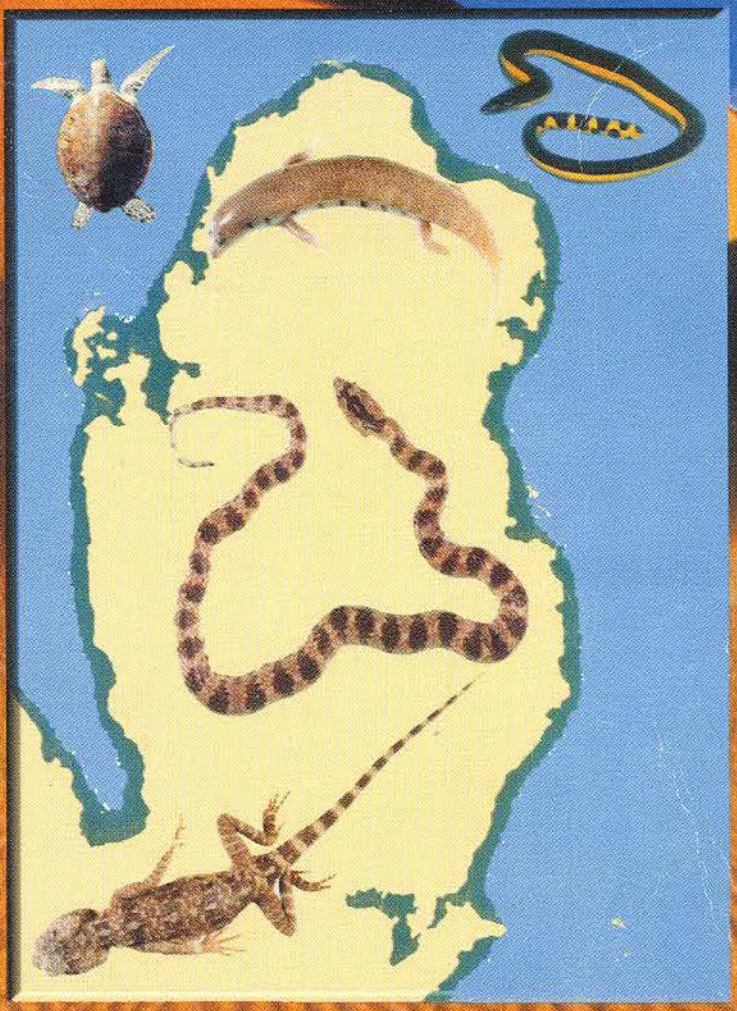
Record, Histological and Enzyme Histochemical Demonstration of Qatari Reptiles in Relation to Seasonal and Environmental Variations



Report For First Part

Prepared By

Dr. Gamal El-Sherif & Dr. Aisha Saud Al-Thani

HE/45/95 Project

Supported by

Scientific and Applied Research Center (SARC)

University of Qatar

October 2000

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ACKNOWLEDGMENT

We would like to express our deep thanks for Dr. Abdu-Allah Bin Saleh Al-Kholaifi, President of the University of Qatar, Dr. Sheikha Abdu-Allah Al-Mesned, Vice- President of the University of Qatar for Research and Community Services and Dr. Abdu-allah Al-kubaisi, Dean of the Faculty of Science for the valuable facilities provided. Prof. Dr. Ibrahim Saleh Al-Noaimi, former President of the University of Qatar is also acknowledged for supporting this work. We are also very grateful to Dr.Homaid Al-Madfa, Director of the Scientific & Applied Research Center (SARC) for his continuous and fruitful support without which this work cannot be done.

Mr. Ahmed Abdel-Aziz, technician of the scientific photography at the educational technology center of the University of Qatar, is deeply acknowledged for the excellent photos illustrated. All the technicians, secretarial and administrative staffs at SARC are also acknowledged. Staff of the Histopathology laboratory at Hamad General Hospital is deeply acknowledged for their excellent assistance.

CONTENTS

I. Introduction

The characteristic location of Qatar peninsula as a projection in the central north west coast of the Arabian Gulf attracted our attention due to both the marine and desert bio-diversity. The nature of its pale desert with the little cultivated areas together with its surrounding seashore may characterize the quatari fauna. In general, research work on reptiles is universally little. However, previous work and literatures on the Qatar reptilian fauna are represented in only one article provides basic collection, identification and distribution of reptiles in the state of Qatar as a rough record study (Mohammed, 1988). Since Qatar is also a marginal semi-island in the Arabia, it is worthy to mention that there are few studies were done in some other Gulf States. Eissa and El-Assy (1975) studied the distribution of reptiles in Kuwait. More earlier, some investigations were established in Arabian desert including Abu Dhabi (Leviton and Anderson, 1967), Bahrain (Summer, 1954 and Gallager, 1971) and Saudi Arabia (Arnold, 1986). Otherwise, some unpublished Trials for only collection of reptiles in Arabia are also observed. Almost all these studies were done as records without any reference to the related seasonal and environmental factors. But, these first trials should be considered as spot light guides in this area of the world.

Due to the relatively easy lizard collection, special attention was given to this group of reptiles. Peoples in Arabia are also more familiar with lizards more than other reptilian groups. They deal with some lizards sometime as food, popular medication and even as normal creatures living around

them. In contrast, snakes are obviously neglected may be due to the difficulties in collection and also the less popular interest as dangerous reptiles. In spite of worm-like reptiles, which are considered as a link between the higher lizards and primitive snakes, are represented well; they are given minor attention in both research and popular levels.

General Characteristics:

Reptiles are the first true land-dwellers among the vertebrates. They are lungs breathing, ideally with two pairs of limbs ended by five fingers or toes armed with claws. Horny scales and plates covering its body for greatly reduce evaporation through the skin and to protect them against desiccation. They are poikilothermic i.e. their body temperature is variable according to the surrounding temperature. The internal fertilization is followed by formation of large eggs with extra large amount of yolk. They exhibit variable sizes and lengths between few centimeters, like geckos (4 cm) and some lizards and may be 14 m, like crocodiles and pythons. The large marine turtle may reach about 600 Kg. Weight while it may reach about 2 g. like the American gecko. They are very long-lived animals, large size reptiles like turtles and crocodiles may reach about 200 years age if they are not weeded out by their enemies.

The skin of reptiles is provided with thick horny epidermis which is convoluted to form scales arranged in different characteristic patterns and it may reach large sizes like plates or shields or even like a firm and strong

bony capsule like turtles. In lizards and snakes, the horny epidermis is of dead uniform material and it can no longer grow and so, they shed their skin at regular intervals on growing up through a process known as "molting". They have much different pigment cells in their skin in the outer region of the dermis and both the colors and its distribution patterns can be changed due to rate of activity, physiological alteration and even the climatic variations. This mechanism is used as an adaptive behavior since reptiles can blend themselves within their surrounding environment. Reptiles with legs, like lizards, can walk but limbless reptiles can move using strong body muscles and certain amount of friction between body and substrate. Few reptiles are flyers or glinding or even climbing. Aquatic reptiles are common for bilaterally compressed body and tail to perform swimming movements. The reptilian sense organs are of great interest. Some reptiles have eyes and can recognize other animals and even colors. Others can use eyes for distance estimation for their preys. However, snakes can not distinguish colors and things because there is no focus, others are absolutely blind. Ear can detect low frequency tones and they are more sensitive especially in reptiles with blind or weak vision sense. Chemically, taste and smelling are sometime highly developed specially tongue. Skin is greatly used for protection and water conservation rather than the sense of touch, it is also thick and it does not use for breathing and so they use lungs. In the primitive reptiles, the lung is symmetrical, but in snake-like reptiles lung is displaced while snakes do sometimes lack the right lobe of lung.

Turtles are never poisonous, but there are only **two poisonous** species of **lizards** belonging to family *Helodermatidae*. These are (1) Gilamonster or *Heloderma suspectum* (2) Mexican beaded lizard or *Heloderma horridum.* However, there are **five families of poisonous snakes** including about **850 species** (from 2500 snake species). These families are *Colubridae*, *Elapidae (cobras), Hydrophidae, Viperidae* and *Crotalidae*.

In this work, we are aiming to establish the first full documented record for reptiles in Qatar and to study the histological & structural variations among the different reptilian species in relation to their habitat, feeding and other characteristics. In the second part of study, we are planning to check the relations between different enzymes of the reptilian tissues and the environmental factors in relation to the seasonal variations. This work also aims to be the first step in a very long - but important - road to reach the qatari fauna database including other groups e.g. fishes, amphibia, birds and mammals. Recording of reptiles, together with the available studies on fishes with the less identified birds and the absolutely lacking studies on amphibia and mammals, may be considered as a trial to be continued for making a full survey for all the animal representatives of the qatari fauna.

Classification of Reptiles

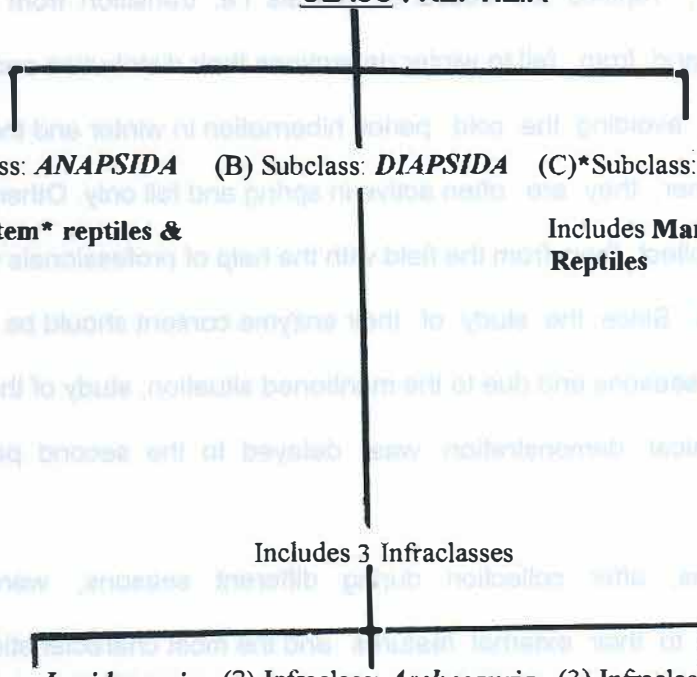
Reptiles are classified as a class of the animal kingdom and exactly as a higher vertebrate rank as follows :

ANIMAL KINGDOM

PHYLUM : CHORDATA

SUBPHYLUM : VERTEBRATA

CLASS : REPTILIA



***Groups which are labeled with asterices referring to the old, ancient and prehistoric reptilian species which are recorded either as fossils, skeleton remnants or even full frozen hidden bodies allover the world.**

II. Collection of Specimens

Reptiles were collected through self-efforts due to the absence of the professional field-hunters for collecting the wild animal species in Qatar. However, almost all the recorded species and also new local records were collected alive mostly in April, May, October and November and then identified. Different organs were cut and treated for histological and histochemical techniques.

Generally, reptiles are seasonal animals i.e. transition from spring to summer and from fall to winter determines their distribution and location. However, avoiding the cold period hibernation in winter and the extreme hot summer, they are often active in spring and fall only. Otherwise, one should collect them from the field with the help of professionals with great difficulties. Since the study of their enzyme content should be regular in different seasons and due to the mentioned situation, study of the enzyme histochemical demonstration was delayed to the second part of the project.

Specimens, after collection during different seasons, were studied according to their external features and the most characteristic features e.g. body scales, head shields and limbs. There are many classification and nomenclature variations among reptilian species but the most recent classification reviews and the most recent scientific names were considered. The study lasted the period between October 1995 and October 1999 in the Qatar peninsula, **[Fig. 1]** while the marine snake

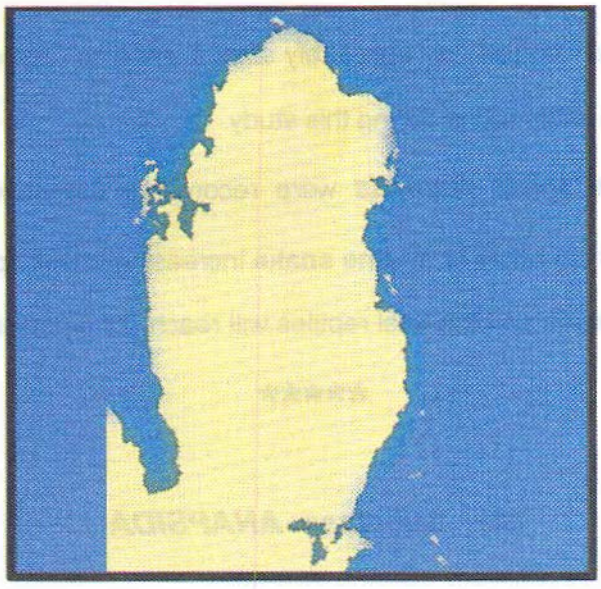


Fig. (1): State of Qatar

specimens were collected from Ras Laffan coast. Each individual, after identification, was either injected with formalin or dissected and each sample was kept in well-fitted jars containing 10 % formalin for preservation. Jars were labeled showing scientific name and sometimes the local (native) name of sample – if present – and all samples are projected at a small showroom inside the lab of histology and histochemistry at SARC for the first time at Qatar.

