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Diversity of Snakes from the Jaffna Peninsula, Sri Lanka

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Abstract: A herpetological survey was carried out to study the diversity of snakes from 2002 to 2004. The study revealed eighteen species of terrestrial snakes belonging to five families. Out of which four species were highly venomous species; two were mildly venomous and the rest of the twelve were non poisonous species. Two species were endemic to Sri Lanka and six out of the eighteen documented species were recorded for the first time from Jaffna Peninsula.

Key words: Snakes, diversity, conservation, venomous, Jaffna

INTRODUCTION

Snakes are the symbols of the healthy environment. But these fascinating creatures of the limbless reptiles are always in trouble. There are a few main reasons why snakes are becoming endangered namely the venom they possess (Hodgson and Wickramaratna, 2006) and the ignorance of the people. Even though snakes are one of the dominant groups of reptiles in the Jaffna Peninsula as it is primarily a dry zone area, the beneficial effects of snakes in the environment is still in poor condition.

The island of Sri Lanka has 96 described species of snakes (De Silva, 2001) of which 82 are fully or partially terrestrial. This accounts 85.42% of the total serpentoids with 6 families confined to 38 genera, out of which 50 species are endemic with 2 endemic genera to the Island.

The remarkably rich snake fauna of Jaffna Peninsula-the Northern part of Sri Lanka has been subject to a few investigations regarding their distribution and ecology. The present knowledge is based mainly on publications which are decades old. The individual accounts of snakes from Northern region such as Mullaitivu, Jaffna and Vavuniya were made by Haly (1890), Willey (1906) and Wall (1921a-c).

Some information regarding the snakes of Jaffna were gathered through the brief accounts made by Deraniyagala (1951), where he reported that the type specimens of *Eryx conicus* and *Echis carinata sinhaleyus* collected from Chavakachcheri were deposited in the Natural History Museum of Colombo. Once again Deraniyagala (1960a) reported the attack made by *Echis carinata carinata* collected at Ariyalai to

Mr. Karunaratne-the Curator of the then Jaffna Museum. In addition Deraniyagala (1960b) referred to the breeding season of the sand boa which he has collected from two localities in Jaffna namely Kandavalai and Chavakachcheri. In the meantime, De Silva (1957) reported seven species of both amphibians and reptiles from the islands off the coast of Jaffna.

Apart from the individual accounts by Deraniyagala (1955), he made a comprehensive account on 82 species of snakes in his "Coloured atlas of some vertebrates-Serpentoid Reptilia" of which the following 13 species *Eryx conicus*, *Ptyas mucosa maximus*, *Lycodon aulicus aulicus*, *Dryocalamus nympha*, *Chrysopelea taprobanica*, *Dendrelaphis tristis*, *Boiga trigonatus trigonatus*, *Atretium schistosum*, *Oligodon arnensis*, *Bungarus caeruleus*, *Naja naja* and *Echis carinata carinata* under four families (Boidae, Colubridae, Elapidae and Viperidae) were reported from Jaffna. Later De Silva (1969) in the "Taxonomic studies on Ceylon snakes of the family Colubridae" added another three species of snakes collected in the Jaffna region out of the account of thirty species. Those were *Cercasps carinatus*, *Xenochrophis piscator piscator* and *Amphiesma stolatum*.

As such, our knowledge on the distribution of snakes in Jaffna Peninsula is rather scanty and the snakes inhabiting this region had no clear picture. Therefore it was decided to study the followings aspects of taxonomy, such as distribution of snakes and to implement conservation activities in the Jaffna Peninsula.

This study presents the snake faunal composition of Jaffna Peninsula with morphological details and their distribution.

MATERIALS AND METHODS

The present survey of snakes was a part of the herpetological survey carried out from 2002 to 2004 in places that are free of land mines in the Jaffna Peninsula. Relief and vegetation maps have been used in selecting the study sites. Sampling sites were noted down according to the DS division (Fig. 1). The snakes were collected by locally made snake sticks or by hands. For those found in the aquatic environment, noosing and modified snake trap (Balasubramaniam and Krishnarajah, 2003) were used. The survey involved an active search i.e. close visual inspection of shrubs, trees, tree holes, ground, leaf litters, stones and rocks along with a VES (Visual Encounter Survey). Every effort was made to minimize the effect on the substrate habitat during the survey.

Collections received from people (dead and occasionally alive) were also taken into consideration, as the presence of land mines restricted the surveying area. Samples of each species were deposited at the museum of Zoology Department of the Jaffna University and in the Natural History Museum, Colombo. Given the emphasis on conservation, collection of specimens was kept to a minimum.

