

A REVIEW OF REPTILE STUDIES IN GUJARAT STATE

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Abstract

Through literature survey and current knowledge on the reptile fauna, this paper deals with a review of reptile studies in the state of Gujarat. A complete bibliography with respect to reptile taxonomy, distribution, range extension, captive breeding, status reports and conservation is listed.

Keywords

Reptiles, Gujarat State, bibliography, overview

Introduction

Gujarat is one of the most diversified states in India with respect to biodiversity. Various types of habitats from dry desert to moist deciduous forests, and seashore along coastal islands with mangrove forests and mud flats are available. This provides a conducive environment for many organisms. The state is also the only home for the Asiatic Lion (*Panthera leo persica*) and Asian Wild Ass (*Equus hemionus khur*) in the subcontinent.

Study on reptile fauna of Gujarat is comparatively better than those of amphibians and fishes but has not equaled the progress made on birds and mammalian fauna. Literature survey shows that a few naturalists and scientists have attempted to study the reptiles as early as 1870s. Stoliczka (1872), Murray (1886) and McCann (1936) have studied the reptiles of Kachchh. Gladeau (1887; 1905) and, Daniel and Shull (1963) made a preliminary study on the reptiles of southern Gujarat. However, none of them have studied the reptile faunal spectrum of the state.

Considerable numbers of studies on reptiles were undertaken in Gujarat State after independence. About 48 species of reptiles were added since 1942. Acharya (1949) and Kapadia (1951) have provided checklists of reptiles of Gujarat, based on previous works. Sharma (1982) and Gayen (1999) published about reptiles of Gujarat based on extensive field surveys and collections of the Zoological Survey of India.

Scattered information on the reptiles of Gujarat is available in the Fauna of British India series (Günther, 1864; Boulenger, 1890; Smith, 1933, 1938, 1943), Snakes of Ceylon (Wall, 1921) and The Book of Indian Reptiles (Daniel, 1983). Extensive surveys were made on sea turtles (Vyas & Patel, 1993), fresh water turtles and tortoises (Bhaskar, 1978, 1981a, 1981b; Frazier, 1987; Vyas & Parasharya, 2000). Barring protected areas, Vyas (1993) studied the snake fauna of the state. The distribution, status and problems of Mugger Crocodile are well documented by Vijayakumar (1997) and Vijayakumar *et al.* (1999a, b). Updated list of the reptiles of Gujarat and their distribution is available in Vyas (1998) and Gayen (1999).

Apart from survey and documentation, George (1955, 1956) made a detailed study on the osteology of *Uromastix hardwickii*. George and Shah (1954, 1955a, 1955b, 1958, 1975), and Shah and Patel (1964) have studied the mycology of *Lissemys punctata* and *Geochelone elegans*. Ramachandran and Shah (1986) and, Naik and Vinod (1997) made attempts to study the morphology of *Mabuya carinata* and *Lygosoma lineatum*, respectively. John *et al.* (1991, 1992) documented the morphometry and anatomy of *Ophisops microlepis*. Momin *et al.* (1990, 1992) and Shah *et al.* (1991) studied parasites of reptiles in detail.

New species described

Six species of reptiles new to science were reported from Gujarat -- three from Kachchh, two from southern Gujarat and one species from Saurashtra region (four species of geckos, one each of snake and skink). Only three species are confirmed as of today and the remaining are to be examined or could be invalid as species (Table 1).

Captive breeding

Along with the systematic study and the inventory of reptiles, the state zoos have made important contributions towards captive breeding of native and endangered species of reptiles (Table 2).

Conservation and protected areas

Four national parks and 21 sanctuaries covering 16902.38 sq. km. protected areas is available in Gujarat for wildlife. These

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Table 1. List of new species of reptiles described from Gujarat State

New species described	Locality	Authors and Year
* <i>Gymnodactylus</i> (= <i>Cyrtopodon kachhensis</i>)	Kachchh	Stoliczka, 1872
* <i>Ablepharus grayanus</i>	Waggar, Kachchh	Stoliczka, 1872
<i>Psammophis sindanus</i> (- <i>schokari</i>)	Kachchh	Stoliczka, 1872
<i>Hemidactylus murrayi</i> (- <i>brookii</i>)	Pimpri & Garvi, Dangs	Gleadov, 1875.
<i>Hemidactylus platyceps</i> (- <i>gracilis</i>)	Billimora, Valsad	Annandale, 1912
* <i>Hemidactylus porbandarensis</i>	Porbander, Junagadh	Sharma, 1981

- Valid species

protected areas are managed by the State Forest Department with the objective to conserve entire biodiversity of the state. It raises a question whether the present management practices really support the conservation of entire biodiversity? It does not because the present management practices and plans of protected areas focus only on mega wildlife species.