III – Results

Reptiles collected from the qatari fauna were collectively found belonging to subclass **Anapsida** (represented by only **3** species of Turtles) and subclass **Diapsida** (represented by the rest of reptilian species of Qatar as **16** species of Lizards and **8** species of snakes). The total reptilian species recorded were found to be **27**. Subclass Synapsida, including the

mammal-like reptiles, is absolutely absent since no representatives were recorded at qatari fauna during this study.

Two new local records were recorded in this work as **one desert snake** and the **other is marine snake** increasing snake species recorded up to **10** species and the total reptiles will reach **29** species.

*****

(A) Subclass ANAPSIDA

This was recorded as only one order represented in Qatar with 3 species.

Order: **Testudines**

Suborder: **Cryptodira**

* Family: **Cheloniidae**

This family includes the marine turtles of many primitive and some highly specialized characteristics. The flat, streamlined carapace never becomes completely ossified, even in old age, so that the ends of the ribs can be exposed. The broad, flat forelegs, like fins with only one or two claws protruding, serve for locomotion in water; while, the short, wide hindlegs act as rudders for steering. Only females can go onto the land to lay their eggs. The marine turtles can eat fish and the lower marine animals as well as variable quantities of plants, algae and seaweed.

WARNING !

The human contact with turtles, particularly the land turtles, which are kept in laboratories, houses and gardens, may be very harmful. These animals can

carry many species of ***Salmonella,*** which is an intestinal bacterium with no specific host and can attack humans causing ***Dysentry*** especially for children.

Subfamily: **Cheloninae**

From which two genera of turtles were recorded as follows:

(1) **Chelonia mydas** : as in **Fig. 2**, is characterized by large and oval body which may reach almost 1.4 m length and about 420 kg body weight. Carapace is covered by epidermal horny plates arranged as 5 median neurals, 4 paired costals located lateral to neurals and 25 marginal plates including an anterior median nuchal and 2 posterior pygal plates. Head is covered on the top by 2 prefrontal hard shields and the upper jaw is straight and provided with teeth-like serrations. There is only one claw on each of the forelimbs. Its color is brownish dorsally and pale yellowish ventrally. Chelonia mydas is entirely aquatic reptile feeds mainly on grasses & algae and it is laying-egg marine representative.

(2) **Eretmochelys imbricata** : **Fig. 3**, it is considered as the smallest size cheloniid among species of this family, its length may reach only up to 90 cm with almost 250 kg body weight. It usually lives in shallow water over sandy bottoms with little vegetation. The carapace is covered with horny plates overlapping on each other towards the back, which is the much-desired shell of turtles, and for this reason it is severely threatened by hunters. It is often found together with *Chelonia mydas* and it eats plants, sea urchins and jellyfish.

** Family: **Dermochelyidae**

(1) **Dermochelys coriacea** : **Fig. 4**, or the huge leatherback turtle, it may measures about 2 m length with about 600 kg body weight, it is the largest turtle of all and it represents a family of its own. Its original bony shell is reduced into tiny mosaic of small plates of bone embedded in a thick leathery skin. Head is large with hooked mouth, neither the head nor the claws-free limbs can be withdrawn under the shell like the majority of other turtles. It feeds on fish, echinoderms, cephalopods, mollusks and marine plants. It may be dangerous to humans because it can even eat the Portuguese man-of-war with its poisonous cysts of nematodes.

Fig. 2: *Chelonia mydas*

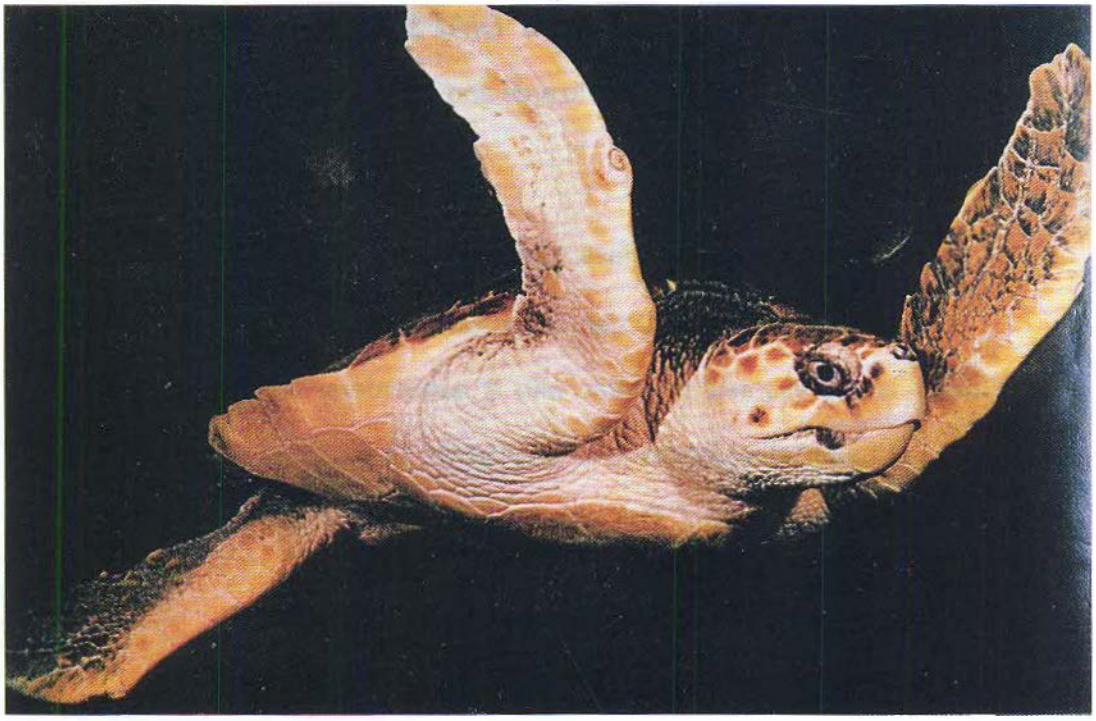


Fig. 3: *Eretmochelys imbricata*

Fig. 4: *Dermochelys coriacea*

(B) Subclass DIAPSIDA

This subclass includes all the rest of lizards and snakes of the qatari fauna which belong to:

Infraclass: **Lepidosauria**

Order: **Squamata**

This order is represented in Qatar with 2 subborders, the first is **suborder SAURIA (Lacertelia)** including all ***LIZARDS*** **(16 species)** while the second is **suborder SERPENTS (Ophidia)** which includes all ***SNAKES*** **(10 species).**

[I] Suborder: **Sauria *(Lacertilia),*** Lizards.

Lizards are more primitive to snakes, coming after crocodiles and alligators at which limbs are strong and more developed and before snakes at which limbs are completely reduced. In lizards, limbs are either reduced or entirely absent as an intermediate characteristic between crocodiles & alligators as a group and snake as another group. They are characterized by the ability to regenerate the tail, the new tail is usually shorter than the old one and it is not supported by bony vertebrae but by a central rod of cartilage. There are 16 species of lizards belong to the following 5 infraorders :

{a} Infraorder: **Gekkota**

Family: **Gekkonidae**

The Geckos are nocturnal climbing reptiles feeding on insects and they can, often, change their colors. They can live in houses and can climb trees and the

smooth walls and even can often walk, through an inverted mode, on ceilings using their clinging dilated pads on the undersides of their toes.

Subfamily: **Geckoninae**

(1) **Stenodactylus slevini** : **Fig. 5,** (Big-headed Gecko), the head is large, flat and broad while its tail is short. Digits are short and provided with bristle-like projections covering both the edges and the ventral sides of digits. No pads found and the toes are unwebbed. Color is spotted brown dorsally while it is silvery white ventrally.

(2) **Hemidactylus flaviridis** : **Fig. 6,** (Yellow-Bellied House Gecko), toes are expanded proximally and provided with ventral climbing pads in the form of transverse lamellae. Pads are arranged in two rows separated by a groove and they are provided by the bristle-like projections. Back skin is smooth with uniform granules with dark crossing lines on the brown dorsal background while the ventral surface is yellowish.

(3) **Bunopus tuberculatus** : **Fig. 7**, (Stone Gecko), body is covered by separate keeled-like tubercles, while toes are short, thick and provided with simple transverse lamellae. Color is sandy brown above with dark brown bands and spots. Ventrally, it is whitish and on both sides, there is a brown line extends from the nostril on the head laterally as far as the hind region at which they unite together dorsally forming a U-shaped characteristic mark.

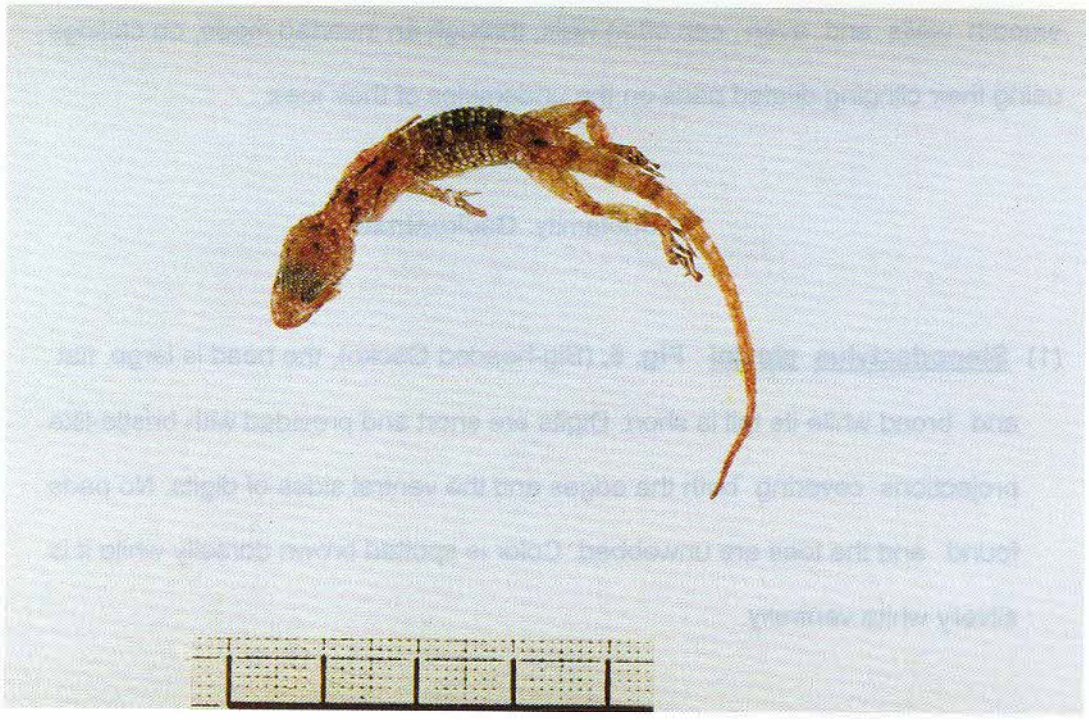


Fig. 5: ***Stenodactylus slevini***

Fig. 6: ***Hemidactylus flaviridis***

Fig. 7: *Bunopus tuberculatus*

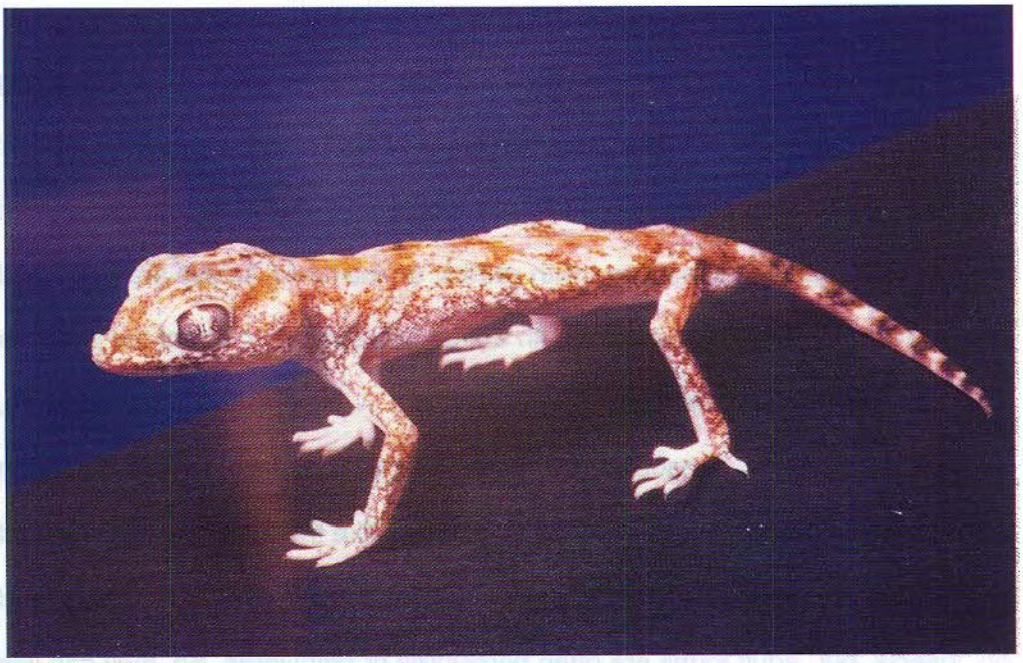


Fig. 8: *Crytodactylus scaber*

(4) **Crytodactylus scaber : Fig. 8**, (Keeled Rock Gecko), it usually living near the old buildings and the rocky regions. Pads are absent and replaced by another device to enable the gecko to climb trees and rocks. Toes are long, narrow provided with simple transverse lamellae and ended with a right angle claw. On the back, there are strongly keeled tubercles arranged in distinct longitudinal rows, tail is provided with pointed tubercles. Color is grayish dorsally with transverse broken lighter lines, ventral side is white.

