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## LIZARDS AND SNAKES IN THE HISTORICAL FAID PROTECTED AREA (FAID HEMA), HA'IL REGION, SAUDI ARABIA

AHMED M. ALSHAMMARI<sup>1</sup> AND ADEL A. IBRAHIM<sup>1,2,3</sup>

<sup>1</sup>Department of Biology, Faculty of Science, Ha'il University, 81451 Hail, Saudi Arabia

<sup>2</sup>Department of Zoology, Faculty of Science, Suez University, 43527 Suez, Egypt

<sup>3</sup>Corresponding author, e-mail address: dolaibrahim@yahoo.com

**Abstract.**—We surveyed the historical Faid Hema, Ha'il region in Saudi Arabia and identified 22 species of reptiles (17 lizards and five snakes). We recorded for the first time nine reptiles (six lizards and three snakes) in the Faid Hema. Of these, one lizard, *Mesalina adramitana*, and two snakes, *Cerastes gasperetti* and *Walterinnesia aegyptia*, were reported for the first time for the entire Ha'il region. We recorded 50% of all species for the entire study area at one site, which may be because it had three different habitat types near it (the Jannin mountain, soft soil, and firm, sandy soil). The next highest number of species we found was at an open site with firm, sandy soils and with gravel (containing 45.5% of the total species recorded), followed by a site that contained only sand (36.4% of the total). The lowest number of species was reported at an agricultural site, with only 13.6% of the total species found.

**Key Words.**—Reptiles; Middle East; surveys, habitat types, agricultural site, biodiversity

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### INTRODUCTION

Despite the vast size and diverse topography of Saudi Arabia, studies on the ecology and distribution of its reptilian fauna have received little attention, especially in the northern portions of the country (Arnold 1986; Gasperetti 1988). The first study on reptiles in the Ha'il region was carried out by Dekinesh (1991). He reported 28 species of lizards and 11 species of snakes. However, there is some question about 15 of these species, of which at least 10 species have not been reported in other studies of Saudi herpetofauna (Arnold 1986; Gasperetti 1988; Sindaco and Jeremčenko 2008). Because of the lack of Saudi Arabian identification keys, it is possible that some of these may have been misidentified (Alshammari 2012). Therefore, there is a need for updated information to confirm which species are present in this region.

Historically, Faid city was located midway along the pilgrimage road between Kufa, Iraq and Mecca, Arabia. Therefore, it was a well-known, respected, and strategic city in the Arabian Peninsula (Alshammari 2010). It is also currently considered as the most fertile area in the Ha'il province (Sharawy and Alshammari 2009; Alshammari and Sharawy 2010), and contains farms that are spreading into surrounding areas. Dekinesh (1991) reported 11 reptile species (seven lizards and four snakes), while Alshammari (2012) reported six species of lizards from the Faid Hema of the 19 species of lizards that have been recorded from Ha'il. These studies, however, focused on Faid city and a few sites to the east, leaving a large area unstudied.

Because the Faid city possesses rare Islamic monuments, it is visited by many people each year. Additionally, a fairly large number of people live in the Faid Hema villages. Snakebites were reported from the area over the past five years, but no casualties have occurred. However, only one venomous snake has been reported in the area (Dekinesh, 1991). Therefore, it is important to know the current venomous snake distribution in the area to raise public awareness. The aim of this study was to fill the gap in the inventory of reptiles in this important archaeological area by updating information on reptile classification and distribution. A survey can be an important addition to understanding the biodiversity in the region of Ha'il and can provide important information on venomous snakes of the area.