Only a few protected areas were investigated with respect to reptiles -- Gir and Vansda National Parks were studied by Bhatt *et al.* (1999) and Singh *et al.* (2000), respectively. Naik *et al.* (1993) and Singh *et al.* (1999) documented the reptiles of Shoolpaneshwar and Wild Ass Sanctuary. Preliminary studies and documentation of reptiles of Hingolghadh and Rampara Wildlife Sanctuary were undertaken by Singh and Tatu (1999), and Vyas (2000).

Present status and threats to reptile fauna

Diverse habitats of the state are rapidly changing due to new irrigation projects and industrialization. Also, most of the present protected areas are under pressure from local politicians, agriculturists and industrialists. Forest areas are being denotified for implementing development projects such as mining, industry, communication and tourism. This has resulted in shrinkage, fragmentation, degradation and destruction of natural habitats. Present data of rescued reptiles from the state, especially snakes (Gohil, 1983; Vyas, 1987a, 1987b; Urfi, 1999), turtles (Vyas, 1989) and crocodiles (Vyas, 1993, 1994; Bhatt, 2000) from urban areas indicate that natural habitats of reptiles are under severe anthropogenic pressures.

Species account

Literature survey shows that a total of 107 species of reptiles belonging to 21 families are reported from the state (Table 3),

Table 2. List of reptile species bred in Gujarat zoos

Species	Institute	Reference
<i>Crocodylus palustris</i>	Kankaria Zoo, Ahmedabad	David, 1970
<i>Aspideretes gangeticus</i>	Sayaji Baug Zoo, Vadodara	Vyas and Patel, 1992b
<i>Kachuga tecta</i>	Sayaji Baug Zoo, Vadodara	Vyas and Patel, 1993
<i>Calotes rouxii</i>	Sayaji Baug Zoo, Vadodara	Vyas, 1995a
<i>Lissemys punctata</i>	Sayaji Baug Zoo, Vadodara	Vyas, 1996a
<i>Python molurus</i>	Sayaji Baug Zoo, Vadodara; Sundarvan, Ahmedabad	Vyas, 1996b; Urfi, 1997
<i>Echis carinatus</i>	Sayaji Baug Zoo, Vadodara	Vyas, 1997
<i>Naja naja</i>	Sayaji Baug Zoo, Vadodara	Vyas, 1998
<i>Geochelone elegans</i>	Sayaji Baug Zoo, Vadodara	Vyas, Unpublished

including one species of crocodile, 12 species of turtles and tortoise, 36 species of lizards and 58 species of snakes. Record of 15 species of reptiles (Table 3) from the state require confirmation regarding their occurrence in the state. They may have been recorded by error or through misidentification by earlier workers. There are, in future, chances of more species being reported because a few pockets and habitats in the state require extensive exploration. In addition, I have received two colour photographs of snakes from Ahmedabad and Bhavnagar City. Based on the photographs it is very difficult to describe the species, except that they are members of Colubridae. I have also studied a specimen of sea snake *Loticuda laticuda* at fisheries museum, Okha. There is no specific record about the origin of the specimen. However, it is believed to be collected from the Gulf of Kachchh. This indicates that there are possibilities of further new records.

References

- Acharya, H. (1949).** List of reptiles from Gujarat state, *Prakurti* 8:156-178 (in Gujarati).
- Akhtar, A.S. and J.K. Tiwari (1991).** Extension of range of the black cobra *Naja naja oxiana*. *J. Bombay nat. Hist. Soc.* 88(1): 123.
- Annandale, N. (1912).** Description of three new Indian lizards, *Rec. Ind. Mus.* 8: 56-65.
- Auffenberg W., H. Rehman, F. Iffat and Z. Perveen (1989).** A study of *Varanus flavescens* (Hardwicke & Gray) (Sauria: Varanidae). *J. Bombay nat. Hist. Soc.* 86(3): 286-307.
- Bhaskar, S. (1978).** Notes from the Gulf of Kutch. *Hamadryad* 4(1): 3-6.
- Bhaskar, S. (1981a).** Sea turtles in Gujarat State, Western India. Report to the WWF-I, 11 pp.
- Bhaskar, S. (1981b).** Survey of sea turtle nesting beaches on the West Coast of Saurashtra. Report to the WWF-I, 3 pp.
- Bhatt, K. (1989).** New locality recored for the Indian pink ringed

Table 3. Systematic list of reptile species reported from Gujarat State.

