

AN IDENTIFICATION KEY TO THE REPTILES OF THE KALAKAD WILDLIFE SANCTUARY, TAMIL NADU, INDIA

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INTRODUCTION

Reptiles, despite the fact that they are predominant, are neglected in the past by the resource managers and the administrators in-charge of the conservation areas such as the sanctuaries and the biosphere reserves in India. One reason is that the information on the herpetology of the protected areas is scanty and no keys covering the reptiles are published. Another is that the definitive volumes on Indian reptiles by Malcolm Smith (1931, 1935, 1943) were written with the specialist in mind. The present key, based on recent material taken from stations located in the heart of the KWLS by the scientists of the Southern Regional Station (SRS) of the Zoological Survey of India (ZSI) and the findings of other workers, is expected to fulfill an urgent need.

The majority of reptiles inhabiting the sanctuary are included in the key, but further study is needed to determine the entire herpetofauna of KWLS. It is felt, therefore, that this work will enable the biologists/naturalists interested in the herpetology of the KWLS to identify the reptiles of the area and thereby facilitate future recognition of species not previously recorded from the sanctuary.

PHYSIOGRAPHY OF THE KALAKAD SANCTUARY

The Kalakad Wildlife Sanctuary is located in Nanguneri Taluq, Tirunelveli District of Tamil Nadu (See Maps 1-2) and lies between latitudes 8°25'N and 8°35'N and longitudes between 77°25'E and 77°35'E. The hills are covered with dry deciduous forest on the lower slopes and evergreen (Shola type) forests on the upper reaches, crossed by rivers and mountain streams. The highest peak is Kalakad Peak (1775 M) and the other noteworthy peaks are Velimalai (1011 M), Kakachi (1233 M), Netterikkal (1350 M), and Tiruvanamalai Peak (1387 M). Of the small but useful rivers springing from the hills, mention should be made of Pachayar, Kilmanimuthar, Nambiar and Kodumudiar.

With an evolutionary lineage dating back to about 50 million years, the KWLS could boast of the richest and least disturbed patch of 100² km of shola forest found in Peninsular India today. It is, therefore, appropriate that the entire Kalakad Reserve Forest was converted into a Wildlife Sanctuary in 1976.

THE KEY

NOTE : The nomenclature, adopted here, follows broadly that of Malcolm Smith (*op. cit.*), but with certain modifications suggested by Gloyd (1977), Loveridge and Williams (1957), Malnate (1960), McDowell (1964), Mittleman (1952), Savage (1952) and Stimson *et al.* (1977).

TURTLES AND TORTOISES

1. Hind feet elephantine ; toes not webbed. Indian Star Tortoise, *Geochelone elegans* (Schoepff), 1792.
Hind feet not elephantine ; toes webbed. 2
2. Forefeet semi paddle shaped and with three claws only ; shell covered with smooth skin ; lower shell with a cutaneous flap, under which the hind-limb may be concealed. Southern Flap-shelled Turtle, *Lissemys punctata granosa* (Schoepff), 1801.
3. Forefeet distinctly paddle-shaped, with five claws ; shell covered with horny shields ; lower shell without a cutaneous flap. The peninsular Pond Turtle *Melanochelys trijuga trijuga* (Schweigger), 1812.

LIZARDS

1. Tongue slender, deeply forked ; granular scales on the back ; size large, adult exceeding 300 mm or more in length. Common Indian Monitor, *Varanus bengalensis* (Daudin), 1802.
Tongue not as above ; dorsal scales not granular ; adult rarely exceeding 200 mm in length. 2
2. Top of head with helmet-like knob ; digits fused into opposable bundles ; tail prehensile, watch-spring-like ; colour changeable. Indian chameleon, *Chamaeleo zeylanicus* Laurenti, 1768.
Without the above combination of characters. 3
3. Top of head without symmetrical plates. 4
Top of head with symmetrical plates. 17
4. Eyelids movable ; digits free. 5
Eyelids immovable ; digits clawed. 11
5. Ribs elongated, supporting a wing-like expansion. Flying lizard, *Draco dussumieri* Dum. & Bibr., 1837.
Ribs not elongated ; no wing-like expansion. 6
6. Hind foot with four toes only. The Fan-throated Lizard, *Sitana ponticeriana* Cuvier, 1844.
Hind foot with five toes. 7