Every animal collected was photographed, sexed and the following data (meristic and morphometric) were taken. Snout to vent length, tail length, head length, snout to post labial, snout to eye; inter orbital; scale types and their number in the head shield; scale counts of dorsal, ventral and subcaudals and the colouration of the snake. Abbreviation for body measurements are as follows: Snout to Post Labial (SPL); South Vent Length (SVL); Head Length (HL); Snout to Eye (SE); Inter Orbital (IO). Only 2 to 3 specimens were preserved as voucher specimens while the rests were released after the collection of data. The standard identification keys

(Deraniyagala, 1955; De Silva, 1969, 1980; Smith, 1943) and colour guide on terrestrial snakes (De Silva, 1990) were used for the identification of the collected snakes. The nomenclature was followed by De Silva (2001) and Das (2001). The advice and useful hints from the local as well as foreign experts were also adopted when identifying the collected snakes.

RESULTS

Family Boidae

Python molurus molurus (Linnaeus, 1758)

Description: Based on a single specimen (2795 mm SVL). In percentage of Snout Vent Length: HL 4.221; SPL 3.635; SE 1.187; IO 0.862; total length to tail length ratio 8.87.

Scalation: Inter nasal 02; pre frontals 04; frontal 02, nasal opening at the very posterior edge with a small post nasal; loreals in longitudinal rows of which inner one elongated and entire, while the outer one is broken; (in this case 2 in the right side, 4 in the left); pre oculars 03; post oculars 03 or 04; temporals variable; supra labials 13 of which 7th touching eye; infralabials 17 of which 12th to 17th reduced; chin shield cannot be distinguished; scale rows: 58, 69, 42 and smooth; ventrals 257 and much narrow compared to the body width, anal united; Subcaudals 66 and united.

Colour: Head with lance shaped mark in a dull brown body, which is followed by a row of yellowish brown blotches that edged with black, another lateral series on each side abruptly ends with the vent, tail part having a single blackish green blotches; a total of 46 blotches of which 37 were on the body, ventral white invaded by lateral blotches.

Collection records: Nunavil (Thenmarachi). Not reported previously from Jaffna Peninsula (Fig. 2a).

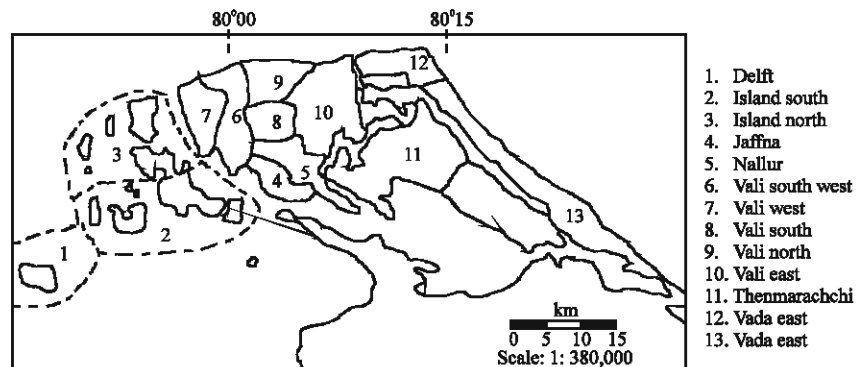


Fig. 1: Divisional secretariats-Jaffna Peninsula

Family Colubridae

***Amphiesma stolatum* (Linnaeus, 1758)**

Description: Based on 07 specimens (from 288-311 mm SVL). In percentage of Snout-Vent length: HL 5.30-5.38; SPL 4.491-4.694, SE 1.409-1.446; IO 1.318-1.377; total length to tail length ratio 4.1-5.3.

Scalation: Internasal 02; loreal 01; pre oculars 01; post oculars 03 or sometimes 04; supra labials 07 or 08 of which 3rd, 4th or 3rd, 4th, 5th entering orbit; temporals 1+2; infra labials 10 of which 5th, 6th and 7th enlarged; scales bifid and keeled; scale rows 19, 19, 17 with lowest row smooth; ventrals 145-155; sub caudals: 66-69 and paired.

Colour: Dorsally yellowish brown to black with about 50 dark brown or black transverse bars. A yellow patch around eye bordered anteriorly and posteriorly by vertical

bars. Another extends from under the orbit to the gape. A row of black spots occur along the sides of the few ventrals for about half of its length in the individuals captured in the islands. Blue colour interstitial skin will be visible when the snake expands its body. Ventrally white.

Collection records: Saravanai (Is South), Naranthanai (Is North) and Kopay (Vali East). It has not been reported previously (Fig. 2b).

