Rec. zool. Surv. India, **80** : 85-106, 1982

TAXONOMIC AND ECOLOGICAL STUDIES ON THE REPTILES OF GUJARAT

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(With 1 Plate and 5 Tables)

INTRODUCTION

The present work is based on the collection made from 60 localities in Gujarat by the Zoological Survey of India during 1964-1975. The material consists of 246 examples belonging to 29 species (2 testudines, 14 lizards and 13 snakes) distributed in 23 genera and 12 families. The variability and difference in means between the two sexes in scale characters of five species namely *Hemidactylus brooki* Gray, *Calotes versicolor* (Daudin), *Acanthodactylus cantoris cantoris* Günther, *Ophisops jerdoni* Blyth and *Ophisops microlepis* Blanford have been studied (Tables 1-5).

For related works on the subject references may be made to the publications of Stoliczka (1872), Murry (1884), Smith (1931, 1935 and 1945), McCann (1938), Daniel & Shull (1963), Minton (1966), Tiwari & Sharma (1970), Sharma (1971), Prakash (1973), Rao & Rajabai (1974), Indurkar & Sabnis (1976) and Sharma & Vazirani (1977). For each species, details of the material collected, some important measurements and the geographical distribution are given. Where necessary, taxonomic and ecological notes are given under each species.

SYSTEMATIC ACCOUNT

Class REPTILIA

Order TESTUDINES

Family TRIONYCHIDAE

Lissemys punctata punctata (Lacépède)

(Indian flap—shell turtle)

Material : 3 ex., Bhuj (Kutch Dist.) and Viramgam (Viramgam Dist.), collected in February 1966 and October 1964 by V. C. Agrawal.

Measurements : Carapace : length 215-240 mm., width 150-175 mm., depth 64-95 mm.

Distribution : Gujarat : As above and from Kutch.

Elsewhere : Indus and Ganga river systems from the North-West Frontier Provinces of Pakistan to Sikkim in India and Bangladesh.

Trionyx gangeticus Cuvier

(Indian soft-shell turtle)

Material : 1 ex., Malegaon forest (The Dangs Dist.) collected in February 1975 by T. G. Vazirani, a few hundred metres from a nallah.

Measurements : Carapace : length 221 mm., width 172 mm. depth 68 mm.

Distribution : Gujarat : As above (first record).

Elsewhere : The Indus, Ganga, Mahanadi, Krishna and their tributaries, North West Frontier Provinces and Sind in Pakistan, Nepal and Bangladesh.

Order SQUAMATA

Suborder SAURIA

Family GEKKONIDAE

Hemidactylus brooki Gray

(Spotted Indian house gecko)

Material : 73 ex., Bhuj (Kutch Dist.), Himmatnagar (Sabarkantha Dist.), Halol (Broach Dist.), Rajpipla (Broach Dist.) Ahwa (The Dangs Dist.), Vijarkhe (Jamnagar Dist.), Jamnagar (Jamnagar Dist.) Ranavav (Junagadh Dist.), Porbandar (Junagadh Dist.), Jafrabad (Amreli Dist.), and Rajkot (Rajkot Dist.), collected between January and November by V. C. Agrawal, R. N. Bhargava, T. G. Vazirani and R. C. Sharma.

Measurements : Snout to vent length 23-52 mm., tail length 27-59 mm *Variability* in meristic characters : (Table 1).

Distribution : Gujarat : As above (new locality records), Surat and Dangs. *Elsewhere* : Widely distributed in India, Sri Lanka, Pakistan, Burma, South China, West Indies, tropical Asia and northern half of Africa.

Remarks : Their food in Gujarat as evidenced by the study of gut contents comprises grasshoppers and their nymphs ; beetles and their grubs (family Scarabaeidae) ; dipterous insects ; cockroaches ; termites ; spiders ; crickets and their nymphs ; earwigs ; arthropod eggs ; moths, butterflies and their caterpillars ; ants (*Camponotus compressus* Fbr.) ;

TABLE 1. *Hemidactylus brooki* Gray — Biometrical constants (Statistical parameters) of certain body parts.

S. No	Characters	Number of Samples		Range		Mean ±	S. E.	C. V		't' value for Sex difference
		Male	Female	Male	Female	Male	Female	Male	Female	
1.	Number of dorsal rows of tubercles	36	39	16-20	16-20	17.02±0.16	17.12±0.20	5.52	7.24	0.39 ns
2.	Number of upper labials (Left)	36	40	8-11	8-11	9.33±0.14	9.45±0.13	8.87	8.62	0.64 ns
3.	Number of upper labials (Right)	36	40	8-11	8-11	9.33±0.12	9.55±0.13	7.68	8.85	1.22 ns
4.	Number of lower labials (Left)	36	40	7-10	7-10	7.89±0.11	7.92±0.13	8.45	10.03	0.18 ns
5.	Number of lower labials (Right)	36	40	7- 9	7-10	7.75±0.11	7.82±0.10	8.92	8.13	0.46 ns
6.	Number of lamellae under first toe (Left)	36	40	4- 6	4- 6	4.86±0.11	4.77±0.11	14.04	15.37	0.55 ns
7.	Number of lamellae under first toe (Right)	36	40	4- 6	4- 6	4.94±0.12	4.77±0.11	14.47	15.37	1.02 ns
8.	Number of lamellae under fourth toe (Left)	36	40	6-10	6-10	7.83±0.23	7.95±0.20	17.76	15.59	0.39 ns
9.	Number of lamellae under fourth toe (Right)	36	40	6-10	6-10	7.78±0.21	8.05±0.20	16.29	15.94	0.91 ns
10.	Number of femoral pores (Left)	36	N.A	8-15	—	11.19±0.29	—	15.38	—	—
11.	Number of femoral pores (Right)	36	N.A	8-15	—	11.25±0.33	—	17.44	—	—
12.	Standard length (mm.)	36	38	34-53	29-50	43.08±0.83	40.79±0.94	11.50	14.25	1.82 ns
13.	Tail length (mm.)	25	25	34-60	28-58	48.24±1.08	45.80±1.76	13.44	19.24	1.03 ns

N. A : Femoral pores are not available in females

ns : Not significant.