{b} Infraorder: **Iguania**

Family: **Agamidae**

These are strongly built animals with long legs, a rather large head and a long tail. Often, they can not discard and regenerate tail which is usually, together with the body, covered by sturdy scales which are almost always provided with a keel or ridge and sometimes with spines, on the head, scales are small and are not arranged symmetrically. Teeth are usually seated on top of the jawbone and very interesting that they are specialized – like human – as incisors, canines and molars, tongue is short but fleshy. They have very acute vision mechanism and eyes are surrounded by scales – like the eyelashes – to protect against blowing sand as an ideal desert animal character. They are usually feed on insects but adult forms are often herbivores or omnivores. So, they can live on the ground, in the trees and even in the water of the tropical rain forest.

They can change body colors as a heat regulating response or even colors of the head as fear, eagerness to attack or sexual excitation.

(1) **Agama flavimaculata** : **Fig. 9**, (Jayakar's Agama, native name : Nufaikhi), the body dorsal side is covered with spiny scales and around the ear opening. Color is dark-brown to black, but may be altered to be sandy yellow dorsally crossed by brown transverse bands due to habitual changes. It may blow up its lower jaw sac of skin as a defensive mechanism of fear against enemies. It is very active during day feeds on insects, it may habit also shrubs of the desert. Coloration can be changed rapidly in accordance with the background, also due to intensity of light and heat, it becomes more pale at increased illumination and light.

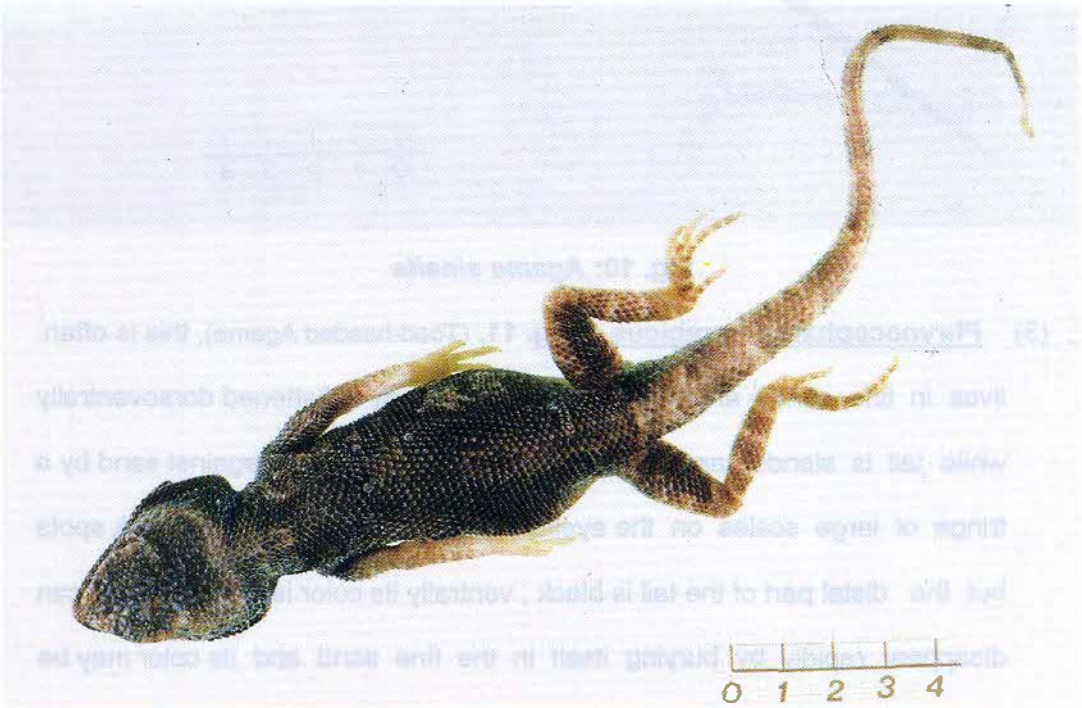


Fig. 9: *Agama flavimaculata*

(2) **Agama sinaita** : **Fig. 10**, it may be classified sometimes as a "pseudo" flavimaculata, there are some differences e.g. smaller ear opening and partly covered by pointed scales from above and its fourth hind toe longer than the third one. There are often dark cross bands on the neck, behind the shoulder and in front of the hind legs.

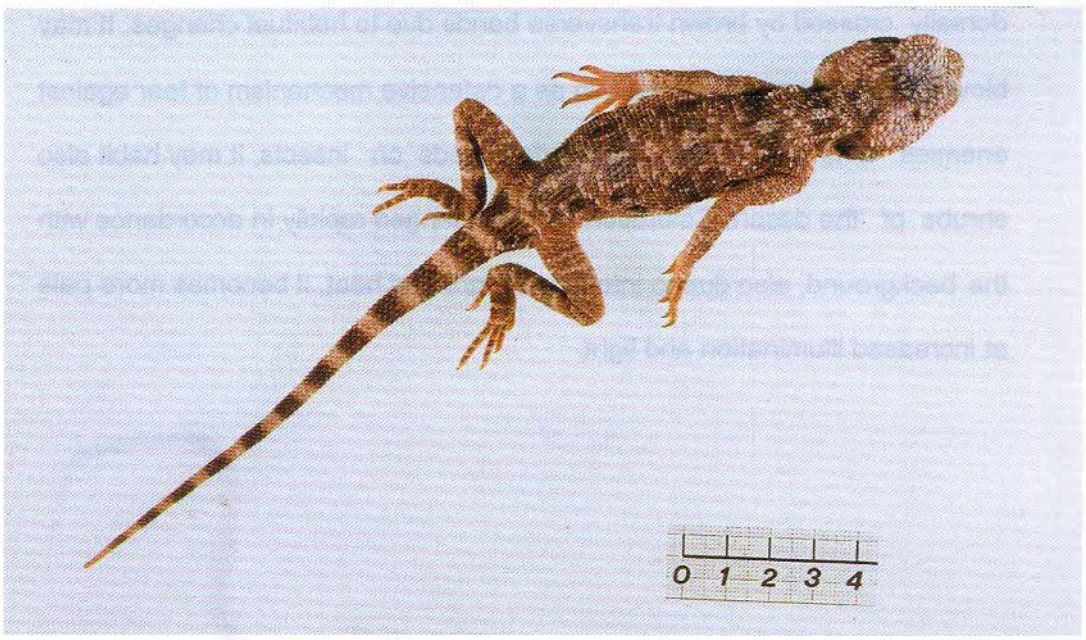


Fig. 10: *Agama sinaita*

(3) **Phrynocephalus arabicus** : **Fig. 11,** (Toad-headed Agama), this is often lives in fine sandy areas inside burrows. Body is flattened dorsoventrally while tail is slender and tapering. Eyes are protected against sand by a fringe of large scales on the eyelids. Color is sandy above with dark spots but the distal part of the tail is black , ventrally its color is pale yellow. It can disappear rapidly by burying itself in the fine sand and its color may be altered rapidly in different environment and as a response to increased temperature or light.

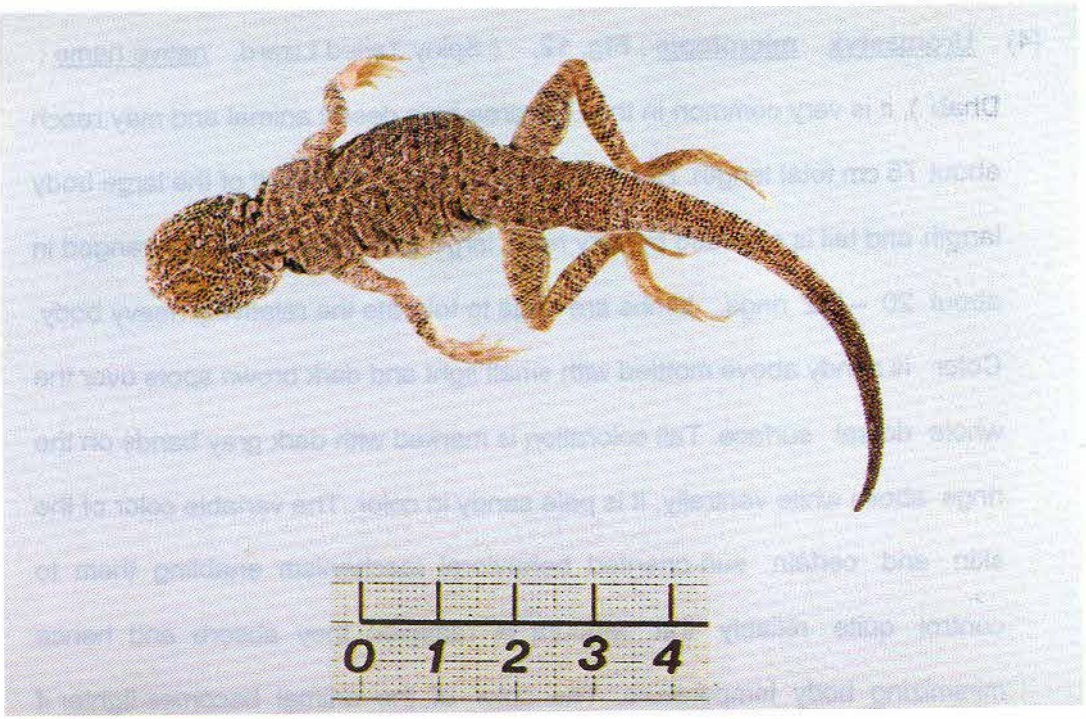


Fig. 11: *Phrynocephalus arbicus*

Fig. 12 : *Uromastyx microlepis*

(4) **Uromastyx microlepis : Fig. 12**, (Spiny Tailed Lizard, native name : Dhab), it is very common in the Gulf area as a desert animal and may reach about 75 cm total length. Head is small but tail is about half of the large body length and tail is provided by very hard, large and pointed scales arranged in about 20 – 22 rings. Limbs are large to tolerate the relatively heavy body. Color is sandy above mottled with small light and dark brown spots over the whole dorsal surface. Tail coloration is marked with dark gray bands on the rings above while ventrally, it is pale sandy in color. The variable color of the skin and certain sun-oriented behavioral mechanism enabling them to control quite reliably the amount of radiation they absorb and hence minimizing body temperature. The color of the animal becomes lighter if exposed to higher temperature and intense light. It very active by day especially in the early morning and late afternoon, but it hibernates during winter inside burrows in the hard rocky substrata. Its adult forms are vegetarian (herbivorous) but the young forms can feed on insects as well. *Uromastyx* is non-aggressive lizard, if it is attacked by a predator, it hides in its burrow leaving part of its tail exposed and swings it strongly. Tail is considered the main defense organ with its rings of spines and its strong muscles. They are very frugal with their water, for they can obtain water only from the spare plant growth that eats and cloaca can reabsorb water from urine and other excretions, it can also use metabolic water from large stores of subcutaneous fat.

{c} Infraorder: **Anguinomorpha**

Superfamily: **Platynota**

Family: **Varanidae**

This family is known as " Monitor Lizards ", It includes only single genus " *Varanus* " . It has heavy body, long neck and large head. Tail is thick and also long, legs are provided with strong claws. Varanidae are dangerous carnivores feed on small vertebrates like rats and also on various invertbrates.

