The colour of Seychelles wolf snakes *Lycognathophis seychellensis* on Aride

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The Seychelles wolf snake *Lycognathophis seychellensis* (Schlegel, 1837) occurs in two distinct colour phases, namely black and yellow, with a third intermediate colour-phase that has variously been described as olive-brown or grey. Previous workers on Aride noted a predominance of yellow snakes amongst the larger specimens. Ian Bullock reported that 'the yellow/khaki individuals appear to be the largest, whereas the black tend to be smaller' (Bullock 1989). Castle & Mileto (1991) reported common sightings of 'both colour phases' but did not find the size difference noted by Bullock. However, Bullock's impression of a smaller number of large black snakes was confirmed by the impressions of former plantation workers on Aride who stated that most of the large snakes they observed in the 1970s on Aride were yellow in colour (R. Fanchette *pers. comm.*).

Betts (1998) collated all sightings of snakes observed in 1996-1997 according to location, size and colour, and from these and our own records in 1998, it became apparent that most large snakes on Aride were no longer yellow, and instead were predominantly darker individuals.

This short report compares recent data on the colour of snakes on Aride collected in 1996-98 with similar data collected in 1989-91 to investigate whether the ratio of snakes of different colours has changed in the intervening period.

Method

Data collected on the colour and length of snakes on Aride was collated from the Aride archives. Only records in which date and colour were recorded could be included in the analyses, and for analyses involving snakes of different sizes, the data-set was further reduced to records which also included an estimate of the length of the snake. Pertinent data were found to have been collected in two periods: 1). 1989-91 and 2). 1996-97. Additional new data were collected in 1998 (up to and including November 1998) and these were added to the more recent data-set.

Considerable variation was encountered in the description of colour of the snakes. All records referring to 'yellow', 'light', 'olive', 'olive-green' and 'khaki' individuals were assigned to the class 'yellow', whilst all other colours ranging from 'black', 'dark', 'dark brown', 'dark grey', 'grey' were assigned to the class 'dark'. Thus, for the analyses, black and intermediate colour-phases were lumped together.

There are a number of assumptions implicit in this study:

1. Snakes of the different colour phases have an equal likelihood of detection. This may not be the case since the camouflage of snakes of different colour will depend on the background substrate.

2. Individual snakes of the same colour phase were recorded an equal number of times. Again this is unlikely to be the case, since search effort was not constant and snakes living close to houses or adjacent to paths would be recorded more frequently than those inhabiting more remote sites. An attempt was made to identify individual snakes from repeat sightings of individuals of similar size and colour description within close proximity. This proved to be rather subjective, since records rarely matched exactly, whilst the distance that individual snakes are capable of moving was not known.

Results

Snakes were observed most frequently on the Plateau, although also on the hill (see also Betts 1998), and any apparent difference in frequency of sightings between these two areas could reflect observer efforts as much as any genuine difference in density between the two areas.

a). All snakes

A comparison of the ratio of yellow to dark snakes of all sizes recorded in 1989-91 with the ratio recorded in 1998-98 (Table 1) revealed that the proportion of yellow snakes was significantly lower in the latter time period ($\chi^2=5.06$, $P<0.05$, d.f.=1).

b). Small snakes (<1m in length)

A comparison of the ratio of yellow to dark snakes of <1m long recorded in 1989-91 with the ratio recorded in 1996-98 (see Table 1) revealed that there was no significant difference between the two time periods ($\chi^2=0.37$, $P>0.1$, d.f.=1).

c). Large snakes (>1m in length)

A comparison of the ratio of yellow to dark snakes of >1m long recorded in 1989-91 with the ratio recorded in 1996-98 (Table 1) revealed that the proportion of yellow snakes was significantly lower in the latter time period ($\chi^2=4.48$, $P<0.05$, d.f.=1).

Discussion

An analysis of the colour of wolf snakes observed in 1996-1998 compared to similar data collected in the period 1989-1991, indicated that the proportion of dark-coloured snakes increased (and the proportion of yellow snakes decreased) during this period. This trend was

Table 1. Frequency of records of snake colour-phases.

	All sizes			Small snakes			Large snakes		
	Yellow	Dark	Total	Yellow	Dark	Total	Yellow	Dark	Total
1989-91	12	21	33	3	10	13	8	7	15
1996-98	28	123	151	11	54	65	15	52	67
Total	40	146	184	14	64	78	23	59	82

significant for snakes more than 1m long, but not for snakes less than 1m long, suggesting that the mortality rates to maturity of snakes of the different colour morphs has changed since 1989. A likely explanation for changes in mortality rate are the changes in habitat that have occurred on Aride in the last decade as a result of on-going management of the vegetation. These have resulted in an increase in canopy density and an increase in leaf litter, making the woodland floor environment (where the snakes live) generally more shaded and darker.

The inference from these data is that in 1989-91, yellow snakes had lower mortality rates (and dark snakes higher mortality rates), probably as a result of being better camouflaged on the open, sunlit floor of the coconut plantation, young plateau woodland, hill glades and relatively recently coppiced hill woodland, and therefore being less prone to predation. By 1996, most of the plateau had developed closed canopy coastal woodland, the glades had shrunk in size and the hill had developed a more closed canopy, resulting in more heavily shaded and litter-covered woodland floors. Such conditions would favour the camouflage of dark-coloured snakes but would increase the likelihood of detection and predation of yellow snakes.

On Aride the chief predator of wolf snakes is probably the moorhen *Gallinula chloropus* (Linnaeus, 1758), numbers of which were also higher in the latter study period (200 birds estimated in 1998), than in the early study period (86 birds estimated in May 1990, Castle & Mileto 1991). Both *Mabuya* species are likely to be predators of both snake eggs and juvenile snakes, as are various land crabs and larger specimens of the bronze gecko *Ailuronyx seychellensis* (Duméril & Bibron, 1834) (Latimer in Betts 1998).

The assumption that snakes of different colour have an equal chance of being recorded is probably not true, since the factors affecting camouflage from predators are likely to similarly affect detection by human observers. However, this would have a conservative effect on the results, since presumably yellow snakes were more easily seen on the more heavily shaded and darker leaf-littered woodland floors of the latter study period, and conversely dark snakes would have been more easily seen on the sunlit and paler woodland floors of the earlier period.

Conclusion

The available evidence concerning the colour of snakes on Aride, concurs with the subjective impression that the proportion of yellow snakes has declined in the last decade, and that the population of large snakes (over 1m) is now predominantly dark in colouration.

References

Betts, M. 1998 - *Aride Scientific Report 1997*. RSNC unpublished.
Bullock, I. 1989 - *Aride Scientific Report 1987-1989*. RSNC unpublished.
Castle, G. & Mileto, R. 1991 - *Aride Scientific Report 1989-91*. RSNC unpublished.