7. Body depressed ; no proper dorsal crest. Peninsular Rock-lizard, *Psammophilus dorsalis* (Gray), 1831.
 Body not depressed ; dorsal crest distinct. 8
8. No fold or pit in front of the shoulder. Indian Garden Lizard, *Calotes versicolor* (Daudin), 1802.
 A fold or pit in front of the shoulder. 9
9. Fold in front of the shoulder extending across the throat ; a white spot below the eye. Elliott's Forest Calotes, *Calotes ellioti* Gunther, 1864.
 Fold in front of the shoulder not exceeding across the throat ; no white spot below the eye. 10
10. Dorsal scales not larger than the ventrals ; colour bright green, with whitish crossbars. Green calotes, *Calotes calotes* (Linn.), 1758.
 Dorsal scales distinctly larger than the ventrals ; colour green, with broad, black transverse bars. Large-scaled calotes, *Calotes grandisquamis* Gunther, 1875.
11. Digits not dilated. Pupil of eye round. 12
 Digits strongly dilated. Pupil vertical. 13
12. Black with small granules, intermixed with much larger keeled scales ; ventral scales smooth ; brown above, with blackish and whitish markings. Ornate Dwarf Gecko, *Cnemaspis ornata* (Beddome), 1870.
 Back with small granules, intermixed with slightly larger keeled tubercles ; ventral scales keeled ; brown above, clouded with paler and darker markings. Beddome's Dwarf Gecko, *Cnemaspis beddomei* (Theobald), 1876.
13. Subdigital lamellae single. Colour greyish-brown, with dark spots. Southern Forest Gecko, *Dravidogecko anamallensis* Gunther, 1875.
 Subdigital lamellae divided. 14
14. Dorsal tubercles strongly keeled and arranged in regular longitudinal series. 15
 Dorsal tubercles rounded, smooth, feebly keeled, not regularly arranged. 16
15. Subdigital lamellae in straight, transverse series. Brown above, with darker spots which often unite to form undulating bars on the back. Rock Gecko, *Hemidactylus maculatus* Dum. & Bibr., 1836.
 Subdigital lamellae in oblique series. Light brown or greyish, with dark brown spots which do not unite to form undulating bars on the back. Spotted Indian House Gecko, *Hemidactylus brooki* Gray, 1845.
16. Tail feebly depressed. Colour grey or pinkish brown or uniform or with dark longitudinal stripes and a pair of eye streaks. Southern House Gecko, *Hemidactylus frenatus* Schlegel, 1836.
 Tail strongly depressed. Colour grey, with distinct dark markings which may be either

- wavy crossbars or rhomboidal spots and a dark eye streak. Bark Gecko, *Hemidactylus leschenaulti* Dum. & Bibr., 1836.
17. Limbs robust, long. 18
 Limbs feeble, short. 20
18. Back with dorso-lateral stripes only. 19
 Back with well-defined vertebral and dorso-lateral series. Beddome's Mabuya, *Mabuya beddomii* (Jerdon), 1870.
19. Back with small dark markings ; sides with white spots ; postnasal present or absent. Bronze Grass Skink, *Mabuya macularia* (Blyth), 1853.
 Back uniform bronze or green ; sides without distinct spots ; no postnasal. Common Skink, *Mabuya carinata* (Schneider), 1801.
20. Tympanum exposed and superficial. Colour brown, with dark spots on the back, which in the juveniles are usually confluent into longitudinal lines down the back. Dotted Garden Skink, *Riopa punctata* (Linn.), 1766.
 Tympanum (if distinct), more or less small, situated in a depression. 21
21. Claws retractile into a sheath. Travancore Cat Skink, *Ristella travancorica* (Beddome), 1870.
 Claws not retractile into a sheath. 22
22. Lower eyelid with a transparent disc. Black-striped Ground Skink, *Scincella laterimaculatum* (Boulenger), 1887.
 Lower eyelid scaly. 23
23. Supranasals present. Ceylon Arboreal Skink, *Dasia haliana* (Haly & Nevill), 1887.
 No supranasals. Slender Skink, *Sphenomorphus dussumieri* (Dum. & Bibr.), 1839.