Common name	Taxa	Reference**	Common name	Taxa	Reference**
<u>Crocodylidae</u>					
1. Muggar	<i>Crocodylus palustris</i>	---	37. Lined Supple Skink	<i>Lygosoma lineata</i>	Naik & Vinod, 1994
<u>Dermochelidae</u>			38. Spotted Supple Skink	<i>Lygosoma punctatus</i>	---
2. Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Bhaskar, 1978	39. Common Keeled Grass Skink	<i>Mabuya c. carinata</i>	Stoliczka, 1872
<u>Chelonidae</u>			40. Striped Grass Skink	<i>Mabuya dissimilis</i>	Vyas & Patel, 1992a
3. Loggerhead Sea Turtle*	<i>Caretta caretta</i>	Mc Cann, 1938	41. Eastern Bronze Skink	<i>Mabuya macularius</i>	Boulenger, 1890
4. Green Turtle	<i>Chelonia mydas</i>	Bhaskar, 1978	42. Indian Sand-swimmer	<i>Ophiomorus tridactylus</i>	Stoliczka, 1872
5. Hawksbill Sea Turtle*	<i>Eretmochelys imbricata</i>	Das, 1985	<u>Lacertidae</u>		
6. Olive Ridley Sea Turtle	<i>Lepidochelys olivacea</i>	Bhaskar, 1978	43. Indian Fringe-toed Lizard	<i>Acanthodactylus cantoris</i>	Gleadow, 1887
<u>Bataguridae</u>			44. Beddome's Lacerta	<i>Ophisops beddomei</i>	Vyas, unpublished
7. Indian Roofed Turtle	<i>Kachuga tecta</i>	Moll & Vijaya, 1986	45. Snake-eyed Lacerta	<i>Ophisops jerdoni</i>	Stoliczka, 1872
8. Pink-ringed Tent Turtle	<i>Kachuga tentoria circumdata</i>	Bhatt, 1989	46. Small-scaled Lacerta	<i>Ophisops microlepis</i>	Stoliczka, 1872
9. Peninsular Black Turtle	<i>Melanochelys t. trijuga</i>	Daniel & Shull, 1963	<u>Varanidae</u>		
<u>Testudinidae</u>			47. Bengal Monitor	<i>Varanus bengalensis</i>	Stoliczka, 1872
10. Indian Star Tortoise	<i>Geochelone elegans</i>	Murray, 1886	48. Yellow Monitor*	<i>Varanus flavescens</i>	Auffenberg <i>et al.</i> , 1989
<u>Trinychidae</u>			49. Eastern Desert Monitor	<i>Varanus griseus koniczny</i>	Boulenger, 1890
11. Indian Softshell Turtle	<i>Aspideretes gangeticus</i>	Kapadia, 1951	<u>Typhlopidae</u>		
12. Leith's Softshell Turtle*	<i>Aspideretes leithii</i>	Acharya, 1949	50. Brahminy Worm Snake	<i>Ramphotyphlops braminus</i>	Murray, 1886
13. South Indian Flapshell Turtle	<i>Lissemys p. punctata</i>		51. Beaked Worm Snake	<i>Rhinotyphlops acutus</i>	Smith, 1943
<u>Eublepharidae</u>			52. Slender Blind Snake	<i>Typhlops porrectus</i>	Kapadia, 1951
14. Common Leopard Gecko	<i>Eublepharis fuscus</i>	Daniel, 1983	<u>Uropeltidae</u>		
<u>Gekkonidae</u>			53. Elliot's Shieldtail	<i>Uropeltis elliotii</i>	Vyas, 1988a
15. Warty Rock Gecko	<i>Cyrtopodion kachhensis</i>	Stoliczka, 1872	54. Bombay Shieldtail	<i>Uropeltis m. macrolepis</i>	Vyas & Jala, 1988
16. Kollegal Ground Gecko	<i>Geckoella kollegalensis</i>	Vyas, 1998b	55. Nilgiri Shieldtail*	<i>Uropeltis ocellatus</i>	Naik <i>et al.</i> , 1993
17. Brook's House Gecko	<i>Hemidactylus brookii</i>	Gleadow, 1887	<u>Boidae</u>		