### MATERIALS AND METHODS

**Study site.**—The Faid Hema lies between 41°23 and 42°31' N, and 26°20' and 27°34' E. The Faid Hema (named for Faid city, Hema = protected area in Arabic) is a historical area of about 4,800 km<sup>2</sup> (about 4.1% of the entire Ha'il area). It is characterized by its unique topography, geomorphology, and biodiversity, possessing several landscape types, such as isolated rugged mountains, clumps, penneplains, escarpments, flat-topped plateaus, wadis (valleys), lava rock, and sandy deserts (Alshammari 2012). The Hema also includes several inhabited towns and villages. Reported vegetation in this area includes 199 species; most being perennial grasses (Alshammari and Sharawy, 2010). The climate of the study area is characterized by hot summers and mild winters. In the Faid Hema, air

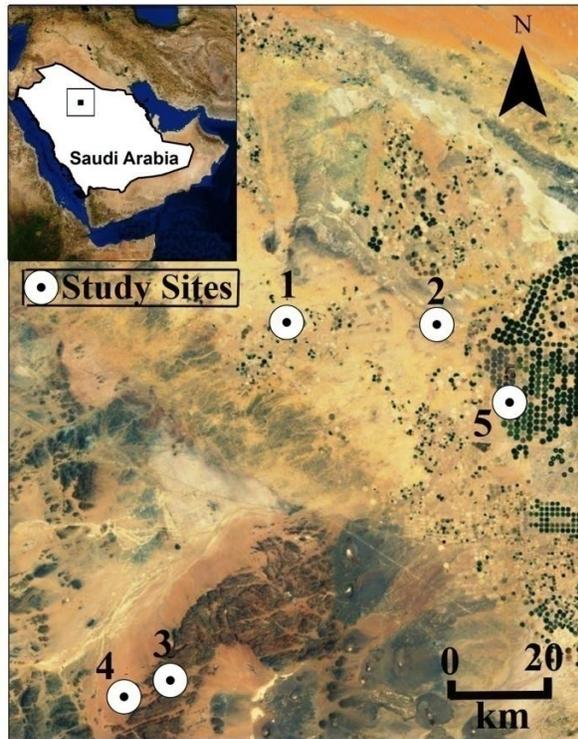


FIGURE 1. Location map showing study area and the five study sites in the Faïd Hema, Ha'il, Saudi Arabia.

temperature averages 39° C in August and 10° C in winter and rarely drops below zero (El-Ghanim et al. 2010). Precipitation falls mainly in winter time with an annual rainfall of 125 ml (El-Ghanim et al. 2010).

We surveyed for reptiles in the Faïd Hema area using five study sites (three in the north and two in the south). We chose these sites because they included multiple representative habitat types. These sites were quite far from each other, with distances ranging from about 25 to 130 km (Fig. 1). Site 1: Jannin area. Jannin is an isolated sedimentary rock (mechanical sand stone) mountain (27°33'45"N; 42°16'49"E; Fig. 2a). At the foot of the mountain, there are gravel deposits intercalated with medium to coarse sand, leading to a fine sand plain. This plain is characterized by sparse vegetation cover, mainly consisting of the shrub *Haloxylon salicornicum*. Site 2: An open firm sand plain (medium to fine grain size), with small, scattered gravels beds (27°16'35' N; 42°31'03"E; Fig. 2b) and a clayey mineral substrate. Vegetation cover is relatively scant. Site 3: A portion of Salma Mount, composed of dense granitic rocks (27°03'39"N; 42°05'48"E; Fig. 2c). A wadi composed of dense substrate of sand and clay minerals, boulders, and gravels initiated from the bed rock. Trees (*Acacia* spp.) are common in this area. Site 4: An open sandy plain between Taba and Assaba'an villages (27°02'15"N; 42°01'25"E; Fig. 2d). A plain with a substrate

predominantly composed of medium-sized sand grains, feldspar, mica, and clay minerals, surrounded by granitic rock mountains. Vegetation is sparse; *Acacia* trees are unevenly distributed. Site 5: An agricultural habitat of cultivated fields of vegetables and cattle and camel fodder (27°27'02"N; 42°37'56"E; Fig. 2e). This substrate is mainly composed of clayey sand soil. There are villages and towns within study sites, in addition to abandoned agricultural fields (Fig. 2f).

