphous fangs (Fig 53B)	<i>Psammophis</i>
	b	Small or large slender snakes with narrow head, only slightly distinct from neck; medium-sized eyes; tail long, about 26–28% of the total length; uniform or transverse dark bands or incomplete streaks on the head, back and flanks; aglyphous teeth (Fig 53A)	<i>Platyceps</i>
14.	a	Subcaudal scales undivided (Fig 51C)	<i>Echis</i>
	b	Subcaudal scales divided (Fig 51B)	15
15.	a	Characteristic prominent horn-like tubercles above the eyes formed by several scales (see species accounts); head and dorsal scales feebly keeled (Fig 46 left)	<i>Pseudocerastes</i>
	b	Either no horns or one single-scaled horn above each eye; head scales keeled and dorsal scales strongly keeled	16
16.	a	Extremely thick robust body and very wide robust head; nostrils situated on the upper surface of the snout; never have horns or horn-like tubercles above the eyes	<i>Bitis</i>
	b	Medium-sized robust snake; some specimens with one single-scaled horn above each eye (see species accounts); lateral scales pointing downwards and backwards, with serrated keels	<i>Cerastes</i>

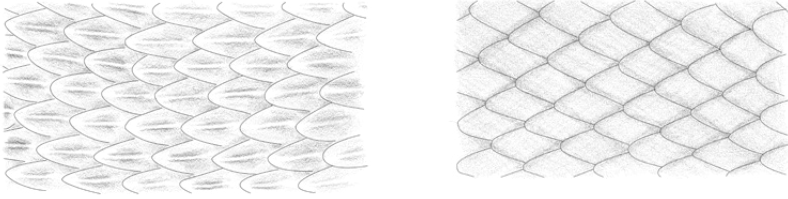
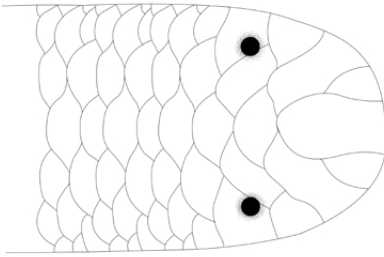
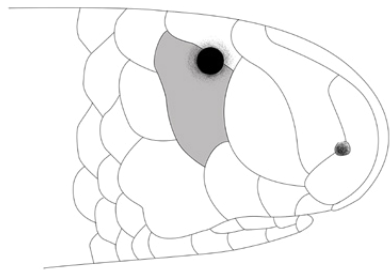


Fig 46: Left: Keeled scales; Right: Smooth scales.

A



B



C

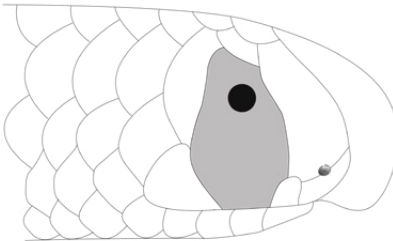


Fig 47: A: Dorsal view of the head of *Indotyphlops braminus*; B: Rudimentary eyes at the upper portion of the translucent ocular scale (gray). The ocular scale does not reach the lip; *Indotyphlops braminus*; C: Rudimentary eyes protected under the translucent ocular scale (gray). The ocular scale extends to the eye; *Myriopholis*.

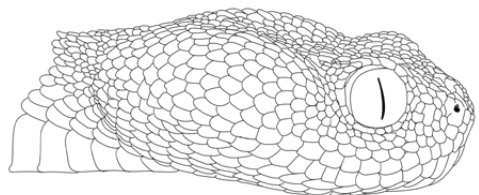
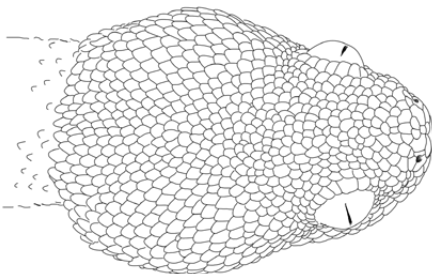
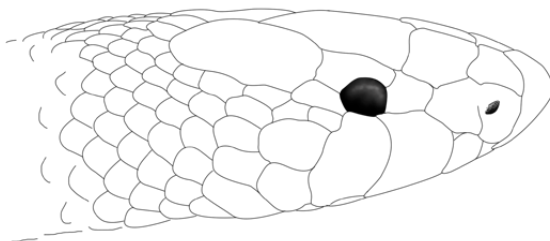
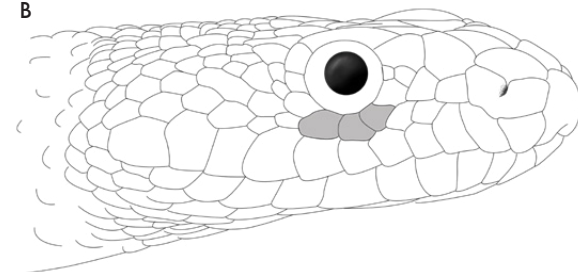


Fig 48: Head of a snake with small scales, *Echis omanensis*. Left: Dorsal view; Right: Lateral view.

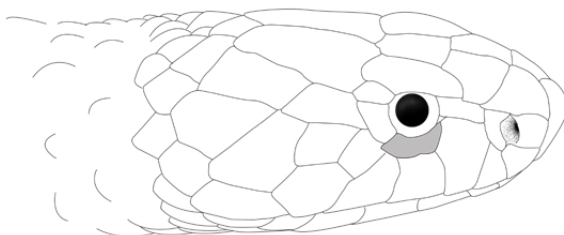
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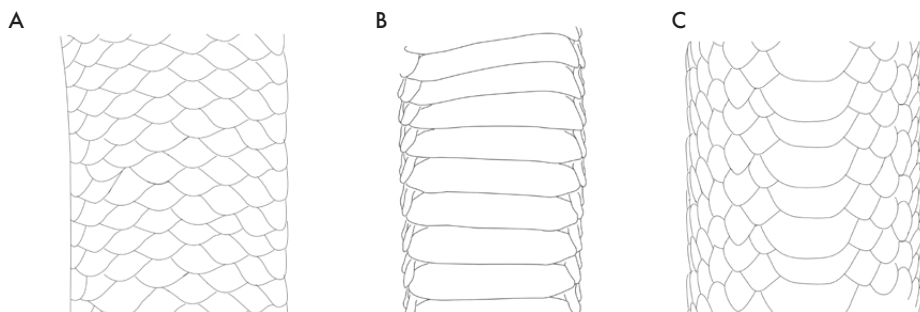
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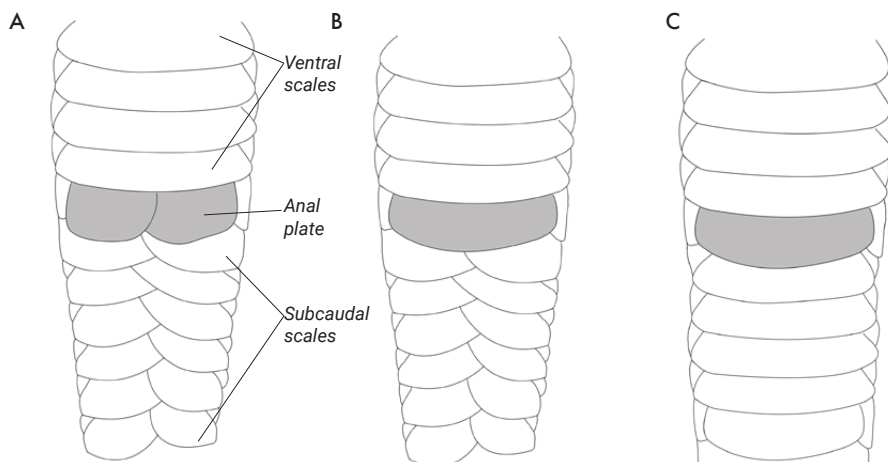
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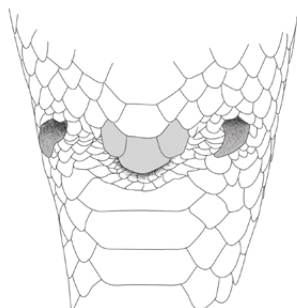
**Fig 49:** Particular arrangements of the head scales in some snakes. **A:** *Atractaspis andersonii*, loreal scale missing (compare with Fig 45); **B:** *Spalerosophis diadema cliffordii*, row of subocular scales (gray) between the eye and the upper labial scales; **C:** *Naja arabica*, subocular scales (gray) between the eye and the upper labial scales; loreal scale missing.



**Fig 50:** Ventral scales of Omani terrestrial snakes. **A:** Ventral scales not distinguishable from the rest, smooth shiny and cycloid; **B:** Large ventral scales well differentiated, also known as ventral plates; **C:** Narrow but well-differentiated ventral scales.

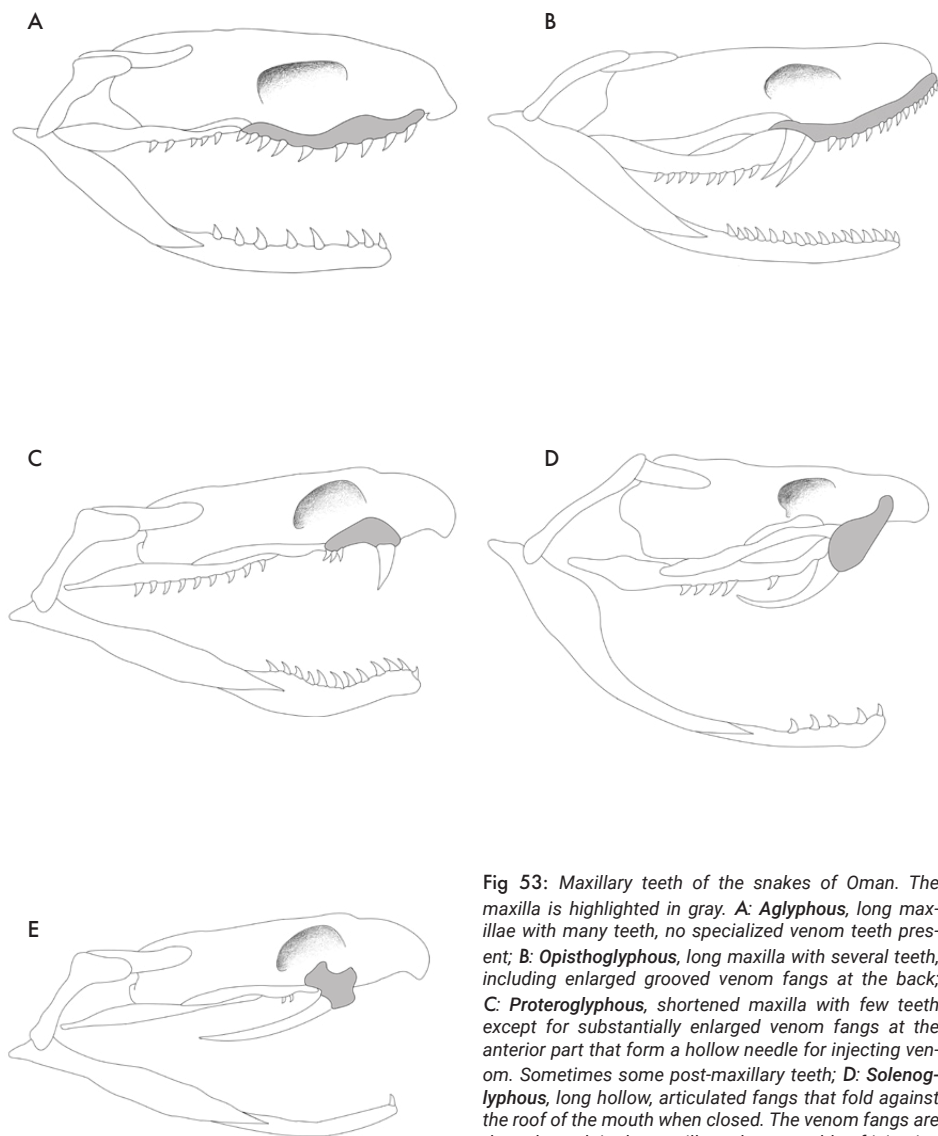


**Fig 51:** Anal plate and subcaudal scales of Omani terrestrial snakes. **A:** Anal plate (gray) and subcaudal scales divided; **B:** Anal plate (gray) undivided and subcaudal scales divided; **C:** Anal plate (gray) and subcaudal scales undivided.



**Fig 52:** Anal plate (center of the figure in gray) and spurs (in gray on the sides of the cloaca), *Eryx jayakari*.





**Fig 53:** Maxillary teeth of the snakes of Oman. The maxilla is highlighted in gray. **A:** *Aglyphous*, long maxillae with many teeth, no specialized venom teeth present; **B:** *Opisthoglyphous*, long maxilla with several teeth, including enlarged grooved venom fangs at the back; **C:** *Proteroglyphous*, shortened maxilla with few teeth except for substantially enlarged venom fangs at the anterior part that form a hollow needle for injecting venom. Sometimes some post-maxillary teeth; **D:** *Solenoglyphous*, long hollow, articulated fangs that fold against the roof of the mouth when closed. The venom fangs are the only teeth in the maxilla and are capable of injecting venom into the prey; **E:** *Atractaspis*, with long, straight, needle-like solenoglyphous fangs. These can be protruded laterally and used to stab preys with the mouth closed as an adaptation to hunt inside narrow burrows. Like in viperids, the venom fangs of *Atractaspis* are the only teeth in the maxilla.



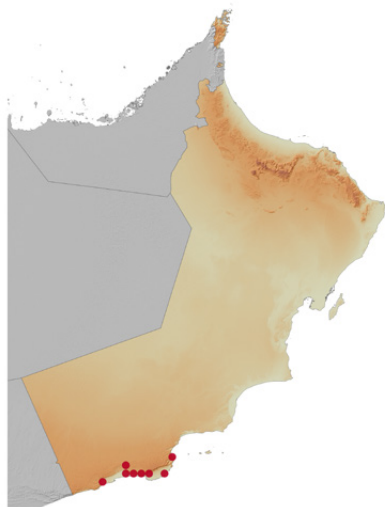
## *Atractaspis andersonii* Boulenger, 1905

Arabian Small-scaled Burrowing Asp



### DESCRIPTION

A medium-sized robust venomous snake with solenoglyphous, needle-like, straight fangs. The fangs can be protruded laterally outwards without opening the mouth as an adaptation for hunting in narrow burrows. Round body and small wedge-shaped head not differentiated from neck; snout short. Small black eyes with round pupils. Head covered with large scales. Loreal scale absent. Countersunk lower jaw as an adaptation for burrowing. Dorsal scales small and shiny, about 23–25 rows at mid-body, 219–243 ventral scales. Tail extremely short, about 8% of the total length, ending in a spike, with 28–33 undivided subcaudal scales. Anal plate undivided. Like *Rhynchocalamus arabicus* (with whom it may be confused in Oman), specimens are completely black without any apparent pattern.



### DISTRIBUTION

An Arabian endemic, it has some populations in central Arabia (including Riyadh) and a continuous distribution from Al Madinah in Saudi Arabia, South through the Asir Mountains to Aden (type locality). From Aden there is a distribution gap of 1,000 km to the populations of South Oman. The distribution in Oman is restricted to the monsoon affected areas of the Dhofar Mountains and further East through the foothills of the Jebel Samhan to Wadi Hasik.

### NATURAL HISTORY

A nocturnal, slow-moving fossorial snake found in well-vegetated wadis like Wadi Dharbat but also in dryer coastal wadis. It preys on small mammals inside burrows. Not aggressive, it may try to confuse the attacker with spasmodic movements to direct the attack to the tail. It has a potent cytotoxic venom that can cause death in humans if left untreated. Females lay 6 eggs.



Nocturnal



Least Concern



TL 600 mm



0 - 800 m

**NATIVE**





## *Eryx jayakari* Boulenger, 1888

Arabian Sand Boa



### DESCRIPTION

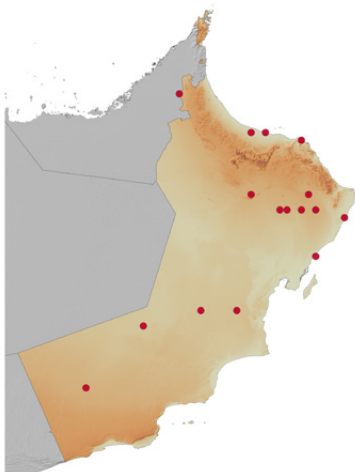
A small, harmless, aglyphous snake with thick body and a small wedge-shaped head not differentiated from the body. Small eyes with brown-orange iris and vertical pupils situated on the dorsal part of the head. Head covered with small scales. Countersunk lower jaw as an adaptation for burrowing. Dorsal scales small and shiny, about 37–51 rows at mid-body, 158–184 narrow ventral scales. A spur on each side of the cloacal opening, larger in males. Tail extremely short, about 8% of the total length, ending in a spike, with 10-17 undivided subcaudal scales. Anal plate small. Dorsal color a combination of yellow, orange and light brown, with transverse dark bands or incomplete streaks. Underside white or pinkish.

### DISTRIBUTION

It is found in a few populations in southwest Khuzestan Province, Iran, and widely distributed across Arabia (Bahrain, Kuwait, Oman, Saudi Arabia, UAE and Yemen), with the only exception of Qatar. In Oman, it is well distributed across the arid interior, the Sharqiyah Sands, and the Batinah Plain.

### NATURAL HISTORY

A locality abundant nocturnal fossorial snake. It inhabits aeolian sand deposits with extensive sand dunes and scattered vegetation and sandy beaches. It hides under the sand, with only the two small eyes surfacing between the sand grains waiting for passing by prey. It also emerges to the surface and moves above ground. It preys mainly on geckos and Zardnyi's Worm Lizards, but large specimens can eat rodents or even birds. Females lay small clutches of less than 4 eggs.



Nocturnal



Least Concern

TL 620 mm



0 - 400 m

NATIVE



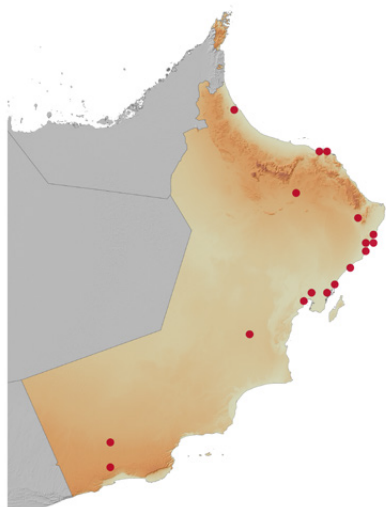
## *Lytorhynchus diadema* (Duméril, Bibron & Duméril, 1854)

Crowned Leaf-nosed Snake



### DESCRIPTION

A small, harmless, aglyphous snake with thin slender round body and narrow head slightly distinct from neck. Very characteristic large shield-like projecting rostral scale and countersunk lower jaw. Medium-sized eyes with vertically elliptical pupils. Head covered with large scales. Dorsal scales smooth, 19 rows at mid-body, 152–195 ventral scales. Tail medium-sized, about 18% of the total length, with 30–49 divided subcaudal scales. Anal plate divided. Dorsal color light brown or grayish, with a pattern of dark brown, black, or reddish ovoid bars or blotches edged in white or yellow. Some animals are uniform in color. Head usually with a very characteristic circle-like brown marking extending posteriorly as a wide longitudinal bar on neck. Underside uniform white.



