New Observation of Intertwined Annulated Sea Snake Hydrophis cyanocinctus (Reptilia: Elaphidae: Hydrophiinae) from Pirotan Island, Gulf of Kachchh

K. Chandrasekar1,2*, S. Balakrishnan3,4, G. Arun3, Ch. Satyanarayana1 & K. Venkataraman1

1Zoological Survey of India, Jamnagar, Gujarat, India.
2Centre for Marine Living Resources & Ecology (CMLRE), Ministry of Earth Sciences, Government of India, CMLRE, 6th Floor, C-Block, Kendriya Bhavan, P.B. No. 5415, CSEZ P.O., Kochi - 682 037, India.
3Dept. of Marine Science, Bharathidasan University, Tiruchirappalli – 620 024, Tamil Nadu, India.

*E.mail: cchandrumbt@gmail.com

Received 14 July 2017; revised 10 August 2017

New evidence of species from an explored area extends its range of distribution and provides valuable information on the biodiversity conservation management. Here we reported observations on the sex of annulated sea snake, Hydrophis cyanocinctus, during May 2014, but previous copulations were reported during January to February. Mean snout-vent length (SVL) was a male 105 cm and the largest snake was a female with an SVL 145 cm and weight 910.5 g. The specimen has been compared with earlier reports and other similar species. These findings are among the first to be recorded in some species of sea snakes in the Indian region. In this present report preliminary observations on the sex, reproductive status of species hydrophiine sea snakes from Gujarat coastal regions, India.

[Keywords: First observation, Hydrophis cyanocinctus, Pirotan Island, Gulf of Kachchh]

Introduction

Pirotan Island (also known as Pirothan) is an Arabian sea Island in the Marine National Park, Jamnagar District, Gujarat, India. The annulated sea snake, H. cyanocinctus (Daudin, 1803), along with the Persian Gulf sea snake, H. lapemoides (Gray, 1849), are the two most abundant sea snakes in the Persian Gulf and Gulf of Oman (Gasperetti, 1988). Hydrophis cyanocinctus is widely distributed throughout the tropical and subtropical Indo-Pacific coastal waters, ranging from the Persian Gulf in the West to the Idzu Sea of Japan in the east1. Previous studies have been conducted on its natural diet and feeding habits2,5 size and morphology6,8, eco- toxicology9 and geographic distribution10-14 throughout its geographic distribution range. Present study was to identify the H. cyanocinctus, which has been first time recorded from for the Pirotan Island, Gulf of Kachchh, Gujarat.

Materials and Methods

Specimens were collected from the Pirotan Island (22° 59’N; 69° 57’E), it is located 22 km off the coast, consisting of mangrove, coral reef, sea grasses, algae, invertebrates and low-tide beaches and has an area of 3 sq. km in the Gulf of Kachchh, Gujarat. The Marine National park consists of 42 Islands. Pirotan Island is the most popular and is one of the only two Islands where visitors are normally permitted (Fig. 1). The sea snakes mating were observed from the boat during the coral transplantation period on 19th May 2014. Detailed morphological features and measurements were not made at the time of mating observation. The largest snake in the present study was a female (app. SVL = 145 cm, TL = 170 cm) and male (app. SVL = 105 cm and TL = 200 cm and weight = 910.5 g) (Table. 1). But photographic evidence was at the time of the observation (Figs. 2 - 4).

Systematic

Class : Reptilia
Order : Squamata
Sub order : Serpentes
Family : Elapidae

Sub family : Hydrophiinae
Genus : Hydrophis
Species : Hydrophis cyanocinctus (Daudin, 1803)
Table 1 — Shows its morphometric characters of Hydrophis cyanocinctus

<table>
<thead>
<tr>
<th>Sex</th>
<th>SVL (cm)</th>
<th>TL (cm)</th>
<th>Wt (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>145</td>
<td>170</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>105</td>
<td>200</td>
<td>910.5</td>
</tr>
</tbody>
</table>

Results and Discussion

This is a widespread species and is common in some parts of the range. It lives on soft bottom habitats. This species is found in the Arabian Gulf East to Indonesia, the Philippines, and China. The range extends south to Northern Australia and Papua New Guinea. This species is also possibly present in Japan. This species was relatively common (as trawler bycatch) in Malaysia in 1989. It also appears to be a common sea snake in Pakistan. Along with Enhydrina schistosa and Lapemis curtus it is probably the most common species in the waters of the Indian sub-continent. It is far more common on the east coast than the west coast of the subcontinent. On the Coromandel Coast (East India), 975 individuals were captured in between 2003-2004 and were considered the most common sea snake in the region. This species can be found in shallow seas over a muddy bottom. It feeds mostly on eels, but also gobies and marine invertebrates. This species is commonly caught as bycatch by trawlers in many parts of its range: Malaysian Borneo; East coast of India. There are no species-specific conservation measures for this species, but it may occur in marine protected areas. No sea snake species are currently listed by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

Fig. 3 — Mating behavior of Hydrophis schistosus: two individuals intertwined each other and floating on the surface in the coastal waters (Gulf of Kachchh, Gujarat).