***Aretium schistosum* (Daudin, 1803)**

Description: Based on 07 specimens (from 669-833 mm SVL). In percentage of Snout-Vent length: HL 3.711-4.325; SPL 2.377-3.331; SE 0.842-0.972; IO 0.937-1.120; total length to tail length ratio 4.3-6.3.



Fig. 2: Terrestrial snakes recorded in the Jaffna Peninsula, (a) *Python molurus molurus* (Family: Boidae); (b) *Amphiesma stolatum* (Family: Colubridae); (c) *Aretium schistosum* (Family: Colubridae), Male; (d) *Aretium schistosum* (Family: Colubridae), Female; (e) *Boiga trigonata trigonata* (Family: Colubridae); (f) *Cerberus rynchops rynchops* (Family: Colubridae), Dorsal view, (g) *Cerberus rynchops rynchops* (Family: Colubridae), Ventral view, (h) *Coelognathus helena helena* (Family: Colubridae); (i) *Dendrelaphis tristis* (Family: Colubridae)

Scalation: Internasal 01; nasal semi divided by the dorsally placed nostril; loreal 01; pre ocular 01 rarely 02; post oculars 03; Scale rows: 19, 19, 17 and keeled; ventrals: 153-158, anal divided; sub caudals: 61-70 and divided.

Colour: Green dorsally upper lip and ventral yellow, a discontinuous dark marking start from eye to 2-3 head length, a pinkish lateral band sometime occupies the 5th coastal row irrespective of sex.

Collection records: Mallakam, (Vali North) Chunnakam (Vali South); Varachchi kulam (Vada South West). It has been reported previously from Jaffna (Deraniyagala, 1955) (Fig. 2c, d).

***Boiga trigonata trigonata* (Schneider, 1802)**

Description: Based on 05 specimens (from 438-492 mm SVL). In percentage of Snout-Vent length: HL 3.30-3.41; SPL 2.53-2.79; SE 1.095-0.955; IO 1.133-1.187; total length to tail length ratio 4.9-5.8.

Scalation: Internasal 02, loreal 01, pre and post oculars 01 and 02 respectively, supra labials 08 of which 3rd, 4th entering orbit, temporals 2+2 or 2+3, infra labials 11 of which 7th largest; each body scale with single apical pit; scale rows: 21, 21, 15; ventrals 206-216, anal united; sub caudals 79-87 and paired.

Colour: Adult specimens pale brown interrupted by a mid dorsal white line. Two white chevron bands diverge from the parietal end. A series of about 60 black Y shaped black marks and white streaks, which are interconnected by white vertebral band. Ventral white with single series of spots laterally while the young displays a dull orange colour.

Collection records: Thirunelvely, Urelu, Kokkuvil (Nallur); Irupalai (Vali South East) and Ariyalai (Jaffna). It has been reported previously from Jaffna (Deraniyagala, 1955) (Fig. 2e).

***Cerberus rynchops rynchops* (Schneider, 1799)**

Description: Based on 05 specimens (from 185-779 mm SVL). In percentage of Snout-Vent length: HL 3.84-6.86; SPL 2.50-4.43; SE 1.11-1.84; IO 0.95-1.57; total length to tail length ratio 4.6-6.3.

Scalation: Internasal 02; loreal 01; pre ocular 01; post ocular 01-03; supralabials 09 or 10 of which last 3 or 4 scales in double rows; 4th, 5th or 4th, 5th, 6th entering orbit or a row of scales separating the orbit and supralabials; infralabials 07 of which the 7 largest; genials 2 pairs of which the 2nd placed behind the 1st; scale rows 25, 25-21, 19; ventrals 146-169, anal divided; sub caudals 52-67 and paired.

Colour: Dirty to blackish green colour interrupted with a series of diffuse dark transverse blotches which are clearly visible under water; a dorso lateral band breaks up into spots almost half the body length, ventrals are heavily blotched with black.

Collection records: It has been reported from Kakai tivu (Jaffna) a fish landing centre of the Jaffna lagoon (Balasubramaniam and Kuganathan, 2006).

***Coelognathus helena helena* (Daudin, 1803)**

Description: Based on 04 specimens (from 303-338 mm SVL). In percentage of Snout-Vent length: HL 3.52-5.02; SPL 3.07-4.19; SE 0.86-1.452; IO 0.99-1.45; total length to tail length ratio 4.1-6.4.

Scalation: Internasal 02; loreal 01; pre, supra and post oculars 01, 01 and 02; supra labials 09 of which 5th, 6th entering orbit; temporals 2+1 or 2+2; infralabials 10 of which 6th and 7th or 7th largest followed by 3 small scales; post genials separated by three scales; scale rows: 25-27, 23-26, 21-19; ventrals 217-265, anal united; sub caudals 74-99 and united.