### DISTRIBUTION

Widely distributed across North Africa, from the Atlantic coast of Mauritania and Morocco to Egypt, through the Levant, into Arabia (Bahrain, Kuwait, Oman, Saudi Arabia, UAE, and Yemen), and South and southwestern Iran. In Oman, there are some scattered localities in the interior and it is well distributed in the northeastern coast, the Sharqiyah Sands, and the Batinah Plain.

### NATURAL HISTORY

A locality-abundant nocturnal fossorial snake. It inhabits aeolian sand deposits with extensive sand dunes and scattered vegetation. It is also found on sandy beaches and compacted sand or sandy areas with rocky substrate. It hides under the sand but emerges frequently and moves using a serpentine locomotion, leaving very characteristic tracks on the sand. It preys mainly on small geckos, but probably also eats insects. Females lay small clutches of 3–5 eggs.



Nocturnal



Least Concern



TL 520 mm



0 - 800 m

**NATIVE**



## *Platyceps rhodorachis* (Jan, 1863)

Wadi Racer



### DESCRIPTION

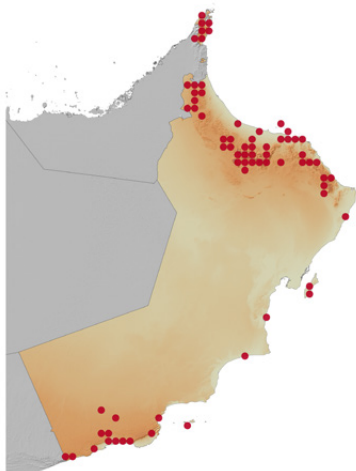
A medium-sized to large, harmless, aglyphous snake with a very thin slender round body and narrow head slightly distinct from neck. Medium-sized eyes with round pupils. Head covered with large scales. Dorsal scales smooth, 19 rows at mid-body, 205–262 ventral scales. Tail long, about 26% of the total length, with 113–154 divided subcaudal scales. Anal plate divided. Dorsal color very variable. From light brown, greenish gray, brick-red or even black uniformly colored specimens, to well patterned individuals with transverse dark bands or incomplete streaks on the head, back and flanks that disappear towards the tail. Underside uniform white.

### DISTRIBUTION

*Platyceps rhodorachis* is a species complex in urgent need of a taxonomic revision. The species belonging to this complex are distributed through North Africa, the Horn of Africa, Arabia (Oman, Saudi Arabia, UAE, and Yemen), northeastern Iraq, Iran, Pakistan, India, and Central Asia. In Oman, it is widely distributed across the Hajar and Dhofar Mountains with populations up to 2,600 m in elevation but it also occurs at sea level on the Batinah Plain and in Ad Dimaniyat, Masirah and Al-Hallaniyah Islands.

### NATURAL HISTORY

A locality-abundant diurnal agile snake. It moves very fast across the rocky terrain and is also a very good swimmer. It is mainly found in wadis with water and cultivated areas, where it preys on fish and amphibians but may also take small mammals, lizards, and birds. Females lay small clutches of 3–7 eggs with an incubation period of 8 weeks.



Diurnal



Least Concern

TL 1,300 mm



0 - 2,600 m

NATIVE





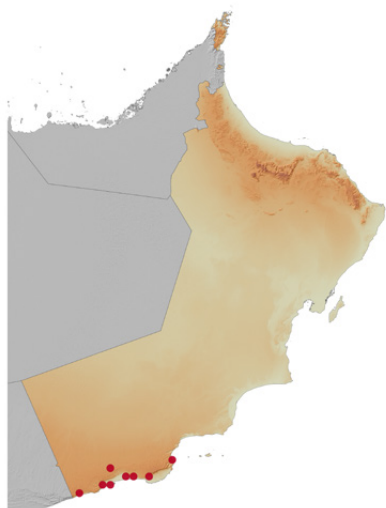
## *Platyceps thomasi* (Parker, 1931)

Thomas' Semi-banded Racer



### DESCRIPTION

A small, harmless, aglyphous, slender snake with a thin round body and narrow head slightly distinct from neck. Medium-sized eyes with round pupils. Head covered with large scales. Dorsal scales smooth, 15 rows at mid-body, 156–160 ventral scales. Tail long, about 28% of the total length, with 78–82 divided subcaudal scales. Anal plate divided. Dorsal color light brown or cream, with a total of 47–56 black bands over the head, body and tail. Some individuals have a rather wide red vertebral stripe from behind the eyes to the tail tip. Underside white with a median row of brown spots on the anterior part of the tail.



### DISTRIBUTION

A southern Arabian endemic, it is only known from a few localities in extreme southeastern Yemen and Dhofar. In Oman, it is distributed both on the inland side and the monsoon affected seaside of the Dhofar Mountain, including the Salalah Plain. It has also been found high up in the Jebel Samhan and near Hasik.

### NATURAL HISTORY

It is an agile snake of which very little is known. It has been found in well-vegetated areas, barren plateaus with scattered vegetation, close to the beachfront, and in mountainous areas. It is most probably a diurnal snake, although some specimens have been found active at dusk. Nothing is known about its diet but it probably preys on small lizards. Oviparous.



Diurnal



Data Deficient



TL 400 mm



0 - 1,400 m

**NATIVE**



## Unidentified *Platyceps* from Mughsayl

On the 6th of April 2010 at 18:30, a specimen of the genus *Platyceps* was found by Jiří Šmíd in Al Mughsayl, Dhofar (16.8859 N, 53.77751 E, 25 m in elevation). The specimen was on a south facing rocky slope with abundant *Adenium* sp. plants. Based on the coloration, the specimen was tentatively classified as *Platyceps variabilis* but an unequivocal identification is not possible as the main identification character, number of scale rows at mid-body, was not recorded. More studies (including genetic analyses) are needed to clarify the identification and taxonomy of this enigmatic *Platyceps* and the three closely related Arabian endemic species: *P. manseri*, *P. variabilis*, and *P. thomasi*.

*Platyceps variabilis* is a species restricted to southwestern Arabia, from Jazan in Saudi Arabia to Aden in Yemen. If confirmed, this new record from Mughsayl, Dhofar, would represent a range extension to the East of more than 1,000 km. A similar range extension was reported for another snake, *Rhynchocalamus arabicus*, initially restricted to a single locality in Aden and recently found in Mughsayl and Wadi Ayun, Dhofar.

As suggested by Parker 1931, *P. variabilis* and *P. thomasi* are morphologically very similar in size, habitus and many aspects of scaling, and differ only in the number of scale rows at mid-body: 17 in *P. variabilis* and 15 in *P. thomasi*. As its name indicates, the dorsal color pattern of *P. variabilis* exhibits a surprising amount of variation, with up to seven different color morphs being identified in the original description by Boulenger in 1905. In fact, one color morph is superficially similar to *P. thomasi* in having transverse bars on the head and a series of blotches on the dorsum but these do not run onto the flanks as they do in *P. thomasi*, being replaced instead by a row of spots. *Platyceps variabilis* sometimes also has a faint vertebral stripe like *P. thomasi*. The unidentified *Platyceps* specimen reported by Jiří Šmíd in 2010 from Mughsayl, Dhofar, is very different from the color pattern of *P. thomasi*. For this reason it was tentatively identified as *P. variabilis*. Nevertheless, a thorough investigation on this taxonomically complex group, including both morphological and molecular data is necessary before a definitive conclusion on the presence of *P. variabilis* in Oman can be reached.



Unidentified specimen of *Platyceps* (tentatively assigned to *P. variabilis* by Jiří Šmíd in 2010) from Mughsayl, Dhofar, Oman.



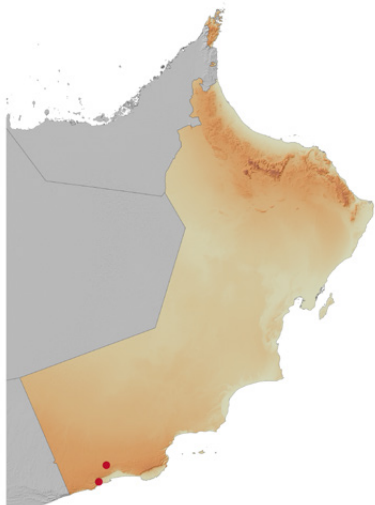
## *Rhynchocalamus arabicus* Schmidt, 1933

Arabian Kukri Snake



### DESCRIPTION

A small, harmless, aglyphous, slender snake with a thin round body and narrow head only slightly distinct from neck. Medium-sized black eyes with round pupils, indistinct from the body background color. Head covered with large scales. Rostral scale wide, extending backwards on the upper surface of the head halfway between the internassals. Dorsal scales smooth, 15 rows at mid-body, 240 ventral scales. Tail medium-sized, about 17% of the total length, with 71–81 divided subcaudal scales (except the last 5 scales that are undivided). Anal plate divided. The only three known specimens to date are completely black, without any apparent pattern.



### DISTRIBUTION

A southern Arabian endemic, it is one of the rarest snakes in the world. It is only known from three specimens, one found in Aden, Yemen and two other specimens found more than 1,000 km to the East, in Wadi Ayun and Marneef Cave in Dhofar, Oman.

### NATURAL HISTORY

Virtually nothing is known about its natural history. The only specimen for which there are any observations was found active in April 2013 in Wadi Ayun resting between two stones at night (21:10h). The other specimen was also found active at night (20:00h) in September 2014 outside Marneef Cave.



Nocturnal



Data Deficient

TL 289 mm



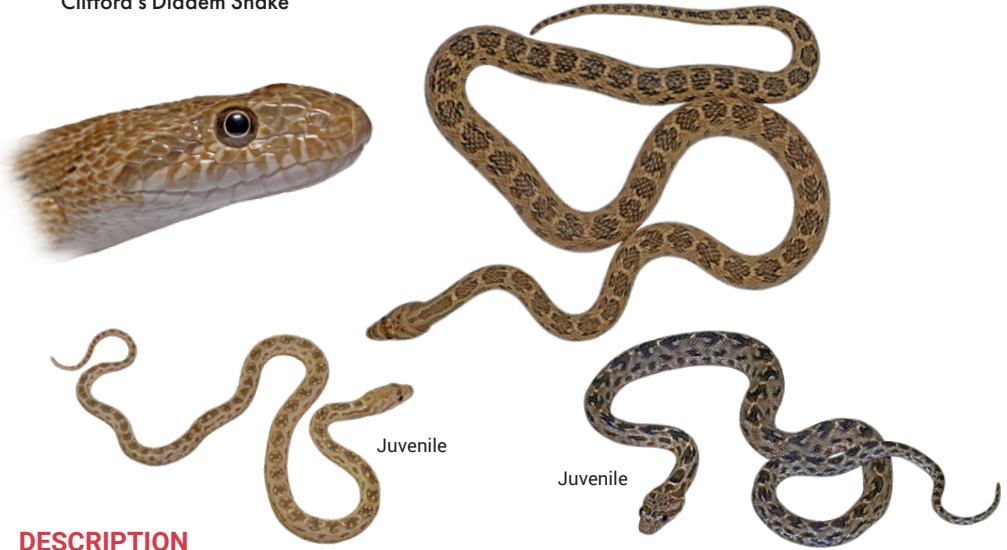
0 - 700 m

NATIVE



## *Spalerosophis diadema cliffordii* (Schlegel, 1837)

Clifford's Diadem Snake



### DESCRIPTION

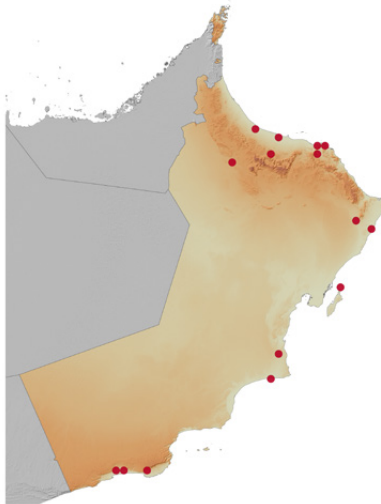
A large, harmless, aglyphous, robust snake with a medium-sized robust head distinct from neck. Medium-sized eyes with round pupils. Head covered with large scales, the two prefrontal scales divided into several smaller scales. A series of subocular scales separating the upper labial scales from the eye. Dorsal scales keeled, 25–29 rows at mid-body, 210–248 ventral scales. Tail medium-sized, about 18% of the total length, with 64–81 divided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to gray, with a series of more than 60 large ovoid dark spots, sometimes partially edged in white. A row of smaller dark spots on the flanks alternating with the dorsal spots. Underside white or creamy.

### DISTRIBUTION

Widespread across North Africa, from the Atlantic Coast of Morocco and Mauritania to Egypt, the Levant, Arabia (Kuwait, Oman, Saudi Arabia, UAE, and Yemen), and northwestern Iran. In Oman, it is well distributed in the North and South of the country, with one record from Masirah Island and another two records in Al Wusta, close to Ras Madrakah.

### NATURAL HISTORY

The Clifford's Diadem Snake can be active both by day and night, depending on the season of the year. It is found in well-vegetated areas in mountain and coastal wadis, sandy areas, and gravel plains with vegetation. It is also common around farms and cultivated areas, where it preys mainly on small mammals and birds. Juveniles eat small lizards. It escapes if approached but will not hesitate to hiss and bite if provoked, although it does not have any serious effects to humans. Females lay clutches of around 6-12 eggs which hatch after an incubation period of 8 weeks.



Diurnal/Nocturnal



Least Concern



TL 1,140 mm



0 - 1,500 m

**NATIVE**



## *Telescopus dhara* (Forsk., 1775)

Arabian Cat Snake

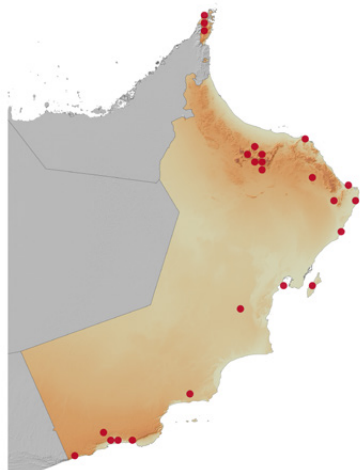


### DESCRIPTION

A medium-sized to large, harmless snake with opisthoglyphous fangs. Body laterally compressed or subtriangular with flat head clearly distinct from neck. Some adult specimens may have a rather large and robust body, with wide heads. Large protruding eyes with golden iris and vertical pupils. Head covered with large scales. Dorsal scales smooth, with visible apical pits, 19–21 rows at mid-body, 235–274 ventral scales. Tail medium-sized, about 13% of the total length, with 66–72 divided subcaudal scales. Anal plate undivided. Dorsal color very variable, from light brown, dark brown or reddish uniformly colored specimens, to well patterned individuals, with transverse dark rectangular blotches along the back and smaller rows of blotches on the flanks. Underside whitish, with either brownish or orange tints.

### DISTRIBUTION

A recent study has shown that *T. dhara* is restricted to eastern Egypt (Sinai), Palestine, Israel, western Jordan, and Arabia (Oman, Saudi Arabia, UAE, and Yemen). The populations in central and northeastern Africa, previously recognized as *T. dhara somalicus*, are now recognized as *T. obtusus*. In Oman, *T. dhara* is widely distributed across the Hajar and Dhofar Mountains, surrounding rocky areas, eastern Oman, and Masirah Island.



### NATURAL HISTORY

A secretive nocturnal snake, it lives in vegetated or barren rocky mountainous areas, where it climbs on rocks and trees with ease to prey mainly on lizards (including chameleons), birds, and bats. It paralyzes its prey with the venom injected through the grooved rear fangs. The venom does not seem to be dangerous to humans, causing only localized swelling around the bite area. Females lay clutches of 6–20 eggs which hatch after 8 weeks.



Nocturnal



Least Concern



TL 1,200 mm



0 - 2,300 m

**NATIVE**





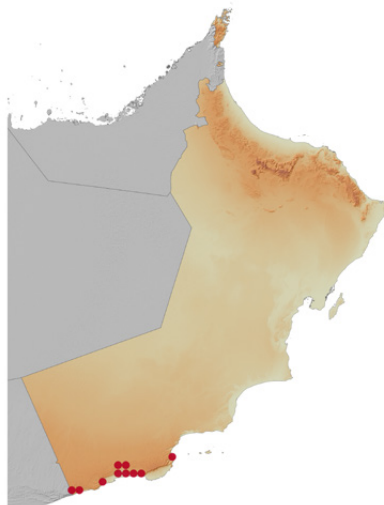
## *Naja arabica* Scortecci, 1932

Arabian Cobra



### DESCRIPTION

A very large venomous snake, with proteroglyphous fangs, a thick robust body, and large robust head slightly distinct from neck. It can expand the sides of the neck if threatened, showing the characteristic cobra hood. Medium-sized dark eyes with round pupils. Head covered with large scales. Loreal scale absent, 2–3 subocular scales separating the upper labials from the eye. Dorsal scales smooth, 19–21 rows at mid-body, 202–226 ventral scales. Tail medium-sized, about 20% of the total length, with 62–80 divided subcaudal scales. Anal plate undivided. Dorsal color very variable, being uniform dark brown, black, reddish brown, orange or yellow, with characteristically black head and tail.



### DISTRIBUTION

An Arabian endemic, it is distributed from approximately Al Madinah in Saudi Arabia, South through the Asir Mountains, the southwestern Yemen Mountains, and through the mountainous areas of southern Yemen East up to Dhofar. In Oman, it is distributed through the monsoon affected areas of the Dhofar Mountains and further East in Wadi Hasik.

### NATURAL HISTORY

It is a secretive, fast, diurnal snake seldom seen in the field. A very good swimmer, it prefers well-vegetated wadis with water pools. It preys mainly on toads, birds, rodents and other snakes. It is not aggressive and will always try to escape if discovered. It has a potent neurotoxic venom that can cause death in humans if left untreated. Females lay 8–24 eggs which hatch after an incubation period of 8 weeks.



Diurnal



Least Concern



TL 1,825 mm



0 - 900 m

NATIVE



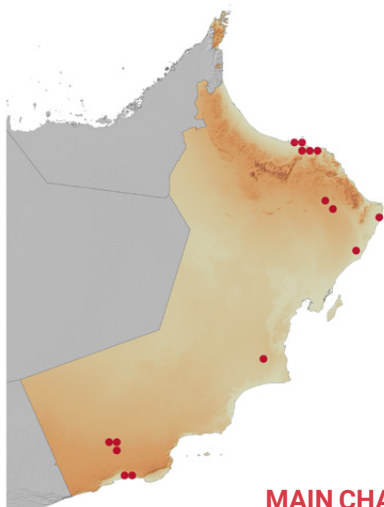
## *Myriopholis macrorhyncha* (Jan, 1860)

Hooked Blind Snake



### DESCRIPTION

A very small, harmless, burrowing snake, with an extremely thin round body. Small head indistinct from the body, terminating in a hooked snout. Teeth only in the lower jaw. Countersunk lower jaw. Rudimentary eyes protected under a translucent ocular scale that extends to the lip. Dorsal and ventral scales almost indistinguishable (no ventral plates), smooth shiny and cycloid, 10 rows at mid-tail and 14 around mid-body, 315–404 dorsal scales between the rostral shield and the tail tip. Tail extremely short, about 6–10% of the total length, ending in a spike, 26–43 subcaudals. Entire body pale reddish, the transparent skin allows to see the blood vessels underneath. Underside whitish.



