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11. A NOTE ON *TESTUDO HORSFIELDI* GRAY, THE AFGHAN TORTOISE OR HORSFIELD'S FOUR-TOED TORTOISE

Five hatchlings of this species were picked up in the summer of 1967 in Baluchistan. I have kept them on the earth floor of a rather spacious aviary in the Punjab, since that date.

Some of my observations on their behaviour do not appear to have been recorded hitherto.

Description

It is a relatively robust and purely terrestrial tortoise, distinguished from other species of the genus by having only four instead of five claws on the fore feet.

The tail in male specimens appears slightly longer than those of the females, and also the concavity in the posterior region of the plastron is more marked and clearer than is the case with females. However, I have not recorded sufficient measurements to substantiate this impression. In both sexes the tail terminates in a horny nail, which is again, slightly longer in that of the males.

The carapace is markedly flared along its posterior edges, so that its width at the broadest point, just anterior to the hind legs, is roughly ninety percent of its length. Minton (1966) records carapace length in adults from 170 mm to 208 mm. In March 1974 I came across two particularly massive specimens in the Sorkhab valley of Pishin District, Baluchistan. One, which appeared to be a female measured approximately 220 mm carapace length and the other was approximately 210 mm.

Distribution

Murray (1884) recorded them as occurring in the Lakhi Hills of Sind but there is no recent evidence of its occurrence east of Baluchistan. It is still fairly plentiful in that Province, at elevations between 5000 up to 7000 feet. I have found it as low as 3000 feet in the Chagai District, near Anam Bostan. It extends northwards into southern Waziristan, specimens having been collected from Wano (Smith 1931). Elsewhere it occurs in Afghanistan, Kazakhstan in the USSR, and in northern Iran, westwards to the shores of the Caspian (Minton, op. cit).

Growth Rate

Minton (op. cit) records a hatchling given to him in August, having a carapace length of 51 mm. Three years later it had grown to

70 mm. I picked up a hatchling in March in Baluchistan, in which the plastron was still quite soft and pliable. It measured 50 mm carapace length and 46 mm width anterior to the hind legs. Another captive born hatchling (described below) measured 49 mm carapace length.

The five young tortoises which provided most of the data for this note measured from 56 to 58 mm carapace when given to me in October 1967. Having been picked up in Baluchistan during the earlier part of summer, I presumed them to be between three and six months old at that time. They are now eight years old and measure from 172 to 181 mm in carapace length. Growth in the intervening years certainly appeared more rapid to my casual observation, that I would have anticipated. A relatively generous diet, available in captivity, may not be significant since they are only active and feeding for about five months in a year.

Habits

My captive specimens bury themselves completely from about mid October until early March. I have recorded emergence on March 2 and March 15 in different years. Even when they are not in physical proximity (one individual having buried itself in a separate corner of the enclosure), it is significant that all five emerge within 24 hours of each other. Aestivation occurs throughout June, July and the early part of August (in the Punjab), even when plentiful drinking water and forage is daily provided.

During their active periods, they feed mostly in the early morning and late afternoon, partially burying themselves during the heat of the day under any convenient object. In the wild they burrow into old rodent holes or underneath overhanging stones. The many wild specimens I have encountered, appeared quite wary and they can move relatively quickly if they want to conceal themselves. They are capable of climbing very steep hillsides and move with their plastron carried well clear of the ground.

Breeding Behaviour

When they first emerge in March all the captive tortoises are very active roaming round and round their enclosure. It is believed that the males at this time are seeking females. I have often encountered two and three tortoises in close proximity during March, in Baluchistan. When they encounter another tortoise they approach it directly until a few inches away. Then withdrawing the head and neck, they almost run forward, and by raising the forelegs, endeavour to tip over the other tortoise. I observed this reaction when both males and females are encountered, but presumably females do not retaliate by attempting to push over their opponent, and this agonistic behaviour is the only manner in which the males determine the sex of the encountered individual (Carr 1968). I have seen tortoises successfully turned up-

side down on several occasions as a result of these "shoving matches" but was always surprised to see how the victim was able to obtain enough purchase with one wildly waving hind leg, to right itself unaided, especially if the ground was a little uneven. Frank Finn (1929) described similar behaviour in the Indian Starred Tortoise (*Testudo elegans*) though this has not previously been recorded for *T. horsfieldi* to my knowledge. It may well be a common courtship behaviour pattern with the genus.

The Starred Tortoise, a typically oriental faunal species, is sexually active at the onset of the rainy season in early August, whereas the Afghan tortoise confines its sexual activity to March so that this may be termed the rut season and is fairly typical of many hibernating Palaearctic mammals, also.

In their sixth year of age in late March, I observed attempted copulation, but no eggs were laid. In their seventh year, on March 22, 1973 I observed apparently successful copulation which lasted for about six minutes. The male stood almost vertically on his hind legs with the head and neck bent at right angles, and during this time he emitted faint but clearly audible squeaking noises at intervals of about half a second. This is the only occasion that I have ever heard vocalizations though Annandale in Smith (1931) remarks that "when eating or drinking, it occasionally emits a low croak like a frog".

By chance, I was home from the office in mid-morning on April 25 of the same year, when a female was observed digging a nest hole. She used only her hind feet, scrapping backwards with vigorous actions. When discovered, the hole was about five inches deep and practically completed. In it, she laid only two eggs. Each was surprisingly large (considering the size of the mother) and almost spherical. I did not measure these but estimated them to be fractionally under the size of a ping pong ball (which has a diameter of 35 mm). Dr. Minton (op. cit) gives the dimensions of one egg as 41 mm by 28 mm and Smith (op. cit) records a female killed, containing five fully formed eggs, which measured 50 mm by 35 mm. From the time of laying the first egg till covering and tamping down the excavation, took hardly twenty minutes. From these two eggs, which I made no attempt to disturb, one tortoise hatched on July 10, 1973 (76 days after egg laying). Unfortunately it appeared to have died of dessication when it was discovered by my Mali (gardener) two days later.

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12. THE OLIVE KEELBACK (*ATRETIUM SCHISTOSUM* RUSSELL) FEEDING ON MOSQUITO LARVAE

At the Madras Snake Park several local species of snakes are kept in a large natural-foliage enclosure surrounded by a 4 ft cement wall and moat. Frogs, mice and lizards are put in as food but the Olive Keelback supplements its diet by actively hunting and feeding on mosquito larvae, probably *Culex* sp., average length 10 mm. We observed 300 mm long keelbacks swimming slowly along the smooth, algae choked bottom and sides of the water moat. Occasionally lowering or bending its head to the side while swimming, the snake disturbed the algae and invariably several larvae would shoot out in their odd jerky way. The Keelback would then grab at the larvae with its characteristic sideways bending jab we have observed it using on frogs. The larva is swallowed with a few quick 'chews'. One specimen observed continuously for 25 minutes caught an average of 17 larvae per 5 minute period and we estimated that only 10% of the snake's jabs were failures. Larger specimens (i.e. females) have not been observed catching larvae.

Considering bio-mass, this feeding behaviour seems a bit impractical. There are other snakes which regularly feed on invertebrates but usually it is of a more logical size relationship, for instance, the Saw-scaled Viper (*Echis carinatus*) feeding on the large black scorpion *Heterometrus* sp. The snakes observed were not in an emaciated state so we consider this to be the normal feeding behaviour of the Olive Keelback, exhibiting a modified frog hunting technique combined with very good close vision and accuracy. Very little is known about the feeding habits of Indian serpents.

MADRAS SNAKE PARK,
GUINDY DEER PARK,
MADRAS-22,
June 29, 1973.

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