(1) **Varanus griseus** : **Fig. 13**, (Monitor Lizard, native name : Waral), body is much thinner, but longer, than Uromastyx, it has slit-like elongated and elongated nostrils near to the eyes. Tail is very long and tapers posteriorly acting as a prehensile organ. Color is sandy with scattered brownish spots on the dorsal side with short transverse brown bands. There are elongated brown lines extend on the sides of the head and neck. Small dark brown spots are scattered on the ventral side of the head and neck. Ventrally, brown bands are found on the tail. It is very active only during day and hibernating, during winter for several months, inside deep burrows formed in hard substrata. It also may retreats to its burrow at midday hours to avoid the hottest period in summer days. It feeds on small rodents and other small lizards tearing its prey with teeth and claws and then swallows it as whole,

this is a snake- like behavior but, thus a unique feature among lizards and it is also, like snakes, can not regenerate its lost tail.

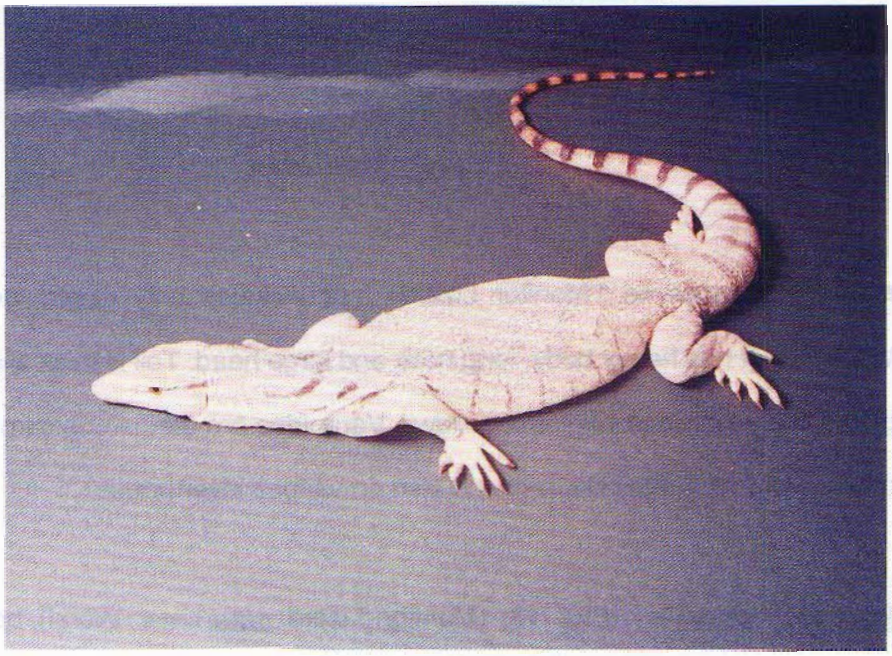


Fig. 13: *Varanus griseus*

{d} Infraorder: **Scincamorpha**

* Family: **Lacertidae**

Or the "*True Lizards*", they are small to medium sized reptiles, tails are almost always longer than their cylindrical bodies. There are bony shields only on the dorsal side of the head which are fused to the bones of the skull. Scales on the ventral body surface are larger than that on the dorsal side. Body scales are arranged in distinct longitudinal and transverse rows while scales on the tail are arranged on whorls. They have either little or no ability to change colors,

however they can perform *"autotomy"* !, i.e., they can discard the tail when necessary leaving it to the attacker and replace it with another which will be supported with unsegmented rod of cartilage which can not be discarded again. So if young lizard discards tail, it may be regenerated and reach almost as long as a normal tail, if it is adult form, regenerated tail will be shorter than the original. If the regenerated part is damaged again, it may happens that that several tails grow out of the wound and so, forked or even multiple tails are formed which may impair the lizard's ability to move rapidly. They feed on the small invertebrates and often insects.

(1) **Acanthodactylus boskianus** : **Fig. 14**, (Fringed-toed Sand Lizard), this is a small lacertid with large ventral scales and tail covered by rings of scales. Toes are fringed with a series of scales projecting along their sides. These fringes help the lizard to move in the loose sand. The dorsal scales are small and granular anteriorly while they are large and imbricate posteriorly. **Three** rows of scales are found around the digits of the anterior limbs. Nostrils are found in contact with the upper labials. Color is sandy with elongate dark brown spotted lines extending along the back but ventral side is white. Dorsal side of limbs is mottled with dark brown spots.

(2) **Acanthodactylus scutellatus** : **Fig. 15,** it is usually inhibiting the same region with *A. boskianus*, and is characterized by **Four** rows of scales around the fingers of the anterior limbs. Lateral fringes are also found on the sides of the toes. Dorsal scales are small and granular and nostrils lie

contacted with the upper labials. Color is sandy with dorsal brown spots giving a mottled pattern to the dorsal surface of both body and limbs. Tail is, dorsally, covered with transverse brown bands but ventrally, it is white.

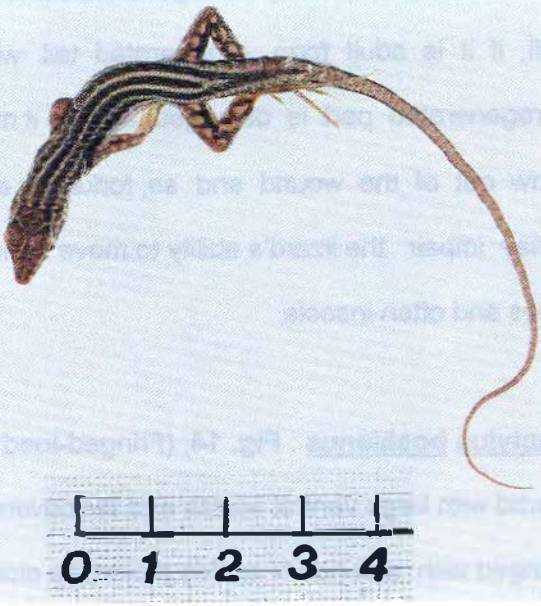


Fig. 14: *Acanthodactylus boskianus*

Fig. 15: *Acanthodactylus scutellatus*

(3) **Eremias brevirostris** : **Fig. 16**, (Short-nosed Desert Lizard), it lives in the rocky desert with shrubs and also in the same region like *Acanthodactylus*. Body is long and the tail is elongated and narrow while legs are short with unfringed toes. Its lateral fringes are absent and nostrils are not contacted with the upper labials. Color is sandy with faint grayish brown spots scattered on the dorsal side of the trunk and tail, ventral side is white.

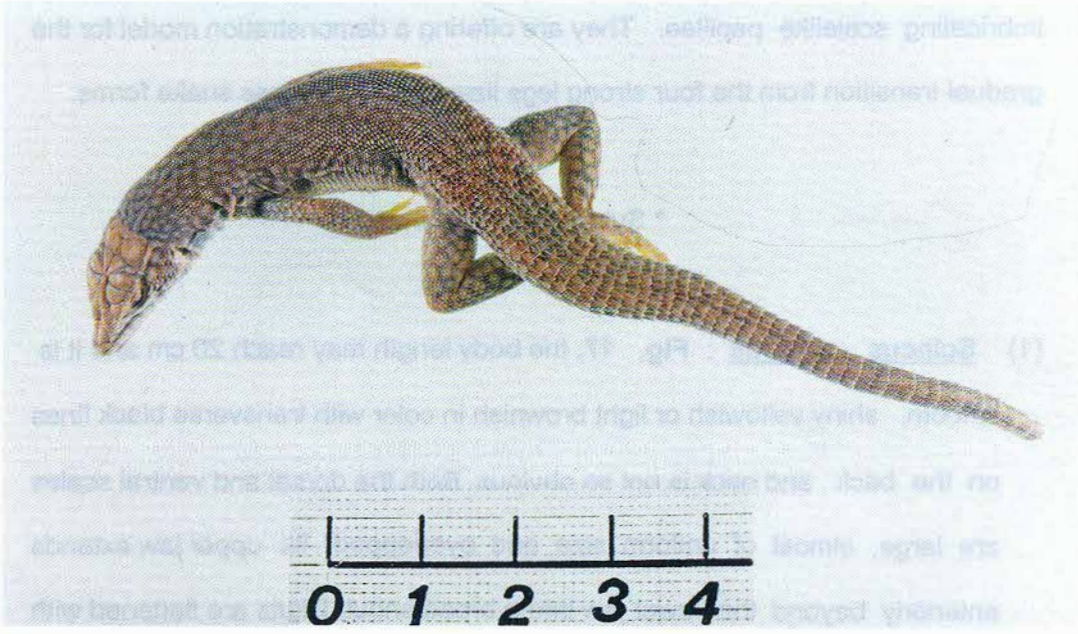


Fig. 16: *Eremias brevirostris*

** Family: **Scincidae**

This family includes lizards of very uniform shape, coloration and habits lizards whish make it easy to distinguish among all lizards, but it also make it very difficult to identify this family into genus and species level. In spite of being widely distributed in forests and deserts, skinks spend most of their life underground. The body is cylindrical, head is often conical in shape with a

sharp snout but legs are small and delicate; the tail is tapered. The head is covered, on top, with large, symmetrically arranged, ossified plates while scales on the body are shiny, round, overlapping and usually ossified. The eyes are provided with a transparent window plate enabling skinks to protect their eyes against soil particles and not preventing their seeing at the same time. The tongue is free and moderately long, slightly notched at the end bearing imbricating scalelike papillae. They are offering a demonstration model for the gradual transition from the four strong legs lizards to the legless snake forms.

* Subfamily: **Scincinae**

(1) **Scincus scincus** : **Fig. 17,** the body length may reach 20 cm and it is smooth, shiny yellowish or light brownish in color with transverse black lines on the back and neck is not so obvious. Both the dorsal and ventral scales are large, almost of uniform size and overlapped. Its upper jaw extends anteriorly beyond the lower jaw into a broad snout. Digits are flattened with broad fringes of projecting scales that may enable the skink to move over the loose sand. It usually spends most of its life under the surface searching for insects.

(2) **Chalcides ocellatus** : **Fig. 18**, the body length may reach about 26 cm, body is thick with relatively long tail with also no obvious neck. Limbs are short with five toes. The body is covered with shiny brown scales and streaked black & white spots arranged as longitudinal rows, sometimes, there is also a dark band at the side.