### DISTRIBUTION

Distributed across East Africa, the Levant, Arabia (Oman, Saudi Arabia, UAE, and Yemen), Iran, Pakistan and northwest India. In Oman, it is widely distributed from North to South, including the Batinah and Salalah Plains, arid areas around Thumrait, Ras Madrakah, and the edge of the Sharqiyah Sands.

### NATURAL HISTORY

A fossorial snake, it is usually found under stones and it has only been found on the surface at night. Very secretive very little known about its biology. It is a very specialized termite eater which may also eat eggs, larvae and pupae from other insects. They lay small clutches of minute eggs.

### MAIN CHARACTERISTICS



Nocturnal



Least Concern

TL 185 mm

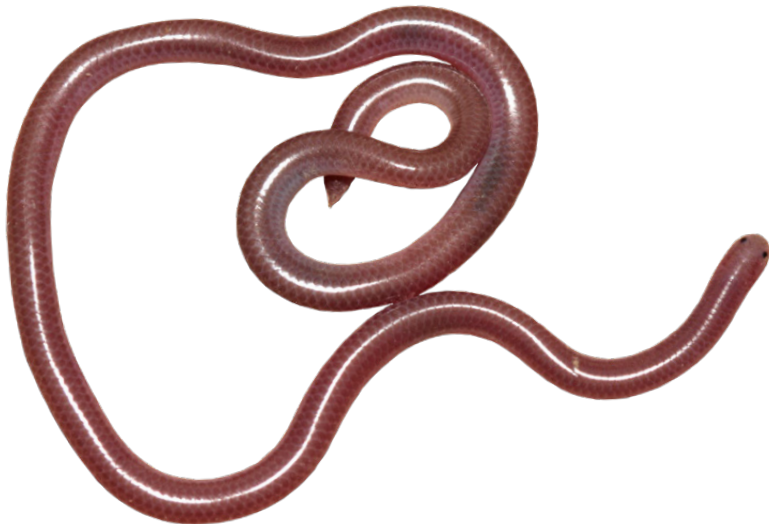


0 - 500 m

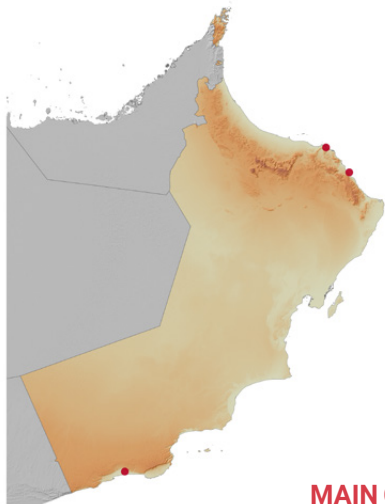
**NATIVE**

***Myriopholis nursii*** (Anderson, 1896)

Nurse's Blind Snake

**DESCRIPTION**

A very small, harmless, burrowing snake, with a thin round body. Small head, only slightly distinct from the body, terminating in an elongated round snout (not hooked). Teeth only in the lower jaw. Countersunk lower jaw. Rudimentary eyes protected under a translucent ocular scale that extends to the lip. Dorsal and ventral scales almost indistinguishable (no ventral plates), smooth, shiny, and cycloid, 12 rows at mid-tail and 14 rows at mid-body, 281–378 dorsal scales between the rostral shield and the tail tip. Tail very short, about 7–13% of the total length, ending in a spike, 34–48 subcaudals. Entire body pale reddish or pinkish-gray, underside whitish.

**DISTRIBUTION**

Found in Somalia, bordering with Ethiopia, and in southern Arabia, from Jeddah in Saudi Arabia, through the Asir and southwestern Arabian Mountains down to Aden, Yemen and East to Oman. There are only three known localities of *M. nursii* in Oman, two in the North, Ras Al Hamra and Dibab, and one in the Salalah Plain, Dhofar. More research is needed to know the real distribution of this snake.

**NATURAL HISTORY**

A fossorial, seldom found secretive snake. Little is known about its biology. It is a very specialized termite eater, which may consume eggs, larvae and pupae from other insects. Females lay small clutches of 2–3 small thin-shelled eggs that hatch within a few days.

**MAIN CHARACTERISTICS**

Nocturnal



TL 240 mm

**NATIVE**

Least Concern



0 - 100 m



## *Psammophis schokari* (Forsk., 1775)

Schokari Sand Racer



### DESCRIPTION

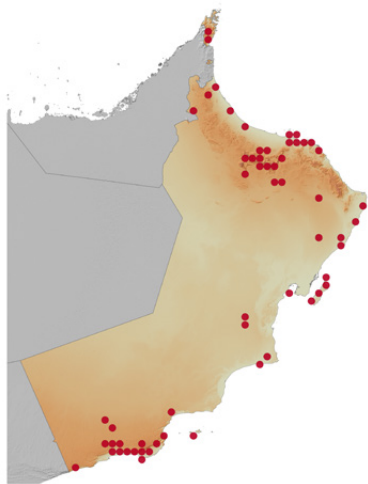
A medium-sized to large, rather harmless snake, with opisthoglyphous fangs. Very thin slender body, and narrow head distinct from neck. Large eyes with round pupils. Head covered with large scales. Dorsal scales smooth, 17–19 rows at mid-body, 162–194 ventral scales. Tail very long, about 35% of the total length, with 95–149 divided subcaudal scales. Anal plate divided. Dorsal color very variable, from light brown to olive brown, with or without a pattern of longitudinal light and dark bands. It is the only snake in Oman with longitudinal stripes. Usually a dark stripe from the nostril to behind the head passing through the eye. Head with dark blotches and streaks above. Underside white with a yellow or gray band in the middle surrounded by dark speckling.

### DISTRIBUTION

Distributed across North Africa, from the Atlantic coast to the Red Sea coast, all seven Arabian countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen), the Levant, Iran, Pakistan, Afghanistan and northwestern India. In Oman, it is distributed across the Hajar and Dhofar Mountains, but also in the Batinah and Salalah Plains, deep in the Sharqiyah Sands, eastern Oman, and Masirah and Al-Hallaniyah Islands.

### NATURAL HISTORY

A diurnal, very fast snake, found in different habitats, from well-vegetated wadis and rocky highland areas to arid sandy areas or gravel plains with sparse vegetation. An extremely good climber, it climbs on trees to prey on birds, although it also feeds on lizards and rodents. It paralyzes its prey with venom injected with the grooved rear fangs using a chewing motion. The venom does not seem to be dangerous to humans, causing only localized swelling around the bite area. Females lay clutches of 5–8 eggs, which hatch after 8 weeks.



Diurnal



Least Concern



TL 1,400 mm



0 - 2,800 m

**NATIVE**

**Malpolon moilensis** (Reuss, 1834)

Moila Snake

**DESCRIPTION**

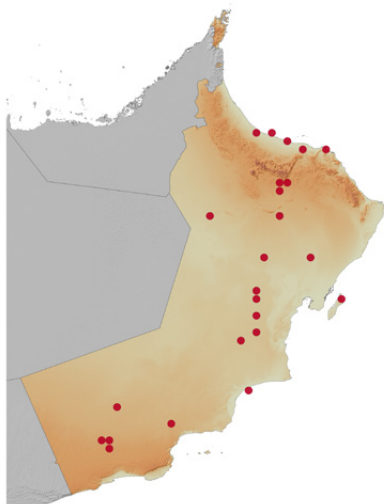
A medium-sized to large, rather harmless snake, with opisthoglyphous fangs. Thick robust round body, and wedge-shaped head only slightly distinct from neck. Countersunk lower jaw as an adaptation for digging. It can expand the sides of the neck if threatened, showing a small hood similar to cobras, except it always faces its back towards the threat. Medium-sized eyes with orange or red iris and round pupils. Head covered with large scales. Supraocular scales projecting above the eye. Dorsal scales smooth, 17 rows at mid-body, 159–176 ventral scales. Tail long, about 18% of the total length, with 48–73 divided subcaudal scales. Anal plate divided. Dorsal color light brown or yellowish, with dark spots or blotches giving a checkered appearance. A very characteristic large dark spot between the eye and the neck. Underside whitish.

**DISTRIBUTION**

Distributed across North Africa, from the Atlantic coast to the Red Sea coast, six of the seven Arabian countries (Bahrain, Kuwait, Oman, Saudi Arabia, UAE, and Yemen), the Levant, and northwestern Iran. In Oman, it is distributed from North to South and with a single record from Masirah Island. Absent from the deep sandy deserts and high Mountains.

**NATURAL HISTORY**

A mainly diurnal fast snake which is also active at dusk on warm nights. It is found on gravel and stony desert plains, foothills, sandy areas, coastal beach regions and cultivated areas. It actively searches for rodents down their burrows and under litter. It kills its prey with venom delivered through grooved rear fangs. The venom does not seem to be dangerous to humans, causing only localized swelling around the bite area. Females lay clutches of 4–18 eggs.



Diurnal/Crepuscular



Least Concern



TL 1,500 mm



0 - 600 m

**NATIVE**





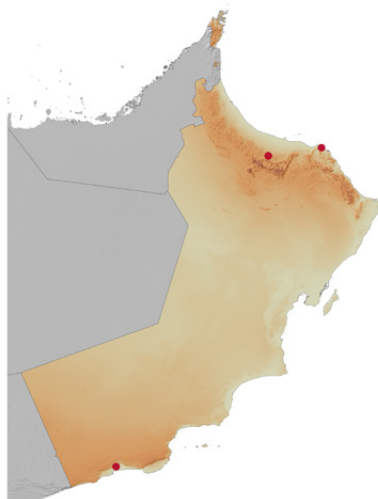
# *Indotyphlops braminus* (Daudin, 1803) **INTRODUCED/INVASIVE**

Brahminy Blind Snake



## DESCRIPTION

A very small, harmless, burrowing snake with a round body. Small head indistinct from the body, with the snout smoothly rounded. Teeth only in the upper jaw. Countersunk lower jaw. Rudimentary eyes at the upper portion of the translucent ocular scale, right at the junction with the supraocular scale. The ocular scale does not reach the lip. Dorsal and ventral scales indistinguishable (no ventral plates), smooth, shiny, and cycloid, 20 rows at mid-body, 306–348 dorsal scales between the rostral shield and the tail tip. Tail almost inexistent, as long as wide, about 0.2% of the total length, ending in a spike. Variable in color, usually dark brown or black but there are also pinkish specimens. Snout and underside of body slightly lighter shade; the chin, tail tip, and cloacal region white.



## DISTRIBUTION

Native from India, it is the most successful invasive reptile species and one of the most widely distributed terrestrial vertebrate in the world. It is now present in at least 118 countries, in all continents except Antarctica and South America, and in more than 543 islands. It gets transported in the soil of commercial plants. In Oman, it has only been found in Muscat and Rustaq in the North and in Salalah in the South. It is most likely restricted to urban areas.

## NATURAL HISTORY

This species includes only females and is the only known obligate parthenogenetic snake in the world. It has a triploid karyotype of  $3n=42$ . A fossorial nocturnal snake, it is normally found under stones, or when excavating earth. In Oman, it occurs in cultivated areas or gardens. It feeds exclusively on ants and termites, preferably their eggs, nymphs, pupae, and larvae. In tropical regions, females lay an average of 3–8 eggs throughout the year.



Nocturnal



Not Evaluated



TL 150 mm

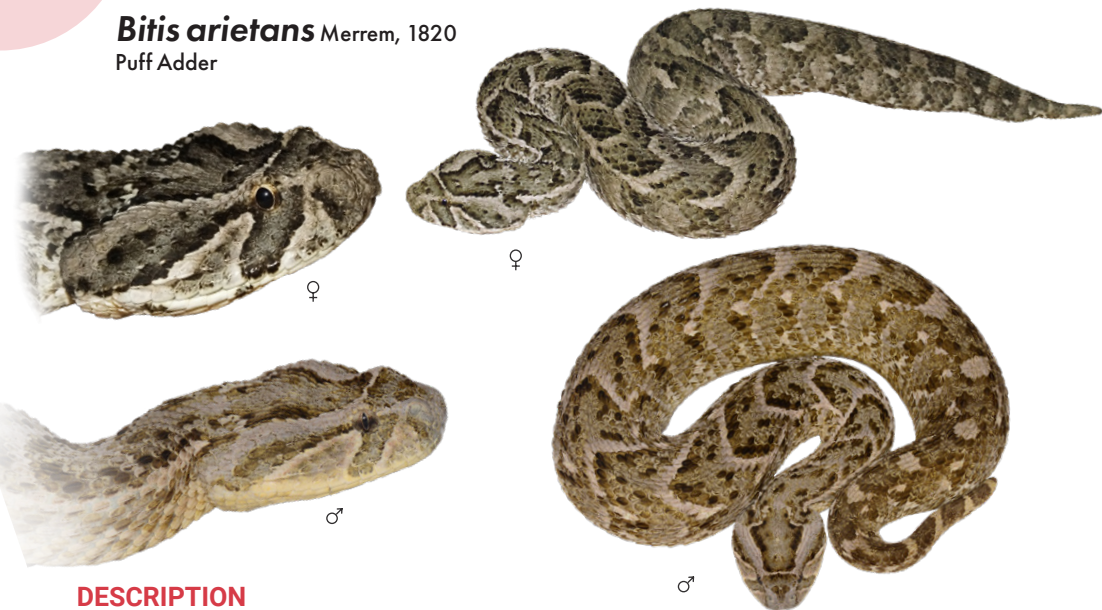


0 - 400 m

**INTRODUCED/INVASIVE**

***Bitis arietans*** Merrem, 1820

Puff Adder

**DESCRIPTION**

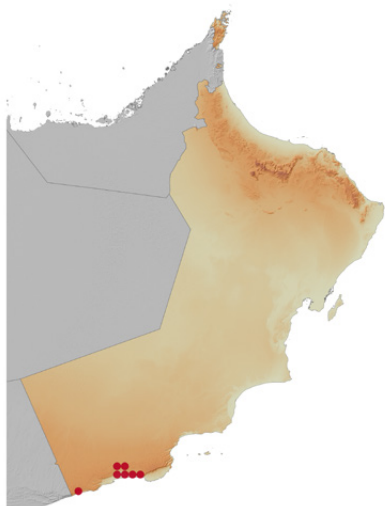
A large venomous snake, with long solenoglyphous fangs. Thick body, and wide robust head clearly distinct from neck. Nostrils on the upper surface of the snout. Head covered with small, keeled scales, 3–4 series of scales between the eye and the upper labials. Eyes rather small, with vertical pupils. Dorsal scales strongly keeled, 29–41 rows at mid-body, 130–145 ventral scales. Tail short, about 5–10% of the total length (longer in males), with 13–28 divided subcaudal scales. Anal plate undivided. Dorsal pattern with a series of dark brown inverted V shaped markings, bordered posteriorly with white. A large, rather triangular, dark marking on top of the head and dark bands between the eyes, from the eye to the lip, and from the eye to the back of the jaw.

**DISTRIBUTION**

Distributed across sub-Saharan Africa, with isolated populations in Morocco. In Arabia, it is restricted to the Western Mountains, from Taif in Saudi Arabia, to near Aden in Yemen and further East to Dhofar. The Arabian populations are related genetically to the Sahelian populations in Africa. In Oman, it is restricted to the monsoon affected areas of Dhofar.

**NATURAL HISTORY**

A mainly nocturnal, slow moving snake. In Dhofar, it lives in well-vegetated wadis and spends hours or even days camouflaged among vegetation to ambush passing by prey. It feeds primarily on mammals, although it also predares on birds and lizards. If disturbed, it will inflate its body and hiss loudly as warning before striking. It has a potent cytotoxic venom that can cause severe tissue damage or even death in humans if left untreated. Females give birth to 12–32 neonates every 3–4 years.



Nocturnal



Least Concern



TL 1,100 mm



0 - 700 m

**NATIVE**



## *Cerastes gasperettii gasperettii* Leviton & Anderson, 1967

Arabian Horned Viper

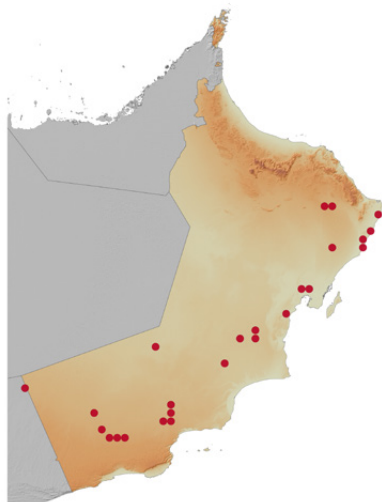


### DESCRIPTION

A medium-sized venomous snake, with long solenoglyphous fangs. Thick flattened robust body, and head clearly distinct from neck. Some specimens with single-scaled horns above each eye. Head covered with small keeled scales. 4–5 series of scales between the eye and the upper labials. Eyes medium-sized, with vertical pupils. Dorsal scales strongly keeled, 30–37 rows at mid-body, lateral scales pointing downwards and backwards, with serrated keels, 150–167 ventral scales. Tail short, about 10-15% of the total length (longer in males), with 28–41 divided subcaudal scales. Anal plate undivided. Dorsal color variable, matching the sand color, with a series of dark blotches along the back. A dark stripe from behind the eye along the upper margin of the cheek.

### DISTRIBUTION

The subspecies *C. g. gasperettii* is found in Jordan, Iraq, northwestern Iran and is widely distributed across Arabia with the exception of Qatar. In Oman, it is distributed across the sandy coastal areas of the East, the Sharqiyah Sands, the Rub' Al Khali Desert, and the arid interior of Dhofar.



### NATURAL HISTORY

A nocturnal, slow-moving snake, it is a sand specialist, often found on sandy flats and aeolian sand dunes with sparse vegetation. It travels for long distances through the sands using the characteristic sidewinding movement and can also bury itself to ambush passing prey. It feeds on rodents, lizards and birds. If disturbed, it coils and makes a warning rasping hiss with the serrated lateral scales. It has a hemotoxic venom, which requires medical attention. Females lay clutches of 4–24 eggs which hatch after 8 weeks.