Hymenopterous insects ; scutigerans ; solifugids, bugs and their nymphs ; isopods ; gastropods (*Zotecus* sp.) and seeds of wild plants.

Many lizards from Porbandar and Rajkot were having two large oviducal eggs.

Hemidactylus leschenaulti Dumeril & Bibron

(Bark gecko)

Material : 2 exs., Malegaon forest rest house (The Dangs Dist.) collected in February 1975 by T. G. Vazirani.

Measurements : Snout to vent length 47-60 mm., tail length 43 mm.

Distribution : Gujarat : As above and Surat in southern Gujarat. *Elsewhere* : In India it has been recorded from Andhra Pradesh, Tamil Nadu, Kerala, Maharashtra, Rajasthan and West Bengal. Also available in Sri Lanka & Pakistan.

Remarks : The above lizards were hiding under the bark of a tree. The female had two large oviducal eggs. The male in the above collection differs from other Indian examples as it is having five lamellae under the first toe and 9 femoral pores (Vs. 10-17) on each side.

Hemidactylus flaviviridis Rüppell

(Yellew bellied house gecko)

Material : 1 ex. (♀), Halol (Broach Dist.), collected in January 1975 by T. G. Vazirani ; 2 exs. (both ♀), Okha (Jamnagar Dist.) and 1 ex. (♂) ; Rajkot (Rajkot Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 54-75 mm., tail length 64-78 mm.

Distribution : Gujarat : As above, Bhuj, Kutch, Surat and Dangs. *Elsewhere* : Whole of India but widely distributed in North India above 20°N. Also available in Arabia, Pakistan, Iran & shores of the Red Sea.

Remarks : In Gujarat its food as evidenced by the study of gut contents comprises black mole crickets, beetles, maggots, spiders and moths.

Family AGAMIDAE

Sitana ponticeriana Cuvier

(Sargota lizard)

Material : 21 exs., Junagadh (Junagadh Dist,), Godhra (Panchmahals Dist.), Ahwa (The Dangs Dist.), Somnath (Junagadh Dist.) and Rajkot

(Rajkot Dist.), collected between January, February, April and September 1969 and 1975 by D. S. Mathur, T. G. Vazirani, and R. C. Sharma.

Measurements : Snout to vent length 21-51 mm., tail length 34-97 mm.

Distribution : Gujarat : As above (new locality record), Kutch and Waghai. *Elsewhere* : Widely distributed in India, Sri Lanka and Thar-Parkar District of Pakistan.

Remarks : It is mainly a diurnal terrestrial lizard. At Junagadh a few examples were found inside a large termite mound at the depth of one metre, at Rajpipla one example was collected from the cracks in a wooden log, at Ahwa an example was collected from a nullah, at Somnath various lizards were hiding under a large stone surrounded by dense xerophytic vegetation, at Veraval many young ones were collected while they were chasing insects under the small green xerophytic bushes and at Rajkot these lizards prefer to live under the stones, surrounded by plenty of xerophytic vegetation.

The studies on its gut contents reveal that in Gujarat the species feeds on grasshopper nymphs, white ants, beetles, bugs, spiders, small red ants, arthropod eggs, dipterous maggots and fibres of wild plants. The presence of lizard skin and scales in the gut of various examples indicate that probably *Sitana ponticeriana* feeds on the lizards of its own or other kinds.

Calotes versicolor (Daudin)

(Indian blood sucker, Indian garden lizard)

Material : 19 exs., Palanpur (Banaskantha Dist.) ; Mehsana (Mehsana Dist.) ; Himmatnagar (Sabarkantha Dist.) ; Godhra (Panchmahals Dist.) ; Halol (Broach Dist.) ; Rajpipla (Broach Dist.) ; Malegaon Forest, collected from a burrow (The Dangs Dist.) ; Vijarkhi, Collected under stones (Jamnagar Dist.) ; Porbandar, collected from a thorny bush (Junagadh Dist.) ; Somnath (Junagadh Dist.) ; Jafrabad (Amreli Dist.) ; Girnar Hills (Junagadh Dist.) ; Junagadh (Junagadh Dist.) and Rajkot (Rajkot Dist.) collected in January, February, September, October and November by V. C. Agrawal, R. N. Bhargava, T. G. Vazirani and R. C. Sharma.

Measurements : Snout to vent length ♂ 78-119 mm., ♀ 64-114 mm. ; tail length ♂ 222-275 mm., ♀ 146-204 mm.

Variability in meristic characters : (Table 2)

Distribution : Gujarat : As above, Kutch and Ahwa. *Elsewhere* : Whole of India and Andaman Islands. Also available in Sri Lanka, Afghanistan, South China, Malaya Peninsula, Sumatra and Pakistan.