Colour: Dorsally brown, a pair of almost parallel dark bands and yellow lateral band upon neck. A black band under the eye to gape and an oblique one behind it. A series of dark brown cross bars with white ocelli are most distinct laterally and dorsally in the anterior body, ventrally white or pale yellow.

Collection records: Thirunelvely (Nallur) and Manipay (Vali South West). Not reported from Jaffna Peninsula previously (Fig. 2f, g).

***Dendrelaphis tristis* (Daudin, 1803)**

Description: Based on 09 specimens (from 236-798 mm SVL). In percentage of Snout-Vent length: HL 3.56-5.68; SPL 2.91-4.89; SE 0.96-1.53; IO 0.9-1.57; total length to tail length ratio 3.1-3.6.

Scalation: Internasal 02; loreal 01 long; pre and post ocular 01 and 02; supra labials 09 of which 5th, 6th entering eye; infra labials 07; temporals 3+2 mostly or 2+2; genials two pairs of which posterior genials much larger than anterior; scale rows 15, 15, 11-9; ventrals 176-185; anal divided; sub caudals 110-135 and paired.

Colour: Dorsally uniform bronze green, that changes into bronze brown gradually. Anteriorly few oblique bars with snout tip brown. Tail with two lateral lines on each side. Ventrally uniform white or greenish white. When these are cornered, they will expand their body to show the hidden part of the blue colour tip of the scale.

Collection records: Thirunelvely (Nallur) and Naranthanai (Is South). It has already been reported from Jaffna (Deraniyagala, 1955) (Fig. 2i).

***Dryocalamus nympha* (Daudin, 1803)**

Description: Based on 10 specimens (from 291-397 mm SVL). In percentage of Snout-Vent length: HL 2.72-4.75; SPL 2.20-3.80; SE 0.88-1.15; IO 0.99-1.08; total length to tail length ratio 4.1-5.4.

Scalation: Inter nasal 02; loreal 01; pre ocular 01; postocular 02; supra labial 07 of which 3rd and 4th entering orbit; infra labial 07 of which 7th largest; temporals very variable (2+1, 2+3, 2+4, 1+2); chin shields 2 pairs of which anterior longer than posterior; scale rows 13 at fore, mid and hind body; ventrals: 184-239, anal divided; sub caudals: 65-89 and paired.

Colour: Head and body jet black with 35-50 pale yellow or white transverse cross bars, but one specimen was brown with bright yellow cross bars having black anterior portion. Bars prominent in the fore part than the hind region. Ventrally uniform pearl white or light yellow. The colour becomes paler and the bands are less defined as it goes posteriorly.

Collection records: Thirunelvely (Nallur); Uduvil (Vali South); Koyathoddam (Jaffna); Atchuvveli, Pathaimeni (Vali East); Udupiddy (Vada South West) and Chempianpattu (Vada East). It has already been reported from Jaffna (Deraniyagala, 1955) (Fig. 3a, b).

***Lycodon aulicus aulicus* (Linnaeus, 1758)**

Description: Based on 10 specimens (from 236-432 mm SVL). In percentage of Snout-Vent length: HL 3.65-4.92; SPL 2.74-4.15; SE 1.08-1.40; IO 0.93-1.2; total length to tail length ratio 5.8-7.8.

Scalation: Internasal 02; loreal 01; pre and post oculars 01 and 02; supra labials 08 of which 3, 4, 5 or 4, 5 entering orbit; infralabials 09-11 of which 6th largest; temporals 2+3 or 3+2 or 2+4; scale rows: 17, 17, 15; ventrals 185-214; sub caudals 59-78 and paired.

Colour: Head and body parts are uniform brown interrupted by 3-6 yellowish white cross bars or spots on anterior half of length, the bands being broken up into small wave appearance through out.

Collection records: Saravanai (Is South), Thirunelvely, Urumpirai (Nallur); Otumadam, (Jaffna); Atchuvveli (Vali East); Meesalai (Thenmarachchi). It has already been reported from Jaffna (Deraniyagala, 1955) (Fig. 3c).

***Oligodon arnensis* (Gunther, 1864)**

Description: Based on 03 specimens (from 41-511 mm SVL). In percentage of Snout-Vent length: HL 3.72-3.82; SPL 2.86-2.87; SE 1.04-1.05; IO 1.10-1.14; total length to tail length ratio 5.6-6.1.

Scalation: Inter nasal 02; loreal absent; pre and post oculars 01 and 03; supra labials 07 of which 3, 4 entering the orbit; infralabials; scale rows 17, 17, 15; ventrals: 169-177, anal divided; sub caudals 48-51 paired.