**Field and laboratory study.**—We conducted field work from November 2012 to December 2013. We visited the study sites at least twice per month throughout that time. For taxonomic investigation, we collected specimens by hand, using snake tools, and using pit-fall traps (Fig. 3) during the day and night. We placed plastic bucket traps in all study sites except in rocky areas. We placed these traps throughout each site, with some in open areas and others near shrubs. To facilitate location of the traps, we put up a red surveyor flag on a tree or small shrub near the trap. We also used animal tracks as an indication of occurrence when identification was unambiguous. Our locality map (Fig. 1) was made with ArcGIS 10.2.1. We used the Reptile Database site (Uetz, P., and J. Hošek (Eds.). 2015. The Reptile Database. Available from <http://www.reptile-database.org/>. [Accessed 23 March 2015]) for English common names of species.

## RESULTS

We recorded 22 species of reptiles (17 lizards and five snakes) in the Faïd Hema (Table 1). The following is a checklist of the species.

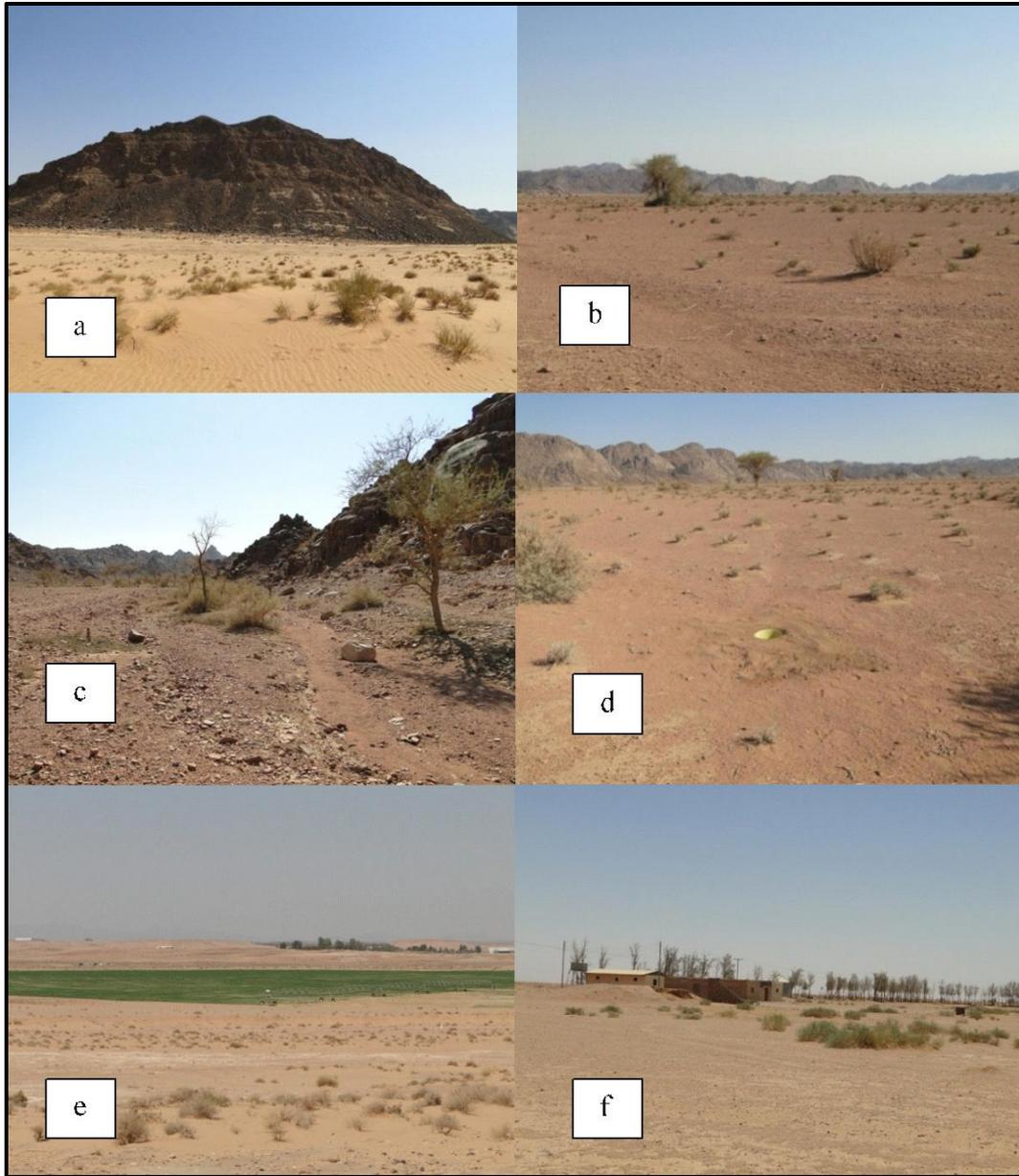
### Lizards

***Diplometopon zarudni*; Zarudny's Worm Lizard (Fig. 4).**—We found these worm lizards in fine and coarse sands at Jannin. They were commonly captured in the pit-fall traps. We occasionally saw tracks in coarse sands.

***Laudakia* sp.**—We observed this agamid lizard basking on a rock in Salma Mount with binoculars, so we do not know the species level identification.

***Trapelus ruderatus blanfordi*; Anderson's Agama.**—This species was rather common in different habitats including sandy, gravel, and even rocky areas. We observed one individual on rocks at the foot of Jannin Mount and another individual in the firm sandy plain. When approached, these lizards displayed their blue chin.

***Uromastix aegyptia*; Egyptian Spiny-tailed Lizard (Fig. 5).**—This lizard was common in sandy plains with scant vegetation cover. It is normally encountered near shrubs (*Fagonia cretica* and *Pulicaria crispa*), which



**FIGURE 2.