Nocturnal



Least Concern



TL 840 mm



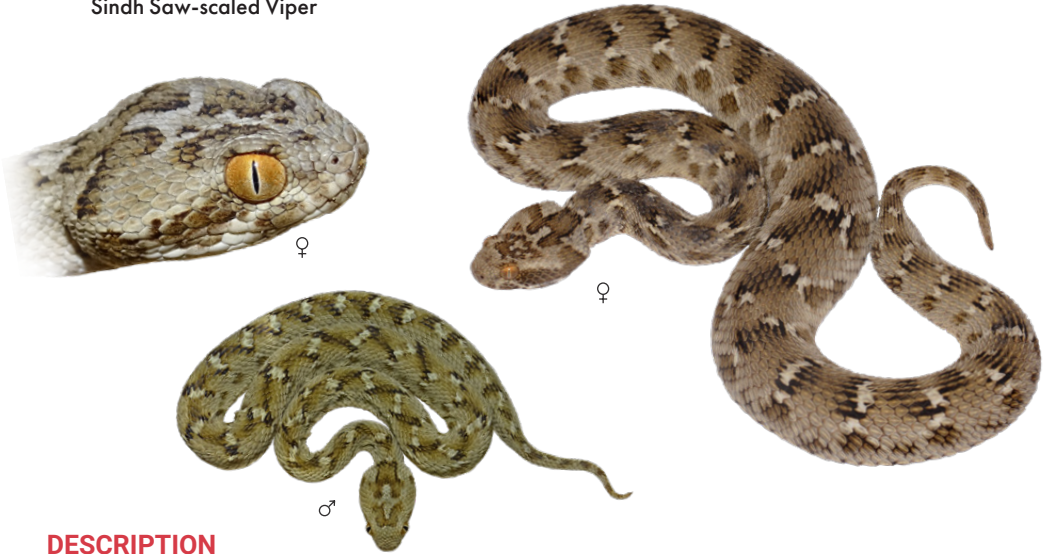
0 - 500 m

**NATIVE**

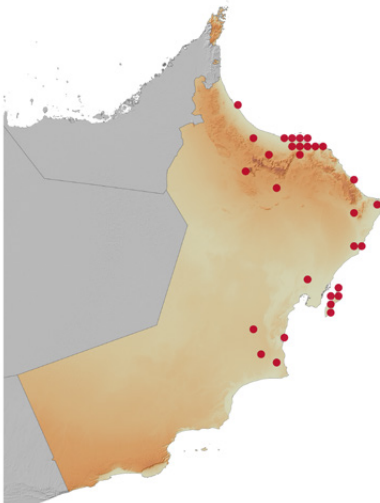


***Echis carinatus sochureki*** Stemmler, 1969

Sindh Saw-scaled Viper

**DESCRIPTION**

A small to medium-sized venomous snake, with long solenoglyphous fangs and relatively narrow pear-shaped head distinct from neck. Head covered with small, keeled scales. Usually 2 series of scales between the eye and the upper labials. Eyes very large and protruding near the front of the head, with vertical pupils. Dorsal scales keeled, 29–35 rows at mid-body, lateral scales pointing downwards and backwards, with serrated keels, 154–169 ventral scales. Tail short, about 9–11% of the total length (longer in males), with 27–34 undivided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to grayish, with a series of white dorsal spots or blotches edged in black. Head with prominent arrow-shape dark markings. Underside whitish with dark spots.

**DISTRIBUTION**

The subspecies *Echis c. sochureki* is found in Bangladesh, North India, South Afghanistan, Pakistan, Iran, Iraq and Arabia (Oman and UAE only). In Oman, it is distributed low down in the Hajar Mountains and surrounding areas, South to Ras Madrakah through the eastern coast, and in Masirah Island.

**NATURAL HISTORY**

A nocturnal snake, it is usually found in vegetated sandy areas, gravel plains, but also in cultivated areas, gardens, and human settlements. It feeds on a wide range of prey, including lizards, rodents and invertebrates. If disturbed, it coils and makes a warning rasping hiss with the serrated lateral scales. It has a hemotoxic venom that can cause bleeding, tissue damage, and organ failure in humans if left untreated. Females give birth to 5–11 young through viviparity.



Nocturnal



Least Concern



TL 610 mm



0 - 600 m

**NATIVE**





## *Echis coloratus* Günther, 1878

Burton's Saw-scaled Viper



### DESCRIPTION

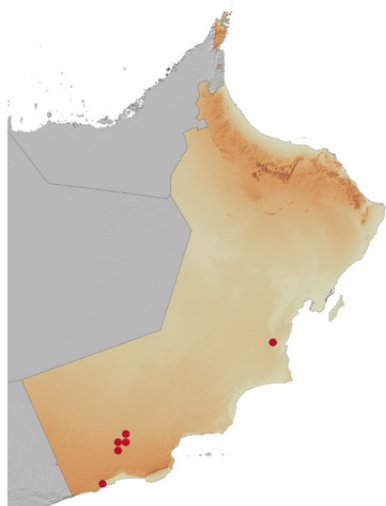
A medium-sized to large venomous snake, with long solenoglyphous fangs. Robust body, and robust wide head distinct from neck. Head covered with small keeled scales. Usually 3–4 series of scales between the eye and the upper labials. Eyes very large and protruding near the front of the head, with vertical pupils. Dorsal scales keeled, 31–37 rows at mid-body, lateral scales pointing downwards and backwards, with serrated keels, 175–210 ventral scales. Tail short, about 9–12% of the total length (longer in males), with 40–57 undivided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to grayish, with a series of dark edged pale dorsal spots or blotches. Underside whitish with dark spots.

### DISTRIBUTION

Distributed along the Red Sea coast of Egypt, the Sinai, Palestine, Israel, Jordan and Arabia (Oman, Saudi Arabia, and Yemen). There are very few records in Oman, one near Duqm in Al Wusta, and the rest in Dhofar, four around Thumrait and one close to Mughsayl.

### NATURAL HISTORY

A nocturnal snake, it is one of the Oman snakes with fewer known localities. This contrasts with other areas such as Saudi Arabia and the Levant, where it is very common. It is always associated with arid rocky areas or gravel plains with sparse vegetation. It feeds on a wide range of prey, including lizards, toads, rodents, birds and invertebrates. If disturbed, it coils and makes a warning rasping hiss with the serrated lateral scales. It has a hemotoxic venom that can cause bleeding, tissue damage, and organ failure in humans if left untreated. Females lay clutches of 4–10 eggs.



Nocturnal



Least Concern

TL 800 mm



0 - 500 m

NATIVE





***Echis khosatzkii*** Cherlin, 1990

Khosatzki's Saw-scaled Viper

**DESCRIPTION**

A small to medium-sized slender venomous snake, with long solenoglyphous fangs and relatively wide pear-shaped head distinct from neck. Head covered with small keeled scales. Usually 2 series of scales between the eye and the upper labials. Eyes very large and protruding near the front of the head, with vertical pupils. Dorsal scales keeled, 29–31 rows at mid-body, lateral scales pointing downwards and backwards, with serrated keels, 165–185 ventral scales. Tail short, about 9–11% of the total length (longer in males), with 36–39 undivided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to grayish, with a series of irregular dark spots or blotches. Head usually uniform or with very faint markings. Underside whitish without dark spots.

**DISTRIBUTION**

A southern Arabian endemic, it is distributed from Al Mukalla in Yemen, East to Oman, where it is found mainly in Dhofar, with a single record North of Lakabi, in Al Wusta Governorate. Within Dhofar, it is found in the monsoon affected areas of the Dhofar Mountains and the Jebel Shams, but also in the much drier inland side of the mountains.

**NATURAL HISTORY**

A nocturnal snake, it lives in mountain rocky wadis and coastal rocky plains, where it can be relatively abundant. It feeds on a wide range of prey, including lizards, rodents and invertebrates. It is usually a very calm snake but if disturbed it coils and makes a warning rasping hiss with the serrated lateral scales. It has a hemotoxic venom that can cause bleeding, tissue damage, and organ failure in humans if left untreated. Nothing is known about its reproduction, it is presumed that females lay eggs.



Nocturnal



Least Concern



TL 500 mm



0 - 1,200 m

**NATIVE**



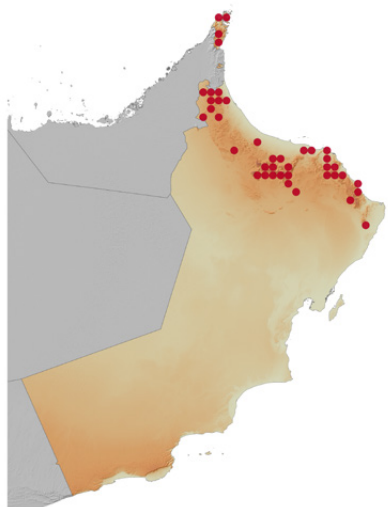
## *Echis omanensis* Babocsay, 2004

Hajar Saw-scaled Viper



### DESCRIPTION

A medium-sized to large venomous snake, with long solenoglyphous fangs. Robust body, and robust wide head very distinct from the narrow neck. Head covered with small keeled scales. Usually 3–4 series of scales between the eye and the upper labials. Eyes very large and protruding near the front of the head, with vertical pupils. Dorsal scales keeled, 31–35 rows at mid-body, lateral scales pointing downwards and backwards, with serrated keels, 184–195 ventral scales. Tail short, about 9–12% of the total length (longer in males), with 48–58 undivided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to gray, with a series of dark edged pale dorsal spots or blotches connected by a zig-zag of darker scales. Underside whitish with dark spots.



### DISTRIBUTION

Endemic to the Hajar Mountains of Oman and UAE, it is widely distributed across the whole massif, from the Musandam Peninsula to the extreme Eastern Hajars, with some high altitude populations. It is closely related to the morphologically similar *E. coloratus*, but the two species are geographically separated (allopatric).

### NATURAL HISTORY

It is mainly nocturnal, but may be active during the day in cooler seasons. It prefers vegetated mountain rocky areas or wadis with water, but it is also found in cultivated areas near villages or in drier conditions with sparse vegetation. It feeds on a wide range of prey, including toads, lizards, rodents and invertebrates. If disturbed it coils and makes a warning rasping hiss with the serrated lateral scales. It has a hemotoxic venom that can cause bleeding, tissue damage and organ failure in humans if left untreated. Nothing is known about its reproduction, it is presumed that females lay eggs.



Nocturnal/Diurnal



Least Concern



750 mm



0 - 2,100m

**NATIVE**

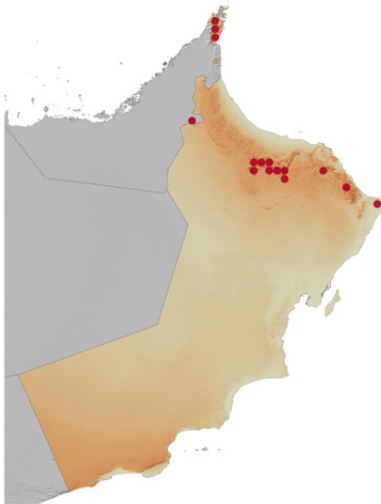


***Pseudocerastes persicus*** (Duméril, Bibron & Duméril, 1854)

Persian Horned Viper

**DESCRIPTION**

A small to medium-sized venomous snake, with long solenoglyphous fangs. Rather robust body, and robust wide head very distinct from neck. Characteristic prominent horn-like tubercles above the eyes, formed by several scales. Head covered with small feebly keeled scales. Eyes small with vertical pupils. Dorsal scales keeled, 23–24 rows at mid-body, 144–158 ventral scales. Tail short, about 10–12% of the total length (longer in males), with 38–48 divided subcaudal scales. Anal plate undivided. Dorsal color variable, from light brown to gray, with a series of dark short thick cross-bars that can be complete or extend only from the flank to the vertebral line. A wide dark stripe from the nostril, through the lower half of the eye to the back of the head. Underside white, gray or reddish-brown.

**DISTRIBUTION**

Widely distributed across Iran, with isolated populations in the Hajar Mountains of Oman and UAE. In Oman, it is distributed from the Musandam Peninsula to the extreme Eastern Hajars, above 500 m in elevation, although it has been found at lower elevations in the UAE.

**NATURAL HISTORY**

A secretive snake, it can be found active at night and basking in the early morning. In the Hajar Mountains, it prefers dry rocky areas with sparse vegetation at medium-high elevations. It preys on lizards, rodents and birds. If disturbed, it coils and makes a warning hissing noise by exhaling air through the nostrils, similar to the Puff Adder. It has a myotoxic and hemotoxic venom, which requires medical treatment if bitten. Females lay clutches of 11–21 eggs in an advanced stage of development that hatch after 29–30 days.



Nocturnal/Diurnal



Least Concern



TL 710 mm



500 - 2,500m

**NATIVE**





## Marine Reptiles

## Sea Snakes

True sea snakes include a monophyletic assemblage of approximately 60 species. They are fully marine viviparous species that spend their entire lives in the oceans, being able to swim to depths of more than 50 m. True sea snakes are relative newcomers to aquatic life, having evolved from land-based snakes of the venomous Family Elapidae only about 15 million years ago. Within this relatively short period of time, true sea snakes have developed a series of adaptations to marine life including:

- 1.- Laterally compressed bodies and paddle-like tails to facilitate swimming;
- 2.- A very long lung that extends almost the full length of their bodies. It provides oxygen whilst the snake is submerged and acts as a buoyancy control, facilitating up and down movements in the water column;
- 3.- The ability to absorb oxygen and eliminate carbon dioxide through their skin, increasing their diving capacity to up to

two hours by providing supplemental oxygen and preventing respiratory acidosis through the release of carbon dioxide;

- 4.- Changes in their visual pigments compared to their relatives on land, which are beneficial for underwater vision (where longer wavelengths dominate);
- 5.- Salt glands under their tongue for osmoregulation;
- 6.- Nostrils that face upwards and can be sealed by valves to avoid water entering the body during dives;
- 7.- Viviparous mode of reproduction.

Despite all these morphological and physiological adaptations, true sea snakes are still restricted to relatively warm waters and need freshwater to maintain a correct osmotic balance. They drink rainwater and therefore may dehydrate and die at sea during periods without precipitation. These two aspects (cold waters and lack of rainfall)

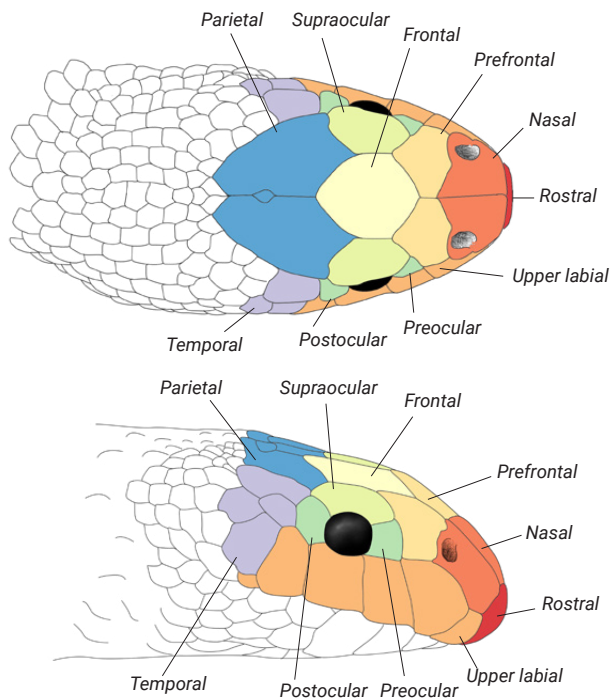


Fig 54: Dorsal (above) and lateral (below) views of the head of *Hydrophis curtus* (Elapidae) showing the main scales used in the species accounts of the sea snakes.



are considered the two main reasons why sea snakes have not been able to disperse from the Indian and Pacific Oceans into the Atlantic Ocean.

Of the approximately 60 described species of true sea snakes, 10 (16.6%) can be found in the waters of the Arabian Gulf and/or the Gulf of Oman.

Sea snakes are a taxonomically very difficult group, with several species presenting very similar morphology and very variable coloration that changes with age. Until very recently, the sea snakes of Oman were divided into 6 different genera: *Enhydrina*, *Hydrophis*, *Lapemis*, *Microcephalophis*, *Pelamis*, and *Praescutata* (Gardner 2013). More recent accounts (Rezaie-Atagholipour et al. 2016; Buzás et al. 2018) recognized just two

genera: *Hydrophis* and *Microcephalophis*.

This book follows the latest taxonomic hypothesis and recognizes all sea snakes from Oman as part of the genus *Hydrophis*. The species *Hydrophis cantoris* was reported by Rezaie-Atagholipour et al. (2016) from Iranian coastal waters of the Gulf of Oman. Therefore, we have decided to include it in the book as a possible species inhabiting Oman waters. Future research on this poorly known and understudied reptile group in Oman might clarify this. In order to try to facilitate the identification of the 10 different species of *Hydrophis* from Oman, we provide an identification key with illustrations of some diagnostic characters. Several of the diagnostic characters used are from Rezaie-Atagholipour et al. (2016). The key has been adapted from Gaspéretti (1988), Gardner (2013), and Rezaie-Atagholipour et al. (2016).

### Key to the species of the genus *Hydrophis* in Oman

1.	a	Head extremely small; very long and slender body anteriorly and thick posteriorly (about 4–5 times greater than the diameter of the neck); large rostral scale projecting beyond the lower jaw; 5–6 upper labial scales; usually 25 or less scales rows around the neck	2
	b	Not extremely small head and anterior part of the body not so thin as the posterior part (less than 4–5 times greater than the diameter of the neck); usually more than 6 upper labial scales; usually more than 25 scales rows around the neck	3
2.	a	Prefrontal scale usually in contact with third upper labial scale; usually more than 400 ventral scales	<i>H. cantoris</i>
	b	Prefrontal scale usually in contact with the second upper labial scale; usually less than 300 ventral scales	<i>H. gracilis</i>
3.	a	Rostral scale beak-shaped (lower part slightly pointed) (Fig 55A), mental scale narrow and elongated, hidden in a groove between the chin shields (Fig 56 right);	<i>H. schistosus</i>
	b	Shape of the lower part of the rostral scale tridentate (Fig 55B or C) or unidentate (Fig 55D); mental scale short and triangular (Fig 56 left)	4
4.	a	Shape of the lower part of the rostral scale tridentate (Fig 55B or C); ventral scales wider than adjacent dorsal scales, more so on the anterior part of the body (Fig 57B), or large, more or less the width of the body on its anterior half (Fig 57A)	5
	b	Shape of the lower part of the rostral scale unidentate (Fig 55D); ventral scales slightly wider than adjacent dorsal scales, more so on the anterior part of the body (Fig 57D), or hardly distinguishable from adjacent scales (Fig 57C)	6
5.	a	large ventral scales, more or less the width of the body on the anterior half, then narrowing until they become less than twice as wide as the adjacent dorsal scales (Fig 57A)	<i>H. viperinus</i>