Colour: Brown colour with transverse black bands varies from 25-27 the head to the tail tip, that are edged with white minute streaks upon the sides. Bands are narrower than the interspaces. Head with chevron marking.

Collection records: Kondavil (Nallur) and Point Pedro (Vada North). It has not been previously reported from Jaffna Peninsula (Fig. 3d).

***Oligodon taeniolatus ceylonicus* (Wall, 1921)**

Description: Based on 02 specimens (from 115-142 mm SVL). In percentage of snout vent length: HL 5.70-6.96; SPL 4.79-5.39; SE 1.76-2.09; IO 1.69-2.0; total length to tail length ratio 5.6-7.1.

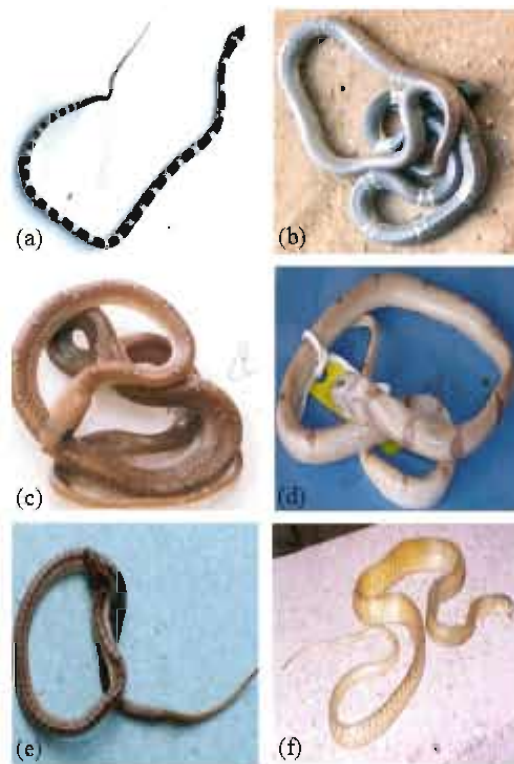


Fig. 3: Terrestrial snakes recorded in the Jaffna Peninsula, (a) *Dryocalamus nympha* (Family: Colubridae), Juvenile; (b) *Dryocalamus nympha* (Family: Colubridae), Adult; (c) *Lycodon aulicus aulicus* (Family: Colubridae); (d) *Oligodon arnensis* (Family: Colubridae); (e) *Oligodon taeniolatus ceylonicus* (Family: Colubridae); (f) *Ptyas mucosa maximus* (Family: Colubridae)

Scalation: Internasal 02, loreal 01; pre oculars 01 and post oculars 02 or 03, supra labials 07 or 8 of which 3rd, 4th or 5th touching eye, infralabials 07 of which 4th, 5th larger, temporals 2+2; scale rows 15 at three points; ventrals: 186-188, anal divided; sub caudals 41 and paired.

Colour: Anterior and posterior and middle band on the head are dark brown, the rest is lighter. From neck up to the tail, slant black and reddish brown dorsal lateral streaks radiated from vertebral line. The last coastal scale rows consist of a dark line made up of small spots or streaks. Ventrally uniform white.

Collection records: Urelu (Kopay). It has not been reported from Jaffna Peninsula (Fig. 3e).

***Ptyas mucosa maximus* (Cope, 1860)**

Description: Based on 8 specimens (from 292-998 mm SVL). In percentage of Snout-Vent length: HL 3.33-6.94; SPL 2.44-6.1; SE 1.18-2.0; IO 1.21-2.06; total length to tail length ratio 3.4-4.5.

Scalation: Internasal 02, nasal 02 and medially divided, loreals 02-03; pre oculars 01 or 02 and post oculars 02, supralabials 08 of which 4th, 5th entering eye, temporals 2+3 or 2+2, infralabials 10 of which 8th largest; scale rows: 17, 17-15, 14; ventrals 197-204 and anal divided; subcaudals 124-135 and paired.

Colour: Dorsal colour varies from brown to bright yellow with black along the edges of the dorsal scales; the young specimens are more bluish-grey than the adults. The supra labials and lateral gulars are outlined with black colour, ventrally cream or white.

Collection records: This is a common snake of Jaffna Peninsula, occupying a variety of habitats including the damp places, bushes trees etc. It has already been reported from Jaffna (Deramiyagala, 1995) (Fig. 3f).

***Xenochrophis piscator piscator* (Schneider, 1799)**

Description: Based on 05 specimens (from 342-698 mm SVL). In percentage of Snout-Vent length: HL 5.19-5.68; SPL 2.83-4.59; SE 1.374-1.495; IO 1.33-1.61; total length to tail length ratio 3.0-5.0.