** Multiple habitat types included in this survey of reptiles in the Faid Hema, Ha'il, Saudi Arabia: (a) study site 1 showing Jannin Mount and its surroundings; (b) study site 2 showing an open firm sandy plain with gravels; (c) study site 3, Salma Mount, with granitic rocks and scattered Acacia trees; (d) study site 4 showing an open sandy plain between Taba and Assaba'an villages, with an embedded pit-fall trap; (e) study site 5, representing agricultural habitat of cultivated fields; and (f) study site 5, with abandoned agricultural fields and buildings. (Photographed by Adel A. Ibrahim).

may be part of their diet. We observed lizards in front of their burrows (Fig. 6) in abandoned agricultural fields during early morning and late afternoon. These burrows were located about 20 m from each other.

***Bunopus tuberculatus*; Baluch Rock Gecko.**—This gecko was common in sandy and gravel plains. We observed it in wadis between Assaba'an and Taba and in the Jannin sandy areas. We collected most individuals in areas with a fairly dense vegetation cover.

***Ptyodactylus hasselquistii*; Yellow Fan-fingered Gecko.**—This species was widespread. We commonly encountered it on rocky mountains, dwellings, and abandoned buildings in villages and cultivated fields. We also found it on rocks scattered in open gravel terrains. Individuals collected in rocky areas in Taba village were dark grey, matching the color of the rocks and ground substrate. These lizards were usually active during the night, but occasionally showed diurnal



FIGURE 3. A pit-fall trap with a sign to facilitate location of the trap. (Photographed by Adel A. Ibrahim).

activity (just before sunset). No lizards were observed during the winter (January and February).

***Stenodactylus doriae*; Middle Eastern Short-fingered Gecko (Fig. 7).**—This species occurred in a variety of habitats, including sandy areas at Jannin, in open, gravel plains, and in abandoned agricultural fields and under fallen wood.

***Stenodactylus slevini*; Slevin's Short-fingered Gecko.**—We recorded this strictly nocturnal lizard in a sandy area at Jannin and in a gravel plain that included a community of sparse vegetation cover (*Haloxylon* sp. and *Lycium shawii*).

***Acanthodactylus boskianus asper*; Bosc's Fringe-fingered Lizard.**—We observed a few individuals of this species in firm, sandy areas with gravels, usually around *Haloxylon* sp. and also on denser, rocky habitat.