TABLE 2. *Calotes versicolor* (Daudin) Biometricala constants (Statistical parameters) of certain body parts

S. No.	Characters	Number of Samples		Range		Mean±S. E.		C. V.		't' value for sex difference
		Male	Female	Male	Female	Male	Female	Male	Female	
1.	Number of scales round the middle of body	8	10	38-44	35-46	40.88±0.66	40.30±1.00	4.61	7.85	0.42 ns
2.	Number of upper labials (Left)	8	10	12- 16	11-13	12.88± 0.48	11.70± 0.21	10·53	5.77	2.42 *
3.	Number of upper labials (Right)	8	10	11- 16	11-13	12.62± 0.53	11.50± 0.22	11.93	6.15	2.09 ns
4.	Number of lower labials (Left)	8	10	11- 13	10-13	12.00± 0.27	11.70± 0.33	6.30	9.05	0.67 ns
5.	Number of lower labials (Right)	8	10	10- 13	10-13	11.62± 0.37	11.40± 0.31	9.12	8.47	0.46 ns
6.	Standard length (mm.)	8	10	42-119	35-114	97.00± 9.20	66.10± 7.22	26.84	34.53	2.68 *
7.	Tail length (mm.)	7	9	108-275	82-204	220.71±20.41	155.67±12.68	24.46	24.43	2.79 *

ns—Not significant

* Significant at 5% level of probability.

Remarks : The study of the gut contents confirm that the food of this most common garden lizard consists of grasshoppers and their nymphs (Acrididae, Blattidae) ; butterflies, moths and their caterpillars ; ants ; beetles ; earwigs ; spiders ; centipedes and vegetable matter like grass, leaves, twigs of delicate plants and seeds. The observations further add in its diet like arthropod eggs, honey bees, small crustaceans (Conchostraca), bugs and dipterous maggots. Numerous stone particles of variable size were found in the gut of many examples. Many examples were highly infested with nematodes. The presence of maggots in the gut suggests that the lizard is a carion feeder also.

In a gravid female from Vijarkhe, eight large eggs (7-8.5 mm. long and 6-6.5 mm. wide) were found in the oviduct.

Calotes rouxi Dumeril & Bibron

Material : 1 ex. (♂), Malegaon forest (The Dangs Dist.) collected in February 1974 by T. G. Vazirani.

Measurements : Snout to vent length 71 mm., tail length 137 mm.

Distribution : Gujarat : As above (first record). *Elsewhere* : Maharashtra (Western ghats), Goa (Molem, Valpoi, Ponda, Canacona), Kerala (Travancore), Karnataka (Chikmaglur and Karwar) and West Bengal (Kalimpong).

Agama minor Hardwicke & Gray

(Small tailed Indian Agama)

Material : 1 ex. ♀, Veraval (Junagadh Dist.) collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 53 mm., tail length 45 mm.

Distribution : Gujarat : As above, Kutch and Kathiawar. *Elsewhere* : Uttar Pradesh, Madhya Pradesh and Pakistan (Sind).

Remarks : The food as evidenced by the study of stomach contents consists of grasshoppers and their nymphs (abdomen, thorax and head portions), earwigs (crushed body parts like abdomen, genetalia, thorax, head etc.), beetles (crushed body parts like elytra, abdomen and antena etc.), bugs (legs, scutilum, fore and hind limbs, head and other body parts), spider (crushed body parts like head, legs, abdomen), seven absolutely round arthropod eggs.

Family SCINCIDAE

Mabuya carinata (Schneider)

(Brahmini, Bronze spotted grass skink)

Material : 3 exs. (2 ♀ and 1 ♂). Ahwa (The Dangs Dist.), Vijarkhe (Jamnagar Dist.) and Girnar Hills (Junagadh Dist.), collected in February and September 1975 by T. G. Vazirani and R. C. Sharma.

Measurements : Snout to vent length 60, 100 and 102 mm., tail length broken, 155, 158 mm.

Distribution : Gujarat : As above (new locality record), North-west Kathiawar. *Elsewhere* : Widely distributed in India, Burma (Tenasserim), Sri Lanka and Bangladesh (Khulna).

Remarks : At Vijarkhe numerous abnormally large skinks were basking on rocks during the morning hours. At Girnar Hills these lizards were found even at an elevation of 1500 metres.

The seasonal food of *Mabuya carinata* in the above localities consists of black mole crickets, ordinary crickets (*Gryllus* sp.), lepedopterous caterpillars, beetles, arthropod eggs and fibres of wild plants.

In February six large oval eggs were found in the oviduct of a gravid female.

Mabuya macularia (Blyth)

(Smaller bronze grass skink)

Material : 4 exs. (2 ♀ and 2 ♂). Bhuj (Kutch Dist.), Rajpipla (Broach Dist.) and Ahwa (The Dangs Dist.), collected during January, February and October 1964 and 1975 by V. C. Agrawal and T. G. Vazirani.

Measurements : Snout to vent length 33-43 mm., tail length 59-69 mm.

Distribution : Gujarat : As above (first authentic record) and Kutch. *Elsewhere* : Widely distributed in India, Burma, Sri Lanka, Cambodia, Laos, Thailand, Malaya Peninsula, South Viet-nam and Pakistan (Baluchistan and lower Sind).

Remarks : In the vicinity of Bhuj these small agile skinks live under dry leaves and other similar places near rainwater tanks where soil is extremely saline and vegitation is absolutely xerophytic.

The study of the gut contents revealed that its food consists of grasshoppers, beetles, bugs, ants and spiders.

Family CHAMAELEONIDAE

Chamaeleo zeylanicus Laurenti

(Indian Chamaeleon)

Material : 1 ex. (♂), Palanpur (Banaskantha Dist.), collected in October 1964 by V. C. Agrawal.

Measurements : Snout to vent length 115 mm., tail length 144 mm.

Distribution : Gujarat : As above (new locality record) and Kutch. *Elsewhere* : Peninsular India, Sri Lanka and Pakistan (The Desert).

Family LACERTIDAE

Acanthodactylus cantoris cantoris Günther

(Indian fringe toed sand lizards)

Material : 32 exs. (4 ♂, 8 ♀ and 20 Juvenile). Okha and Dwarka (Jamnagar Dist.), Porbandar, Somnath and Veraval (Junagadh Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 30-75 mm., tail length 55-144 mm.

Variability in meristic characters : (Table 3).