18. Yellow-green House Gecko	<i>Hemidactylus flaviviridis</i>	Murray, 1886	56. Common Sand Boa	<i>Eryx c. conica</i>	—
19. Slender Gecko	<i>Hemidactylus gracilis</i>	Gleadow, 1887	57. Eastern Red Sand Boa	<i>Eryx j. johnii</i>	—
20. Bark Gecko	<i>Hemidactylus leschenultii</i>	Murray, 1886	58. Indian Rock Python	<i>Python m. molurus</i>	—
21. Northern Spotted Gecko	<i>Hemidactylus m. maculatus</i>	Acharya, 1949	<u>Acrochordidae</u>		
22. Porbandar Gecko	<i>Hemidactylus porbandarensis</i>	Sharma, 1981	59. Western Wart Snake	<i>Acrochordus granulatus</i>	Murray, 1886
23. Indian Termite Hill Gecko	<i>Hemidactylus t. triedrus</i>	Vyas, 1998a	<u>Colubridae</u>		
<u>Agamidae</u>			60. Common Vine Snake	<i>Ahaetulla nasutus</i>	Kapadia, 1951
24. Roux's Forest Lizard	<i>Calotes rouxii</i>	Daniel & Shull, 1963	61. Brown Vine Snake	<i>Ahaetulla pulverulenta</i>	Vyas, 1988a
25. Eastern Garden Lizard	<i>Calotes v. versicolor</i>	---	62. Buff-striped Keelback	<i>Amphispma stolata</i>	Murray, 1886
26. Lesser Agama	<i>Laudakia minor</i>	Stoliczka, 1872	63. Banded Racer	<i>Argyrogena fasciolatus</i>	Acharya, 1949
27. Blanford's Rock Agama	<i>Psammophilus blanfordanus</i>	Vyas, in press	64. Olive Keelback Water Snake*	<i>Atretium schistosum</i>	Naoroji & Monga, 1985
28. Fan-throated Lizard	<i>Sitana ponticeriana</i>	---	65. Forsteni Cat Snake	<i>Boiga forsteni</i>	Daniel, 1962
29. Brilliant Ground Agama*	<i>Trapelus agilis</i>	Murray, 1886	66. Common Indian Cat Snake	<i>Boiga trigonatus</i>	Stoliczka, 1872
30. Hardwick's Spiny-tailed Lizard	<i>Uromastix hardwickii</i>	Günther, 1864	67. Dog-faced Water Snake	<i>Cerberus rynchops</i>	Vyas, 1996a
<u>Chamaeleonidae</u>			68. Indian Ornate Flying Snake	<i>Chrysopelea ornata</i>	Vyas, 1990
31. Indian Chamaeleon	<i>Chamaeleo zeylanicus</i>	Stoliczka, 1872	69. Glassy-bellied Racer*	<i>Coluber ventromaculatus</i>	Boulenger, 1890
<u>Scincidae</u>			70. Painted Bronzeback Tree Snake*	<i>Dendrelaphis pictus</i>	Kapadia, 1951
32. Dwarf Earless Skink	<i>Ablepharus grayanus</i>	Stoliczka, 1872	71. Common Bronzeback Tree Snake	<i>Dendrelaphis tristis</i>	Daniel & Shull, 1963
33. Indian Mole Skink	<i>Eumeces s. schneiderii</i>	Stoliczka, 1872	72. Common Indian Trinket Snake	<i>Elaphe h. helena</i>	Murray, 1886
34. Eastern Yellow-bellied Mole Skink	<i>Eumeces t. taeniolatus</i>	Stoliczka, 1872	73. Glossy Marsh Snake	<i>Gerarda prevostianus</i>	Wall, 1921
35. White-spotted Supple Skink	<i>Lygosoma albopunctata</i>	Acharya, 1949	74. Common Indian Wolf Snake	<i>Lycodon aulicus</i>	Murray, 1886
36. Günther's Supple Skink	<i>Lygosoma guentheri</i>	Acharya, 1949	75. Yellow-spotted Wolf Snake	<i>Lycodon flavomaculatus</i>	Vyas, 1987a
			76. Northern Barred Wolf Snake	<i>Lycodon s. striatus</i>	McCann, 1938