Fig. 4 — Two annulated sea snake Hydrophis cyanocinctus intertwined each other and floating on the surface in a Pirota Island Marine Protected Area (Gulf of Kachchh). Open sea (left) and when they came to the surface to breathe (right). Photo: K. Chandrasekar.

Found in the Indian Ocean (Persian Gulf, Iran, Pakistan, India, Sri Lanka, Bangladesh, Myanmar, Thailand, Malaysia, Philippines: Visayan Sea, Panay, etc.) and the marine waters around Korea, Japan, Solomon Islands, South China Sea (including Hainan), East China Sea (including Taiwan), coastal regions of Shandong and Liaoning (China) coasts of Persian Gulf (Oman, United Arab Emirates), east through South Asia until New Guinea.
The annulated sea snake is listed as of least concern on the Red List of the International Union for Conservation of Nature; thus, the species is not immediately threatened. Nonetheless, there are some threats to the populations of the annulated sea snake in the Hara protected area, the largest marine protected area in Iran, from local fishing activities in the mangrove channels. Field surveys showed that snake become entrapped in the trap nets used by local fishermen for shrimp fishing. Fortunately, sea snakes are not known as dangerous animals by the local people and trapped snakes are usually returned to the water alive. However, sea snakes still trapped for more than one day and indeed most trapped snakes were injured by net lines. Fishing activities have been known as the main threat of sea snakes, but it may be reduced by locals’ awareness. Although sea snakes are used by humans for food, leather and medicines and catching sea snakes and processing them for human exploitation has been developed as an industry in southeastern Asia and Australia to the best of our knowledge sea snakes are not caught by local people for human exploitation in the Hara Protected Area or in other parts of the southern coastal waters of Iran (northern part of the Persian Gulf and the Gulf of Oman). Environmental contaminants may also be considered as a potential threat for the annulated sea snake in the area. Rezaie and Atagholipour et al. found that cadmium levels in the liver of the species ranged from 15 to 1290 ng/g dry weight, which is more than two times as high as those found in the banded water snake, Nerodia fasciata (Linnaeus, 1766).

Lobo (2006) reported 11 species of sea snake (Hydrophis cyanocinctus, H. (Microcephalophis) gracilis, H. fasciatus, H. lapemoides, H. ornatus, H. spiralis, Lapemis curtus and Thallasophina vipersina, Acrochordus granulates, dog faced water snake Cerberus rynchops, and Pelamis platurus. Hydrophis cyanocinctus is viviparous sea snake off the Gujarat coast. The breeding season of this species is towards April and May. Copulating pair of the sea snakes H. cyanocinctus from the water on the Pirotan Island, Gulf of Kachchh (Fig 3, 4).

It is highly interesting; however, that copulation takes place in the water during the early morning period. Rezaie-Atagholipour et al. mentioned that H. cyanocinctus is the most abundant sea snake in Hara Biosphere Reserve (the largest mangrove stand in the northwestern Indian Ocean) of the Persian Gulf. Intertwining of two H. cyanocinctus is sometimes observed in the mangrove channels of the same ecosystem and other mangrove stands in the area. Rezaie-Atagholipour et al. studied feeding habits of the same population in the biosphere reserve and found that main prey item for H. cyanocinctus in this protected area are the mudskippers (Gobiidae, Oxudercinae). The venom proteomes were also investigated for the same population of H. cyanocinctus in the Hara Biosphere Reserve of the Persian Gulf.

Conclusion
The area is quite a biodiversity hotspot. To restore the charismatic megafauna and other endangered species, the marine life alliance has taken initiative to conserve the marine biodiversity. Monitoring and conservation of annulated sea snake as a major group. The annulated sea snake is listed as of least concern on the Red List of the International Union for Conservation of Nature thus the species is not immediately threatened.

Acknowledgements
The authors express their gratitude to the Director, Zoological Survey of India (ZSI), Government of India, for their support provided to carry out the work.

References
Wall, F., Notes on some Ceylon snakes recently required by the Colombo Museum-Spoila Zeylanica, 11(1921) 405-406.


Linne, C., Systema naturae by means of the three kingdoms of nature, having, according to the classes, or dines, genera, species, with the characters, the differences, synonyms, places. Volume I. 12 th reformed Holmiæ. (Salvias) (1766) 1- 532 pp. SVL-Snout Vent Length, TL- Total Length, Cm- Centimeter, W-Weight, g-gram

APPENDIX

SVL-Snout Vent Length, TL- Total Length, Cm- Centimeter, W-Weight, g-gram