**Key to the species of the genus *Hydrophis* in Oman**

	<b>b</b>	Ventral scales hexagonal, wider than adjacent dorsal scales, more so on the anterior part of the body (Fig 57B); large, robust, blunt head not distinct from neck; thick body laterally compressed posteriorly; 7–9 upper labial scales, the second in contact with the prefrontal scale; usually the third and fourth upper labials or only the fourth contact the eye.	<i>H. curtus</i>
<b>6.</b>	<b>a</b>	Ventrals hardly distinguishable from adjacent scales, small and hexagonal in shape, as broad as long (Fig 57C); entire body laterally compressed, large head, clearly distinct from the body with very narrow elongated snout; eyes placed further back on the head; color dark brown or black dorsally, yellow ventrally	<i>H. platurus</i>
	<b>b</b>	Ventral scales slightly wider than adjacent dorsal scales, more so on the anterior part of the body (Fig 57D); short snout (not long and narrow), color different from 6a	<b>7</b>
<b>7.</b>	<b>a</b>	Large adult size, usually well above 1,000 mm; 8 or fewer maxillary teeth; body scales on the thickest part of the body rhomboid in shape, longer than broad, with rounded or bluntly pointed tips, more or less distinctly imbricate	<b>8</b>
	<b>b</b>	Adult size usually below 1,000 mm; 8 or more maxillary teeth; body scales on the thickest part of the body hexagonal in shape, juxtaposed	<b>9</b>
<b>8.</b>	<b>a</b>	Long and slender; head covered with large scales sometimes superimposed; 7–8 upper labial scales, the second in contact with the prefrontal; third, fourth, and fifth upper labials may contact the eye; one preocular and usually two postocular scales; 8 maxillary teeth behind the venom fangs; dorsal color variable, light brown or yellowish, with 50–75 dark bars across the body, broader dorsally, that fade away with age	<i>H. cyanocinctus</i>
	<b>b</b>	Very long snake, large head, slightly distinct from neck; 6–8 upper labial scales, the second usually in contact with the prefrontal; usually the third and fourth upper labials contact the eye; one preocular and usually one postocular scale; 6–7 maxillary teeth behind the venom fangs; dorsal color usually yellow or brownish, with about 30–60 more or less narrow black rings encircling the body, narrower than the yellowish interspaces; head yellowish as body. Tail tip usually black	<i>H. spiralis</i>
<b>9.</b>	<b>a</b>	Large head, slightly distinct from neck; 7–8 upper labial scales, the second usually in contact with the prefrontal; usually the third and fourth upper labials contact the eye; one preocular and two or three postocular scales; 10–13 maxillary teeth behind the venom fangs; dorsal color variable, light brown or yellowish, with about 50 dark bars or oval-rhomboidal spots close to each other	<i>H. ornatus</i>
	<b>b</b>	Small, elongated head, slightly distinct from the neck; 8 upper labial scales, the second usually in contact with the prefrontal scale; the third, fourth, and fifth upper labials may contact the eye; one preocular and usually two postocular scales; 8–11 maxillary teeth behind the venom fangs; dorsal color variable, light brown or yellowish, with 33–45 dark bars across the body, broader dorsally, that fade away with age	<i>H. lapemoides</i>

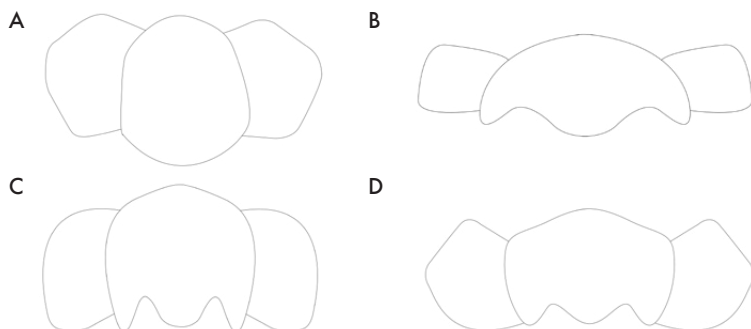
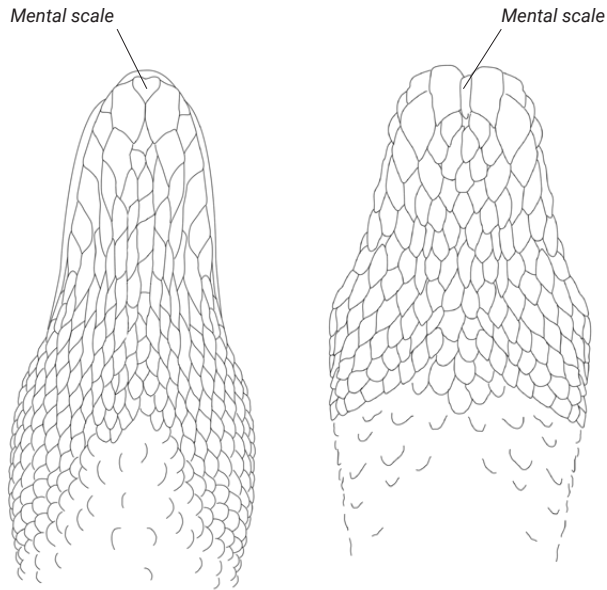
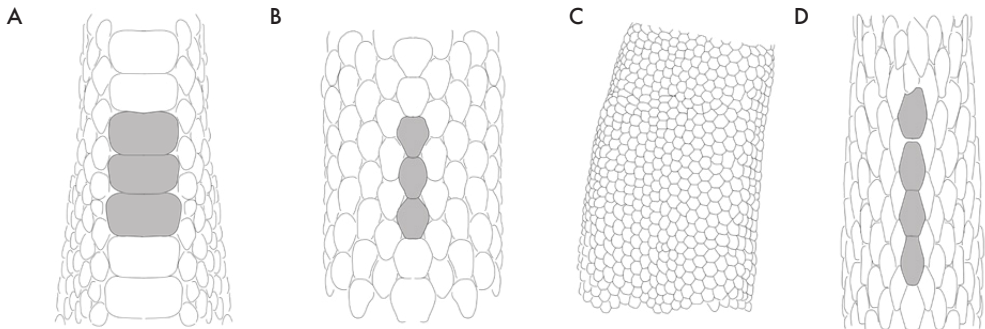


Fig 55: Different shapes of the rostral scales. Redrawn from Fig. 2 of Rezie-Atagholipour et al. (2016). A: Rostral scale beak-shaped (lower part slightly pointed); B: Lower part of the rostral scale tridentate; C: Lower part of the rostral scale tridentate; D: Lower part of the rostral scale unidentate.



**Fig 56:** Detail of the underside of the head of sea snakes showing the different shape of the mental scale. **Left:** Mental scale short and triangular. Drawing of *Hydrophis platurus* as an example; **Right:** Mental scale narrow and elongated, hidden in a groove between the chin shields. Drawing of *Hydrophis schistosus*.



**Fig 57:** Size and disposition of the ventral scales at mid-body (gray) of the sea snakes of Oman. Drawn based on Fig. 4 of Rezie-Atagholipour et al. (2016). **A:** Large ventral scales, more or less the width of the body, *Hydrophis viperinus*; **B:** Hexagonal ventral scales, wider than adjacent dorsal scales, more so on the anterior part of the body, *Hydrophis curtus*; **C:** Ventrals hardly distinguishable from adjacent scales, small and hexagonal in shape, as broad as long, *Hydrophis platurus*; **D:** Ventral scales slightly wider than adjacent dorsal scales, more so on the anterior part of the body, *Hydrophis cyanocinctus*, *H. lapemoides*, *H. ornatus*, and *H. spiralis*.



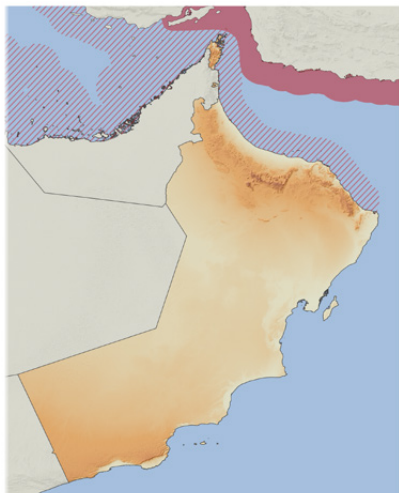
## *Hydrophis cantoris* Günther, 1864

Gunther's Sea Snake



### DESCRIPTION

A large marine venomous snake with proteroglyphous fangs and extremely small pointed head. Body long and slender anteriorly, laterally compressed and thick posteriorly, its greatest diameter being four or five times greater than the diameter of the neck. Head covered with large scales, large rostral scale projecting beyond the lower jaw. 5–6 upper labial scales, the third in contact with the prefrontal scale. Third and fourth upper labials contact the eye. One preocular and one postocular scale. 5–6 maxillary teeth behind the venom fangs. Dorsal scales on the thickest part of the body hexagonal, broader than long, juxtaposed, with two or three small tubercles, one behind the other, most pronounced in males. 41–48 mid-body scale rows and 21–25 scale rows on the neck. 404–468 ventrals, entire on the slender portion of the body and broader than adjacent dorsal scales, completely divided by a longitudinal furrow posteriorly. Tail short, paddle-like, about 8–12% of the total length. Coloration in adults light gray above and paler below, darker anteriorly than posteriorly, with a series of broad dorsal dark bands on the anterior part of the body fading posteriorly. Head dark.



### DISTRIBUTION

Widely distributed, from the Malay Archipelago to the Iranian side of the Gulf of Oman. Further research on these secretive snakes may reveal its presence on the Omani side of the Gulf of Oman and in the Arabian Gulf.

### NATURAL HISTORY

It prefers shallow coastal waters. It is a specialist feeder on slender bottom fish, such as gobies and eels that hunts within small holes. It has a potent venom that requires medical attention. Females give birth to 6 young on average through viviparity.



Data Deficient

TL 1,880 mm

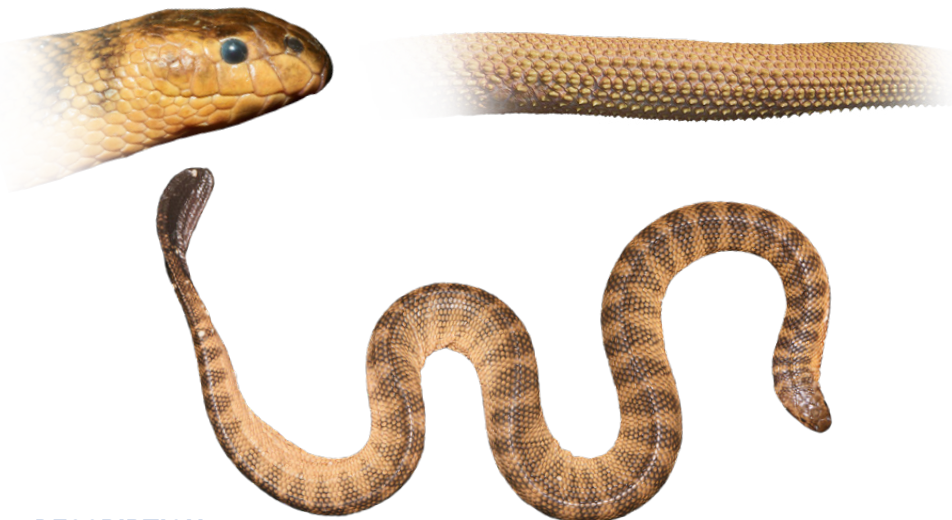
NATIVE





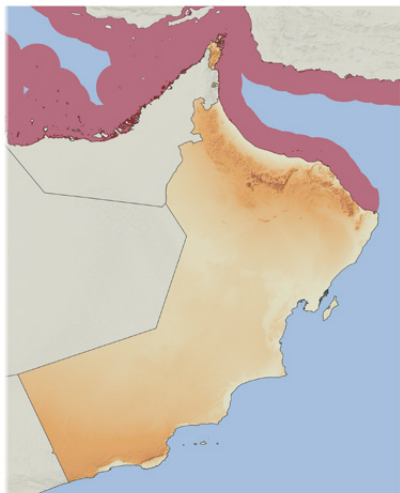
## *Hydrophis curtus* (Shaw, 1802)

Spine-bellied Sea Snake



### DESCRIPTION

A medium-sized, marine venomous snake with proteroglyphous fangs, thick body laterally compressed posteriorly, and large, robust, blunt head not distinct from neck. Shape of the lower part of the rostral scale markedly tridentate, mental scale short and triangular. Head covered with large scales, sometimes parietal broken into smaller shields. 7–9 upper labial scales, the second in contact with the prefrontal scale. Third and fourth upper labials or only the fourth contact the eye. 3–6 maxillary teeth behind the venom fangs. Body scales hexagonal, each with a single sharp keel in the middle, the keels increasing in size towards the flanks. 32–43 mid-body scale rows and 28–38 scale rows on the neck. 147–201 ventral scales, wider than adjacent dorsal scales, more so on the anterior part of the body. Tail short, paddle-like, about 9% of the total length. Dorsal color variable, light brown, gray or yellowish, with darker head and tail and incomplete dark bars across the body.



### DISTRIBUTION

Widely distributed from New Caledonia, through Australia and Asia, to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

Relatively abundant, it lives in shallow marine habitats where it preys on a wide variety of fishes belonging to more than 33 different families, amphipods and cuttlefish. It has been found on the sea surface during the day and after dusk. It will try to bite if restrained. It has a potent venom that requires medical attention. Females give birth to 1–6 young through viviparity.



Least Concern

TL 1,015 mm

NATIVE

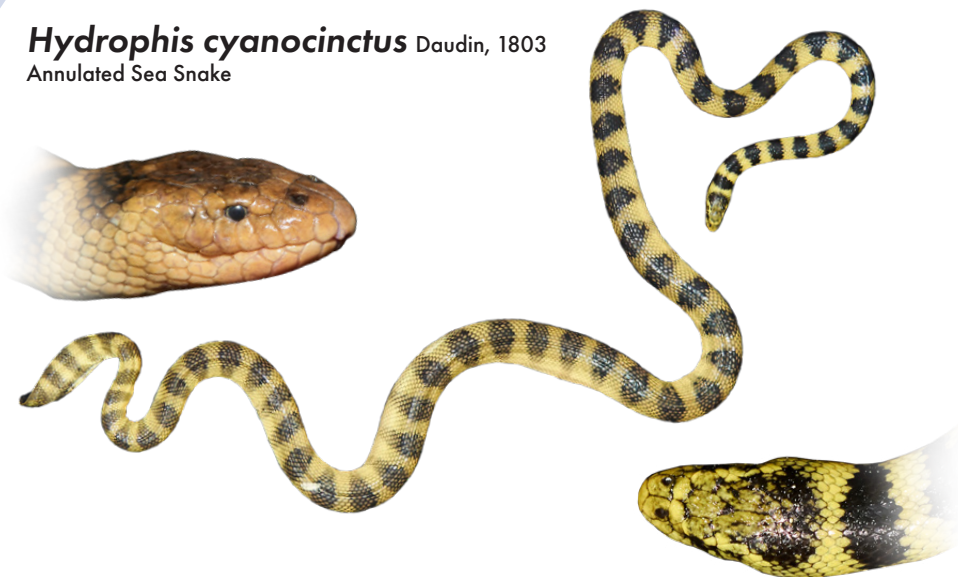






## *Hydrophis cyanocinctus* Daudin, 1803

Annulated Sea Snake



### DESCRIPTION

A long, slender marine venomous snake with proteroglyphous fangs, round body, laterally compressed posteriorly. Small, elongated head, slightly distinct from neck. Shape of the lower part of the rostral scale unidentate, mental scale short and triangular. Head covered with large scales, sometimes superimposed. 7–8 upper labial scales, the second in contact with the prefrontal scale. Third, fourth, and fifth upper labials may contact the eye. One preocular and usually two postocular scales. 5–8 maxillary teeth behind the venom fangs. Body scales on the thickest part of the body rhomboid in shape, longer than broad, with bluntly pointed tips, slightly or distinctly imbricate, usually with a central keel or two or three tubercles. 33–48 mid-body scale rows and 27–35 scale rows on the neck. 280–397 ventrals distinct throughout, anteriorly twice as wide as adjacent dorsal scales. Tail short, paddle-like,

about 8–10% of the total length. Dorsal color variable, light brown or yellowish, with 50–75 dark bars across the body, broader dorsally, which fade away with age.



### DISTRIBUTION

Widely distributed, from Japan to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

Relatively abundant in the Arabian Gulf and the Gulf of Oman. It lives in warm, shallow marine waters over reefs, seagrass beds or sand; also found in mangroves. It preys on small fish such as gobies and eels. It has been found on the sea surface during the day and after dusk. Although it is normally not aggressive, it will bite if restrained. It has a potent venom that requires medical attention. Females give birth to 3–16 young through viviparity.



Least Concern

TL 1,447 mm

NATIVE





## *Hydrophis gracilis* (Shaw, 1802)

Graceful Small-headed Sea Snake



### DESCRIPTION

A medium-sized marine venomous snake with proteroglyphous fangs and extremely small pointed head. Body long and slender anteriorly, laterally compressed and thick posteriorly, its greatest diameter being four or five times greater than the diameter of the neck. Head covered with large scales, large rostral scale projecting beyond the lower jaw. 5–6 upper labial scales, second in contact with the prefrontal scale. Third and fourth upper labials contact the eye. One preocular and one postocular scale. Dorsal scales on the thickest part of the body hexagonal, broader than long, juxtaposed, with two or three small tubercles one behind the other, most pronounced in males. 29–43 mid-body scale rows and 17–23 scale rows on the neck. 220–287 ventrals, entire on the slender portion of the body and broader than adjacent dorsal scales, completely divided by a longitudinal furrow posteriorly. Tail short, paddle-like, about 8–12% of the total length. Coloration in adults light gray above and paler below, darker anteriorly than posteriorly, with a series of broad dorsal dark bands on the anterior part of the body, fading posteriorly. Head dark.



### DISTRIBUTION

Widely distributed, from New Guinea and Australia to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

A very scarce species in the Gulf of Oman and the Arabian Gulf. It prefers coastal waters and can dive to at least 50 m. It is a specialist feeder on slender bottom fish, such as gobies and eels, which are actively hunted from within their burrows. It has a potent venom that requires medical attention. Females give birth to 1–16 young through viviparity.



Least Concern

TL 1,025 mm

NATIVE





## *Hydrophis lapemoides* (Gray, 1849)

Arabian Gulf Sea Snake



### DESCRIPTION

A rather small, marine venomous snake with proteroglyphous fangs, round body, laterally compressed posteriorly. Small, elongated head slightly distinct from neck. Shape of the lower part of the rostral scale unidentate, mental scale short and triangular. Head covered with large scales. 8 upper labials, the second usually in contact with the prefrontal scale. Third, fourth, and fifth upper labials may contact the eye. One preocular and usually two postocular scales. 8–11 maxillary teeth behind the venom fangs. Body scales on the thickest part of the body more or less quadrangular or hexagonal in shape, keeled and juxtaposed; larger and more strongly keeled towards the back of the body, where scales may have spine-like scales instead of keels. 40–51 mid-body scale rows and 29–35 scale rows on the neck. 300–404 ventral scales, slightly wider than adjacent dorsal scales, more

so on the anterior part of the body. Tail short, paddle-like, about 10% of the total length. Dorsal color variable, light brown or yellowish, with 33–45 dark bars across the body, broader dorsally, which fade away with age.



### DISTRIBUTION

Widely distributed, from the Malay Archipelago to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

Relatively abundant in the Arabian Gulf and Gulf of Oman. It lives in warm, shallow marine waters, often close to shore. It preys mainly on small fish such as gobies and eels. It has been found on the sea surface during the day and after dusk. Although it is normally not aggressive, it will bite if restrained. It has a potent venom that requires medical attention. Females give birth to 1–5 young through viviparity.



Least Concern

TL 960 mm

NATIVE





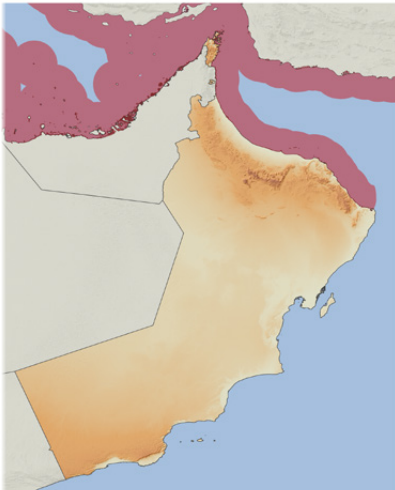
## *Hydrophis ornatus* (Gray, 1842)

Ornate Reef Sea Snake



### DESCRIPTION

A medium-sized, marine venomous snake with proteroglyphous fangs, round, thick body, laterally compressed posteriorly. Large head, slightly distinct from neck. Shape of the lower part of the rostral scale unidentate, mental scale short and triangular. Head covered with large scales. 7–8 upper labial scales, the second usually in contact with the prefrontal scale. Usually third and fourth upper labials contact the eye. One preocular and two or three postocular scales. 10–13 maxillary teeth behind the venom fangs. Body scales on the thickest part of the body more or less hexagonal in shape, juxtaposed, with a central tubercle or short keel. 33–55 mid-body scale rows and 28–45 scale rows on the neck. 209–312 ventral scales, slightly wider than adjacent dorsal scales, more so on the anterior part of the body. Tail short, paddle-like, about 10–14% of the total length. Dorsal color variable, light brown or yellowish, with about 50 dark bars or oval-rhomboidal spots close to each other.