***Acanthodactylus opheodurus*; Arnold's Fringe-fingered Lizard.**—This species was fairly common; we found it in all dense, sandy plains and wadis, particularly those with *Haloxylon* sp. We observed these lizards being active during most of the year, including the sunny days of winter.

***Acanthodactylus schmidtii*; Schmidt's Fringe-fingered Lizard (Fig. 8).**—This was a common diurnal species that we recorded in areas characterized by firm, sandy soil, largely stabilized by root systems, with fairly low vegetation diversity. We usually observed it close

to bushes such as *Haloxylon* sp. and *Lycium* sp. When pursued, it dodged from bush to bush, briefly taking shelter in a shadow or running to a burrow. We observed individuals throughout the year and on sunny days in winter. In the summer, we usually saw lizards on the ground in the early morning and late afternoon, and wholly or partly in shadow most of the day.

***Mesalina adramitana*; Hadramawt Sand Lizard.**—We only observed one individual, which we collected in the open hard sand soil with scarce vegetation near Assaba'an village.

***Mesalina guttulata*; Small-spotted Lizard.**—We encountered this lizard in firm soil of the plains at the foot of Jannin Mount and in wadis with stones and gravels.

***Chalcides ocellatus*; Ocellated Skink.**—We recorded this species in the open, sandy plain with scattered vegetation including *Haloxylon* sp., *Pulicaria crispa*, and *Citrullus* sp. It was mostly active from 0900–1100 and 1500–1700.

***Scincus mitranus*; Eastern Skink.**—We typically encountered this skink on soft sand surfaces at the foot of Jannin Mount slowly clambering over the sand and diving into it with a winding motion. We frequently encountered individuals around *Haloxylon* sp. at the firmer substrate near Jannin Mount.

***Scincus scincus*; Sandfish Skink.**—We collected a few lizards from a sandy area fairly far from the mount of Jannin. We observed these lizards in the morning around 0900 and just before dusk.

***Varanus griseus*; Desert Monitor.**—We captured a single individual from a sandy area at Jannin Mount and released it at the site of capture. We also observed tracks in sandy areas near Jannin.

## Snakes

***Atractaspis microlepidota engaddensis*; Small-Scaled Burrowing Asp.**—This is a highly venomous, secretive species. Local people in the Ha'il region call it Alkhabeeth, meaning too dangerous in Arabic. This snake was strictly nocturnal. We recorded it in the open sandy plain, in Salma Mount, and in hard terrain (gravels and stones).

***Spalerosophis diadema*; Diadem Snake.**—We captured and released a specimen of this snake species from green fields in As-Saba'an village. We also saw tracks in fairly coarse sand in the Jannin area.

***Walterinnesia aegyptia*; Desert Cobra.**—We captured an individual on the open sandy plain (Site 4; Fig. 2d). This snake was uniformly black with white ventral shields.

***Cerastes gasperettii*; Sand Viper (Fig. 9).**—We recorded this viper species in sandy areas at Jannin Mount. We saw two individuals after 2000. We occasionally saw the distinct side-winding tracks of

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**TABLE 1.** Distribution of reptiles found at the five study sites (representing different habitat types) in the Jannin area (Site 1), open, firm, sandy plain (Site 2), mountains (Site 3), open, sandy plains (Site 4), and agricultural fields (Site 5) in Faïd Hema, Ha'il Region, Saudi Arabia. The percentage of total is the number of individuals collected in one study site divided by the total number of individuals collected from the whole study area. Note that the percentages are different from those in the results, which were calculated based on number of species rather than number of individuals.