77. India Green Keelback	<i>Macropisthodon plumbicolor</i>	Wall, 1921
78. Banded Kukri Snake	<i>Oligodon arnensis</i>	Acharya, 1949
79. Indian Streaked Kukri Snake	<i>Oligodon taeniolatus</i>	Sharma, 1982
80. Black-spotted Kukri Snake*	<i>Oligodon venustum</i>	Patel & Reddy, 1995
81. Western Sand Snake*	<i>Psammophis c. condanarus</i>	Murray, 1886
82. Pakistani Ribbon Snake	<i>Psammophis leithii</i>	Stoliczka, 1872
83. Stout Sand Snake	<i>Psammophis longifrons</i>	Gleadow, 1894
84. Afro-Asian Sand Snake*	<i>Psammophis schokari</i>	Stoliczka, 1872
85. Indian Rat Snake	<i>Ptyas mucosus</i>	—
86. Dumeril's Black-headed Snake	<i>Sibynophis subpunctatus</i>	Daniel & Shull, 1963
87. Royal Snake	<i>Spalerosophis d. diadema</i>	Murray, 1886
88. Checkered Keelback Water Snake	<i>Xenochrophis piscator</i>	Acharya, 1949
<u>Elapidae</u>		
89. Common Indian Krait	<i>Bungarus caeruleus</i>	—
90. Common Sind Krait	<i>Bungarus s. sindanus</i>	Bolenger, 1890
91. Common Slender Coral Snake	<i>Calliophis m. melanurus</i>	Vyas, 1993a
91a Black Slender Coral Snake	<i>Calliophis melanurus nigrescens</i>	Vyas, 1988b
92. Spectacled Cobra	<i>Naja naja</i>	Günther, 1864
93. Black Cobra*	<i>Naja oxiana</i>	Akhtar & Tiwari, 1991
94. King cobra*	<i>Ophiophagus hannah</i>	Wall, 1924
<u>Hydrophidae</u>		
95. Hook-noised Sea Snake	<i>Enhydrina schistosa</i>	Murray, 1886
96. Many-toothed Sea Snake	<i>Hydrophis caerulescens</i>	Smith, 1926
97. Cantor's Narrow-headed Sea Snake	<i>Hydrophis cantoris</i>	Smith, 1926
98. Annulated Sea Snake	<i>Hydrophis cyanocinctus</i>	Murray, 1886
99. Common Small-headed Sea Snake	<i>Hydrophis gracilis</i>	Murray, 1886
100. Persian Golf Sea Snake*	<i>Hydrophis lapemoides</i>	Gayen, 1999
101. Bombay Sea Snake	<i>Hydrophis mamillaris</i>	Smith, 1926
102. Yellow Sea Snake	<i>Hydrophis spiralis</i>	Murray, 1886
103. Short Sea Snake	<i>Lapemis curtus</i>	Stoliczka, 1872
104. Pelagic Sea Snake	<i>Pelamis platurus</i>	Murray, 1886
<u>Viperidae</u>		
105. Russell's Viper	<i>Doboia r. russelii</i>	Theobald, 1876
106. Indian Saw-scaled Viper	<i>Echis carinatus</i>	Stoliczka, 1872
107. Bamboo Pit Viper	<i>Trimeresurus gramineus</i>	Acharya, 1949