Scalation: Inter nasal 02, loreal 01 rarely 02, pre ocular 01, post oculars 02 or 03, supra labials 09 of which 4th, 5th entering eye, 5th sub ocular, infralabials 8 or 10 of which 6th is the largest, genials 2 pairs of which anterior genial smaller than posterior genial; scale rows 19, 19, 17; ventrals: 132-138, anal divided; sub caudals 90-92 and paired.

Colour: Dorasally dark to pale brown, 2 dark oblique bars extending from optic to labials. Large black blotches more prominent anteriorly, ending up into narrow streaks or spots posteriorly. Yellow, white and

pale blue colour well marked on the dorsal surface than the last 2-3 coastals in the lateral side, tail is with few spots. Ventrals creamy in females and reddish in males.

Collection records: Kantharodai (Vali South); Mallakam, Alavaddy (Vali North); Thirunelvely (Nallur). But several sightings were made in a number of ponds of various localities in the Jaffna Peninsula during the rainy seasons (Fig. 4a).

Family Elapidae

***Bungarus caeruleus* (Schneider, 1801)**

Description: Based on 07 specimens (from 253-827 mm SVL). In percentage of Snout - Vent length: HL 3.22-4.88; SPL 2.56-3.52; SE 0.88-1.26; IO 0.91-1.50; total length to tail length ratio 6.2-7.9.

Scalation: Internasal 02; loreal absent; pre and post oculars 01 and 02; Supralabial 07 rarely 08 of which 3rd, 4th entering orbit; temporals 1+2; infralabials 06 of which 3rd, 4th largest and 4th touching the posterior genials and wider than them; scale rows smooth and 15 in all three points; ventrals 194-202, anal paired; sub caudals: 40-44 and uniserial.

Colour: Glossy bluish-black snakes having paired narrow white transverse bands of about 40, which are more distinct in the posterior region. Some times patches of white vertebral spots occur. Both young and adults possess white spots along the first third of the backbone in place of the cross lines, ventrals white.

Collection records: Thirunelvely, Urelu (Nallur); Meesalai (Thenmarachchi) and Karavaddy (Vada South). This species was previously reported from Jaffna (Deramiyagala, 1955) (Fig. 4b).

***Naja naja* (Linnaeus, 1758)**

Description: Based on 06 specimens (from cm 741-1364 mm SVL). In percentage of Snout-Vent length: HL 4.39-4.44; SPL 3.05-3.64; SE 1.08-1.16; IO 1.32-1.49; total length to tail length ratio 5.3-6.1.

Scalation: Inter nasal 02, pre ocular 01, post oculars 03, supra labials 07 of which 3rd and 4th entering eye, infra labials 07 or 08 of which cunate scale found in the 3rd and 4th scales, 2 pairs of temporals; scale rows 21-23, 21-23, 15; ventrals 185-194; sub caudals 56-64 and paired.

Colour: Usually the dorsal body colour varies from yellowish brown to dark brown with minute white and black cross bands. Ventrals usually white or yellowish with a wide dark neck band. A distinctive hood marking on top of neck. The interstitial scale between scales is grey or white.

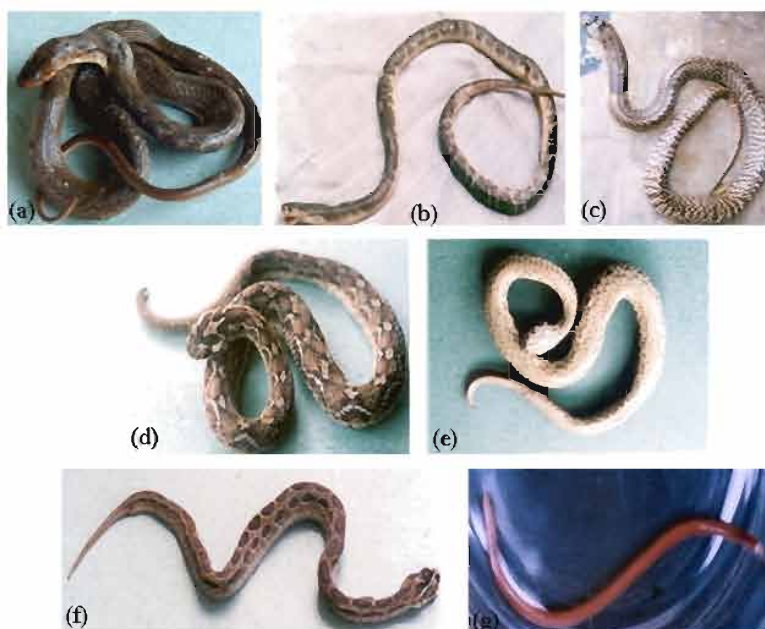


Fig. 4: Terrestrial snakes recorded in the Jaffna Peninsula (a) *Xenochrophis piscator piscator* (Family: Colubridae); (d) *Bungarus caeruleus* (Family: Elapidae); (c) *Naja naja* (Family: Elapidae); (d) *Echis carinata carinata* (Family: viperidae), dorsal aspect; (e) *Echis carinata carinata* (Family: Viperidae), ventral aspect; (f) *Daboia russelli russelli* (Family: Viperidae); (g) *Ramphotyphlops braminus* (Family: Typhlopidae)