SNAKES

1. Eyes concealed ; teeth only in the upper jaw ; body worm-like, covered with uniform scales. Common Blind Snake, *Ramphotyphlops braminus* (Daudin), 1803.
 Eyes exposed ; teeth in both jaws ; body not worm-like ; ventral scales distinctly enlarged. 2
2. Traces of hind-limbs, projecting as claw-like spurs on each side of the vent ; pattern of regular, large brown or reddish-brown, black-edged spots. Indian Python, *Python molurus* (Linn.), 1758.
 No traces of hind-limbs ; pattern not as above. 3
3. No poison fangs in the front of the mouth. 4
 Poison fangs in the front of the mouth. 26
4. Ventrals narrow, not as broad as the body ; tail extremely short, ending in a spiny-shield or tip. 5

- Ventrals as broad as the body ; tail not short nor ending in a shield, cylindrical, pointed. 8
5. Tail terminating in a flattened, rounded rugose shield. Red-bellied Uropelt, *Rhinophis sanguineus* Beddome, 1863.
Tail not as above. ... 6
6. Tail more or less compressed, distinctly rounded above. Ashambu Uropelt, *Uropeltis liura* (Gunther), 1875.
Tail obliquely truncate above. ... 7
7. Truncated portion of the tail small, feebly convex, neeve quite flat ; brown, with small yellow spots on the underside. Elliot's Uropelt, *Uropeltis ellioti* (Gray), 1858.
Truncated portion of the tail large, distinctly flat or concave ; yellowish below, with large black or brown patches or crossbands. Tirunelveli Uropelt, *Uropeltis arcticeps* (Gunther), 1875.
8. Dorsal scales smooth throughout. ... 9
Atleast some of dorsal scales keeled. ... 21
9. Anterior teeth in both jaws much enlarged ; eye very dark, pupil scarcely visible in life. ... 10
Anterior teeth in both jaws not much enlarged ; pupil of eye distinctly visible in life. ... 11
10. Brown above, with white crossbars ; anal plate divided ; loreal shield touching internasal. Common Wolf Snake, *Lycodon aulicus* (Linn.), 1754.
Blackish above, with pale yellow crossbars ; anal plate undivided ; loreal shield not touching internasal. Travancore Wolf Snake, *Lycodon travancoricus* (Beddome), 1870.
11. Ventrals notched and with lateral keel. ... 12
Ventrals normal. ... 14
12. Scales in 17 rows ; vertebral row of scales not enlarged ; head barred with black and yellow ; back with a dorsal pattern of reddish or orange spots shaped like tetrapetalous flowers. Golden Tree Snake or 'Flying' Snake, *Chrysopelea ornata* (Shaw), 1802.
Scales in 13 to 15 rows ; vertebral scales enlarged ; pattern of the head and the back not as illustrated above. ... 13
13. Eye moderate ; head with a black temporal stripe ; back with a pair of buff lateral stripes. Common Indian Bronze-back, *Dendrelaphis tristis* (Daudin), 1803.
Eye rather large ; no lateral stripes on the body ; no black temporal stripe on the head. Large-eyed Bronze-back, *Dendrelaphis grandoculis* (Boulenger), 1890.
14. Head triangular and pupil of eye vertical. Indian Gamma Snake or Common Cat Snake, *Boiga trigonata* (Schneider), 1802.
Head not triangular ; pupil of eye not vertical. ... 15