Species	Study Site				
	1	2	3	4	5
Class Reptilia					
Suborder Amphisbaena					
Family Trognophidae					
<i>Diplometopon zarudnyi</i>	7				
Suborder Sauria					
Family Agamidae					
<i>Laudakia</i> sp.			1		
<i>Trapelus ruderatus</i>	1	1	1	1	
<i>Uromastyx aegyptia</i>		3		2	
Family Gekkonidae					
<i>Bunopus tuberculatus</i>	2	4		3	
<i>Ptyodactylus hasselquistii</i>		5	7		12
<i>Stenodactylus doriae</i>	7	8		6	
<i>Stenodactylus slevini</i>	1	2			
Family Lacertidae					
<i>Acanthodactylus boskianus</i>		3		4	
<i>Acanthodactylus opheodorus</i>		5		8	
<i>Acanthodactylus schmidti</i>				9	
<i>Mesalina adramitana</i>		1			
<i>Mesalina guttulata</i>	1	1			
Family Scincidae					
<i>Chalcides ocellatus</i>	5				
<i>Scinus mitranus</i>	10				
<i>Scinus scinus</i>	4				
Family Varanidae					
<i>Varanus griseus</i>	1				
Suborder Serpentes					
Family Atractaspididae					
<i>Atractaspis microlepidota engaddensis</i>			1	1	
Family Colubridae					
<i>Spalerosophis diadema</i>					1
Family Elapidae					
<i>Walterinnesia aegypti</i>				1	
Family Viperidae					
<i>Cerastes gasperettii</i>	2				
<i>Echis coloratus</i>			2		
Total (134)	41	33	12	29	19
Percentage	30.6	24.6	9	21.6	14.2

vipers near shrubs. We clearly observed these tracks on sand just after sunset until early morning and take them as documentation of their existence because the tracks could be unambiguously recognized as being made by this species as no other species found in this area in the Kingdom of Saudi Arabia produces similar, sidewinding tracks (pers. obs.).

***Echis coloratus*; Palestine Saw-scaled Viper.**—We observed two individuals in Al-Modayyeh, Salma Mount on 26 April 2014. One of these was captured and one was found dead. Both vipers were large and fatty.

***Spatial distribution of reptiles.***—The highest number of species (50% of the diversity of the sampled areas based on percentage of species) was recorded in the Jannin area (Site 1), followed by open firm sand plain

(45.5%, Site 2). The number of individuals found at sites varied from one to 12, and we found the fewest species in the sampled agricultural habitats (13.6% at Site 5; Table 1).

## DISCUSSION

This study revealed eight species of lizards and three species of snakes not previously reported in the Faïd Hema (Table 2). Of these, *Mesalina adramitana* and *Walterinnesia aegyptia* are recorded for the first time, not only for the Faïd Hema, but also for the Ha'il region (Dekinesh 1991; Schätti and Gasperetti 1994; Alshammari 2012). Our finding of 17 species of lizards from the Faïd Hema indicates that this area has a broad saurofaunal diversity. This may be attributable to the



FIGURE 4. Zarudnyi's Worm Lizard, *Diplometopon zarudni* (Photographed by Adel A. Ibrahim).



FIGURE 6. Burrow of *Uromastix aegyptia* (Photographed by Adel A. Ibrahim).



FIGURE 5. Egyptian Spiny-tailed Lizard, *Uromastix aegyptia* (Photographed by Adel A. Ibrahim).



FIGURE 7. Middle Eastern Short-fingered Gecko, *Stenodactylus doriae* (Photographed by Adel A. Ibrahim).

variety of the reptile habitats as well as control of grazing and hunting.

Dekinesh (1991) reported 17 species of reptiles from two localities in the Faid Hema; Al-Kuhfa and Samira at its eastern edge. Four of these species, however, have not otherwise been reported in Saudi Arabia. These are *Mabuya vittata*, *Stenodactylus petrii*, *Trapelus savignyi*, and *Sphenops sepsoides* (see Arnold 1984, 1986; Sindaco and Jeremcenko 2008). He also reported two other lizard species, *Acanthodactylus cantoris arabicus*, from the south of the country (Arnold 1983), and *Hemidactylus flavivirdis* from coastal areas (Arnold 1986). Although both species were previously reported within Saudi Arabia, they have not been previously reported near the Faid Hema, and it is possible that they were misidentified (Alshammari 2012).