Distribution : Gujarat : As above (new record) and Bhuj. *Elsewhere* : Widely distributed in Rajasthan. Recorded from Uttar Pradesh, Haryana and Punjab. Also available in Pakistan, Eastern Iraq, Saudi Arabia, Southern Afghanistan and Iran.

Remarks : At Okha these lizards were in large numbers in sandy inland areas. The dense xerophytic bushes provide them an excellent shelter. At Dwarka they live in burrows dug by themselves under the dense bushes.

At Porbandar these lizards were observed while they were digging their burrows on the granular sand of the coast. In the process of digging generally the fore limbs were employed but occasionally the help was taken, also by the hindlimbs and tail in pushing the sand behind. The digging was most quick and the limb movements were extremely fast. The depth of the burrows varied from 11-65 centimetres and generally the each burrow was occupied by a single individual. The lizards were most abundant beneath the bushes and their activities were fast during the early hours of the day reaching at the optimum by 11-30 A. M.

TABLE 3. *Acanthodactylus cantoris cantoris* Günther Biometrical constants (Statistical parameters) of certain body parts.

S. No.	Characters	No. of samples		Range		Mean ± S. E.		C. V.		't' value for sex difference
		Male	Female	Male	Female	Male	Female	Male	Female	
1.	Number of scales round the middle of body	13	8	31- 47	30- 40	38.00± 1.16	33.37± 1.08	11.02	9.12	2.69 *
2.	Number of longitudinal plates on the body	13	8	10- 16	12- 13	12.53± 0.42	12.25± 0.16	12.02	3.70	0.50 ns.
3.	Number of transverse rows of plates on the ventrum	13	8	28- 31	30- 33	30.23± 0.32	30.87± 0.40	3.86	3.65	1.23 ns.
4.	Number of femoral pores (Left)	13	8	18- 23	16- 21	19.53± 0.37	16.12± 0.67	6.81	11.84	4.48 ***
5.	Number of femoral pores (Right)	13	8	19- 23	16- 21	20.46± 0.35	18.00± 0.60	6.19	9.39	3.81 **
6.	Standard length (mm.)	12	3	30- 75	56- 72	42.25± 2.08	64.66± 4.67	17.05	12.50	4.95 ***
7.	Tail length (mm.)	8	3	55-144	63-110	88.00±12.64	87.66±13.62	40.61	26.91	0.01 ns

ns—Not significant

* Significant at 5% level of probability

** Significant at 1% level of probability

*** Significant at 0.1% level of probability

TABLE 4. *Ophisops jerdoni* Blyth — Biometrical constants (Statistical parameters) of certain body parts.

S. No.	Characters	Number of Samples		Range		Mean ± S. E.		C. V.		't' value for sex difference
		Male	Female	Male	Female	Male	Female	Male	Female	
1.	Number of scales round middle of body	4	8	26-30	27-30	28.00±0.81	28.50±0.38	5.83	3.75	0.65 ns.
2.	Number of longitudinal plates on the belly	4	8	6- 6	6- 6	6.00±0.00	6.00±0.00	—	—	0
3.	Number of transverse plates on the ventrum	4	8	28-28	26-29	28.00±0.00	27.87±0.29	—	2.99	0.30 ns.
4.	Number of femoral pores (Left)	4	7	7- 8	6- 7	7.50±0.29	6.57±0.18	7.69	7.53	2.70 *
5.	Number of femoral pores (Right)	4	7	7- 8	6- 7	7.25±0.25	6.57±0.18	6.89	7.53	2.07 ns.
6.	Standard length (mm.)	4	6	19-36	24-40	30.50±3.88	35.33±2.37	2.54	16.47	1.13 ns.
7.	Tail length (mm.)	2	4	28-44	40-58	36.00±8.00	50.25±4.00	31.42	19.95	1.84 ns.

ns : Not significant

* Significant at 5% level of probability.

The food of *Acanthodactylus cantoris cantoris* in Gujarat as observed in the field and as evidenced by the study of gut contents consists of various insects like lepidopterous larvae, beetles, ants, bugs, nymphs and adults of orthopterous insects, flies, mole crickets, field crickets, earwigs, small cockroaches and the nymphs of various insects. Spiders and isopods (crustaceans) are also devoured.

The presence of large number of young ones in many areas denote a general post breeding season. But at Somnath and Veraval many gravid females were noticed with 3-5 large oval eggs (10-15 mm. long and 7-9 mm. wide) in their oviduct. The colour of peritoneum as noticed in numerous examples immediately after death was dark brown to black.

Ophisops jerdoni Blyth

(Golden striped lizard)

Material : 14 exs. (4 ♂, 8 ♀ and 2 Juvenile). Jamnagar, Dwarka, Bet Dwarka Island (Jamnagar Dist.), Ranavav, Porbandar, Somnath and Veraval (Junagadh Dist.), and Rajkot (Rajkot Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 19-40 mm., tail length 28-72 mm.

Distribution : Gujarat : As above (new locality record) and Kutch. *Elsewhere* : In India distributed in Andhra Pradesh, Maharashtra, Madhya Pradesh, Tamilnadu and Rajasthan. Outside India the species has been recorded from Pakistan.

Remarks : All the examples from Dwarka, Bet-Dwarka and Porbandar were collected from the coastal sandy areas during the day time by digging the small burrows under the xerophytic bushes. Noting was known about the food of this secretive and most agile tiny lacertid. The present findings on the basis of stomach contents establish that its diet in Gujarat during September consists of termites (*Odontotermes* sp.), lepidopterous caterpillars, ichneumonids (Hymenoptera), spiders, ants, orthopterans and their eggs.