### DISTRIBUTION

Widely distributed, from Australia to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

Abundant in the Arabian Gulf and Gulf of Oman. It lives in coastal waters, where it preys on a wide variety of fish species. It has been found on the sea surface during the day and after dusk. Although it is normally not aggressive, it will bite if restrained. It has a potent venom that requires medical attention. Females give birth to 2–5 young through viviparity.



Least Concern

TL 1,200 mm

NATIVE





## *Hydrophis platurus* (Linnaeus, 1766)

Yellow-bellied Sea Snake



### DESCRIPTION

A rather small marine venomous snake with proteroglyphous fangs, entire body laterally compressed, large head, clearly distinct from neck with very narrow elongated snout. Eyes placed further back on the head. Shape of the lower part of the rostral scale unidentate, mental scale short and triangular. Head covered with large scales. 7–8 upper labial scales, the second in contact with the prefrontal scale. Upper labials separated from the eye by subocular scales. One or two preocular and two to three postocular scales. 7–11 maxillary teeth behind the venom fangs. Body scales small, hexagonal in shape, as broad as long, the lower rows with two or three small tubercles, more pronounced in adult males. 49–67 scale rows around the thickest part of the body. 264–440 ventral scales, undistinguishable from the adjacent dorsal scales. Tail short, paddle-like, about 9–11% of the total length. Color variable but usually it has a thick dark (usually dark brown or black but sometimes light brown) dorsal stripe along the whole body that contrasts with the canary yellow or light brown ventral surface and flanks. The tail has vertical bands and blotches on a whitish background.



### DISTRIBUTION

Very wide distribution. Its range extends from the western shores of tropical America, across the Pacific and Indian Oceans, entering into the Gulf of Oman and Arabian Gulf, and westwards to East Africa.

### NATURAL HISTORY

A very abundant species in the Gulf of Oman. It prefers clear, warm, shallow waters with weak surf and currents. It is a pelagic species and has been seen out in the open ocean. Sometimes individuals can gather in large numbers. It preys on fish. It has been found on the sea surface during the day and after dusk. It is a very docile species but requires medical attention in case of a bite. Females give birth to 1–6 young through viviparity.



Least Concern

TL 880 mm

NATIVE







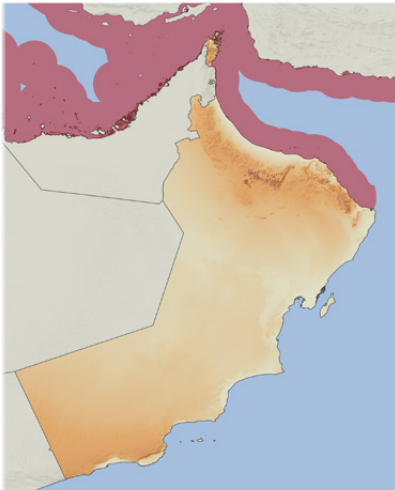
## *Hydrophis schistosus* Daudin, 1803

Beaked Sea Snake



### DESCRIPTION

A large marine venomous snake with proteroglyphous fangs, robust body, laterally compressed, more so posteriorly. Large blunt robust head, slightly distinct from neck. Rostral scale beak-shaped, with the lower part slightly pointed, mental scale narrow and elongated, hidden in a groove between the chin shields. Head covered with large scales. 7–9 upper labial scales, none in contact with the prefrontal scale; the third and fourth or only the fourth in contact with the eye. One preocular and one postocular scale. Body scales on the thickest part of the body more or less rhomboid in shape, longer than broad, juxtaposed or slightly imbricate, with a short central keel. 49–69 mid-body scale rows and 40–55 scale rows on the neck. 230–354 ventral scales, slightly wider than the adjacent dorsal scales. Tail short, paddle-like, about 9–13% of the total length. Color variable, light gray or bluish, with about 40 dark bands across the body which fade away and even disappear with age. Juveniles whitish with black cross bands.



### DISTRIBUTION

Widely distributed, from Australia to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

An abundant species in the Gulf of Oman. It prefers shallow waters near the shore with sandy or muddy substrate, where they may be seen both during the day or after dusk. They also enter estuarine areas, lagoons and harbors. It preys on small fishes but prefers gobies and eels. Attention must be paid when approaching this snake as it will not hesitate to bite if restrained. It has a potent venom that requires medical attention. Females give birth to 4–11 young through viviparity.



Least Concern

TL 1,230 mm

NATIVE





## *Hydrophis spiralis* (Shaw, 1802)

Yellow Sea Snake



### DESCRIPTION

A very large (the largest in Arabia) marine venomous snake with proteroglyphous fangs, round elongated body, laterally compressed posteriorly. Large head, slightly distinct from neck. Shape of the lower part of the rostral scale unidentate, mental scale short and triangular. Head covered with large scales. 6–8 upper labial scales, the second usually in contact with the prefrontal scale. Usually the third and fourth upper labials contact the eye. One preocular and usually one postocular scale. 6–7 maxillary teeth behind the venom fangs. Body scales on the thickest part of the body rhomboid in shape, longer than broad, juxtaposed or slightly imbricate, smooth or with a central tubercle or short keel. 29–39 mid-body scale rows and 25–32 scale rows on the neck. 282–373 ventral scales, slightly wider than adjacent dorsal scales, more so on the anterior part of the body. Tail short, paddle-like, about 7–9% of the total length. Dorsal color usually yellow or brownish, with about 30–60 more or less narrow black rings encircling the body, which are narrower than yellowish interspaces; head yellowish. Tail tip usually black.



### DISTRIBUTION

Widely distributed, from New Caledonia to the Gulf of Oman and Arabian Gulf.

### NATURAL HISTORY

Not very abundant in the Arabian Gulf and Gulf of Oman. It lives in shallow coastal waters, where it preys mainly on eels and other slender fish species. It has been found on the sea surface during the day and after dusk. Although it is normally not aggressive, it will bite if restrained. It has a potent venom that requires medical attention. Females give birth to 5–14 young through viviparity.



Least Concern

TL 2,700 mm

NATIVE





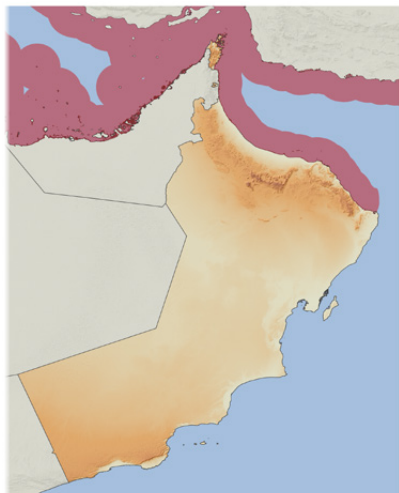
## *Hydrophis viperinus* (Schmidt, 1852)

Viperine Sea Snake



### DESCRIPTION

A rather small marine venomous snake with proteroglyphous fangs; robust body, laterally compressed, more so posteriorly. Large robust wide head, distinct from neck. Shape of the lower part of the rostral scale markedly tridentate, mental scale short and triangular. Head covered with large scales. 7–9 upper labial scales, none in contact with the prefrontal scale. Third, fourth, and fifth upper labials may contact the eye. One or two preocular and one or two postocular scales. Dorsal scales on the thickest part of the body more or less rhomboid in shape, longer than broad, juxtaposed, keeled, becoming spinose posteriorly in older males. 37–50 mid-body scale rows and 27–38 scale rows on the neck. 226–291 large ventral scales, the width of the body on the anterior half, then narrowing until they become less than twice as wide as the adjacent dorsal scales. Tail short, paddle-like, about 10–12% of the total length. Color variable, dorsal part of the body dark gray or bluish, often with dark rhomboid spots. Flanks and ventral surface whitish, clearly differentiated from the dorsal coloration. Tail tip often black.



### DISTRIBUTION

Widely distributed, from the Malay Archipelago and Southern China to the Gulf of Oman and Arabian Gulf. Its presence in the Arabian Gulf has been questioned, as it is based on a single specimen collected around 1963.

### NATURAL HISTORY

A very scarce species in the Gulf of Oman and with only one record in the Arabian Gulf. It has been suggested that this species prefers relatively deep waters between 50–60 m, which might explain why it is not collected very frequently. It preys on small fishes, including gobies and eels. Although it is normally not aggressive, it will bite if restrained. It has a potent venom that requires medical attention. Females give birth to 2–6 young through viviparity.



Least Concern

TL 950 mm

NATIVE



## Testudines

Testudines is an Order of reptiles in which all its extant members are characterized by having a bony or cartilaginous shell encasing the entire body. As a result of that, turtles are among the most distinctive and instantly recognizable of all organisms. The shell is originally developed from its ribs and consists of a dorsal part called the carapace and a ventral part that protects the belly known as the plastron. The dorsal carapace and the ventral plastron are joined by lateral bony scutes. Turtles consists of more than 361 species, classified into 94 different genera. They inhabit terrestrial (tortoises), marine (sea turtles) and freshwater (freshwater turtles and terrapins) habitats around the globe except at very high latitudes. Regions with very high diversity are the southeastern United States, Amazonia, and southeastern Asia. Although turtles are phylogenetically nested among diapsid amniotes (Rhynchocephalia, Squamata, Crocodilia, and Aves; Fig 6) with two temporal fenestrae in their skulls (diapsids), turtles lack any temporal fenestrae and hence are anapsids. It has been shown that the anapsid condition of turtles is secondarily derived from a diapsid skull. In

order to recognize the skull diversity of this group of amniotes, the monophyletic group including Rhynchocephalia, Squamata, Turtles, Crocodilia, and Aves is known as Sauropsida.

Extant turtles completely lack teeth, which are replaced by a tough keratinous beak. They use their jaws to cut and chew food. Carnivorous turtles usually have knife-sharp ridges for slicing through their prey. Herbivorous turtles have serrated-edged ridges that help them cut through tough plants. Turtle limbs are morphologically variable, reflecting the environment and locomotory mode. Terrestrial species have round robust limbs, capable of lifting their heavy carapaces. Their digits are often reduced. Most freshwater species have well-developed webbing between the digits, which still retain some independent mobility. All marine species and the freshwater species of the genus *Carettochelys* have well-developed flippers with very elongated digits that cannot move independently. All turtles are oviparous and lay eggs within a nest dug in the ground or lay their eggs on the surface with no nest. In general, no parental care occurs. Most turtle species (including all 5 marine turtles present in Oman) have temperature-depend-



Left, *Pelomedusa barbata*, a freshwater terrapin endemic to southwestern Arabia; Right, *Stigmochelys pardalis*, a large tortoise found in the savannas of eastern and southern Africa.



ent sex determination, which means that offspring is male or female depending on the incubation temperature. For instance, in *Caretta caretta* (Loggerhead Turtle) the pivotal temperature (the constant temperature giving 50% of each sex) is around 29 °C. At higher temperatures all turtles develop as females and at lower temperatures all develop as males.

Oman has no terrestrial or freshwater turtles but its coastal areas are visited by 5 species of marine turtles classified into 5 genera, and 2 families. The 5 species of marine turtles are: *Caretta caretta* (Loggerhead Turtle), *Chelonia mydas* (Green Turtle), *Eretmochelys imbricata* (Hawksbill Turtle) and *Lepidochelys olivacea* (Olive Ridley Turtle) from the Cheloniidae family and *Dermochelys coriacea* (Leatherback Turtle) from the Dermochelyidae family. As shown in the distribution maps, marine turtles are found across the whole coastal area of Oman and around all island waters. For some species like *Caretta caretta* and *Chelonia mydas*, Oman is a very important nesting



*Dermochelys coriacea*, the largest of all living sea turtles. They are found primarily in the open oceans where they subsist almost entirely on jellyfish.

ground, with thousands of nests every year. In the species accounts, nesting grounds have been indicated in orange.



Hatchling of the freshwater terrapin *Pelomedusa barbata*.



## Key to Testudines in Oman

1.	a	Body without a bony carapace with scutes; instead of scutes a thick leathery skin with embedded minute osteoderms and seven longitudinal ridges crossing from the cranial to the caudal margin of the carapace (Fig 58); Five ventral ridges; upper jaw with 2 pointed cusps at front, the lower jaw with a single, pointed central hook; flippers without claws; hatchlings can present small scales	<i>Dermochelys coriacea</i>
	b	Carapace and plastron covered with scutes (Fig 59); relatively large scales on the head (Fig 62); flippers with 1 or 2 claws (Fig 63)	2
2.	a	4 pairs of lateral scutes, the anterior one not touching the precentral (nuchal) scute, 5 central (neural) scutes (Fig 60A); 4 pairs of inframarginal scutes underneath, without pores (Fig 61A)	3
	b	5 or more pairs of lateral scutes, the anterior one touching the precentral (nuchal) scute; 5 or more central (neural) scutes (Fig 60B or C); 3 pairs of inframarginal scutes underneath without pores (Fig 61B), or 4 pairs of inframarginal scutes underneath with pores (Fig 61C)	4
3.	a	2 pairs of prefrontal scales (Fig 62 right), hooked horny beak; fore flippers with 2 visible claws situated on the anterior margin (Fig 63 right); oval-shaped (adults) or heart-shaped (juveniles) carapace, with posterior scutes imbricated and serrated posterior carapace margins	<i>Eretmochelys imbricata</i>
	b	1 pair of prefrontal scales (Fig 62 left), unhooked horny beak with serrated lower jaw; fore flippers with 1 visible claw situated on the anterior margin (Fig 62 left); oval-shaped carapace with smooth juxtaposed scutes; carapace margin feebly serrated in young individuals	<i>Chelonia mydas</i>
4.	a	Heart-shaped carapace with smooth juxtaposed scutes; 5 pairs of lateral scutes, the anterior one touching the precentral (nuchal) scute; 5 central (neural) scutes (Fig 60B); 3 pairs of inframarginal scutes underneath, without pores (Fig 61B); fore flippers with 2 visible claws situated on the anterior margin (Fig 63 right)	<i>Caretta caretta</i>
	b	Nearly round carapace, flattened posteriorly and highest anteriorly, with smooth juxtaposed scutes; 6–9 lateral scutes, the anterior one touching the precentral (nuchal) scute; 5–9 central (neural) scutes (Fig 60C); 4 pairs of inframarginal scutes underneath with pores (Fig 61C); fore flippers with 1 or 2 visible claws situated on the anterior margin	<i>Lepidochelys olivacea</i>

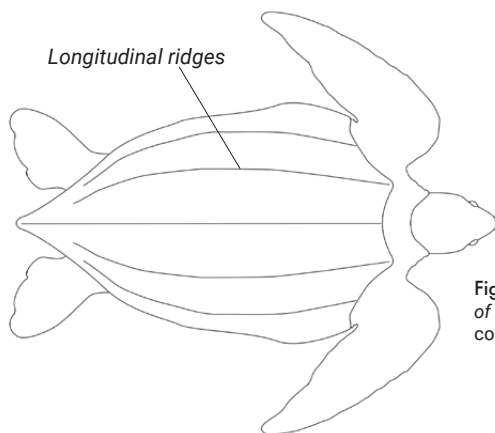


Fig 58: Dorsal view of the leathery carapace of the Leatherback Turtle (*Dermochelys coriacea*) showing the 7 longitudinal ridges.

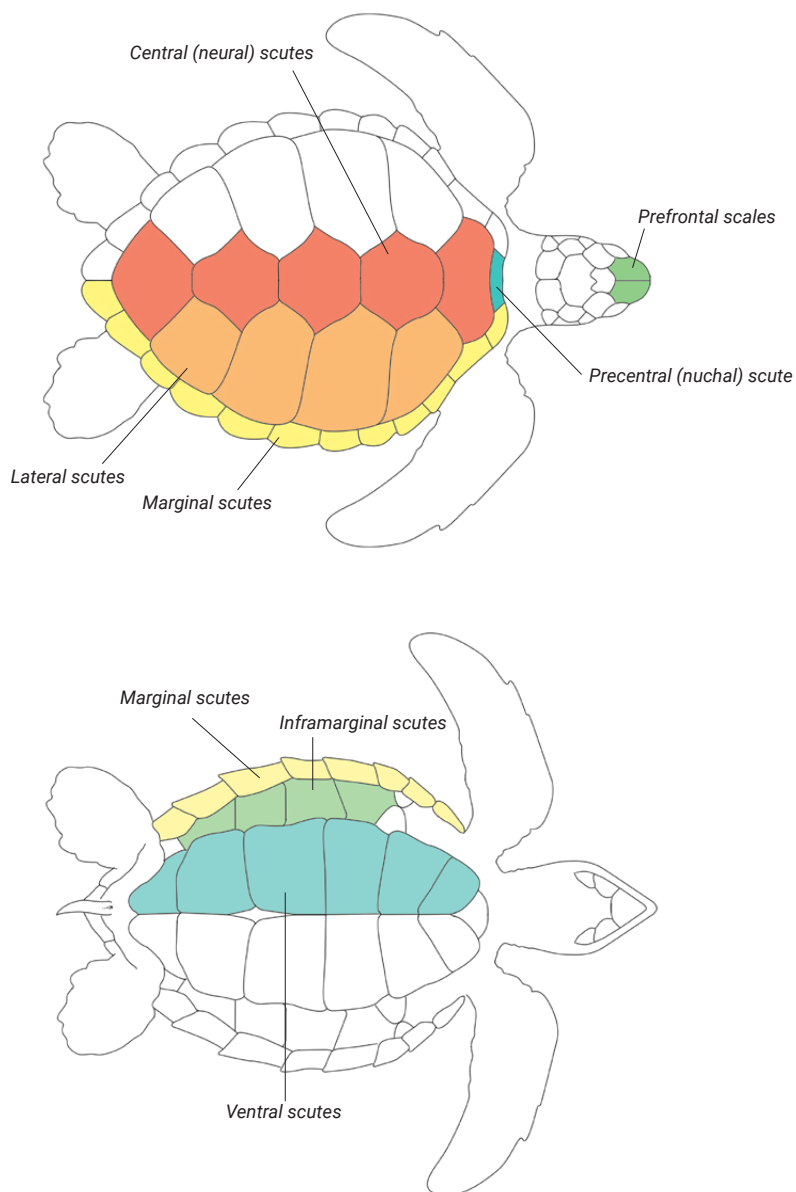
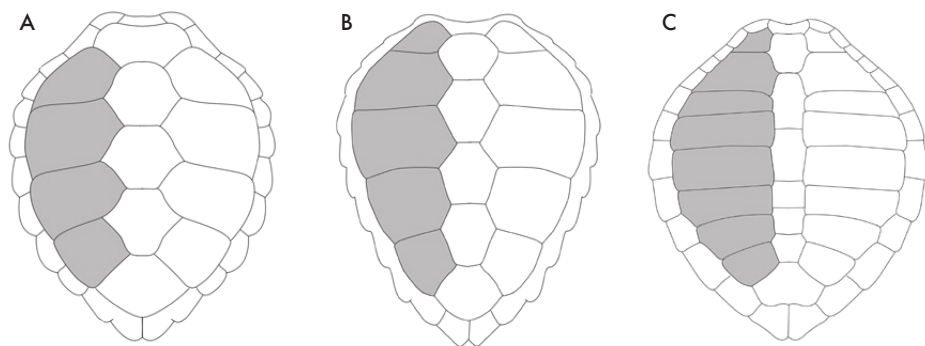
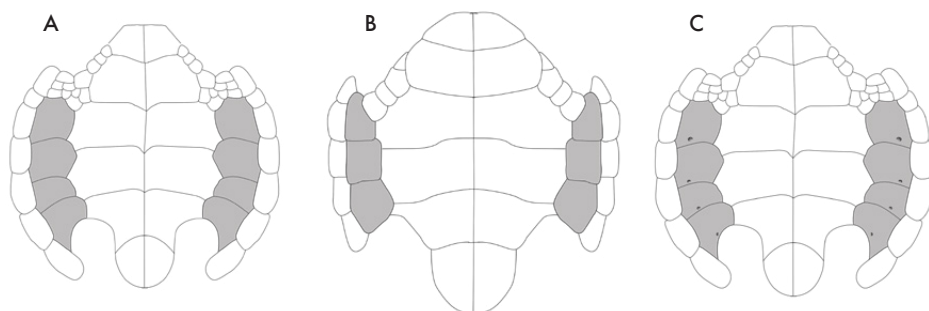


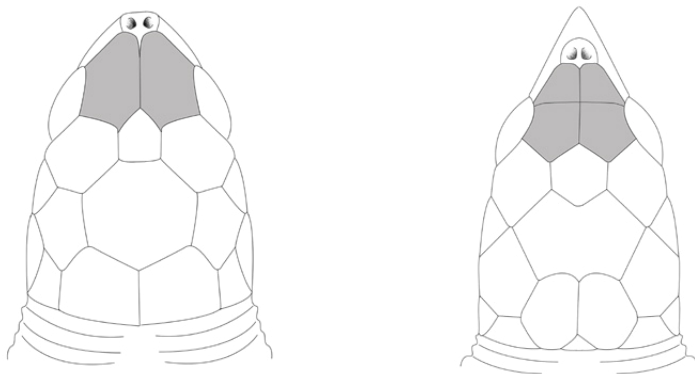
Fig 59: Dorsal (above) and ventral (below) views of the carapace and the plastron, respectively of *Chelonia mydas* (Cheloniidae) showing the names and disposition of the main scutes and scales used in the species accounts.



