

## Study of Population Status and Natural History of Agamid Lizards of Karachi

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**Abstract:** The present study included the current population status and natural history of Agamids lizards of three districts (East, South and Malir) of Karachi. Investigation was carried out on the physical characteristics of the selected areas and its lizard fauna. During the present study 215 lizards were captured belonging to family Agamidae. Captured lizards were 187 Indian garden lizard (*Calotes versicolor*) 102 males and 85 females and 28 Indian spiny-tailed lizard (*Uromastix hardwickii*) 17 males and 11 females. The *Calotes versicolor* has been recorded as common agamid in the three districts of Karachi. The brilliant agama (*Agama agilis isolepis*) was not found during the study from August 1999 to July 2002 in the three districts of Karachi. In Pakistan *Uromastix hardwickii* is an endangered species and is already included in the IUCN Red List and CITES Appendix. Present study also recorded that *Uromastix hardwickii* as threatened species in the three districts.

**Key words:** Agamids lizard, current population, Karachi

### INTRODUCTION

Today reptiles are barely in a position to make us aware that the reptiles of prehistoric times produced the largest animals ever to walk upon the earth. From the evolutionary history of reptiles, with originally twenty orders, only four orders with around six thousand species still survive. The conservation of reptiles has been receiving considerable attention in recent years. But for the most reptiles, as with the majority of other animals, ultimate survival will depend not on legal protection but on survival of the environment in which they live. The Lizards perform a service consuming significant amounts of small insects and important part of our biodiversity. Internationally 25% of reptiles are listed as threatened<sup>[1]</sup> as a result of human activities including destruction of habitat, increase of human population and use of agriculture pesticides. In Pakistan 179 taxa of reptilian fauna consisting of lizards, snakes, turtles, tortoise, crocodiles and gavels have been recorded<sup>[2]</sup>. The family Agamidae contains two subfamilies, approximately 52 genera and more than 350 species. The agamids are a diverse group of lizards that represent a variety of life history strategies. Among their ranks are terrestrial, tropical forest dwellers; terrestrial desert dwellers and semiaquatic forms that use water as a refuge. Some work has been done by Smith<sup>[3]</sup>, Minton<sup>[4,5]</sup>, Martens<sup>[6]</sup>, Khan<sup>[7]</sup>, Ghalib *et al.*<sup>[8]</sup>, Khan and Mirza<sup>[9]</sup>, Khan and Mirza<sup>[10]</sup>, Baig<sup>[11,12]</sup>, Auffenberg and Rahman<sup>[13]</sup>, Baig and Bohme<sup>[14]</sup>, Rahman and Iffat<sup>[2]</sup>, Khan<sup>[15,16]</sup> and Nazia<sup>[17]</sup>. Some other works also reported with reference to effect of pesticides

on reptiles and amphibians of Karachi by Khan<sup>[18]</sup>, Khan and Fatima<sup>[19]</sup>, Khan *et al.*<sup>[20]</sup>. Today, we are unaware of status of agamids lizards and factors which are affecting the population of lizards of Karachi. During the present study, the current population status of agamids lizards in the three districts of Karachi was investigated.

### MATERIALS AND METHODS

During the present study all specimens were captured along the edge of plants to obtain the individual by hand. Photographs and notes of local habitats of study area were made. During the period of study temperatures were taken at different intervals. These included aerial and soil and underside of bushes. Binoculars were used for spotting lizards some distance away or high up in trees, especially for Indian garden lizards (*Calotes versicolor*), burrowing lizards were found by digging in loose soil.

For collecting more secretive diurnal lizards, rocks, logs and other debris on the ground were turned over. This attempt also proved to be successful because most of them hide in the daytime to avoid the heat of the sun. Some of the specimens were taken for identification and study in the Laboratory of the Wildlife and Fisheries, Department of Zoology, University of Karachi, Karachi. For each specimen captured in the field the total length and especially the snout-vent length and tail length were measured. Measurements were taken with flexible tape in millimeters. The time of the day that each lizard was caught was noted. Finally injecting a solution of 10%

formalin preserved the specimens. Tags with the registration number and the names of the specimens were tied to the limbs. The study areas were visited from 9:00 am to 5:00 pm. It was recorded that the lizards come out in the early morning between 10:00 am to 1:00 pm and late afternoon between 4:00 pm to 6:00 pm (during the end of March to end of September), while from October to early March come out between 11:00 am to 1:00 pm. In the afternoon the frequency of the movement of the lizards become low due to the high temperature.