Ophisops microlepis Blanford

(Snake eyed lizard)

Material : 31 exs. (13 ♂, and 18 Juvenile). Bhuj (Kutch Dist.) Okha, Dwarka, Bet Dwarka Island (Jamnagar Dist.) and Rajkot (Rajkot Dist.), collected in September and October 1964 & 1975 by V. C. Agrawal and R. C. Sharma.

Measurements : Snout to vent length 22-60 mm., tail length 38-132 mm.

Variability in meristic characters : (Table 5)

Distribution : Gujarat : As above (new locality record) and Kutch. ***Elsewhere*** : Widely distributed in western Rajasthan. The records are available from Bihar and Madhya Pradesh also.

Remarks : At Okha and Dwarka these diurnal, most agile lacertides, share the same ecological environment with *Acanthodactylus cantoris cantoris*. It is interesting to observe that not even a single female came across and the burrows were occupied either by the males or by the young ones, At Bet-Dwarka these lizards make their burrows under the dense bushes of *Acacia juliflora* and *Cactus* sp. The lizards are having an acute sense of homing behaviour and always choose to live in the burrows made by themselves. At Porbandar their population was observed to be the maximum and they live with a perfect harmony in the association of a tiny member of the family, *Ophisops jerdoni*, in the crevices on the railway tracs and other such places. At Rajkot numerous such lizards were found under a huge pile of loose, flat stones in the association of snakes (*Oligodon taeniolatus* and *Echis carinatus*), gekkonid lizards (*Hemidactylus brooki*), toads, (*Bufo melanostictus*), scorpions, centipedes and different kinds of spiders.

In Gujarat they feed on various Orthopterous insects, beetles of Staphylinidae and of other families, flies of family Muscidae, earwigs, bugs, grubs of beetles, spiders and isopods (crustaceans).

At Porbandar the presence of seven large oval eggs (8.5-10 mm. long and 5-6 mm. wide) in the oviduct of a gravid female indicate the continuation of breeding season of this species also through September.

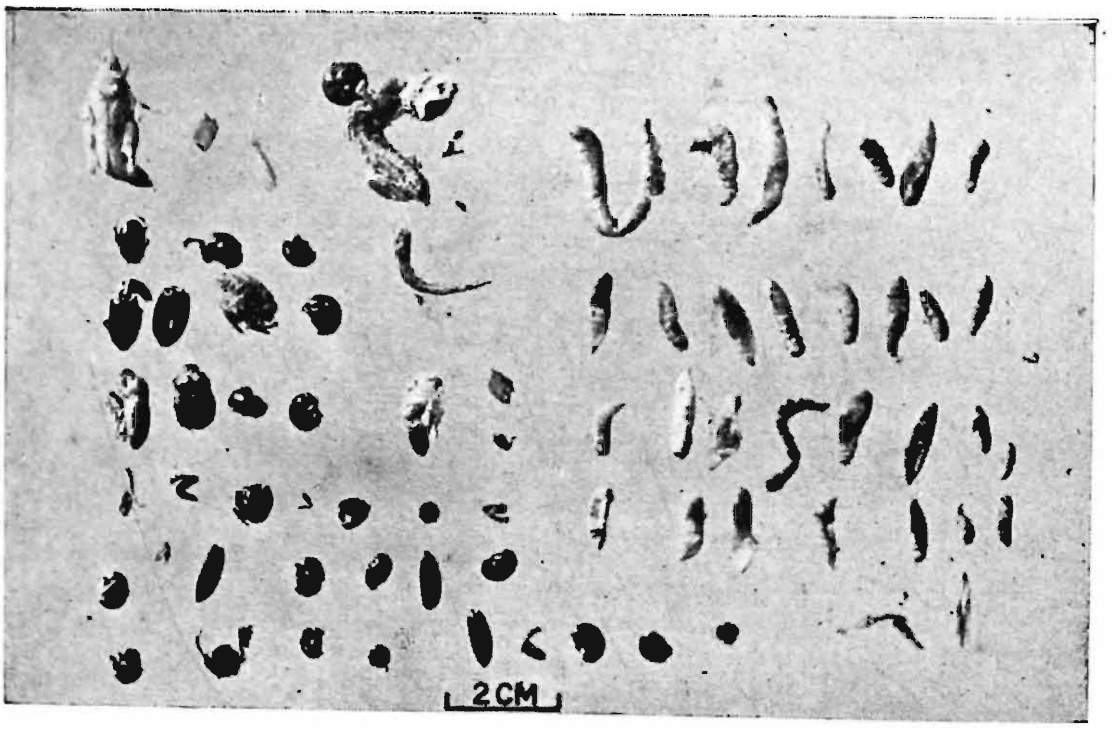
The examples from Dwarka are darker in dorsal coloration. The peritoneum in all the examples is jet black. The hemipenis is bifid and is divide into two lobes at the tip. Scales across the middle of body 46-60, femoral pores on each side are 12-16 and the preanal plate is divided in few examples.

Family VARANIDAE

Varanus bengalensis (Daudin)

(Indian monitor)

Material : 4 exs. (♀) Mehsana (Mehsana Dist.), Dwarka (Jamnagar Dist.), and Girnar Hills (Junagadh Dist.) collected in September and November 1964 and 1975 by R. N. Bhargava and R. C. Sharma.



Various food items as evidenced by the stomach contents of *Varanus bengalensis* (Daudin).

TABLE 5. *Ophisops microlepis* Blanford — Biometrical constants (Statistical parameters) of certain body parts.