**Fig 60:** A: Carapace with four costal scutes and first scute not in contact with nuchal. Typical of *Chelonia mydas* and *Eretmochelys imbricata*; B: Carapace with five costal scutes and first scute in contact with nuchal. Typical of *Caretta caretta*; C: More than five costal scutes and first scute in contact with nuchal. typical of *Lepidochelys olivacea*.



**Fig 61:** A: Four inframarginal scutes without pores. Typical of *Chelonia mydas* and *Eretmochelys imbricata*; B: Three inframarginal scutes without marginal pores. Typical of *Caretta caretta*; C: Four inframarginal scutes with pores. Typical of *Lepidochelys olivacea*.



**Fig 62:** Left: One pair of prefrontal scales. Typical of *Chelonia mydas*; Right: Two pairs of prefrontal scales. Typical of *Eretmochelys imbricata*, *Caretta caretta* and *Lepidochelys olivacea*.



**Fig 63:** Left: Fore flippers with one visible claw. Typical of *Chelonia mydas*, and sometimes *Lepidochelys olivacea*; Right: Fore flippers with two visible claws. Typical of *Caretta caretta*, *Eretmochelys imbricata*, and sometimes *Lepidochelys olivacea*.

***Caretta caretta*** (Linnaeus, 1758)

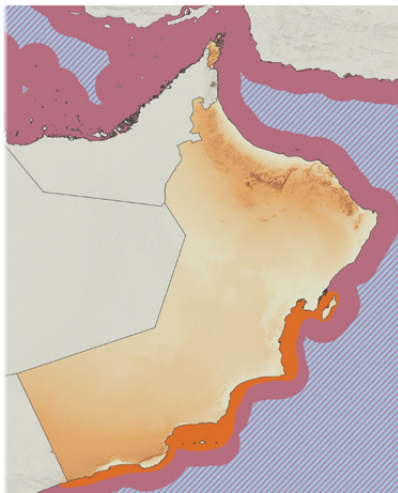
Loggerhead Turtle

**DESCRIPTION**

A large sea turtle with robust, large, triangular head and heart-shaped carapace with smooth juxtaposed scutes. Hatchlings and juveniles with blunt spines on carapace scutes, forming 3 longitudinal keels that disappear during juvenile stage. 5 pairs of lateral scutes, the anterior one touching the precentral (nuchal) scute; 5 central (neural) scutes; 3 pairs of inframarginal scutes underneath, without pores. 2 pairs of prefrontal scales; beak horny and very strong, thicker than in other sea turtles. Fore flippers with 2 visible claws situated on the anterior margin. Tail longer in males than in females. Carapace in adults copper brown or reddish-brown, hatchlings dark brown dorsally and much paler underneath.

**DISTRIBUTION**

Widely distributed in tropical and subtropical coastal waters. A circum-global, migratory species found in the Mediterranean Sea, the Pacific, Atlantic, and Indian Oceans. In Oman, it nests on Masirah Island in great numbers between April and August (the world's second largest nesting population with more than 20,000 nests per year). It also nests on the Khuriya Muriya Islands and along the Arabian Sea coast, between Masirah and Yemen.

**NATURAL HISTORY**

A very abundant species in Oman. Individuals of this species show a bimodal behavior, with some turtles spending most of their time in coastal waters and other in oceanic waters. It does transoceanic migrations of thousands of kilometers that can last several years. It is a carnivorous species that feeds mainly on bottom-dwelling hard-shelled invertebrates but it is known to eat a great variety of prey. Females lay several clutches of around 100 eggs every 2–3 years on the same beach or near where the females hatched. Eggs hatch after 45–80 days. Hatchlings live on floating mats of *Sargassum* algae, where they find refuge and food. Sexual maturity is reached between 10–30 years; life expectancy is around 50 years.





## *Chelonia mydas* (Linnaeus, 1758)

Green Turtle



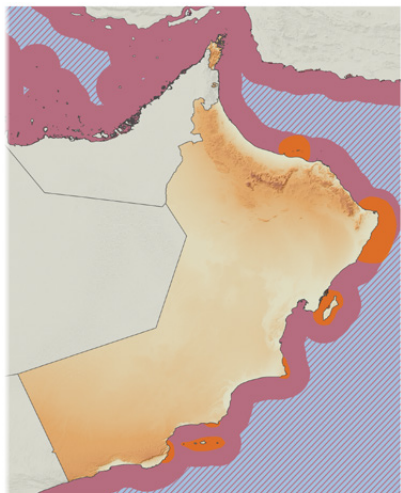
### DESCRIPTION

A large sea turtle with round, blunt head and dorsoventrally flattened body, covered by an oval-shaped carapace with smooth juxtaposed scutes. Carapace margin feebly serrated in young individuals. 4 pairs of lateral scutes, the anterior one not touching the precentral (nuchal) scute; 5 central (neural) scutes with a low keel in juveniles that disappears with adulthood; 4 pairs of inframarginal scutes underneath, without pores. 1 pair of prefrontal scales; unhooked horny beak with serrated lower jaw. Fore flippers with 1 visible claw situated on the anterior margin. Tail longer in males than in females. Carapace in adults usually brown or olive, with dark blotches or radiating stripes of light brown, yellow or green. In juveniles, head and upper flippers scales with yellow margin. Distinctive white margin on flippers in hatchlings.

### DISTRIBUTION

Widely distributed in tropical and subtropical waters along continental coasts and islands between 30°N and 30°S of latitude. It inhabits coastal areas of more than 140 countries. In Oman, Green Turtles nest on beaches along the entire coast of the country, including Ad Dimaniyat, Masirah and

Khuriya Muriya Islands. Its principal nesting area is on the northeastern Arabian Sea coast, in Ras Al Hadd, with several thousand nesting females every year, making Oman one of the most important nesting sites in the Indian Ocean. Nesting peak in Ras Al Hadd is between June and September.



### NATURAL HISTORY

The most abundant marine turtle species in Oman. It migrates long distances between feeding and nesting grounds, some swimming more than 2,000 km. Mature turtles spend most of their time in shallow, coastal waters with lush seagrass beds. The diet changes with age, juveniles being carnivorous and most adults being strictly herbivorous, chewing algae and seagrasses with their serrated jaws. Females lay several clutches of around 110 eggs every 2 years on the same beach or near where the females hatched. Eggs hatch after 50–75 days. Sexual maturity is reached between 15–25 years; life expectancy is around 60 years or more.



Endangered

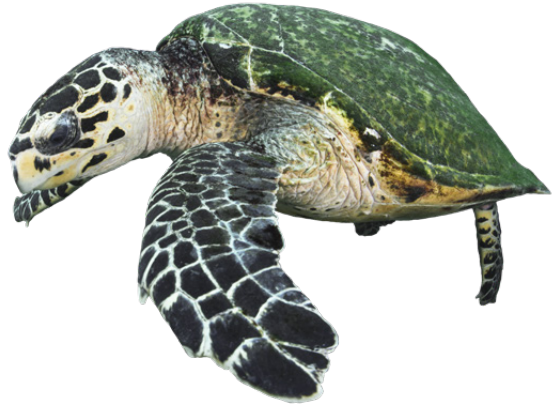
CL 800 - 1,200 mm

WEIGHT 80 - 190 kg

NATIVE

***Eretmochelys imbricata*** (Linnaeus, 1766)

Hawksbill Turtle

**DESCRIPTION**

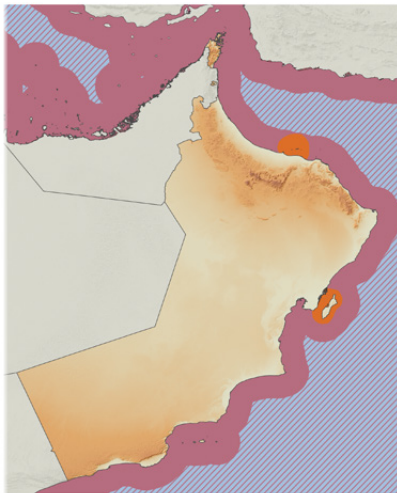
A medium-sized sea turtle with a laterally compressed, elongated snout, and a distinctive pointed, bird-like beak. Oval-shaped (adults) or heart-shaped (juveniles) carapace, with posterior scutes imbricate and serrated posterior carapace margins. Hatchlings and juveniles with 3 keels of spines along the carapace, disappearing with growth; sometimes a remnant of the dorsal central keel is maintained in young adults. 4 pairs of lateral scutes, the anterior scute not touching the precentral (nuchal) scute; 5 central (neural) scutes; 4 pairs of inframarginal scutes underneath, without pores. 2 pairs of prefrontal scales; hooked horny beak. Fore flippers with 2 visible claws situated on the anterior margin. Tail longer in males than in females. Carapace in adults amber or yellowish with dark brown or black radiating streaks. Plastron and underside of flippers and throat yellowish. Head and limbs dark with scale margins yellowish.

**DISTRIBUTION**

It is the most tropical of all sea turtles, widely distributed across tropical and subtropical waters of the Indian, Atlantic and Pacific Oceans. In Oman, most nesting occurs in Ad Dimaniyat and Masirah islands, and in the Muscat area, with scattered nesting elsewhere. Nesting in Ad Dimaniyat is especially important for the global conservation of this Critically Endangered species. Nesting peak in Ad Dimaniyat occurs in spring (around April).

**NATURAL HISTORY**

It is quite abundant in Oman waters, where it inhabits clear, warm, shallow littoral waters of mainland and island shelves with coral reefs and rocky areas. Juveniles are more herbivorous but adults are mainly carnivorous, feeding primarily on sponges, but eating also anemones, soft corals, and crustaceans, among other animals. Females lay several clutches of around 130 eggs every 2–3 years on the same beach or near where the females hatched. Eggs hatch after 55–65 days. Sexual maturity is reached between 20–35 years; life expectancy is around 45 years.



Critically Endangered

CL 700 - 900 mm

WEIGHT 35 - 50 kg

NATIVE



## *Lepidochelys olivacea* (Eschscholtz, 1829)

Olive Ridley Turtle



### DESCRIPTION

A small sea turtle with subtriangular head and nearly round carapace, flattened posteriorly and highest anteriorly, with smooth juxtaposed scutes. Hatchlings and juveniles with 3 keels of spines along the carapace, disappearing with growth; sometimes a remnant of the dorsal central keel is maintained in young adults. 6–9 lateral scutes, the anterior one touching the precentral (nuchal) scute; 5–9 central (neural) scutes; 4 pairs of inframarginal scutes underneath, with pores on their posterior edges. 2 pairs of prefrontal scales; finely serrated slightly hooked horny beak. Fore flippers relatively short, usually with 1 (sometimes 2) visible claw situated on the anterior margin. Tail longer in males than in females. Carapace in adults uniform dark gray or pale olive green. Plastron and underside of flippers and throat yellowish. Head and limbs dark, with scale margins yellowish.

### DISTRIBUTION

Widely distributed across the tropical regions of the Indian, Atlantic and Pacific Oceans. In Oman, the largest population is on the southern shores of Masirah Island, with approximately 150 nests per year occurring between February and May. Less frequent nesting occurs in scattered beaches along the mainland coast South from Masirah Island to Dhofar.

### NATURAL HISTORY

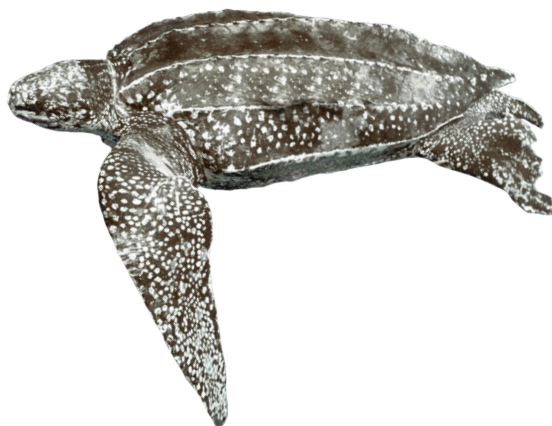
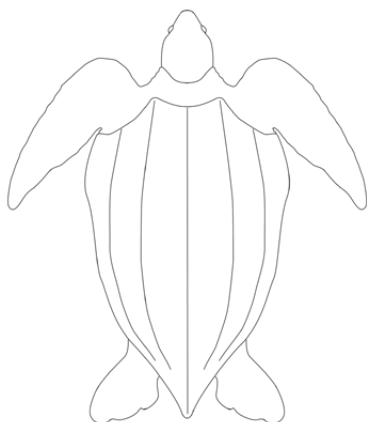
Although on a global scale it is the world's most abundant sea turtle, it is a rare species in Oman. Adults are mainly found in shallow continental surface waters, but can also dive down to 200 m. It is one of the only two species of sea turtles that engage in "arribada" nesting, where large groups of females gather offshore and come onto the beach to nest all at once. It is a chiefly carnivorous species, feeding mainly on crabs and shrimps but also on jellyfishes and sea squirts. Females lay several clutches of around 100 eggs every 2–3 years on the same beach or near where the females hatched. Eggs hatch after 50–70 days. Age at sexual maturity and lifespan is unknown.





## *Dermochelys coriacea* (Vandelli, 1761)

Leatherback Turtle



### DESCRIPTION

The largest sea turtle, distinguished from all the other sea turtles by its lack of bony carapace with large scutes. Instead of scutes it has a thick leathery skin with embedded minute osteoderms and seven distinct longitudinal ridges crossing from the cranial to the caudal margin of the carapace. It also presents five ridges on the ventral region. Relatively small head, upper jaw with 2 pointed cusps at front; the lower jaw with a single, pointed central hook that fits between the two upper cusps when the mouth is closed. Fore flippers relatively large in relation to carapace length, especially in hatchlings. Claws are absent from all flippers. Tail longer in males than in females. Carapace in adults generally black, with scattered white spots and markings.

### DISTRIBUTION

It is the species with the widest distribution of all marine turtles, with a global range, reaching very high northern and southern latitudes (from Alaska to New Zealand). Despite its wide distribution, it nests in tropical waters. It is not known to nest in Oman and it is rarely observed in the region.



### NATURAL HISTORY

A pelagic species, it can be found primarily in the open ocean, several specimens having been tracked worldwide for 20,000 km in a continuous foraging journey of nearly two years. It actively follows jellyfish (its main food source), being able to dive deeper than 1,000 m. Leatherbacks are unique among extant reptiles for their ability to maintain high body temperatures, well above the water temperature, which allows them to swim in very cold waters below 5 °C. Females can lay as many as 9 clutches of around 60-90 eggs every 2-3 years on the same beach or near where the females hatched. Eggs hatch after 60-70 days. Age at sexual maturity and lifespan is unknown.



Vulnerable

CL 1,600 - 1,800 mm

WEIGHT 300 - 900 kg

NATIVE

# Photographic credits

**B = Bottom, T = Top, R = Right, L = Left, M = Middle**

**Front cover:** From top to bottom *Asaccus plathyrrhynchus* (Salvador Carranza), *Chelonia mydas* (Keith Wilson), *Hemidactylus festivus* (Gabriel Martínez), *Platycephalus thomasi* (Salvador Carranza) and *Uromastix aegyptia microlepis* (Roberto Sindaco).

**Back cover:** From top to bottom *Varanus griseus* (Salvador Carranza), *Omanosaurus jayakari* (Johannes Els), *Diplometopon zarudnyi* (Salvador Carranza), *Trachylepis brevicollis* (Salvador Carranza) and *Naja arabica* (Salvador Carranza).