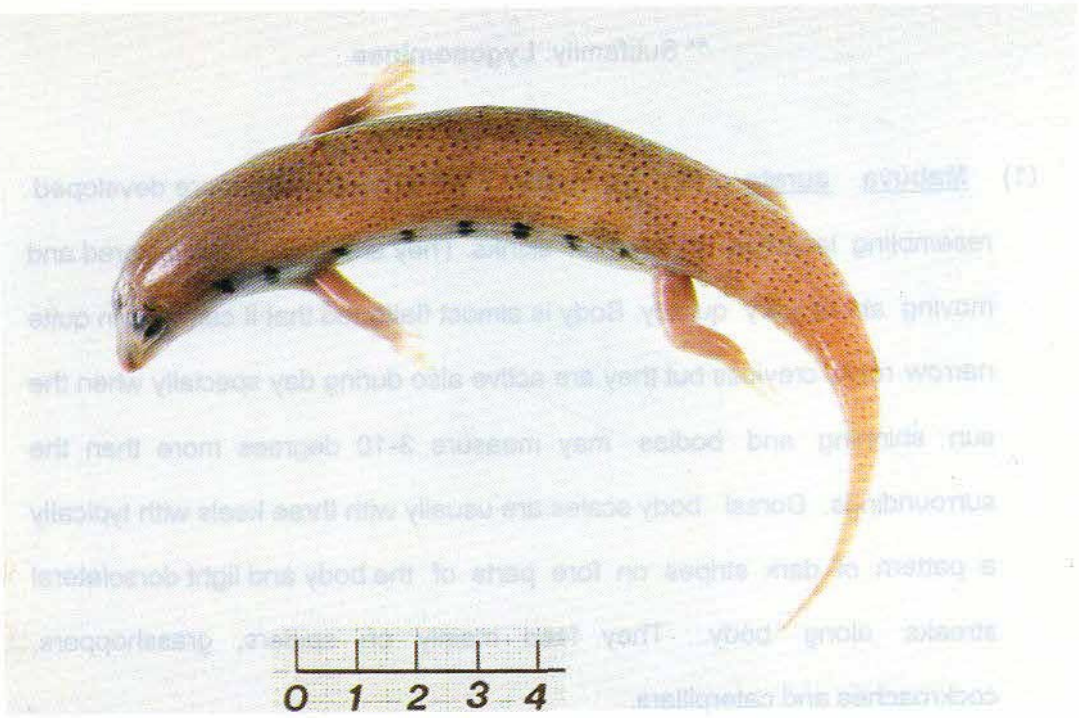


Fig. 17: *Scincus scincus*

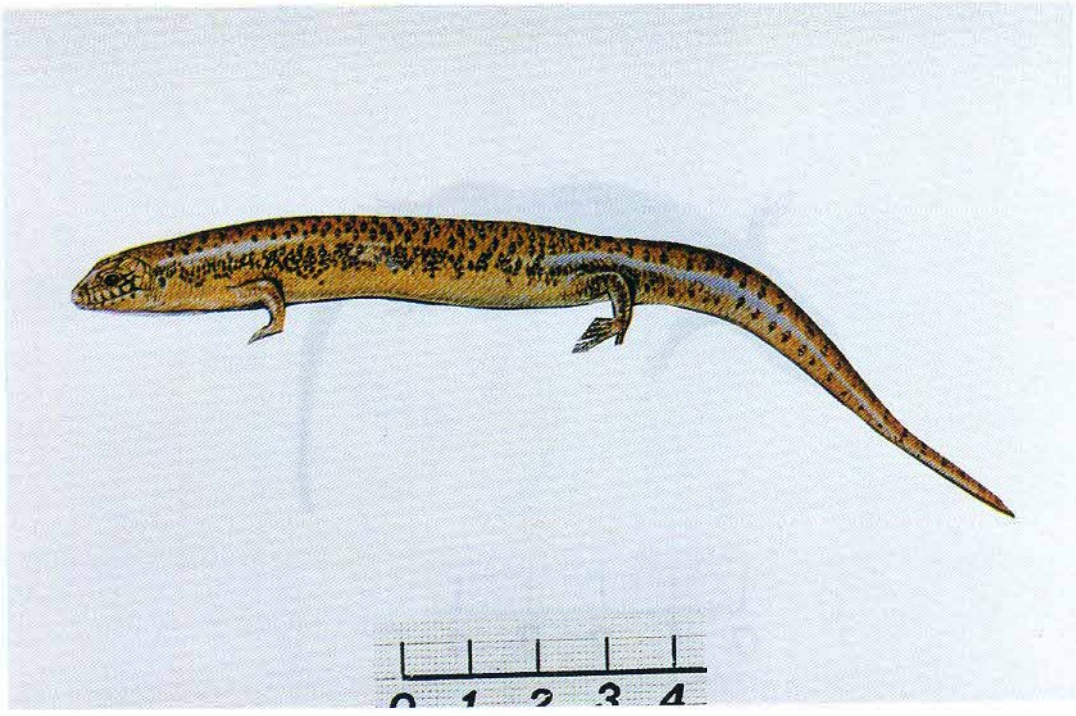


Fig. 18: *Chalcedis ocellatus*

** Subfamily: **Lygosominae**

(1) **Mabuya aurata** : **Fig. 19**, there limbs are relatively more developed resembling lacertids rather than skinks. They are usually over colored and moving about very quickly. Body is almost flattened that it can hide in quite narrow rocky crevices but they are active also during day specially when the sun shinning and bodies may measure 3-10 degrees more than the surroundings. Dorsal body scales are usually with three keels with typically a pattern of dark stripes on fore parts of the body and light dorsolateral streaks along body. They feed mainly on spiders, grasshoppers, cockroaches and caterpillars.

Fig. 19: *Mabuya aurata*

{e} Infraorder: **Amphisbaenia**

Family: **Amphisbaenidae**

These are known as the worm-like lizards considered as the successful development of the anatomy of the modern reptiles. They have some lizard characteristics and also typical snake features. However, it may be taken as a separate evolutionary group intermediate between lizards and snakes.

(1) **Diplometopon zarudnyi** : **Fig. 20**, (Arabian Worm Lizard, native name: Nadus), the body is long, cylindrical and bears a loose skin with fairly well defined rings. It is limbless lizard with blunt head with very small eyes and short pointed tail. It lives inside burrows in sandy areas feeding on small invertebrates, ants and termites. The dorsal body side is spotted brown in color while the ventral side is whitish with smooth scales. It has many adaptations for living underground, such as the ability to take up water between the grains of sand using cilia in the mouth cavity. As a folklore, it is may be known popularly as the "mother" or even the "king" of ants.

Fig. 20: *Diplometopon zarudnyi*

[II] Suborder: **Srepents** ***(Ophidia),*** Snakes

Snakes are the last reptiles to evolve. It is generally accepted that snakes evolved from lizards, but any direct connection is yet to be discovered. The term " *missing link* " can be apply on the snake phylogeny because only few numbers of fossilized snake genera have been found and no exact intermediate species have been discovered up to now. However, explanation of that snakes evolved from burrowing lizards is still reasonable because snakes lost their limbs, external ears and almost the eyesight. Moreover, many lizards have evolved on a lime parallel to that of the snakes and certain primitive snakes have retained certain obvious lizard characteristics.

The most characteristic snake feature is the relatively long, almost circular and highly flexible body with no clear-cut definition between head, neck, thorax, abdomen and tail; the underside is usually flattened with a slight ridge along the flanks between the dorsal and ventral surfaces. The only distinct border between the tail and the rest of the body is the external opening of cloaca, which is the common orifice for both the excretory and reproductive functions.

Snakeskin is usually provided with overlapping scales to protect against physical hazards, mechanical injury and desiccation, wear & tear as well. These thickened scales are joined together by a much thinner membranes and usually the ventral scales are relatively large than that of the dorsal surface. The outer dead layer (epidermis) of the skin is periodically shed, sloughed or cast off as it becomes worn and as the snake grows and a new skin is formed separated from the old skin by a lubricant fluid produced during this phenomenon.

The special vertebrate joints enable snakes to move with such grace and agility. This flowing locomotion of most snakes makes it possible to the special ability for extreme bending in almost all directions. The lateral undulations of the dorsal muscles coupled with rectilineation (either separately or simultaneously) achieving such pattern of locomotion. Aquatic snakes, however, use undulatory movement to swim using their laterally flattened bodies and the paddle-like tails. Sand desert-dwelling species have developed a specialized means of locomotion known as " *sidewinding* " as the snake seems to move by side leaving a sequential "J"- shaped tracks.

A typical feature of snakes is that their eyes have no movable eyelids but the cornea is protected by a circular, transparent scale (or a part of a transparent larger scale) known as the " *Brille* or *Spectacle* ". However, considering the predatory nature of snakes, their eyes are relatively inefficient !, but they have either poor eyesight or even blind. On the other hand they can hear much better than they can see, but they have almost normal sense of smell. Snakes have highly efficient sense of balance and touch. Some of them, however, have two special heat receptors each located between the eye and the nostril. These heat-receptor pits contain a membrane, which is extremely sensitive to temperature changes enabling snakes to locate the direction of the warm-blooded prey and strike at it accurately even in complete darkness.

Snakes mouth cavity contains various glands to help for moistening and lubricating the prey before swallowing the prey as whole because they have no means for tearing, crushing or chewing. Snakes are usually stimulated for feeding using a combination of the visionary, olfactory and heat receptory

senses. After the food stimulation, the oral glands secrete more lubrication mucus fluid, but in the venomous snakes, their venom glands (a modified pair of salivary glands) secrete saliva and venom as well. Snakes are either lacking teeth or may have a fairly uniform teeth, but, venomous snakes (about 850 species of total 2500) have also a pair of fangs which are used for injecting venom into the prey since are canaliculated or grooved. Snakes are exclusively carnivorous (eating fishes, amphibia, smaller reptiles, birds and small mammals like rats) taking vegetable food elements accidentally during prey consumption, young forms or small adults may feed on worms, mollusks, insects and spiders. Snakes are extremely had varying sizes ranged between about 7.3 cm only and about 14 m length.

Infraorder: **Caenophidia**

* Family: **Colubridae**

This family, alone, includes about three-quarters of the genera of the snakes in the world. Species of this family represent the typical common snake characters, they are living in different habitats e.g. on the ground, in trees or even in water. Nine large shields typically cover the upper part of the head. Most colubrids are harmless to the human because generally they have neither true venom nor true fangs except very few species. However, they used to swallow the prey and their saliva may be toxic for the prey.

Subfamily: **Colubrinae**

(1) **Coluber ventromaculatus** : **Fig. 21,** (Rat snake), length is about 120 cm, this coluber has no fangs (i.e. harmless to man), its color is dark gray dorsally with small dark brown spots. Ventrally, it is pale gray in general interrupted with dark bands. It is laying-egg snake, usually found below rocks and it feeds on small birds, lizards or even on small snakes.

(2) **Psammophis schokari** : **Fig. 22**, (Sand snake), it may measure about 1 m, it has fangs which are carried posteriorly on the jaws and it still considered as a little harmful to man. Color is olive-brown dorsally with three longitudinal lines, yellowish in color, the middle of which is thin while the two lateral lines are broad. Its ventral side is yellow to white with one broad middle longitudinal band and two narrow lateral bands. On both sides of the head, there is a continuous dark line extending from the snout down to the neck region and interrupted by the eye on each side. It may feed on small reptiles, mammals and eggs.

Fig. 21: *Coluber ventromaculatus*

Fig. 22: *Psammophis schokari*

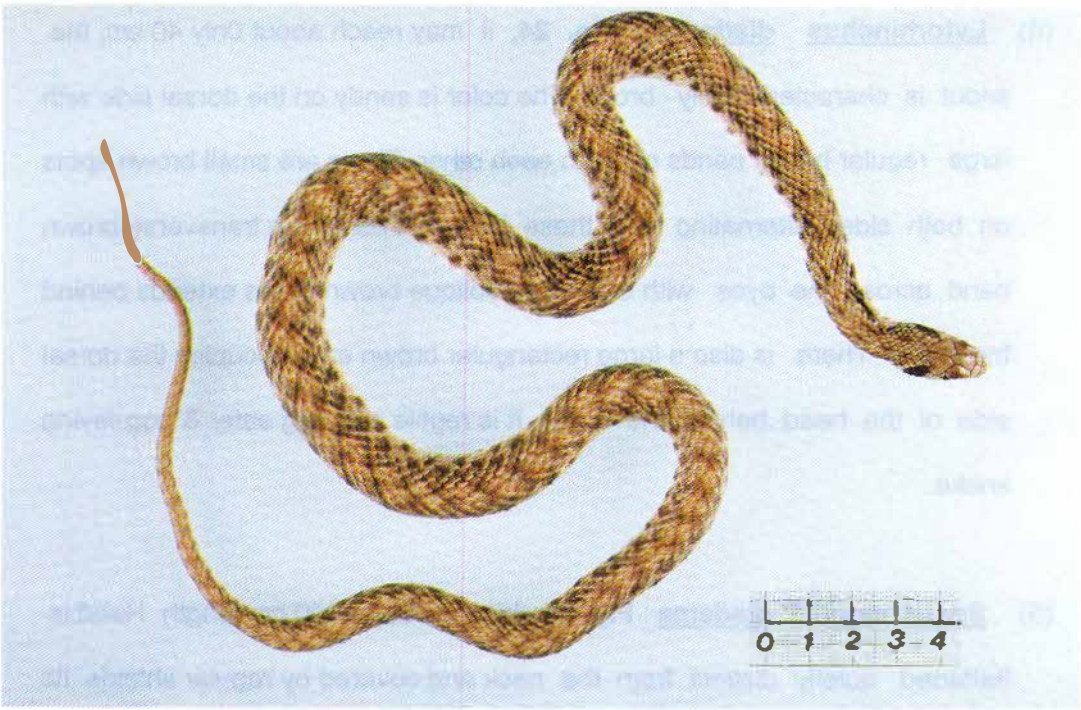


Fig. 23: *Malpolon moilensis*

(3) **Malpolon moilensis** : **Fig. 23**, (The Arabian rear-fanged snake, native name: Hanash), it is longest locally recorded colubrid and may reach about 170 cm, this is characterized by their large eyes and the posteriorly located fangs in the jaw, it considered as " *semi-venomous* " snake. Its anterior part of the head is often bend downwards forming a distinct convex dorsal surface. Color is pale sandy-yellow with small dark patches and spots on its dorsal side but more distinct on the sides, ventrally, it is pale yellowish in color. Eyes are bordered ventrally by a dark brown spot followed by a large, but conspicuous dark brown area. It feeds on small mammals (e.g. rats) birds and sometimes on lizards and other snakes.

(4) **Lytorhinchus diadema : Fig. 24,** it may reach about Only 40 cm, the snout is characteristically broad. The color is sandy on the dorsal side with large regular brown bands close to each other. There are small brown spots on both sides alternating with these bands. There is a transverse brown band across the eyes with elongated oblique brown areas extends behind the eyes. There is also a large rectangular brown area occupies the dorsal side of the head behind the eyes. It is reptile and egg eater & egg-laying snake.