S. No.	Characters	Number of Samples		Range		Mean ± S. E.		C. V.		't' value for Sex difference
		Male	Female	Male	Female	Male	Female	Male	Female	
1.	No. of scales round the middle of body	15	4	53- 66	52- 59	57.86± 0.89	56.00± 1.47	5.98	5.25	0.98 ns.
2.	No. of longitudinal plates on belly	15	4	6- 6	6- 6	6.00± 0.00	6.00± 6.00	—	—	0
3.	Number of transverse plates on the ventrum	15	4	27- 32	28- 30	28.46± 0.36	29.00± 0.41	4.94	2.81	0.73 ns.
4.	Number of femoral pores (Left)	15	4	12- 14	12- 14	13.06± 0.12	13.00± 0.41	3.50	6.28	0.20 ns.
5.	Number of femoral pores (Right)	15	4	12- 16	12- 14	13.20± 0.24	13.00± 0.41	7.12	6.28	0.75 ns.
6.	Standard length (mm.)	15	4	25- 60	25- 63	46.26± 3.68	36.00± 9.03	30.83	50.20	1.38 ns.
7.	Tail length (mm.)	11	3	26-132	49-101	92.63±11.24	66.67±17.17	40.24	44.60	1.10 ns.

ns : Not significant

Measurements : Snout to vent length 170-323 mm. tail length 249-448 mm.

Distribution : Gujarat : As above (new record) and Bhuj. *Elsewhere* : Whole of India, Burma, Sri Lanka, Iran, Waziristan, Western Himalayas, Nepal, Uzbekistan and Pakistan.

Remarks : At Dwarka a considerably large monitor was in a burrow (partly covered by a huge stone) in the company of toads, crabs, scorpions, spiders, centipedes, various insects and isopods (crustaceans). At Girnar foot hills one juvenile female monitor was on the trunk of a teak tree. Numerous monitor lizards came across in Girnar Hills up to 660 metres altitude.

Their food in Gujarat during September consists of beetles of families Scarabaeidae, Curculionidae, Carabidae etc. ; bugs ; grubs of various beetles ; orthopterous insects like *Chrotogonus* sp., nymphs of *Schizodactylus* sp. ; lepidopterous caterpillars and dipterous maggots. In addition to the above insect food its diet also includes scorpions, gekkonid lizards (*Hemidactylus brooki* Gray) and fibrous vegetable matter.

Though the records are available about its feeding on small mammals, snakes and lizards but its natural food in Gujarat and Rajasthan seems to be mainly the beetles and their grubs, lepidopterous and dipterous larvae and grasshoppers. In the full stomach with a capacity of 23 ml. of an example from Gujarat the following were the counts of food items. One entire lizard (*Hemidactylus brooki* Gray), 2 entire *Chrotogonus* sp. (Orthoptera), 2 entire nymphs of *Schizodactylus* sp. (Orthoptera), at least 50 beetles (5 entire and others evidenced by the body parts), 8 fairly large lepidopterous caterpillars, 40 dipterous maggots of quite a large size, 1 sting (with 5 segments) of a yellow scorpion and 8 fibrous pieces of vegetable matter (Plate I).

Fourteen large oval eggs (16-20 mm. long and 15-16 mm. wide) were found in the oviduct of a large gravid female at Dwarka.

Suborder SERPENTES

Family TYPHLOPIDAE

Typhlops braminus (Daudin)

(Brahminy snake, Common blind snake, worm snake)

Material : 4 exs., Rajpipla (Broach Dist.) and Vijarkhe (Jamnagar Dist.), collected in January and September 1975 by T. G. Vazirani and R. C. Sharma.

Measurements : Total length 62-125 mm., diameter at middle of body 2-2.5 mm. which is 29.2-31 times in the total length (Vs. 30-45 times, as recorded in other Indian examples) ; tail length 3-4 mm.

Distribution : Gujarat : As above (new record), Surat and Dangs districts. *Elsewhere* : Whole of India, Burma, Sri Lanka, East Indies, North Viet-nam, South Viet-nam, Malaya, Mexico, Pakistan, Bangladesh, Iran, Southern China, Arabia, South Africa, Islands of Indian Ocean, Hawai and other islands of Pacific ocean.

Remarks : Scales round the middle of body 20, transverse rows of scales 330-364 (vs. 290-320 rows in other Indian examples), caudal scales 9-12. The examples from Vijarkhe were buff to darkbrown in life.

Typhlops porrectus Stoliczka

(Slender blind snake)

Material : 1 ex., Ranavav *ca.* 16 km. N. of Porbandar (Junagadh Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Total length 127 mm., diameter at middle of body 2 mm., which is 63.5 times in the total length of the snake.

Distribution : Gujarat : As above (first locality record). *Elsewhere* : Whole of India, Sri Lanka, Burma and Pakistan.

Remarks : Collected from the subterranean tunnel under a large black stone, where it was in the association of various small insects like earwigs, silverfish, and spiders. The vicinity around was rocky, with xerophytic vegetation.

Typhlops acutus (Dumeril & Bibron)

(Beaked blind snake)

Material : 1 ex., Virandragarh *ca.* 14 km. from Dhrangadhra (Surendranagar Dist.), collected in February 1966 by V. C. Agrawal.

Measurements : Total length 289 mm., diameter at middle of body 5 mm., which is contained 57.8 times in the total length of the snake.

Distribution : Gujarat : As above (new locality record) and Baroda. *Elsewhere* : Peninsular India, Bihar, Orissa and West Bengal. The snake is absolutely an Indian.

Family BOIDAE

Eryx johni (Russell)

(John's sand boa)

Material : 1 ex., Veraval (Junagadh Dist.), collected in April 1969 by D. S. Mathur.

Distribution : Gujarat : As above (new locality record) and Kutch. *Elsewhere* : Recorded from Andhra Pradesh, Maharashtra, Tamil Nadu, Punjab, Rajasthan and Uttar Pradesh. Also available in Pakistan, Afghanistan and Iran.

Family COLUBRIDAE

Oligodon taeniolatus (Jerdon)

(Streaked kuri snake)

Material : 1 ex., Aji River vicinity, Rajkot (Rajkot Dist.), collected in October 1975 by R. C. Sharma.