Collection records: Thirunelvely, Kanthamadam (Nallur); Vaddukodai (Vali West); Meesalai (Thenmarachchi); and Pointpedro (Vada North). This species was previously reported from Jaffna (Deraniyagala, 1955) (Fig. 4c).

Family Viperidae

Daboia russelli russelli (Gray, 1842)

Description: Based on 05 specimens (from 295-105 mm SVL). In percentage of Snout-Vent length: HL 5.75-7.22; SPL 4.86-6.102; SE 1.54-1.850; IO 1.59-2.01; total length to tail length ratio 10.12-12.82.

Scalation: Rostral touches 6 scales; 3 vertical rows of scales between eye and nostril, 12 cephalic scale rows of interorbital scales; Scale rows 29-31 at the mid body and strongly keeled; ventrals 173-189, anal united; sub caudals 55-61 and divided.

Colour: Three rows of dark brown blotches, which can be connected, or separated in the light brown dorsal background. The ventral scale with the paired black spots arranged in a regular manner.

Collection records: Thirunelvely, Kokuvil (Nallur), Navali (Vali South West); Kopay (Vali East) and Karaveddy (Vada South West) (Fig. 4f).

Echis carinata carinata (Fayrer, 1874)

Description: Based on 05 specimens (from 220-293 mm SVL). In percentage of Snout-Vent length: HL 5.02-

6.14; SPL 4.16-4.52; SE 0.84-1.59; IO 1.806-1.909; total length to tail length ratio 7.8-9.8.

Scalation: Dorsally head scales small and imbricate; 3 vertical rows of scales between eye and nostril, 12 cephalic scale rows interorbital scales, costals at mid body 31, scale rows: 28-31 at the mid body and strongly keeled; ventrals: 147-179, anal united; subcaudals 29-32 and divided.

Colour: Dorsal colour variable from dark brown to pale yellowish. Ventral side creamy with numerous black spots placed randomly in each scale. Large eye with the vertical pupil. Dorsal scales with the serrated keels.

Collection records: Ariyalai (Jaffna), Saravanai (Is South) and Chavkachcheri. The snake collected at Saravanai has been deposited to the Colombo Natural History Museum (Reg No: 2003-01-01). Previousl it was reported from Chavkachcheri and Iranaitivu (Deraniyagala, 1951, 1955) (Fig. 4d, e).

Family Typhlopidae

Ramphotyphlops braminus (Daudin, 1803)

Description: Based on 09 specimens (from 133-213 mm total length).

Scalation: Dark purple to pink colour throughout the body whole body. The body is covered with the minute scales. A peculiar marking can be seen in the dorsal side of the head, when observe through the

microscope. Nasals completely divided with the nostril in its lower half. Tail ending in a spine, prefrontal, frontal and interparietal are sub equal. Four supraoculars of which 1st and 2nd touch the preoculars, the 3rd and 4th oculars; scale rows: 20 scale row around the body; ventrals 297-331 as minute as coastals.

Colour: Two colour forms are found. One form dark purple dorsally lighter ventrally; while the other is reddish pink dorsally pale ventrally.

Collection records: The specimens collected at Naranthanai (Is. North), Velanai and Saravanai (Is. South) were predominantly pinkish in colour. The specimens collected in the Valikamakkam were mostly purple in colour. This species has not been reported from Jaffna Peninsula previously (Fig. 4g).

DISCUSSION

The recorded eighteen species of terrestrial snakes belonging to five families. Out of which four species were highly venomous, two each from family Elapidae (*Bungarus caeruleus* and *Naja naja*) and Viperidae (*Echis carinata carinata* and *Daboia russelli russelli*); two were mildly venomous namely *Boiga trigonatus trigonatus* and *Cerberus rynchops rynchops* of the family Colubridae and the rest of the twelve were non poisonous species of the family Boidae, Colubridae and Typhlopidae. Two species were endemic to Sri Lanka; those were, *Oligodon taeniolata ceylonicus* and *Ptyas mucosa maximus* of the family Colubridae and seven out of the eighteen documented species were recorded for the first time from Jaffna Peninsula.