(5) **Spalerosophis diadema : Fig. 25,** this may be of 140 cm length. Head is flattened, quietly distinct from the neck and covered by regular shields. Its color is sandy with large rhomboid-shape dark brown areas on the dorsal side alternating with smaller elongated patches on both sides and ventrally, it is yellowish. On its head, there are two oblique elongated dark brown patches extending behind the eyes up to the last upper labials. There are also two oblique almost elongate dark brown lines on the parietal shields over the head. It is usually inhibit the dry sandy areas feeding mainly on small rodents such as rats.

Fig. 24: *Lytorhincus diadema*

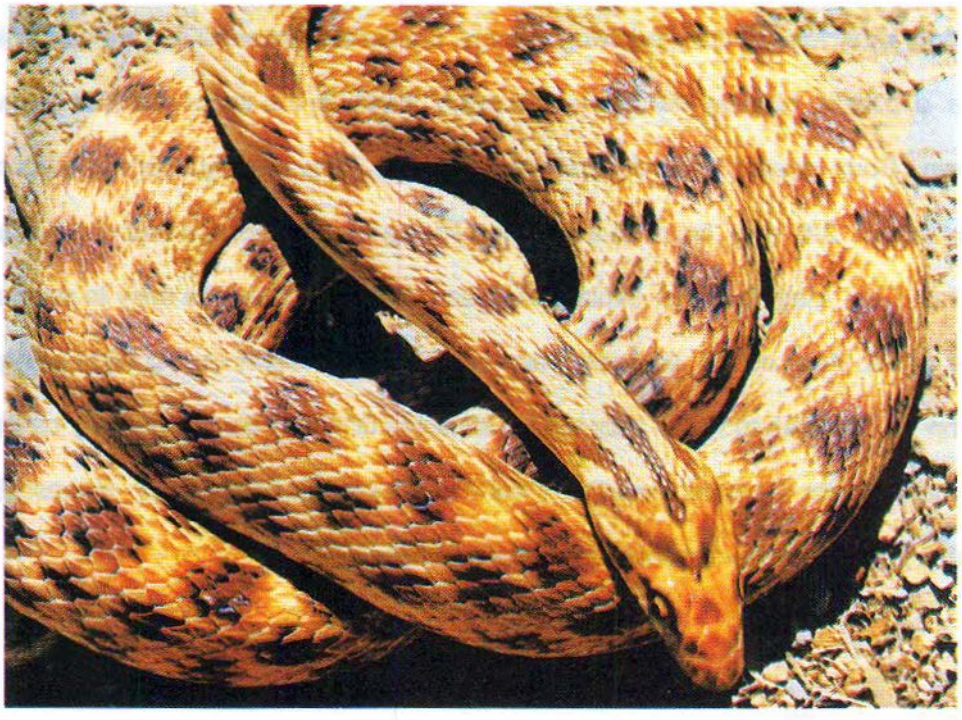


Fig. 25: *Spalerosophis diadema*

** Family: Hydrophiidae

This is a small family of snakes represented by about 50 species living in the warm seas usually near to the coast. **All species are marine except only one fresh-water sea snake** recorded in Lake Taal on Luzon at Philippines, it is known as *Hydrophis semperi* , it may reach about 75-80 cm in length. They never can live on land because the absolutely lost the ventral shields of the land snakes. They are provided with valves in the nostrils to ingress of prevent water. They can breath air through an adaptation represented by their ability to draw the front end of the trachea up to the extreme opening of nostrils while the head is still submerged under the water surface. The lung is very large and its hind part my serve to store air during diving period. The body, which lacks the strong muscles of the land living snakes, is laterally flattened and the tail looks like a paddle helping the snake to swim easily in the water and also to dive down. Body scales are very uniform and small. They usually bear living young and about 2-6 may born at a time, the young may measure a half of the adult form. They may feed on small fishes and eels since they are easy to swallow but never they attack peoples. They can be caught easily during night using a lamp in the dark to which they will be attracted 0r it may be accidentally caught in the fish nets. Peoples sometimes eat the sea snakes (Native name : Hanash El-Bahar) and they can not distinguish them from eels.

Subfamily: **Hydrophiinae**

(1) **Hydrophis cyanocinctus** : **Fig. 26**, (The Blue-Banded Sea Snake), the head is distinctly small, the neck is cylindrical and nostrils are directed upwards. Color is gray with large dark rings around the body along its whole length. These rings are darker dorsally than the ventral side. It may reach about 2 m in length and it is venomous sea snake. They penetrate rivers for only hundreds of meters but come back again into the sea.

Fig. 26: *Hydrophis cyanocinctus*

(2)Hydrophis spiralis : **Fig. 27**, (The Yellow Banded Sea Snake), **this was recorded for the first time in Qatar during this study. It is one of the largest and venomous sea snake, about 2.75-m length. In the young forms, the body rings are often yellow in color with the other characteristics of the *Hydrophis* species. In the older animals, these rings turned gradually to be dirty-yellow-green color giving a uniform dirty hue appearance.**

Fig. 27: *Hydrophis spiralis*

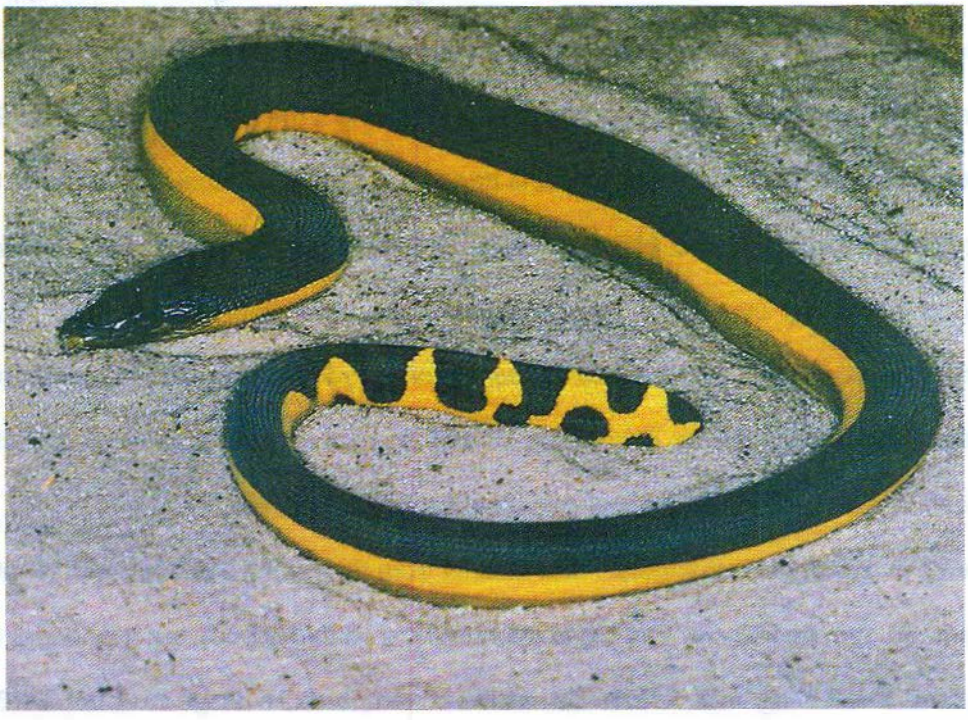


Fig. 28: *Pelamis pelaturus*

(3)**Pelamis pelaturus** : **Fig. 28,** (The Black-Yellow Sea Snake), it is the smaller one (Length is about 60-70 cm), its head is elongated and it is not easy to be identified from the neck. There is a clear-cut border between the color of the back, which is dark, brown to black on the upper side and clear yellow on the ventral side. It is the most highly adapted sea snake since its body is more flattened and so it is much faster during swimming and diving. It is fish eater and venomous.

*** Family: **Viperidae**

This is the most dangerous snake to the human, their fangs on the two upper jaws are provided with special canals for injecting venom during biting the prey. Each of the upper jaws has a special joint giving it the ability to rotate into 90 degree angle. Venom mainly contains haematoxic materials that are injurious to both the blood and the blood vessels of the prey. Local irritation and severe blood poisoning symptoms usually accompany viper bites with burning pain, inflamed swellings, pronounced discoloration, sudden drop in blood pressure, internal bleeding, tissue degeneration and formation of an abcess on the bite location. Later, death may occur because the heart may stop.

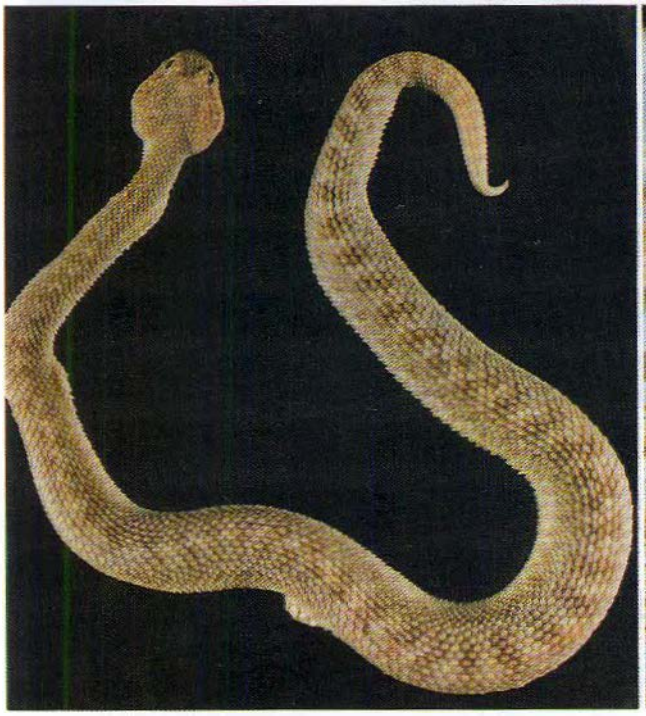
Head is commonly triangular and distinct from the rest of the body with length from 30 cm to 180 cm. The tail is short compared to the body but it is longer in males. Interesting that it can be active at temperature range of about 3 – 37 degrees so they are widely distributed and active during day & night. Females can recognize their mating males that have special mating apparatus and they can live together for years. Pregnant females usually bearing young up to the birth. However, viper's venom is widely used as pharmaceutical useful materials and for this reason, there are some farms of vipers allover the world at which these snakes are " ***Milked*** " regularly to produce venom periodically every two weeks.

Head shields of the colubrid snakes were replaced in vipers by numerous small scales. Body scales are larger, keeled and pointed posteriorly covering all the body surface with different colors.

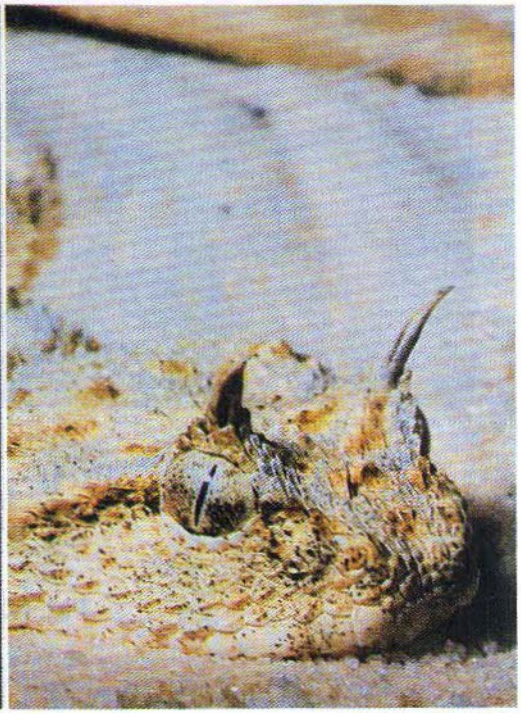
(1) **Cerastes cerastes** : **Fig. 29 "a",** (Horned Sand viper), it lives in the sandy- rocky areas. Tail is very short and the keels of the lateral scales are arranged so that when the viper moves, the keels throw the sand upwards and it sinks below the surface of the land and hides itself. Color is sandy above with median transverse brownish bands alternating with lateral brown patches. The head has dorsal scattered brown spots. It has two ***Horns, Fig. 29 "b",*** which are a pair of short and pointed horn-like scales that may serve to protect eyes from the sun during the day and from sand during sinking down. It is of about 75 cm length, may live in shrubs, eating small mammals and lizards and it is an egg-laying viper.

Fig. 29: Cerastes cerastes

" a "



" b "



(2)Cerastes vipera : Fig. 30, (The Common Sand Viper), this is also recorded or the first time here, it is sandy yellow in color. It prefers the drifting sand found in the completely plantless desert stretches. The typical viper characteristics are well represented especially those of *Cerastes cerastes*. However, no horns on the upper head surface, which is of, uniform scales. Length may be about 75 cm and also it is venomous to human as the most of vipers.