Measurements : Snout to vent length 315 mm., tail length 68 mm.

Distribution : Gujarat : As above (first locality record). *Elsewhere* : Peninsular India and Bihar. Also available in Sri Lanka and Pakistan.

Remarks : The snake was under a huge pile of stones in the association of various lacertid and gekkonid lizards, toads, scorpions, insects, centipedes and spiders but the examination of its gut revealed that it devoured nothing out of the above mentioned readily available animals and its stomach was completely empty.

Xenochrophis piscator (Schneider)

(Checkered keelback)

Material : 2 exs. (1 ♂ and 1 Juvenile), Gangasarovar tank, Viramgam (Viramgam Dist.). Ahwa (The Dangs Dist.), collected in February 1966 and 1975 by V. C. Agrawal and T. G. Vazirani.

Measurements : Snout to vent length 342-717 mm., tail length 60-305 mm.

Distribution : Gujarat : As above (new locality record), Surat and Dangs districts. *Elsewhere* : Widely distributed in India, Burma, Sri Lanka, China, Hongkong, Laos, Malaya, Nepal, Pakistan, Bangladesh, Thailand, Borneo and Taiwan.

Remarks : The Gangasarovar tank is inhabited by numerous such snakes where they were found in the association of large number of fishes, gastropods, bugs, dragon fly nymphs and decapod crustaceans.

Lycodon aulicus (Linnaeus)

(Common wolf snake)

Material : 1 ex. (Juvenile), Palanpur (Banaskantha Dist.), collected in October 1964 by V. C. Agrawal.

Distribution : Gujarat ; As above (first record). *Elsewhere* : Whole of India, Burma, Sri Lanka, Hongkong, Laos, Malaya, Mauritius, Nepal, North and South Viet-nam, Pakistan, Bangladesh, Phillippines, Sikkim, Timor and Thiland.

Psammophis leithi Günther

(Indian ribbon snake)

Material : 1 ex. (♂), Bet Dwarka Island (Jamnagar Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 447 mm., tail length 168 mm.

Distribution : Gujarat : As above, Kutch, Nirwand and Pachum Island, *Elsewhere* : In India the species has been recorded from Uttar Pradesh, Maharashtra and Kashmir, Also available in Waziristan and Pakistan.

Remarks : The colour of the head of this example varies from other Indian examples in having a tunning fork shaped dark brown marking from frontal shield to the tip of snout (passes through the prefrontals and internasals), a dark brown spot on the middle of the head at the junction of parietals and two rows of dark brown hatched lines on the throat. The snake possess large eyes with round pupil. Central portion of the eye is deep yellow which is encircled by a jet black ring (with yellow reticulations).

Family Hydrophiidae

Enhydrina schistosa (Daudin)

(Beaked sea snake)

Material : 1 ex. (Juvenile), *ca.* 40 km. off shore, Veraval (Junagadh Dist.), collected in April 1969 by D. S. Mathur.

Measurements : Snont to vent length 462 mm., tail length 58 mm.

Distribution : Gujarat : As above (first locality record). *Elsewhere* : In India recorded from the coastal waters of Goa, Tamil Nadu, Orissa and West Bengal. Also available in Gulf of Oman, Seychelles, South Viet-nam coast, North coast of Australia, Rockhampton coast, coast of Burma and Sanday bay in Thailand.

Remarks : This deadly poisonous marine snake prefers to live generally in the shallow coastal waters but when the sea is calm it can go sufficiently advance in off shore waters also, in search of fishes and crustacean food.

According to Minton (1966) its food consists of large prawns and fishes like *Tetrodon coilia* and *Harpodon*.

In the above example fron Veraval coast one small but entire *Gobid* sp. fish was found.

Microcephalophis cantoris (Günther)

Material : 1 ex ., Old port *ca.* 4 km. N. of Bhaunagar (Bhaunagar Dist.), collected in April 1969 by D. S. Mathur.

Measurements : Snout to vent length 470 mm., tail length 53 mm.

Distribution : Gujarat : As above (first record). *Elsewhere* : On Western coast of India recorded from Cannanore, Orissa Coast, Sunderbans and Chittagong in Bangladesh. Also recorded from Pakistan coast near Karachi.

Hydrophis caerulescens (Shaw)

Material : 3 exs. (1 ♀ and 2 ♂) *ca.* 14 km. off shore Veraval (Veraval Dist.), collected in September 1975 by R. C. Sharma.

Measurements : Snout to vent length 608-700 mm., tail length 70-72 mm.

Distribution : Gujarat : As above (first record). *Elsewhere* : Coasts of Goa, Maharashtra, Karnataka, Tamil Nadu, West Bengal. Also recorded from Burma coast, Gulf of Thailand Malacca, Malaya archipelago.

Remarks : In the stomach of two individuals entire small fishes were found.

The female example was gravid and contained seven large oval eggs in the oviduct measuring 21-35 mm. in length and 16-18 mm. in width.

Lapemis curtus (Shaw)

(Short sea snake)

Material : 3 exs. Veraval coast and *ca.* 40 km. off shore (Veraval Dist.), collected in April 1969 and September 1975 by D. S. Mathur and R. C. Sharma.

Measurements : Snout to vent length 374-605 mm., tail length 42-84 mm.

Distribution : Gujarat : As above (first record). *Elsewhere* : Coasts of Goa, Maharashtra, Tamil Nadu, Orissa and West Bengal. Also recorded from the coastal waters of Burma, Arabia, Iran, Sri Lanka and Mekran.

Family VIPERIDAE

Echis carinatus (Schneider)

(Saw scaled viper)

Material : 3 exs. Rajkot (Rajkot Dist.), and Vijarkhe (Jamnagar Dist.), collected in February, September 1966 and October 1975 by V. C. Agrawal and R. C. Sharma.