* Confirmation on its presence in Gujarat required.

** Reference showing the first record of the species distribution in the state.

terrapin. *J. Bombay nat. Hist. Soc.* 86: 253.

Bhatt, K., R. Vyas and M. Singh (1999). Herpetofauna of Gir Protected Area. *Zoos' Print J.* 14(5): 27-30.

Bhatt, S. (2000). Croc recaptured on Gujarat. *Crocodile Specialist Group Newsletter* 19(1): 9-10.

Boulenger, G.A. (1890). *The Fauna of British India, including Ceylon and Burma. Reptilia and Batrachia.* Taylor and Francis, London. 541 pp.

Daniel, J.C. (1962). Extension of range of the skink *Riopa guentheri*

(Gray). *J. Bombay nat. Hist. Soc.* 59(3): 965.

Daniel, J.C. (1962). Extension of the known range of the Catsnake, *Boiga forsteni* (Dum. & Bib.). *J. Bombay nat. Hist. Soc.* 59(3): 966-967.

Daniel, J.C. (1983). *The Book of Indian Reptiles.* Bombay Natural History Society/Oxford University Press, Bombay 141 pp.

Daniel, J.C. and E.M. Shull (1963). A list of the reptiles and amphibians of Surat, Dangs, South Gujarat. *J. Bombay nat. Hist. Soc.* 60: 737-743.

Das, I. (1985). *Indian Turtles - A Field Guide.* WWF-India (Eastern region), Calcutta, 119 pp.

David, R. (1970). Breeding the Mugger Crocodile (*Crocodylus palustris*) and water monitor (*Varanus salvator*). *Int. Zoo YearBook* 10: 116-117.

Frazier, J. (1987). Biology and conservation of Indian turtles and tortoises. Interim report to the American Institute for Indian studies, 64 pp.

Gayen, N.C. (1999). A synopsis of the reptiles of Gujarat, western India. *Hamadryad* 24(1): 1-22.

George, J.C. (1955). On the cranial osteology of *U. hardwickii* (Gray). *J. Anim. Morphol. Physiol.* 1(2): 23-29.

George, J.C. (1956). The post-cranial osteology of *U. hardwickii*. *J. Anim. Morphol. Physiol.* 3(1): 25-35.

George, J.C. and R.V. Shah (1954). The occurrence of a striated outer muscular sheath in the lung of *Lissemys punctata granosa* (Achoepff). *J. Anim. Morphol. Physiol.* I.I.

George, J.C. and R.V. Shah (1955a). The myology of the head and neck of the Indian Tortoise, *Testudo elegans*. *J. Anim. Morphol. Physiol.* 2: 1-13.

George, J.C. and R.V. Shah (1955b). The myology of the chelonian trunk and tail. *J. Anim. Morphol. Physiol.* 2: 49-64.

George, J.C. and R.V. Shah (1958). The myology of the chelonian limbs and the hind limbs musculature of *Lissemys punctata*. *J. Anim. Morphol. Physiol.* 5(1): 21-33.

George, J.C. and R.V. Shah (1975). Cardiovascular system of the Indian Pond Turtle *Lissemys punctata*. *J. Anim. Morphol. Physiol.* 22(1): 66-86.

Gleadow, F. (1887). Description of a new lizard from the 'Dangs'. *J. Bombay nat. Hist. Soc.* 2:49-51.

Gleadow, W. (1894). *Psammophis longifrons*. *J. Bombay nat. Hist. Soc.* 8: 55.

Gleadow, J. (1905). Reptiles from Surat, India. *J. Bombay nat. Hist. Soc.* 16: 724.

Gohil, K. (1983). Shukla's snake service in Bhavnagar. *Hamadryad* 8(1): 14.

Günther, A.C.L. (1864). *The Reptiles of British India.* Hardwicke, London 452 pp.

John, S., B.D. Joshi and V.C. Soni (1991). Studies on morphometry, cephalic plates and body scales of *Ophisops microlepis* Blanford. *J. Anim. Morphol. Physiol.* 38: 191-198.

John, S., B.D. Joshi and V.C. Soni (1992). The anatomy of the heart of lizard *Ophisops microlepis* Blanford. *J. Anim. Morphol. Physiol.* 39: 161-164.

Kapadia, G.A. (1951). Animal list of Mahagujarat. Gujarat Research Soc., Bombay, 18 pp.

McCann, C. (1938). The reptiles and amphibia of Cutch. *J. Bombay nat. Hist. Soc.* 40: 425-427.

Moll, E.O. and J. Vijaya (1986). Distributional records for some Indian turtles. *J. Bombay nat. Hist. Soc.* 83: 57-62.

Momin, R.C., D.K. Pethkar and R.H. Sabapara (1990). Parasites of reptiles. *Zoos' Print* 5(10). 20-24.