Fig. 30: *Cerestes vipera*

IV- Conclusion

Results of this study in Qatar may confirm the environmental, geographic and/or geological characteristics of Qatar peninsula as a pale desert area surrounded by the seawater. It is also agree with that of the few studies established in the Arabia, Kuwait, UAE and Bahrain regarding the distribution of reptiles considering the Gulf area as a communicated and characteristic ecological model. This may be explained on the basis of the atmospheric, habitual and even the population of different areas of this environmental model system.

Since land reptiles are the first true land-dwellers among other vertebrates, this may indicate that life in this area of the world appeared as far as these animals created. However, up to now, no fossil records registered which may refer to the absence of the primitive fossil reptiles of the Upper Carboniferous [about 260 million years ago] in this area. On the other hand, record of **three** species of **turtles** may propose that the ancient reptiles are well represented, which may be taken as an indication for that their ancestors (together with crocodiles, *Archosauria*, e.g. Dinosaurs), were sometime be here.

Crocodiles and alligators are absolutely absent in Qatar because they are ideally live near to the fresh water shores of the main rivers and lakes of the warmer regions of the earth except only one species found in the brackish and seawater. This is the American Crocodile, *Crocodylus porosus*, is of about 7 m length, it can swim into the open ocean only from southern of India as far as northern Australia.

Geckos, however are well represented by **Four** species in Qatar. Family *Gekkonidae* is a group of quite old reptiles on the revolutionary scale. This may

be due to the ability of these primitive lizards to habit the desert and the rain forest as well.

Lizards are still serially represented in Qatar through **Four** species of **Agama ,** one of which is the most famous lizard all over the Gulf area, Uromastyx or "Dhab". It is well known on the popular level even children can deal with this "kind" desert reptile. Many stories were built on *Dhab,* sometimes as a food or as a popular medicine.

Varanidae, which is the family of the *Monitor Lizards*, is also represented in Qatar in spite of that it includes only **One** species, *Varanus griseus,* or "Waral". This is also very common for peoples, but they knew that it is very dangerous and harmful for them, however, this is true since it is the unique lizard that have TEETH and it can make "tearing" for the prey before swallowing. It is,. In contrast to Dhab, usually avoided by human as an " unkind " reptile.

Again, another reptile, rather than crocodiles & alligators, was not recorded up to now in Qatar, this is *Chameleon*, since they are almost arboreal reptiles living in the low bushes, undergrowth and as well as trees, this habitat is usually not available in Qatar.

The **True Lizards** are also represented in Qatar as **Six** species of **Lacertids & Skinks,** making a good presentation for the higher lizard on the evolution rank. This may support that the lost rings of lizards are absent due to either habitual or atmospheric reasons.

On the other hand, **Amphisbaenidae,** or the worm-like reptile, which is of great taxonomic importance as it is sometimes considered as the link between the latest higher true lizards and the first primitive snakes. This was established by

only **one** species, *Diplometopon zarudnyi*. This again, may compensate a little the absence of other species and may ensure the "richness" of the qatari fauna and also its continuity on the evolution levels.

Snakes, which are considered as the last reptiles evolved, were represented well since there are **ten** species of **snakes** in Qatar. Five of which belong to family *Colubridae*, from *Hydrophidae*, three species were recorded and only two species were found representing family *Viperidae*. Primitive snakes, e.g. the Blind Snakes, were not recorded in spite of that the link between them, *Amphisbaenians*, and lizards was recorded, they are only recorded in Madgascar (Africa), tropical and temperate Asia, Indo-Australian islands, Australia and the tropical parts of America. This may be due to the moist soil, small insect habitat and the plant coverage of these areas at which these snakes live and on which it feed. Boids are also lacking in Qatar, they are lasge snakes living in areas at which trees & shrubs, water and different small animals are available.

Interesting that the most venomous snakes in Qatar are the Sea snakes especially *Hydrophis spiralis & Pelamis pelaturus*, then coming the two vipers, *Cerestes cerestes & cerestes vipera*, and later on, among colubrids found in Qatar, only two species, *Psammophis schokari & Malpolon moilensis*, which are considered as semi- venomous snakes. Now, it is very important to state that the danger coming first from the sea, because peoples used to go there during holidays, and also because only the specialists can distinguish between the sea snake and the fish snake which is commonly used as food. We have to make "warning" also against vipers because peoples are also used to go to the open

desert areas as a camping activity especially on the sandy areas at which vipers may be there, but peoples will take care. In spite of colubrids are the largest and may cause more fear, they are not too dangerous to human.

In conclusion, the "treasure" of these animals is still rich and we do ask peoples to take care and to avoid the dangerous species, like Varanus and venomous snakes. Also, we kindly asking them to help in conserving this group of animal as a very important "ring" in the biological diversity series in Qatar.

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HISTOLOGICAL AND HISTOCHEMICAL STUDY OF THE DIGESTIVE TRACT OF THE WORM-LIKE REPTILE*, *DIPLOMETOPON ZARUDNYI* (SQUAMATA)

By

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دراسة التركيب النسيجي وكيمياء النسيج للقناة الهضمية للزاحف شبيه الديدان «ديلوميتوبون زارودني» (الحرشفيات)

عائشة سعود آل ثاني و جمال الشريف

يعتبر «ديلوميتوبون زارودني» من الزواحف شبيهة الديدان المعروفة في البيئة القطرية باسم «الاذاوس». وقد أجريت دراسة بالمجهر الضوئي للتركيب النسيجي وكذلك تفاعل حمض البيرأيوديك وكاشف شيف . وقد لوحظ أن مخاطية المرئ تتكون من طلائية عمودية مصففة بينما مخاطية المعدة خلايا طلائية عمودية مخاطية . كما وجدت الخلايا الامتصاصية ذات الحواف الفرجونية والغدد الكأسية في مخاطية الأمعاء الدقيقة ، وفي الأمعاء الغليظة لوحظ وجود مخاطية هرمية الشكل وعدد كبير من الغدد الكأسية مع طبقة محددة بوضوح من المواد المخاطية . كما أظهرت خلايا المرئ والمعدة تفاعل إيجابي بصورة موحدة مع تفاعل البيرأيوديك وكاشف شيف بينما تميزت الغدد الكأسية بكميات كبيرة من عديدات التسكر المخاطية شديدة التفاعل . تراوحت الطبقة العضلية بين الألياف الطولية فقط في المرئ والطولية والعرضية الرقيقة في المعدة ، بينما تميزت الأمعاء الغليظة بوجود طبقتين سميكتين من الألياف الطولية والعرضية .

Key Words: Histology and Histochemistry, Digestive tract, Diplometopon Zarudnyi

ABSTRACT

The structure of the digestive tract of *Diplometopon zarudnyi* was studied by means of light microscopic histology and PAS reaction. The oesophagus is lined with stratified columnar epithelium while the stomach is lined with mucous columnar epithelium. The small intestine is lined with brush-border absorptive columnar cells and goblet cells, while the large intestine is lined with mucous pyramidal cells and larger goblet cells with an extreme layer of mucin lining. The oesophageal and gastric mucosae are uniformly PAS positive. In both the large and small intestine, goblet cells are normal with large amounts of mucin granules. The muscular layer varies in structure being only longitudinal in the oesophagus, thin longitudinal and circular in stomach and more thick in the large intestine.

*This work was supported by a grant from the Scientific and Applied Research Centre (SARC), HE-45/95
**Author to whom all correspondence should be addressed.

Egypt. J. Histol. 20 (1) 1997: 175-185

ANATOMICAL STUDIES OF THE WORM-LIKE REPTILE, *DIPLOMETOPON ZARUDNYI* (SQUAMATA) AND STUDY OF THE HISTOLOGY AND PAS-REACTION IN ITS LIVER AND KIDNEY *

By

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ABSTRACT

The antomy of *D. zarudnyi*, which is common in the Qatari environment was described with special reference to the arrangement and shape of the internal organs. The left lung was found larger in size with about four folds, compared to the right lung. The gut was found generally straight or slightly folded. Transitions from the oesophagus, stomach, small and large intestine and cloaca were in the form of just swelling or narrowing.

Unlike mammals, non lobules were observed in the liver. It was found to be composed of hepatocytes surrounding blood sinusoids. The walls of the sinusoids are of two cells thick and the adjacent hepatocytes are held together by the tiny bile channels. The liver capsule, ductules and cell surfaces lining the sinsuoids exhibited a moderate polysaccharide content.

The metanephric kidney was typically formed of renal capsules and nephric tubules which are divided into proximal, intermediate and distal tubules without distinct cortex and medulla like mammals. The proximal tubules were lined with brush-border cuboidal or low columnar cells while the intermediate segment was of thin ciliated cells, and again cells lining the distal tubules were cuboidal with a few or without microvilli. The parietal walls of the renal corpuscles were of simple squamous epithelium. The proximal tubules showed slight polysaccharide content. The anatomy of *D. zarudnyi* showed a classical model of almost a straight reptilian gut. The structure of the liver and kidney of *D. zarudnyi* confirms the role metabolic and water conservation mechanisms of reptiles.

INTRODUCTION

Reptiles of Qater peninsula were recorded *(Mohammed, 1988)* without an extra anatomical study. *Al-Thani, and El-Sherif (1996)* studied some histological and histochemical characteristics on the digestive tract of the worm-like reptile *D. zarudnyi* which is known as "Nadus" as common name in Qatar. *D. zarudnyi* is a worm-like reptile classified at one time with the lizards but now generally given subordinal rank within the squamata in

* This work was made possible by a grant HE-45/95 from Scientific and Applied Research Center (SARC), University of Qatar.

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12-(822/97)

Egypt. J. Anat., Vol. 21 (2), 125-138, July 1998

ISSN 1110-2144

HISTOLOGICAL STUDIES ON THE GASTROINTESTINAL TRACT OF THE SNAKE, *CERESTES VIPERA*: A NEW LOCAL RECORD IN QATAR*

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INTRODUCTION

Qatar peninsula is almost pale desert in the northwest Arabian Gulf and approaching the sea level in most directions. Reptiles in Qatari fauna had been recorded once by **Mohammed (1988)**, at which the horned snake, *Cerestes cerestes* was recorded. **Elssa and El-Assy (1975)** studies the distribution of reptilian species in an other state, Kuwait, in the north Arabian Gulf. They recorded both the horned snake, Cerestes cerestes and the non-horned snake *Cerestes vipera* as well.

Earlier, other authors described the distribution of reptiles in the neighbouring regions of Qatar, namely Arabia, **(Anderson, 1889; Hass, 1957, 1961; Corkill & Cochrane, 1966; Hass & Weerner, 1969)**, in Eastern Arabia **(Mandaville, 1965)**, in Northeastern Arabia **(Mandaville, 1967)**, in Abu-Dhabi **(Leviton & Anderson, 1967)** and later in Bahrain **(Summer, 1954; Gallagher, 1971)**.

Reptiles have been attracting the attention of many investigators mostly as

KAY WORDS: Snake - Gastrointestinal tract- Histology - PAS+ve materials- Feeding mechanism.

* The work was supported by a grant HE 45/95 by Scientific and Applied Research Center (SARC), University of Qatar.

Egypt. J. Anat., Vol. 21 (2), 173-183, July 1998

ISSN 1110-2144

HISTOLOGICAL AND PAS-REACTION STUDIES IN THE LIVER AND KIDNEY OF THE SNAKE *CERESTES VIPERA* (OPHIDIA, VIPERIDAE)*

By

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INTRODUCTION

Although the basic and the functional mechanisms of both liver, in digestion, and kidney in excretion are now well understood in higher vertebrates with special interest to mammals, these investigations are often rare in lower vertebrates specially in reptiles. Snakes represent a group of reptiles at which its bioactivities are almost still not so clear except on the level of venom-related studies.

The non-horned snake, Cerestes vipera was firstly recorded in Qatar by **Al-Thani (1998)** and the functional histology and the distribution of the PAS-positive materials in the digestive tract of the snake were discussed. The relation between the feeding mechanisms in one side and both the histological structure and PAS-positive materials on the other side was established.

Liver plays a central role in digestion, partly as secretory mechanisms for fat digestion and also as a store for carbohydrates. Liver also converts proteins into fats or carbohydrates. It releases nitrogenous wastes which are transported into kidneys for elimination. Liver is also involved in removal of RBCs and elaborating of the yolk necessary for the growing eggs (**Hildebrand, 1988**).

However, kidney was reported as being the main pathway for removal of the nitrogenous wastes of protein digestion and also for excretion of other harmful materials resulted after the metabolic activities. It was also stated that it eliminates a controlled amount of water and salts (**Hildebrand, 1988**) for maintaining an

* The work was supported by a grant HE 45/95 by Scientific and Applied Research Center (SARC), University of Qatar.