Measurements : Snout to vent length 246-390 mm., tail length 33-41 mm.

Distribution : Gujarat : As above (new locality record), Kutch Nirwand and Panchum Island, Bunny, Surat and Dangs. *Elsewhere* : Widely distributed in Andhra Pradesh, Goa, Maharashtra, Karnataka, Tamil Nadu, Rajasthan and Jammu & Kashmir. Outside India available in Arabia, Ghana, Kenya, Nigeria, Sri Lanka, Iran, Whole of middle east, south portion of Russian Asia, Pakistan and Iraq.

SUMMARY

This is the first comprehensive account of the taxonomy, habitats, food and other details of the ecology of 29 species of reptiles, so far collected from Gujarat by the various field parties of the Desert Regional Station, Zoological Survey of India, Jodhpur between the years 1964-1975.

The following species are recorded for the first time from the area : *Trionyx gangeticus* Cuvier, *Calotes rouxi* Dumeril and Bibron, *Mabuya macularia* (Blyth), *Acanthodactylus cantoris cantoris* Günther, *Varanus bengalensis* (Daudin), *Typhlops porrectus* Stoliczka, *Typhlops acutus* (Dumeril & Bibron), *Oligodon taeniolatus* (Jerdon), *Lycodon aulicus* (Linnaeus), *Enhydrina schistosa* (Daudin), *Microcephalopis cantoris* (Günther), *Hydrophis caerulescens* (Shaw) and *Lepemis curtus* (Shaw). The species like *Lissemys punctata punctata* (Lacépède), *Hemidactylus brooki* Gray, *Hemidactylus flaviviridis* Rüppell, *Sitana ponticeriana* Cuvier, *Calotes versicolor* (Daudin), *Mabuya carinata* (Schneider), *Chamaeleo zeylanicus* Laurenti, *Ophisops jerdoni* Blyth, *Ophisops microlepis* Blanford, *Typhlops*

braminus (Daudin), *Eryx johni* (Russell), *Xenochrophis piscator* (Schneider) and *Echis carinatus* (Schneider) constitute the new locality records and extend the range in Gujarat.

The conventional characters of *Hemidactylus brooki* Gray, *Calotes versicolor* (Daudin), *Acanthodactylus cantoris cantoris* Günther, *Ophisops jerdoni* Blyth and *Ophisops microlepis* Blanford from different localities of Gujarat have been analysed statistically for showing the variability and difference between means in the two sexs.

ACKNOWLEDGEMENTS

I am thankful to Dr. B. K. Tikader, the Director, Zoological Survey of India for the necessary facilities in connection with this work. I am highly indebted to Dr. M. L. Roonwal for his valuable guidance. Thanks are due to Dr. B. Biswas, Mrs M. R. Mansukhani and Dr. K. C. Jayaramakrishnan for the useful suggestions. I am much obliged to Dr. G. S. Arora, for going through the manuscript.

REFERENCES

DANIEL, J. C. AND SHULL, B. M. 1963. A list of the Reptiles and Amphibians of the Surat Dangs, Southern Gujarat. *J. Bombay nat. Hist. Soc.*, **60** (3) : 737-743.

INDURKAR, S. S. AND SABNIS, J. H. 1976. Observations on the dietary components of the Garden lizard, Calotes versicolor (Daudin) *Comp. Physiol. Ecol.*, **1** (1) : 9-12.

MCCANN, C. 1938. The reptiles and amphibia of Cutch State. *J. Bombay nat. Hist. Soc.*, **40** : 425-427, pl. 1.

MINTON, S. A. 1966. A contribution to the herpetology of West Pakistan, *Bull. Am. Mus. nat. Hist.*, **134** (2) : 27-184, text-figs., 1-12, plates 9-36, tables 1-7, maps 1-5.

MURRY, J. A. 1884. *The vertebrate zoology of Sind.* A systematic account. xvi+424 pp., Illusts. London (Richurdson & Co.)

PRAKASH, I. 1973. The ecology of vertebrates of Indian Desert. Ecology and Biogeography of India, 369-420 pp. Hague (Dr. W. Junk).

RAO, M. V. S. AND RAJABAI, B. S. 1974. Food and feeding behaviour of the agamid lizards, *Sitana ponticeriana* Cuvier and *Calotes nemoricola* Jerdon. *Indian J. Ent.*, **36** (1) : 63-65.

SHARMA, R. C. 1971. The Reptile fauna of the Nagarjunasagar Dam area (Andhra Pradesh, India). *Rec. zool. Surv. India*, **63** (1-4) : 77-93.

SHARMA, R. C. AND VAZIRANI, T. G. 1977. Food and feeding habits of some Reptiles of Rajasthan. *Rec. zool. Surv. India*, **73** : 77-93.

SMITH M. A. 1931. *The fauna of British India including Ceylon and Burma.* Reptilia and Amphibia, vol. 1 Loricata, Testudines xviii+ 185 pp., figs. 2 pls., map—London (Taylor and Francis).

SMITH, M. A. 1935. *The fauna of British India including Ceylon and Burma.* Reptilia and Amphibia vol. II. Sauria. xiii+440 pp., figs., pl., map—London (Taylor & Francis).

SMITH, M. A. 1943. *The fauna of British India including Ceylon and Burma.* Reptilia and Amphibia. Vol. III Serpentes, xii+583 pp., figs., map.

STOLICZKA, F. 1872. Notes on the reptilian and amphibian fauna of Kuchh. *J. Proc. Asiat. Soc. Beng.*, pp. 71-85.

TIWARI, K. K. AND SHARMA, R. C. 1970. Reptiles of Western Maharashtra. *J. zool. Soc. India*, **22** (1 & 2) : 101-115.