*Diplometopon zarudnyi* was added to the fauna of the Faid Hema during this study. Although Schätti and Gasperetti (1994) suggested that *D. zarudnyi* is restricted to the periphery of the Arabian Gulf, it was recently

reported in the Ha'il region (Alshammari 2012). In the Faid Hema, we captured this lizard only via pit-fall trapping. The ability of this lizard to elude predators by diving into the sand coupled with the difficulty of observing its body imprint, especially on coarse sand, were the main reasons for not being able to track it easily.

We found a high number of species in the family Lacertidae than other families in the Faid Hema. Similar findings were reported by Alshammari (2012) for the Ha'il lizards. This may be attributable to the vast areas of sands of different sizes and forms that may constitute suitable habitat for lacertid lizards. Geckos followed lacertids in number. The adaptability of geckos to live in a variety of habitats, including sand, gravel, and rocks, may explain their diversity.

We found the snake *Atractaspis microlepidota* only in hard terrains and rocky areas. Similar results were previously reported for the species in the vicinity of Ha'il (Gasperetti 1988, Dekinesh 1991). Gasperetti



**FIGURE 8.** Schmidt's Fringe-fingered Lizard, *Acanthodactylus schmidti* (adult male) (Photographed by Adel A. Ibrahim).



**FIGURE 9.** Sand Viper, *Cerastes gasperetti* (Photographed by Adel A. Ibrahim).

(1988) reported that *A. microlepidota* was one of the least known snakes in Arabia and that the open areas of its distribution map may reflect a lack of collecting activity rather than a distributional hiatus. Occurrence of *Spalerosophis diadema* in agricultural fields in the Faid Hema may be due to the fact that the fields harbor rats and mice on which the snake feeds. This result supports the observation of Ibrahim (2013), who found a large rat in the stomach of a freshly killed snake in the Suez Canal zone. The Sand Viper, *Cerastes gasperetti*, is wide-spread in the Ha'il region (Alshammari, pers. obs.) and is found throughout the peninsula (Schätti and Gasperetti 1994). Dekinesh (1991) identified this species as *Cerastes cerastes*, a species known to occur in the south of Saudi Arabia (Gasperetti 1988). Individuals of *Walternessia aegyptia* we collected from the Faid Hema were uniformly black with no flickering bluish black ventral parts as previously reported from other areas within the country (Gasperetti 1988). This maybe a specific morphological character for the Ha'il black cobras.

There are some species reported from the Faid Hema in the literature but not found in the present study: *Hemidactylus turcicus*; *Mesalina brevirostris*, *Trapelus sinaita*, and *Eryx jayakari* (Alshammari 2012; Dekinesh 1991). *Hemidactylus turcicus* seems to have been replaced by *P. hasselquistii* in the Ha'il region and is very occasionally seen coexisting with it. Alshammari (2012) reported similar results and claimed that *H. turcicus* is a problematic species in need of study. These species are, however, expected to be found in the Faid Hema.

Traditionally, the spiny-tailed lizard is known to be consumed by humans in the Arabian Peninsula because its meat is regarded as a delicacy (Monchot et al. 2014). For that purpose, this species is being hunted in the Ha'il region and a large number are taken from the wild annually (Ahmed Alshammari, pers. obs.). An effort is being made to save this lizard in the Faid Hema, as well as the Ha'il area.

The number of species we found differed from one site to another. Our finding that the highest diversity of reptiles was in Site 1, the Jannin area may be attributable to the variety of habitats located at that site, which includes soft and firm sand soil and rocky terrain. The open firm sand site with sand grains and gravels at Site 2 had a lower number of species than Jannin, but a greater number than in other areas that contained only one habitat. The agricultural site, with only one habitat type, displayed the lowest number of species. The habitat type as a dimension of reptile resource partitioning (Schoener, 1974) was evident in the Faid Hema. The psammophile species, such as *Chalcides ocellatus* and *Scincus scincus*, were confined to the soft sandy areas in Jannin (Site1), while *Laudakia* sp. was found in the rocky areas (Site 3) and *Mesalina adramitana* on the gravel territory (Site 2). In the Zaranik protected area in Sinai, Ibrahim (2002) reported that the diversity of reptiles greatly varied according to the habitat type and the segregation of species was evident.