15. Pupil of eye round. 16
 Pupil of eye horizontal. 19
16. Head and nape black or with distinctive dark markings ; medium to large snakes, total length exceeding 450 mm. 17
 Head and nape without the pattern as illustrated above ; dwarfed snakes, total length not exceeding 450 mm ; head with a series of dark spots on each side, the remnants of temporal stripes. Striped-neck Snake, *Liopeltis calamaria* (Gunther), 1858.
17. Scales in 17 rows. 18
 Scales in 15 rows. Russell's Kukri Snake, *Oligodon taeniolatus* (Jerdon), 1853.
18. No loreal shield ; head with crenate-shaped markings ; back with large paired spots ; ventrals fewer than 160. Travancore Kukri Snake, *Oligodon travancoricus* Beddome, 1877.
 Loreal shield present or absent ; head with 3 distinct chevron-shaped markings ; back with well defined black crossbands ; ventrals 200 or more. Banded Kukri Snake, *Oligodon arnensis* (Shaw), 1802.
19. Snout ending in a pointed fleshy appendage. 20
 Snout not ending in a pointed fleshy appendage. Gunther's Whip Snake, *Ahaetulla dispar* (Gunther), 1864.
20. Fleshy appendage on snout formed entirely by the rostral shield ; snout with a median groove ; colour green. Common Green Whip Snake, *Ahaetulla nasuta* (Lacepede), 1789.
 Fleshy appendage on snout formed by a number of small scales ; snout without a median groove ; colour grey or brown, with blackish spots. Brown Whip Snake, *Ahaetulla pulverulenta* (Dum. & Bib.), 1854.
21. Scales in 21 or more rows. 22
 Scales in 19 rows. 23
22. Scales strongly keeled throughout the body ; anal plate divided ; grass-green in colour. Green keelback, *Macropisthodon plumbicolor* (Cantor), 1839.
 Scales smooth anteriorly, feebly keeled posteriorly ; anal undivided ; colour dark brown, with black crossbars containing white ocelli. Trinket Snake, *Elaphe helena* (Daudin), 1803.
23. Ventrals 190 or more ; adult exceeding 1.25 m in length ; lips and throat stippled with black. Rat Snake, *Ptyas mucosus* (Linn.), 1758.
 Ventrals 187 or less ; adult rarely exceeding 1.25 m in length. 24
24. Body with a pattern of alternating dark spots. 25
 Body with a pattern of lateral stripes. Striped Keelback, *Amphiesma stolata* (Linn.), 1758.

25. Two black streaks from the eye to the gape ; ventrals 158 or more ; colour olivaceous or yellowish, with numerous black spots arranged in the pattern of a chessboard. Checkered Keelback, *Xenochrophis piscator* (Schneider), 1799.
One yellow, black-egged streak from the eye to the gape ; ventrals 150 or fewer ; colour olive-brown or brown, with a series of yellow spots or transverse bars. Beddome's Keelback, *Amphiesma beddomei* (Gunther), 1864.
26. Head triangular, covered with tiny head shields or numerous small scales ; pupil vertical. 27
Head oval, covered with well-developed symmetrical shields ; pupil round. 31
27. A deep sensory pit between the nostril and the eye on each side of the face. 28
Face without a sensory pit as above. Russell's Viper, *Vipera russelli* Shaw, 1797.
28. Head covered with large symmetrical shields ; snout turned up at the end like a hump. Hump-nosed pit Viper, *Hypnale hypnale* Merrem, 1820.
Head covered with scales ; snout not as above. 29
29. Upper head scales very large ; scales in 12-15 rows. Colour bright green, with a white to yellowish stripe on the sides. Large-scaled Pit Viper, *Trimeresurus macrolepis* Beddome, 1862.
Upper head scales not markedly large ; scales in 19-21 rows. Colour and pattern not as above. 30
30. Upper head scales strongly imbricate ; supraoculars broken up into several shields ; colour green or brown, with brown or black spots which may unite to form a zigzag. Malabar Pit Viper, *Trimeresurus malabaricus* (Jerdon), 1854.
Upper head scales scarcely imbricate ; supraoculars narrow ; brown above and whitish below, with a dorsal series of brown spots which may unite to form a zigzag ; nape with a prominent -shaped mark. Horse-shue pit Viper, *Trimeresurus strigatus* Gray, 1842.
31. Scales along centre of back distinctly enlarged. Common Indian Krait, *Bungarus caeruleus* (Schneider), 1801.
Scales along centre of back not enlarged (except in *O. hannah*) ; neck not dilatable into a hood (in life). 32
32. Scales in 13-15 rows, Slender Coral Snake, *Calliophis melanurus* (Shaw), 1802.
Scales in 15-25 rows, disposed obliquely ; neck dilatable into a hood (in life). 33
33. Scales in 15 rows ; head with a pair of large occipital shields. King Cobra, *Ophiophagus hannah* (Cantor), 1836.
Scales in 19-25 rows ; head without the occipital shields. Indian Cobra, *Naja naja naja* (Linn.), 1758

SUMMARY

A key to the identification of sixty one species of reptiles occurring in the Kalakad Wildlife Sanctuary (KWLS) in Tamil Nadu, India is presented.

ACKNOWLEDGEMENTS

I am thankful to Dr. Asket Singh, Scientist 'SF', and Prof. M.S. Jairajpuri, Director, Zoological Survey of India for their encouragement. It gives me great pleasure to appreciate the splendid efforts made by the Scientists of the SRS, ZSI to collect the first quantitative series of reptiles from the KWLS which has greatly motivated me to present the paper.

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