## RESULTS AND DISCUSSION

Several field methods were utilized to evaluate the presence or absence of lizard species in the three districts Malir, East and South of Karachi. During the present work 215 lizards were captured belonging to family Agamidae. Captured lizards were 187 Indian Garden Lizard (*Calotes versicolor*) 102 males and 85 females and 28 Indian spiny-tailed lizard (*Uromastix hardwickii*) 17 males and 11 females. The *Calotes versicolor* has been recorded as common agamid in the three districts of Karachi, while the Indian spiny-tailed lizard (*Uromastix hardwickii*) have been recorded as threatened species. The brilliant agama (*Trapelus agilis isolepis*) was not found during the study from August 1999 to July 2002 in the three districts of Karachi.

### Natural history

**Genus calotes:** This genus is represented by agamids. Only one species is found in Pakistan.

### *Calotes versicolor* (Daudin) Indian garden lizard

**Distinguishing characters:** Head large, markedly swollen at angle of jaw in males, *Canthus rostralis* present, eye large, but opening small and almost horizontal, tympanum about diameter of eye opening, males with gular sac, limbs long, well developed, digits long, slender, slightly compressed laterally, terminating in strong claws, tail almost round, slender, filiform, its length 232-285% of snout-vent length. Head scales irregularly arranged, juxtaposed, 10 to 13 upper and 11 to 14 lower labials, body scales keeled, imbricate, with more or less pointed tips, in 37 to 47 (mean 41.8) rows at mid body, a crest of 41 to 49 lanceolate spines from occiput to base of tail, more prominent in males. Dorsal colour light sandy or olive through shades of brown to sooty gray depending on metachroic change, usually a sequence of light transverse bars and light dorsolateral stripes, more marked in juveniles, head and shoulders of males suffused with

orange or dull red, throat and chest orange to red, with black mottling, belly whitish, with dark streaks.

**Habits and habitats:** They climb with great agility, often jumping from branch to branch. The toes are prehensile, and the long tail is used for balancing. They hide behind stems or branches, flattening the body laterally until they are almost invisible. When sleeping or basking, they usually lie with the body closely pressed against a stem. The adults may climb 20 feet or so to station themselves on the top of a tree or bush. The period of activity in warm weather extends from dawn to shortly after sunset, but they are most active 2 -5 h after sun rise.

Garden lizards feed on spiders and various kind of large diurnal insects such as grasshoppers and butterflies. The domestic cat is an important predator on these lizards in cities. From late April through June, the males show brilliant color and quite aggressive toward other males. This basically arboreal lizard occurs wherever there are trees or shrubs. While it tolerates considerable aridity, it is most abundant in mesic situations such as the low land along streams, desert oases and city gardens. Although quite at home on the ground, these lizards are more often found in shrubs or tangles of vines. In cooler weather they spend most of the time in piles of decaying vegetation, hollow logs, or beneath stones. Even in winter, however, the young and half grown individuals emerge about midday to bask an hour or two.

**Distribution:** The range of the species extends from Sumatra to South China and west through nearly all of India and Ceylon. It is common and generally distributed through Sindh and the Punjab northward to Swat and Southern Afghanistan. In Baluchistan its distribution is decidedly spotty and confined to oases and margins of water courses.

## GENUS UROMASTIX

### *Uromastix hardwicki* (Gray): Indian Spiny Tailed Lizard

**Distinguishing characters:** Head small and chunky, snout blunt, eye small, ear opening a vertical slit as large as eye, its anterior border denticulate, body dorsoventrally flattened, a prominent fold from behind ear over shoulder to flank, limbs short and stout, toes fringed with pointed scales, tail broad, heavy, tapering evenly, its length 69-79% of snout vent length. Head scales small, irregularly arranged, 11-13 upper and 12-14 lower labials, body scales minute, granular above, quadrangular and

imbricate ventrally, femoral pores present in both sexes, combined count 29-38, large spine-like scales on posterior aspect of thighs, scales of tail in annuli, those on dorsal and lateral aspects enlarged, forming short, heavy spines, numbering 17-22 in basal annuli. Adults dull sandy, yellowish, khaki or brown, with darker reticulation, throat white, with dark spots, belly white, a blue black spot in groin. Young brown to khaki, with numerous black spots that tend to fuse on sides, sides of head and shoulders mottled with white.