Momin, R.C., D.K. Pethkar, R.H. Sabapara and A.I. Patel (1992). Helminthes infection in Indian python at Sakkabaug Zoo, Junagadh. *Zoos'*

- Print 7(12): 40-41.
- Murray, J.A. (1886).** *The Reptiles of Sind*. The Education Society's Press Bombay, 192pp.
- Naik, Y.M. and K.R. Vinod (1994).** Record of a rare skink *Lygosoma lineata* (Gray) from Kevadia, Gujarat. *J. Bombay nat. Hist. Soc.* 91: 324-325.
- Naik, Y.M. and K.R. Vinod (1997).** Morphology of a rare skink, *Lygosoma lineatum* (Gray). *J. Anim. Morphol. Physiol.* 44(2): 107-110.
- Naik, Y.M., and K.R. Vinod and P.K. Pradeep (1993).** Reptiles of Narmada Valley, Gujarat. *Cobra* (11): 7-8.
- Naorji, R.K. (1985).** Notes on some common breeding reptiles of the Rajpipla Forest. *J. Bombay nat. Hist. Soc.* 82: 278-308.
- Patel, J.D. and A.S. Reddy (1995).** Flora, fauna and EM of SSP-Command between Narmada and Sabarmati River, Vallabh Vidhaya Nagar, Sardar Patel University, Vallabh Vidhaya Nagar. 233 pp.
- Ramachandran, N. and R.V. Shah (1986).** Morphology, anatomy and histology of the normal and regenerating tail of the scincid lizard *Mabuya carinata*. *J. Anim. Morphol. Physiol.* 33(1&2): 1-16.
- Singh, H.S. and K. Tatu (1999).** *Biodiversity study on Rampara Wildlife Sanctuary*. Gujarat Ecological Education and Research Foundation, Gandhinagar. 106 pp.
- Singh, H.S., B.H. Patel, R. Pravez, V.C. Soni, N. Shah, K. Tatu and D. Patel (1999).** *Ecological study of Wild Ass Sanctuary*. Gujarat Ecological Education & Research Foundation, Gandhinagar. 300 pp.
- Singh, H.S., B.R. Raval, B.H. Patel, K. Tatu, D. Pate, R. Vyas and B.H. Patel (2000).** *Biodiversity Study on Vansda National Park*. Gujarat Ecological Education & Research Foundation, Gandhinagar. 176 pp.
- Shah, R.V. and V.B. Patel (1964).** Myology of the chelonian pectoral appendage. *J. Anim. Morphol. Physiol.* 11(1): 58-84.
- Sharma, R.C. (1981).** *Hemidactylus porbandrensis*, new geckonid lizard from Gujarat, India. *Rec. Zool. Surv. India.* 4(1): 1-2.
- Sharma, R.C. (1982).** Taxonomic and ecological studies on the reptiles of Gujarat. *Rec. Zool. Survey India* 80:85-108.
- Smith, M.A. (1926).** *A Monograph of the Sea-snakes*. London. 130 pp., text-figs. & pls.
- Smith, M.A. (1931).** *The Fauna of British India, including Ceylon and Burma. Reptilia and Amphibia Vol. I. Loricata, Testudines*. Taylor and Francis, London. 185 pp.
- Smith, M.A. (1933).** *The Fauna of British India, including Ceylon and Burma. Reptilia and Amphibia Vol. II. Sauria*. Taylor and Francis, London 440 pp.
- Smith, M.A. (1943).** *The Fauna of British India, including Ceylon and Burma. Reptilia and Amphibia Vol. III. Serpentes*. Taylor and Francis, London. 583 pp.
- Stoliczka, F. (1872).** Notes on the reptilian and amphibian fauna of Kutchh (Cutch). *Proc. Asiat. Soc. Bengal*, May: 71-85.
- Theobald, W. (1876).** *Descriptive Catalogue of the Reptiles of British India*. Calcutta, 238 pp.
- Urfi, A.J. (1997).** Successful breeding of the Indian Python *Python molurus molurus* (Linnaeus) at Sundarvan Nature Discovery Center, Ahmedabad. *Zoos' Print* 12(1): 4-5.
- Urfi, A.J. (1999).** The snake conservation programme of Sundarvan Nature Discovery Centre, Ahmedabad (Gujarat, India): An evaluation. *Zoos' Print* 14(4): 7-10.
- Vasu, V.M. (1949).** Remarks on aggressive demonstration by Russell's Viper. *J. Bombay nat. Hist. Soc.* 48(1): 190-191.