Four species namely *Amphiesma stolatum*, *Atractaspis schistosum*, *C. rynchops rynchops* and *Xenochrophis piscator piscator* were aquatic and the rest were terrestrial. *A. schistosum* and *C. rynchops rynchops* have been collected from water; *X. piscator piscator* were collected from water as well as from terrain closer to the water body but all the *Amphiesma stolatum* were collected from very dry area without the vicinity of water. This study reports *A. schistosum* and *C. rynchops rynchops* from lagoons as both the species are known to inhabit mangrove (Karns *et al.*, 2002) and salty areas (Deraniyagala, 1955).

Threats observed against snakes: The following have been noted during the study period:

- During the field observation, it was noted that many farmers kill *D. russelli russelli* and *O. arnensis* in paddy field, although they do tolerate *A. stolatum*.

- Some vehicle drivers intentionally or unintentionally running over and killing what ever the snake they see. Road kills become one of the major threats in the Jaffna Peninsula, as a number of killed snakes such as *L. aulicus*, *D. nympa*, *A. stolatum*, *D. tristis*, *P. mucosus maximus* were collected in our survey. Road kills have been well documented and quantified by Attum *et al.* (2007) and Roe *et al.* (2006) elsewhere.
- Domestic animals such as cats, dogs and hens as well as wild birds such as king fishers and Indian coucal are another threat to the snakes. It was also observed that *B. caeruleus* and *L. aulicus* were found dead in home yards by the attack by the domestic animals.
- Very often the common *D. nympa* and *L. aulicus* encountered within the home and end up with death probably misidentified as dangerous snakes. Another snake face death penalty because of the camouflage is and *Oligodon arnensis*.
- As the densely grown trees of Thespesia, Coconut and Palmyra trees have been cut to make bungalows, to make a clear view in war ragging areas and for fire wood and timber make the soil to expose directly to the sun light. The shade and moisture content of the soil lost due to these activities. Shade and moisture are one of the key factors in the choice of habitats of many endemic and relict reptiles and amphibians (De Silva, 1996). Evidently *Cercaspid carinata*-a relict reptile member which was reported from Jaffna Peninsula (Deraniyagala, 1955; De Silva, 1969) was not collected from the survey period. This may lead to occurrence of extreme drought as Jaffna Peninsula lies in the dry zone and it is another factor to fight for the survival of snakes (Willson *et al.*, 2006).
- Rare occurrence of *P. molurus* has also been killed mostly for extracting oil than out of fear, which has a high market value locally. The use of snake in medicine is well documented in other parts of the world as well (Stephen, 2007).
- Though the effect of pesticides on reptiles which feed on frogs and insects are not known clearly, it is reasonable to expect that these animals may have affected by the foods which are soaked by the chemical pesticides and insecticides.
- Although no observations have been made, it is reasonable to assume that the wide use of land mines and other explosives will disturb and destroy the herpetofauna. These explosive devices contribute a threat to herps in Northern part

especially the Jaffna Peninsula, as modifications to nearby terrestrial habitats negatively correlate the abundance of snakes (Attum *et al.*, 2007; Roth, 2005) hence land-use practices are important for maintaining wildlife populations (Attum *et al.*, 2007).

RECOMMENDATIONS

- More researches have to be undertaken regarding the distributional status of herpetofauna including snakes of the Northern part, since less attention is paid for threatened reptile taxa. Because some of the nationally threatened, globally threatened (Hilton-Taylor, 2000) species and the species included in the CITES (Gunawardena, 1995) of Sri Lanka are showing their presence in the Jaffna Peninsula as well.
- Steps have to be taken to re-function the Sanctuary at Chundikulam. At the same time, many studies have to be carried out on the status assessment on the fauna inhabiting in this region and according to this, a number of small nature reserves must be established in each major division in the Jaffna Peninsula. In addition to that, establishing buffer zones around riparian habitats is essential as many case studies reported the importance of bufferzone (Roth, 2005).
- We have to educate the public through popular seminars regarding the legal protection of reptiles through exhibitions and through conducting nature competitions. If the management is a community based programme the conservation of these animals will be more effective.
- At the same time school students will be trained and educated from the kindergarten level by incorporating herps in their play cards. Higher level students must be educated through incorporating them in the field works and surveys. Also all the students must be told that how herps are beneficial to human beings and how they are important for the persistence of nature.

Ultimately it appears that successful conservation of reptiles (including snakes) in the country will have to largely depend on educational organizing. Without good extension work, which encourages the full participation of local people to implement and maintain conservation plans in their areas, there are few good prospects for protection of these reptiles and other wildlife species in the country.

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