**Habits and habitat:** They feed on grass, flowers and leaves and as juveniles on insects as well. Desert dwellers such as the spiny-tailed lizards must become specially adapted to the rigors of their environment, for the possibility of overheating or desiccation is of course particularly great. Although the spiny-tailed lizard can survive at body temperatures as high as 47°C, the mid day heat in summer forces them to withdraw into crevices as much as 1 m deep. In March or April, when the reproductive season begins, they reappear and spend the whole day in the relatively mild sunshine. The variable color of the skin and certain sun-oriented behavioural mechanisms enable the spiny-tailed lizards to control quite reliably the amount of radiation they absorb. Early in the morning the animals are usually very dark, so that they absorb a great deal of radiation.

When the body temperature rises, the light pigment cells (yellow or orange) in the skin spread out to increase the amount of light reflected, and the lizard adjusts its posture so as to make the exposed surface area as small as possible. When the body temperature exceeds 42°C the rate of respiration is suddenly increased, the lizard opens its mouth and the greater ventilation of the lungs cause more water to evaporate, further cooling the body. When it is very warm, one can see regular crusts of salt forming around the nostrils. Finally, the spiny-tailed lizard has stores of subcutaneous fat, whose metabolism also provides water. The spiny-tailed lizards are very frugal with their water, for they can obtain it only from the sparse plant growth that serves as their food. They are found in grassland of Pakistan and western India. According to Minton<sup>[4,5]</sup>, the spiny-tailed lizard of southern Asia occupies about the same habitat (that is, the same ecological niche) as burrowing rodents do elsewhere. Indian spiny-tailed lizards live in loose associations, each adult male having a burrow to himself. They dig the holes themselves and close the semicircular opening from within with loose earth. Initially the passage runs steeply downward for about 30 cm and then it

continues horizontally for a few meters, there are small lateral passages, at the end of which the female lays as many as fourteen eggs, with thin, parchment like shells. They are laid from April until June. After hatching, the young lizards remain for a while in the same burrow with their parents.

**Distribution:** The Indian spiny-tailed lizard occurs from the united provinces of India to Kathiawar and west to the northwest frontier provinces and southeastern Baluchistan. West Pakistan records are confined mostly to that part of the province east of the Iranian plateau and below 1,500 feet in elevation. In Sindh, Kirthar National Park, Sukkur and Khairpur desert area, Manghupir area, Karachi, Multan in Punjab.

## DISCUSSION

Ghalib *et al.*<sup>[3]</sup> reported that the Brilliant Agama (*Trapelus agilis isolepis*) found in Karachi region, but in the present study (August 1999 through July 2002), brilliant agama was not found in the three districts of Karachi. After nearly 23 years due to destruction of habitat, increase of human population and increase of traffic in Karachi, *Trapelus agilis isolepis* is threatened or has gone extinct. Khan<sup>[21]</sup> studied the diurnal lizards of Karachi University campus and Malir Karachi and reported that the status of Indian Garden Lizard (*Calotes versicolor*), Bronze grass skink (*Mabuya macularia*), striped grass Skink (*Mabuya dissimilis*) are common in the University campus and Malir, while the Indian spiny-tailed lizard (*Uromastix hardwickii*) have been recorded as threatened species and Brilliant Agama (*Trapelus agilis isolepis*) was not recorded in the University campus and Malir. The present findings are generally in accordance with the Khan<sup>[21]</sup> reports. *Uromastix hardwickii* (Indian spiny-tailed lizard) is an endangered species and is currently included in IUCN Red List and CITES Appendix. The results of this study indicate that the current status of agamids lizards, Indian Garden Lizard (*Calotes versicolor*) is common in the three districts of Karachi Malir, East and South, while the Indian spiny-tailed lizard (*Uromastix hardwickii*) have been recorded as threatened species. Ghalib *et al.*<sup>[3]</sup> reported that the Indian spiny-tailed lizard (*Uromastix hardwickii*) has been common but today this species is threatened species in Malir, East and South districts of Karachi and in decline. Ghalib *et al.*<sup>[3]</sup> collected Brilliant Agama (*Agama agilis isolepis*) from Karachi region but in the present study, Brilliant Agama was not found in the three districts of Karachi. Nearly after 23 years due to

destruction of habitat and increase of human population in Karachi *Agama agilis isolepis* is a threatened or has gone extinct or has been shifted to other habitat near the Karachi city areas.

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