- Vijaykumar, V. (1997).** Evaluation of restocked Mugger crocodiles and its implication in longterm conservation and management of the species in Gujarat, India, Gujarat Institute of Desert Ecology, Bhuj-Kachh, Gujarat, 65 pp.
- Vijaya Kumar, V., R. Vyas and B.C. Choudhury (1999a).** Status of Mugger in Gujarat State. *Crocodiles Specialist Group Newsletter* 18(2): 7-8.
- Vijaya Kumar, V., R. Vyas and B.C. Choudhury (1999b).** Status of Mugger: its conservation problems in Gujarat. *ENVIS (Wildlife & Protected Area)* 2(1): 69-76, Wildlife Institute of India, DehraDun.
- Vyas, R. (1987a).** A list of the snakes of Bhavnagar District, Gujarat State. *J. Bombay nat. Hist. Soc.* 84(1): 227-230.
- Vyas, R. (1987b).** Snake collection data from Bhavnagar City, Gujarat for 1984. *Hamadryad* 12(1): 3-4.
- Vyas, R. (1988a).** Notes on snakes from district Dang, Gujarat State. *J. Bombay nat. Hist. Soc.* 85(1): 200.
- Vyas, R. (1988b).** Extension range of the Striped Coral Snake (*C. nigresens*). *Hamadryad* 13(2): 3-4.
- Vyas, R. (1989).** The Ganges Soft-shell Turtle (*Tryonix gangeticus* Cuvier) from Vadodara City. *J. Bombay nat. Hist. Soc.* 86(1): 107-108.
- Vyas, R. (1990).** Golden Tree Snake. *J. Bombay nat. Hist. Soc.* 87(2): 309.
- Vyas, R. (1993a).** Recent cases of man-eating by the Mugger (*Crocodylus palustris*) in Gujarat State. *Hamadryad* 18: 48-49.
- Vyas, R. (1993b).** Studies on some snakes (Ophidia-Reptilia) of Gujarat State, India, Ph.D. Thesis, Bhavnagar University, Bhavnagar, India, 187 pp.
- Vyas, R. (1994).** Mugger crocodiles in the vicinity of human settlements in South Gujarat. *Hamadryad* 19: 94-96.
- Vyas, R. (1995).** Breeding record of *Calotes rouxi* (Duméril & Bibron). *Zoos' Print* 10(7): 36 & 38.
- Vyas, R. (1996a).** Breeding data on *Lissemys punctata* from western India. *Hamadryad* 21: 45-47.
- Vyas, R. (1996b).** Captive breeding of the Indian Rock Python (*Python molurus molurus*). *The Snake* 27(2): 127-134.
- Vyas, R. (1997).** Captive breeding of Saw-scaled Viper (*Echis carinatus*). *Hamadryad* 22(2): 115-117.
- Vyas, R. (1998a).** The reptiles of Gujarat State: Updated distribution. *Tigerpaper* 25(1): 8-14.
- Vyas, R. (1998b).** First record of the Spotted Forest Gecko *Geckoella collegalensis* (Beddome, 1870) from Gir Forest, Gujarat State, India. *J. Bombay nat. Hist. Soc.* 95: 123-124.
- Vyas, R. (2000).** Herpetofauna of Hingolghadh Nature Education Sanctuary, Gujarat. *Zoos' Print J.* 15(6). 285-286.
- Vyas, R. and C. Jala (1988).** The Bombay Shield Tail Snake (*Uropeltis macrolepis* Peters) collected from the Saputara, Dang. *Herpeton* 1(1): 16.
- Vyas, R. and B.M. Parasharya (2000).** Distribution and status of the Star Tortoise (*Geochelone elegans*) in Gujarat State, India. *Zoos' Print J.* 15(4): 239-242.
- Vyas, R. and B.H. Patel (1990).** A survey of fresh water turtle of Gujarat. *J. Bombay nat. Hist. Soc.* 87(1): 152-155.
- Vyas, R. and B.H. Patel (1992a).** Extension range of Striped Grass Skink *Mabuya dissimilis*. *J. Bombay nat. Hist. Soc.* 89(3): 382.
- Vyas, R. and B.H. Patel (1992b).** Studies on the reproduction of the Indian Soft Shell Turtle *Aspideretes gangeticus*. *Hamadryad* 17: 32-34.
- Vyas, R. and B.H. Patel (1993).** Captive breeding of the Indian Roofed Terrapin *Kachuga tecta* (Grey). *J. Bombay nat. Hist. Soc.* 90(1): 109-112.
- Wall, F. (1921).** *The Snakes of Ceylon*. H.R. Cottle, Government Printer, Ceylon. Xxii, 581 pp.
- Wall, F. (1924).** The Hamadryad or King Cobra (*Naja hannah* Cantor). *J. Bombay nat. Hist. Soc.* 30: 189-195.