**Aaron Lobo:** 197

**Al Faqih Ali Salim:** 131 (T), 177 (TL)

**Alexander Pyron:** 85 (B)

**Andrew Gardener:** 129

**Bernat Burriel-Carranza:** 19 (TR), 207 (L)

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**Daniel Fernández:** 64 (BL), 88 (T), 95 (TR), 97 (TL & TR), 117 (TR), 126, 138 (L), 149 (R), 162 (BL & R), 164 (TL & B), 181 (L)

**David Donaire:** 127 (B)

**Fadi Yaghmour:** 204, 206 (L), 207 (R)

**Fabio Pupin:** 23 (T)

**Félix Amat:** 24 (T), 62, 64 (TR), 65 (TL & BL), 66, 71, 95 (TL), 105 (L), 112, 113 (TR), 114 (L), 115 (L), 118 (TR), 146, 147, 162 (TL), 163 (TL & BL), 182 (TL)

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**Josep Maria Mompert:** 20 (T), 180 (L)

**Jürgen Gebhart:** 115 (R), 132 (B), 161 (L)

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**Patrick Campbell:** 136

**Roberto Sindaco:** 26 (T), 30 (T), 33, 61, 67, 87, 89 (R), 93, 97 (L), 101, 113 (BR), 134 (TL & B), 137 (B), 149 (L), 150 (TL), 177 (TR)

**Salvador Carranza:** 21, 22, 31, 32, 34, 36, 37, 38, 48, 53, 54, 58, 59, 59, 65 (BR), 70, 74, 75, 78, 79, 80 (TL & BR), 81, 82, 83, 84, 86, 88 (B), 89 (L), 90, 91, 92 (B), 94, 96, 97 (B), 98 (R), 99, 103, 104, 105 (R), 106, 107, 108, 109, 110, 111, 113 (L), 114 (R), 116, 117 (TL & B), 118 (TL & B), 119, 120, 127 (TL & TR), 128, 130, 131 (B), 132 (TR), 133 (L), 134 (TR), 139 (R), 140, 145, 150 (TR & B), 152, 153, 161 (R), 163 (R), 164 (TR), 165, 168 (BL), 169, 170 (BL & R), 171 (TL & BL), 173, 176 (TL & TR), 177 (BR), 178 (TL & B), 179, 182 (R)

**Todd Pierson:** 144

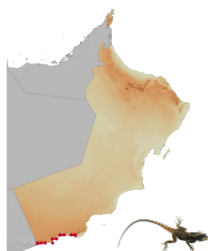
**Tomas Mazuch:** 69, 100

**Warren Baverstock:** 205 (L), 206 (R)

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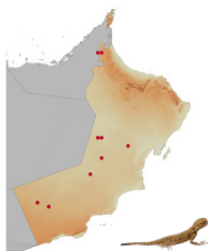
## Distribution maps



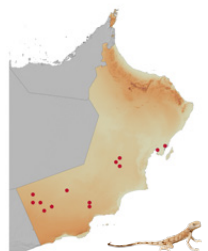
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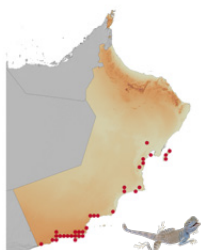
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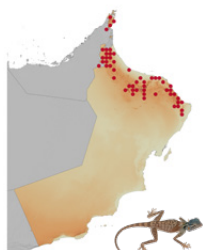
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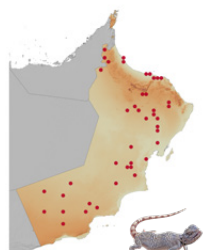
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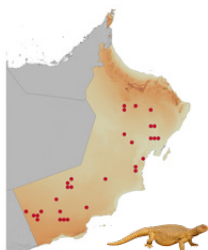
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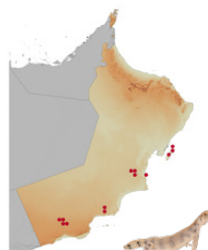
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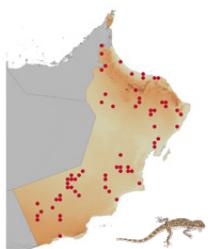
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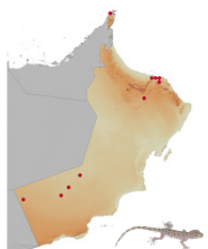
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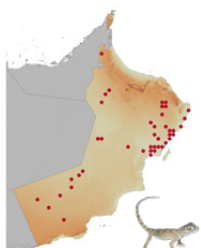
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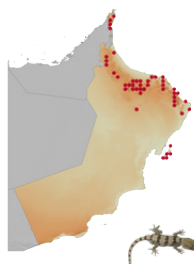
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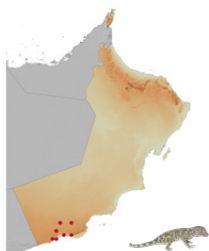
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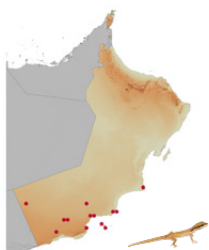
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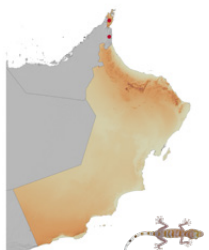
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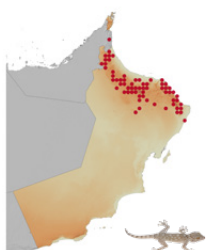
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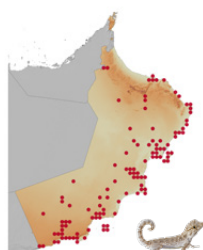
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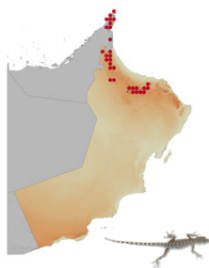
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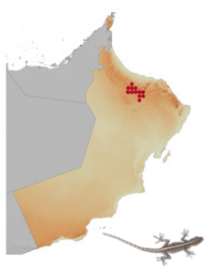
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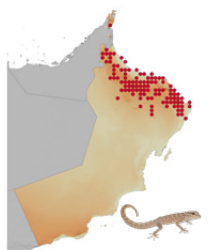
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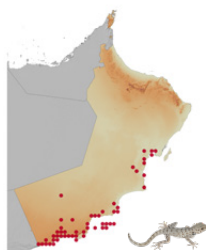
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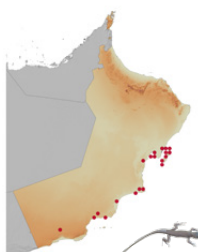
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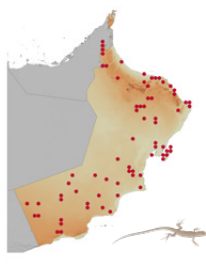
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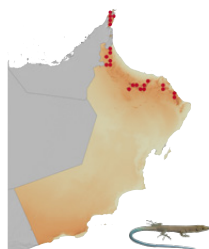
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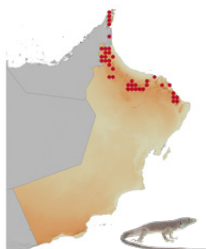
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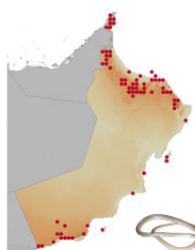
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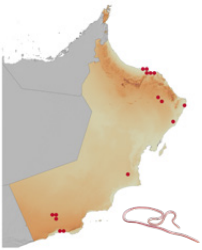
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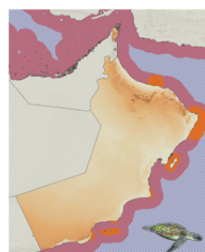
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# Glossary

- Aeolian sands:** Fine to medium uniformly graded materials present in many sandy sites, mainly in desert areas.
- Aglyphous:** Snake that does not have fangs with the capacity to inoculate venom.
- Allopatric:** Two species are allopatric when occurring in separate non-overlapping geographical areas.
- Anal plate:** The scale just in front of and covering the cloacal opening in snakes.
- Antivenom:** It is composed of antibodies and used to treat certain venomous bites. Specific treatment for envenomation.
- Archipelago:** Is a chain, cluster or collection of islands, or sometimes a sea containing a small number of scattered islands.
- Arid Climate:** Climate with an excess of evaporation over precipitation. The typically bald, rocky, or sandy surfaces in desert climates hold little moisture and evaporate the little rainfall they receive.
- Autotomy:** Reflex separation of a part (such as the tail) from the body with voluntary muscular contractions. Often referred as self-amputation ability.
- Bask:** To lie exposed to warmth and light, typically from the sun.
- Biodiversity:** Variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level.
- Blotch:** A large irregular patch or unsightly mark on the skin.
- Boulder:** A large rock, typically one that has been worn smooth by erosion.
- Burrow:** Hole or tunnel excavated into the ground by an animal to create a space suitable for habitation, temporary refuge, or as a byproduct of locomotion.
- Carapace:** Dorsal bony or chitinous shell of an animal, as of a turtle.
- Carinated scales:** Synonym to keeled scales.
- Cloaca:** Posterior orifice that serves as the only opening for the digestive, reproductive, and urinary tracts.
- Collection:** Compendium of specimens that are preserved, catalogued and managed for the purpose of scientific research.
- Commensal species:** Species that have a relationship with another where there are only benefits for the commensalist species but there is neither benefit nor negative effects to the other species.
- Countersunk lower jaw:** Lower jaw shorter than upper jaw. It is an adaptation for burrowing in the sand (see Fig 42 on page 142).
- Crevice:** A narrow opening or fissure, especially in a rock or wall.
- Cryptic species:** Term to define two or more species that are morphologically identical and that can only be differentiated by genetic analyses.
- Cycloid scales:** Scales that are large, thin, and round or oval in shape (see Fig 12 on page 51).
- Cytotoxic venom:** Venom that works at a molecular level by destroying the cell membrane, thus destroying the tissue cell by cell.
- Desert:** Barren area of landscape where little precipitation occurs and, consequently, living conditions are hostile for plant and animal life. The lack of vegetation exposes the unprotected surface of the ground to the processes of erosion.

**Display behavior:** Set of ritualized behaviors that enable an animal to communicate with other animals (typically of the same species) about specific stimuli.

**Distal:** Away from a particular point in the body.

**Diurnal:** An animal that is active during daylight.

**Endemic species:** A species being native to a single defined geographic location, such as an island, region, state or other defined zone, or habitat type; organisms that are indigenous to a place are not endemic to it if they are also found elsewhere.

**Femoral pores:** Part of a holocrine secretory gland found on the inside of the thighs of certain lizards, which releases pheromones to attract mates or mark territory.

**Forage:** To go from place to place searching for food.

**Forelimb:** Anterior limb of an animal.

**Fossorial:** A fossorial animal is one adapted to digging, which lives primarily, but not solely, underground.

**Generalist species:** Generalists species are those species that can survive in a wide variety of environments and usually have a diverse diet.

**Genus:** Taxonomic rank used in the biological classification. In the hierarchy of biological classification, genus comes above species and below family. The genus name also forms the first part of the binomial species name for each species.

**Granular scales:** Small scales that appear bumpy.

**Gular fold:** Granular fold found on the ventral throat, located immediately in front of the forelegs.

**Gular pouch:** Distensible skin below the lower mandible.

**Hatch:** To emerge from an egg.

**Head-bobbing:** Quick movement of the head up and down. Used for signaling by many lizard species.

**Hemipenis:** A hemipenis (plural hemipenes) is one of the pair of copulatory organs of male squamates.

**Hemotoxic venom:** Venom that damages the circulatory system and muscle tissue and causes swelling, hemorrhage, and necrosis.

**Herbivore:** An animal that is anatomically and physiologically adapted to eating plant material as the main component of its diet.

**Herpetology:** Branch of zoology concerned with the study of amphibians and reptiles (excluding birds).

**Hind limb:** Posterior limb of an animal.

**Holotype:** A single specimen designated as the name-bearing type of a species or subspecies.

**Hummock:** Small knoll or mound above ground. They are typically less than 15 m in height and tend to appear in groups or fields.

**Imbricate scales:** Scales that mount on top of each other overlapping like roof tiles.

**Insectivorous:** Carnivorous animal which only eats insects.

**Introduced species:** An organism that is not native to the place or area where it is considered introduced and instead has been accidentally or deliberately transported to the new location by human activity.

**Invasive species:** Usually a non-native species that spreads from a point of introduction (usually introduced by humans) to become naturalized and negatively alters its new environment.

- Jacobson's organ:** Also named vomeronasal organ. This chemoreceptor organ is part of the olfactory system in amphibians, reptiles and mammals that detect heavy moisture-borne odour particles. Behavioral studies show the importance of the vomeronasal system in reproduction and social networking.
- Juvenile:** A juvenile is an individual organism that has not yet reached its adult form, sexual maturity or size.
- Karyotype:** Number and visual appearance of the chromosomes in the cell nuclei of an organism or species.
- Keeled scales:** Scales with a central ridge (see Fig 46 on page 157).
- Keratin:** It is the key structural protein making scales, hair, nails, feathers, horns, claws, hooves, calluses, and the outer layer of skin among vertebrates.
- Labial scales:** Scales that border the mouth opening.
- Lamellae:** Thin layer, membrane or plate of tissue. Geckos have lamellae (fine plates) on the undersides of the toes. Each lamella is made up of brush-like setae. The tips of each seta divide hundreds of times into tiny spatulae (spoon-shaped strands).
- Lineage:** Series of populations, organisms, cells, or genes connected by a continuous line of descent from ancestor to descendant. Lineages are subsets of the evolutionary tree of life.
- Loreal scale:** Referring to the scales on the head (see Fig 45 on page 154).
- Medial:** Towards the center of the body rather than the sides.
- Medically important venomous snake:** Term to refer to those venomous snakes that can be a threat to human life if a person is bitten.
- Mental scale:** Referring to the scales on the head (see Fig 29 on page 73).
- Mesic habitat:** Type of habitat with a moderate or well-balanced supply of moisture.
- Molecular phylogeny:** Branch of phylogeny that analyzes genetic, hereditary molecular differences, predominately in DNA sequences, to gain information on an organism's evolutionary relationships.
- Monophyletic group:** Group of taxa composed by its common ancestor and all of its descendants.
- Monsoon:** Seasonal reversing wind accompanied by corresponding changes in precipitation. Usually, the term monsoon is used to refer to the rainy phase of a seasonally changing pattern.
- Morphological plasticity:** Morphological changes in an organism in response to a unique environment.
- Morphotype:** Any of a group of different types of individuals of the same species in a population that can be distinguished by morphological differences; a morph.
- Myotoxic venom:** Venom that causes generalized destruction of skeletal muscle either throughout the body or locally.
- Native species:** A species is considered native or indigenous of a certain region if its presence in that region is the result of only natural processes, with no human intervention.
- Naturalized species:** Non-native species that is spread into the wild and its reproduction is sufficient to maintain its population.
- Neurotoxic venom:** Venom that affects the structure or function of the central and/or peripheral nervous system.
- Nocturnal:** An animal is nocturnal when its main activity is at night.
- Nostril:** One of the two orifices of the nose.
- Ocelli:** Rounded color-differentiated spots in the skin.
- Opisthophagus:** Rear-fanged, venomous snakes.



- Oviparous:** Oviparous animals are animals that lay their eggs, with little or no other embryonic development within the mother.
- Ovoviviparous:** Ovoviviparous animals have the embryos develop inside eggs that remain in the mother's body until they are ready to hatch.
- Paraphyletic group:** In taxonomy, a group is paraphyletic if it consists of the group's last common ancestor and all descendants of that ancestor excluding a few—typically only one or two—monophyletic subgroups.
- Parthenogenesis:** Natural form of reproduction in which growth and development of embryos occur without fertilization by sperm. In animals, is the development of an embryo from an unfertilized egg cell.
- Phylogeny:** branching diagram or “tree” showing the evolutionary relationships among various biological species or other entities based upon similarities and differences in their physical or genetic characteristics.
- Physiological plasticity:** Physiological changes in an organism in response to a unique environment.
- Plastron:** Ventral nearly flat shell structure of Testudines.
- Postmental scale:** Referring to the scales on the head (see Fig 29 on page 73).
- Preal anal pores:** Pores located above the anal opening that are actually openings of follicular glands. They are usually distributed in a V shape.
- Predator:** An animal that hunts and kills other animals for food.
- Prehensile:** Organ adapted for seizing or grasping especially by wrapping around.
- Principal Component Analysis:** Analysis used to reduce the number of dimensions of multivariate data. The analysis expresses the given information into a new set of variables called principal components which are a linear combination of the originals.
- Proteroglyphous:** Proteroglyphous snakes have shortened maxillae bearing few teeth except for a substantially enlarged fang pointing downwards and completely folded around the venom channel, forming a hollow needle.
- Protruding eyes:** Eyes that exceed beyond the ocular orbit.
- Proximal:** Near to the center of the body or to the point of attachment of a bone or muscle.
- Reticulate:** Divided in a way that resembles a network or a net.
- Rostral scale:** Referring to the scales on the head (see Fig 45 on page 154).
- Sabkhas:** Coastal, supratidal mudflat or sand-flat in which evaporite-saline minerals accumulate as the result of semiarid to arid climate.
- Sand dunes:** A hill of sand made by the wind on the coast or in a desert.
- Sand plains:** Area where the soil is sand deposited from elsewhere by processes such as wind or ocean, rather than direct weathering of bedrock.
- Scale:** A small rigid plate that grows out of an animal's skin to provide protection.
- Scansor:** Expanded digital pads.
- Sexual dimorphism:** Distinct difference in size or appearance between both sexes of an animal in addition to the sexual organs themselves.

**Sheath:** Membranous tissue where snakes store their fangs when not in use.

**Sister taxon:** Closest relative of another given unit in an evolutionary tree.

**Snout:** The projecting nose and mouth of an animal.

**Solenoglyphous:** Solenoglyphous snakes have the most advanced venom delivery method of any snake. Each maxilla is reduced to a nub supporting a single hollow fang tooth. The skull has a series of interacting elements that ensure that the fangs rotate into biting position when the jaws open.

**Somber:** Dark or dull in color or tone.

**Specialist species:** Specialist species are species that occupy a specific niche.

**Species:** Basic unit of classification and a taxonomic rank of an organism, as well as a unit of biodiversity.

**Spectacle:** Transparent eyelid fused with the eye.

**Spine:** Hard, needle-like anatomical structure usually covered in a thick, hard layer of keratin.

**Spinose scales:** Spine-shaped scales.

**Subdigital scales:** Scales that are on the underside of a digit.

**Subspecies:** One of two or more populations of a species living in different subdivisions of the species' range and varying from one another by morphological or genetic characteristics.

**SVL:** Snout-vent length. Measurement taken in herpetology from the tip of the snout to the most posterior opening of the cloacal slit (vent). It is the most common measurement taken in herpetology, being used for all amphibians, lepidosaurs, and crocodilians.

**Systematics:** Biological systematics is the study of the diversification of living forms, both past and present, and the relationships among living things through time.

**Taxonomy:** Practice and science of classification of things or concepts, usually organisms, into groups that share similar qualities.

**Temporal scale:** Referring to the scales on the head (see Fig 45 on page 154).

**Threatened species:** A species that is vulnerable, endangered or critically endangered with extinction.

**Toepad:** A pad that is part of an animal's toe.

**Toxicofera:** Proposed clade of squamates that includes Serpentes, Anguimorpha and Iguania. It encompasses all venomous reptile species as well as numerous non venomous species.

**Trihedral tubercles:** Tubercles with three well differentiated sides.

**Vertebrate:** Animal distinguished by the possession of a backbone or spinal column. Includes mammals, birds, reptiles, amphibians, and fishes.

**Viviparous:** Opposed to oviparous species that are the ones which females lay developing eggs, viviparous species develop embryo inside the body of the parent.

**Wadi:** Arabic term traditionally referring to a valley. In some instances, it may refer to a dry (ephemeral) riverbed that contains water only when heavy rain occurs.

**Whorls:** Tissue that surrounds another and wraps around another in an expanding circular pattern.

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# A Field Guide to the Reptiles of Oman

- Detailed information for each of the 111 species of Oman reptiles, which include their identification, distribution, and natural history.
- Includes 104 illustrations and 350 photographs that will help the reader quickly identify key characters of each species.
- 130 Distribution maps showing an updated and precise distribution of each species and of the main taxonomic groups of Oman reptiles.
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