Occurrence of four highly venomous snakes in the Faid Hema is a point of interest, and motivates more public awareness. Many snakebite victims have been reported in Saudi Arabia (Al-Sadoon and Abdo 1991). In the Ha'il area, 90 cases of snakebite were reported during a period between 1995 and 1998 (22–28 case per annum, Mahaba 2000; Alshammari 2007). Unfortunately, all snake-bite records obtained from Ha'il hospitals and health administration were combined with scorpion bites, so we could not list the number of snake bites during the last five years.

Comparison of the species list reported in this study with reports from other areas in Saudi Arabia (Arnold 1986; Gasperetti 1988, Hussein and Darwish 2001; Masood and Asiry 2012) shows that the reptile fauna in Faid is not identical to any other areas in the kingdom. Additionally, we did not identify any endemic species from the Faid Hema. This preliminary study in such an

**TABLE 2.** Comparison between the species recorded as present in the present study with previous studies. An asterisk (\*) indicates the species was found.

Species	Present study	Dekinesh (1991)	Alshammari (2012)
<i>Diplometopon zarudnyi</i>	*		
<i>Laudakia</i> sp.	*	*	
<i>Pseudtrapelus sinaita</i>		*	
<i>Trapelus blanfordi</i>	*		
<i>Uromastix aegyptia</i>	*	*	
<i>Bunopus tuberculatus</i>	*		*
<i>Ptyodactylus hasselquistii</i>	*		*
<i>Hemidactylus turcicus</i>			*
<i>Stenodactylus doriae</i>	*	*	
<i>Stenodactylus slevini</i>	*	*	*
<i>Acanthodactylus boskianus</i>	*	*	
<i>Acanthodactylus opheodorus</i>	*		*
<i>Acanthodactylus schmidti</i>	*		
<i>Mesalina adramitana</i>	*		
<i>Mesalina guttulata</i>	*		*
<i>Chalcides ocellatus</i>	*		
<i>Scincus mitranus</i>	*		
<i>Scincus scincus</i>	*		
<i>Chameleo chamaeleon</i>		*	
<i>Varanus griseus</i>	*		
<i>Atractaspis microlepidota engaddensis</i>	*		
<i>Eryx jayakari</i>		*	
<i>Psammophis schokari</i>		*	
<i>Spalerosophis diadema</i>	*	*	
<i>Walterinnesia aegyptia</i>	*		
<i>Cerastes gasperetti</i>	*	*	
<i>Echis coloratus</i>	*		
Total	22	11	6

important area in Ha'il can be the beginning of more ecological studies on reptiles of the region. Also, this study may contribute to future work on the medical and economic importance of the venomous snakes in this part of Saudi Arabia.

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**AHMED M. ALSHAMMARI** (left) is an Associate Professor in the Department of Biology, Faculty of Science at Ha'il University. Dr. Alshammari holds several positions at Ha'il University. He was the first dean of admission and registration and the first dean of the faculty of science at Ha'il University. Later, he served as rector of the same university from 2012-2014. He received his B.Sc. with honors from the Faculty of Teachers at Ha'il University. His M.S. (1997) and Ph.D. (2007) degrees were bestowed from King Saud University. Ahmed has published 23 scientific papers in peer-reviewed journals, most of them in the field of herpetology and natural toxins. **ADEL A. IBRAHIM** (right) is an Associate Professor of Zoology and is currently the Vice-Dean for quality and development, Faculty of Science, Ha'il University. He began his career as a teaching assistant at the Suez Canal University, Egypt in 1983. He received his B.Sc. and M.S. in Zoology from the University of Suez Canal. His Ph.D. was also bestowed by the University of Suez Canal with collaboration from Texas A&M University through Channel System Supervision. Thus far he has 38 publications, most on lizard ecology and herpetofaunal communities. He has also published two chapters in one book, *Amphibians of Egypt and Amphibians of Libya*. Adel is an avid photographer, having contributed about 50 photos of reptile species to the Reptile Database: <http://www.reptile-database.org/>. (Photographed by Salem Busais).