(٧) السحالي الراقية مثل " الدفان " رصد منها أكبر عدد من السحالي، وذلك يكمل السلسلة التطورية لهذه الأنواع.

(٨) الحلقة التطورية بين السحالي الراقية والثعابين البدائية وتسمى " الزواحف شبيهة الديدان " ظهرت أيضا مثل " النادوس "، ولم ترصد أية سحالي سامة.

(٩) سبعة ثعابين برية تم رصدها بالإضافة إلى ثلاثة ثعابين بحرية ومن بينها أخطر الأنواع السامة في قطر، كذلك يوجد من الثعابين السامة الخطيرة " الحية المقرنة و الحية القرعاء " وتعيش في الرمال, أما الثعابين الصحراوية فهي إما أقل سمية أو غير سامه على الإطلاق بالرغم من أحجامها الكبيرة وأشكالها المخيفة.

(١٠) تكمن الخطورة في البحر والكثبان الرملية ، وخاصة أن سكان المنطقة قد إعتادوا علي قضاء أجازاتهم في " البر " أو " البحر" خاصة أن الفرق بين الثعابين البحرية من الزواحف، وبين ثعابين السمك لا يمكن تمييزه لغير المتخصصين.

توجه الدراسة توصية بضرورة الحذر أثناء إرتياد تلك المواقع مع الحفاظ على تلك " الثروة " من التنوع البيئي الحيوي والتي مازالت غنية بأنواعها ، كحلقة هامة من الناحية البيئية من مظاهر التنوع الحيوي في قطر.

* * * * * * * *

***** النتائج:**

تم خلال هذه الدراسة، حصر **" ثلاثة "** من **السلاحف** التي تمثل الزواحف القديمة وكلها من السلاحف البحرية، وكذلك **" ١٦ "** نوعاً من **السحالي والبرصيات** ، في حين تم حصر **" ١٠ "** من أنواع **الثعابين البرية والبحرية** من بينها **إثنين** من **الثعابين** أحدهما بري والآخر بحري تم تسجيلها وتعريفها محلياً **لأول مرة**، كم تمت الدراسة النسيجية لنوعين منها ونشرت نتائجها في مجلات علمية متخصصة مدرجة في قائمة المراجع المرفقة، وبذلك وصل **مجموع عدد أنواع الزواحف** في قطر إلى **" ٢٩ "** نوعاً خلال هذه الدراسة.

****** الخلاصة:**

(١) إتفقت نتائج هذه الدراسة مع نتائج الدراسات القليلة السابقة وزادت عليها كما ونوعا مما يمكن تفسيره على أساس التشابه المناخي والبيئي بين دول المنطقة.

(٢) وجود أنواع من السلاحف البحرية ربما يؤكد ظهور الحياة القديمة في المنطقة حيث أن تلك الزواحف ظهرت أولا في العصر الكربوني [حوالي ٢٦٠ مليون سنة].

(٣) لم تمثل التماسيح لأنها غالبا تعيش في الأنهار العذبة ، وكذلك لم تمثل الديناصورات لإنقراضها بصورة عامة.

(٤) الأبراص ظهرت بما يتلائم مع قدرة أنواع هذه الأنواع الهائلة علي التكيف مع مختلف الظروف البيئية من الصحاري إلي المناطق الممطرة.

(٥) السحالي الكبيرة تم رصدها أيضا وأشهرها " الضب " الذي يعتبر أكثر الأنواع شيوعا على المستوى الشعبي.

(٦) النوع الوحيد في فصيلته، وهو " الورل " تم رصده أيضا بالرغم من صعوبة رصده في مناطق عديده في العالم لكونه النوع الوحيد.

** الصفات العامة للزواحف:

تعتبر الزواحف أول الكائنات التي سكنت الأرض بصفة أساسية حيث تسبقها الأسماك والبرمائيات، وتليها الطيور والثدييات، كما أن لبعضها أطراف قوية مثل التماسيح، وللبعض الآخر تكون الأطراف ضعيفة أو ضامرة مثل السحالي أو تختفي على الإطلاق كما في الثعابين. كذلك، تتباين في أحجامها وأطوالها بين حوالي ٤ سنتيمترات مثل بعض البرصيات؛ وقد تصل إلى حوالي ١٤ مترا مثل التماسيح والثعابين والحيات العملاقة. أما أوزانها، فقد تتراوح بين جرامين فقط مثل البرص الأمريكي، وأكثر من ٦٠٠ كيلوجرام مثل بعض السلاحف. كما أنها قد تعيش لأعمار طويلة إذا لم تهاجمها أعدائها مثل السلاحف التي قد تعيش لمدة ٢٠٠عام .

تتميز السحالي والثعابين بظاهرة " الإنسلاخ " حيث تتخلص من الطبقة الخارجية للجلد وتنشأ طبقة جديدة تناسب معدلات النمو المتزايدة. كما أن درجة حرارة أجسامها تتغير لتلائم الظروف المناخية المحيطة وبعضها يتحمل الجليد والبعض الآخر يعيش في بيئة درج الحرارة فيها قد تصل ٤٧ درجة مئوية، أما أكثر من ذلك فإنها قد تغير ألوانها أو تختفي في جحورها. بعض الزواحف يمكن أن يرى بينما البعض الآخر يستخدم العين في تقدير المسافات فقط. تتميز حاسة السمع بالقدرة على قياس الموجات الصوتية ذات التردد المنخفض خاصة الأنواع العمياء منها. وليست كل الزواحف سامة ولكن هناك نوعين فقط من السحالي وحوالي ٨٠٠ نوع من الثعابين من أصل ٢٥٠٠ نوعا منها.

وتهدف هذه الدراسة ، في الجزء الأول ، إلى تكوين " سجل شامل " لأنواع الزواحف لأول مرة في قطر؛ ودراسة التركيب النسيجي لأعضائها ومدى ملائمتها لمختلف ظروفها البيئية والمعيشية. أما الجزء الثاني ، سوف يتضمن دراسة المحتوى الإنزيمي لأنسجتها مع التغيرات المناخية أثناء الفصول المختلفة في البيئة. إلا أن توفير "صياد محترف" لجمع العينات بصفة دورية طوال العام سوف يساعد الباحثين في إستكمال هذا البحث.

VII- Arabic summary

الملخص العربي

*** مقدمة:**

تتناول هذه الدراسة والتي تجرى لأول مرة، على هذا المستوى، في دولة قطر عملية رصد علمي لأنواع طائفة الزواحف والتعرف على صفاتها ومتطلباتها البيئية حيث أن تلك المجموعة تمثل حلقة هامة من حلقات النظام البيئي كأحد مظاهر التنوع الحيوي في شبه الجزيرة القطرية والتي ، وكذلك جزيرة العرب ومنطقة الخليج بصفة عامة، تتميز بكونها صحراء منبسطة غالباً مع نسبة محدودة من الغطاء النباتي.

وبالرغم من الدور البيئي الحيوي للزواحف، إلا أنها لم تلق الإهتمام البحثي المناسب حتى على المستوى العالمي؛ ولكن، كانت هناك بعض الدراسات المحدودة تناولت فقط عملية " رصد " للأنواع فقط في بعض دول المنطقة مثل قطروالكويت والبحرين والإمارات والسعودية؛ دون أن تكون دراسة شاملة متكاملة ولم تتضمن، في معظمها، حتى صورة لكل نوع منها ولكن كانت العملية مجرد قائمة بالأنواع التي تم رصدها، لكنها في مجملها كانت خطوة جيدة ورائدة في هذا الإتجاه ويجب أن تتبعها خطوات ودراسات شاملة ليست على مستوى الزواحف فقط ولكن اتكوين قاعدة معلومات بيئية متكاملة، نأمل أن تكون على مستوى كل دول المنطقة.

ونظرا لسهولة التعامل مع السحالي، مثل " الضب "، فقط لافت إهتمام سكان المنطقة وقد تستعمل كغذاء أو في الطب الشعبي قديما كما تعايشوا معها بصورة طبيعية على العكس من الثعابين والحيات التي يصعب جمعها كما أن لبعضها خطورة معلومة للسكان، ولكنها تبقى جزءا من التراث في البيئة البرية والصحراوية.

{ شكر خاص }

يتقدم الباحثان بوافر الشكر والتقدير إلى **سعادة الدكتور / عبد الله بن صالح الخليفي** ، مدير جامعة قطر **وسيادة الدكتورة / شيخة عبد الله المسند** ، نائب مدير الجامعة للبحوث وخدمة المجتمع ، كذلك إلى **السيد الدكتور / عبد الله حسين الكبيسي**، عميد كلية العلوم لتوفير الظروف والإمكانات والتشجيع على إنجاز هذا العمل . الشكر موصول **للأستاذ الدكتور / إبراهيم صالح النعيمي** ، مدير الجامعة السابق لدعم سيادته لهذا العمل منذ بدايته، ولم يكن لهذا العمل أن يظهر للوجود لولا الدعم المستمر والمثمر بمختلف صوره من قبل **السيد الدكتور / حميد عبد الله المدفع** ، مدير مركز البحوث العلمية والتطبيقية بجامعة قطر، كما نتوجه بالشكر للسيد / أحمد عبد العزيز، مسئول التصوير العلمي بمركز تكنولوجيا التعليم – جامعة قطر؛ لإعداده الصور الخاصة بالعينات بكل كفاءة وإمتياز . جزيل الشكر لكل الفنيين والإداريين بمركز البحوث وكذلك مختبر الأنسجة بمستشفى حمد العام للمعاونة في إنجاز هذه الدراسة.

(SARC)

رصد وتسجيل طائفة الزواحف في البيئة القطرية ودراسة التركيب النسيجي والمحتوى الإنزيمي لأعضائها وعلاقته بالتغيرات البيئية

تقرير عن الجزء الأول من المشروع رقم

HE - 45/95

مركز البحوث العلمية والتطبيقية

الدكتور/ جمال الشريف الدكتورة/ عائشة سعود آل ثاني

جامعة قطر

أكتوبر ٢٠٠٠م

رصد وتسجيل طائفة الزواحف في البيئة القطرية
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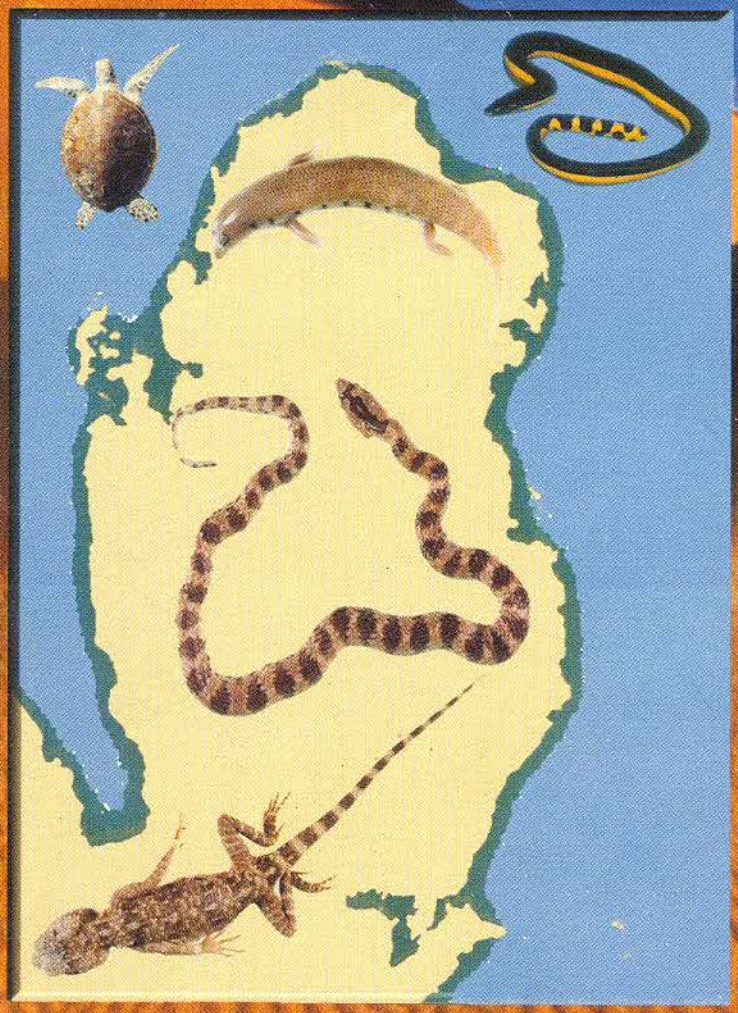

تقرير عن الجزء الأول من المشروع رقم :

HE / 45 / 95

الدكتور / جمال الشريف و الدكتورة / عائشة سعود آل ثاني

مركز البحوث العلمية والتطبيقية

جامعة قطر

أكتوبر ٢٠٠٠