Journal of the Department of Wildlife Conservation 2006-1: 127-132

SUBSTRATE PREFERENCE OF THE *CERATOPHORA TENENTII*: GUNTHER, 1834 (SQUAMATA: AGAMIDAE) IN THE NORTHERN FLANK OF KNUCKLES CONSERVATION FOREST IN SRI LANKA

R.K. RODRIGO[1*], U.K.G.K. PADMALAL[1], I.U.P.A. SAMARAWEERA[1] and A.U.L.D. JAYANTHA[2]

[1]*The Department of Zoology, Faculty of Natural Science, The Open University of Sri Lanka, Nugegoda, Sri Lanka.*
[2]*The Department of Zoology, Faculty of Science, University of Colombo, Sri Lanka*

ABSTRACT

A study was conducted in the eastern slope of the northern flank of the Knuckles forest range in Sri Lanka for a piod of 3 months from March to June 2002 with the objective of studying the substrate preference of *C. tennentii*. Data were collected between 0800 to 1800 hrs following focal sampling method. Juvenile (J), male (M) and female (F) lizards were observed. The most preferred substrates were tree trunks (Juveniles = 34.3%, males = 37.3%, females = 13.5%) and cardamom stems (Juveniles = 33.5%, males = 28.2%, females = 32.2%) throughout the study period. The animals spent less than 10% of the total observed time on ground litter, logs, moss covered logs, twigs and moss covered twigs. This is the first study of the kind, substrate preference of any agamid lizard, in Sri Lanka.

KEY WORDS: Substrate preference, *Cetatophora tenentii*, Knuckles conservation forest

INTRODUCTION

Knuckles forest range comprises different unique eco- systems (De Rosayro, 1958), with a high species endemism and richness (Ministry of forestry and environment, 1999). Out of five species of the endemic agamid lizard genus, *Ceratophora*, *C. tenentii* is distinctive to these mountain forest habitats. Due to habitat destruction by clearing the understorey for cardamom plantations, logging and man made fires, change in macro and microenvironment of the species is invariably resulted. A drastic change in ambient temperature following montane habitat destruction can be highly influencing the thermoregulation activity pattern of ectotherms (Clarke, 1996) such as agamids. The study has designed to determine the substrates preference of the endemic and highly threatened lizard species (Bambaradeniya, C. N. B. & Samarasekara, V. N., 2001).

C. tennentii belongs to the class reptilia, order Squamata, family Agamidae (Lizards) and sub family Lyriocephalinae. *Cophotis, Ceratophora and Lyriocephalus* are the three extant genera of the sub family and are endemic to Sri Lanka (Deraniyagala, 1953; Manamendra-Arachchi, & Liyanage, 1994). The genus *Ceratophora* is represented by five species *C. tennentii, C. stodartii, C. aspera, C. eardlarnii* and *C. karu* (Pethiyagoda & Manamendra-Arachchi, 1998).

C. tennentii is distinguished from all other Ceratophorans by the complex, laterally compressed rostral appendage (Pethiyagoda & Manamendra-Arachchi, 1998), its similarity to a leaf has earned this lizard the common name, the Leaf-Nosed Lizard (Senanayake, 1979). The total length of the adult male is about 185 mm and that of adult female is about 183 mm (Deraniyagala, 1953).

Predominant colour of the dorsum and sides of mature individuals is reddish brown to olive green; larger scales more greenish than smaller ones. Area around the eye and sides of neck are with black margins. There are about ten broad, dark brown bands on tail separated by narrow, lighter interspaces. Venter is usually whitish. Male is darker than female (Manamendra-Arachchi, 1990). Juvenile lizard is dark brown both dorsally and laterally (Pethiyagoda & Manamendra-Arachchi, 1998).

Distribution of the *C. tennentii* is only in Knuckles mountain region (Manamendra-Arachchi, K. & Liyanage, S. 1994), which has been isolated from rest of the central hills by the Mahaweli River, at an altitude of 760-1220 m (Pethiyagoda & Manamendra-Arachchi, 1998). Most of the habitat of this species is now under cardamom (*Elettaria cardamonium*) plantations (Manamendra-Arachchi & Liyanage, 1994), with its concomitant clearing of undergrowth. This slow moving lizard is frequently seen arboreal (Pethiyagoda & Manamendra-Arachchi, 1998).

Location

The selected habitat "Rivers Turn" is located in the Matale district in Sri Lanka. The study site is located adjacent to the Matale - Laggala main road in the Eastern slope of the mountain range 07. 52305^0 N and 080.73615^0 E (Figure 1).

Habitat

The study area was montane tropical wet evergreen vegetation. A clear stratification of the vegetation could be seen in the area, consisted of continuous canopy, understorey and ground layer. *Calophyllum* spp., *Syzygium* spp., *Neolitsea* spp., and *Symplocos* spp. were the dominant plant species in the canopy. Most of the trees trunks were covered by mosses, lichens and orchids. In the understorey, *Strobilanthes* spp., *Lisea* spp. and *Elettaria cardamonium* were the common plants. The ground layer contained different herbs, grasses, orchids, ferns and fern allies (De Rosayro, 1958) (Figure 2).

METERIALS AND METHODS

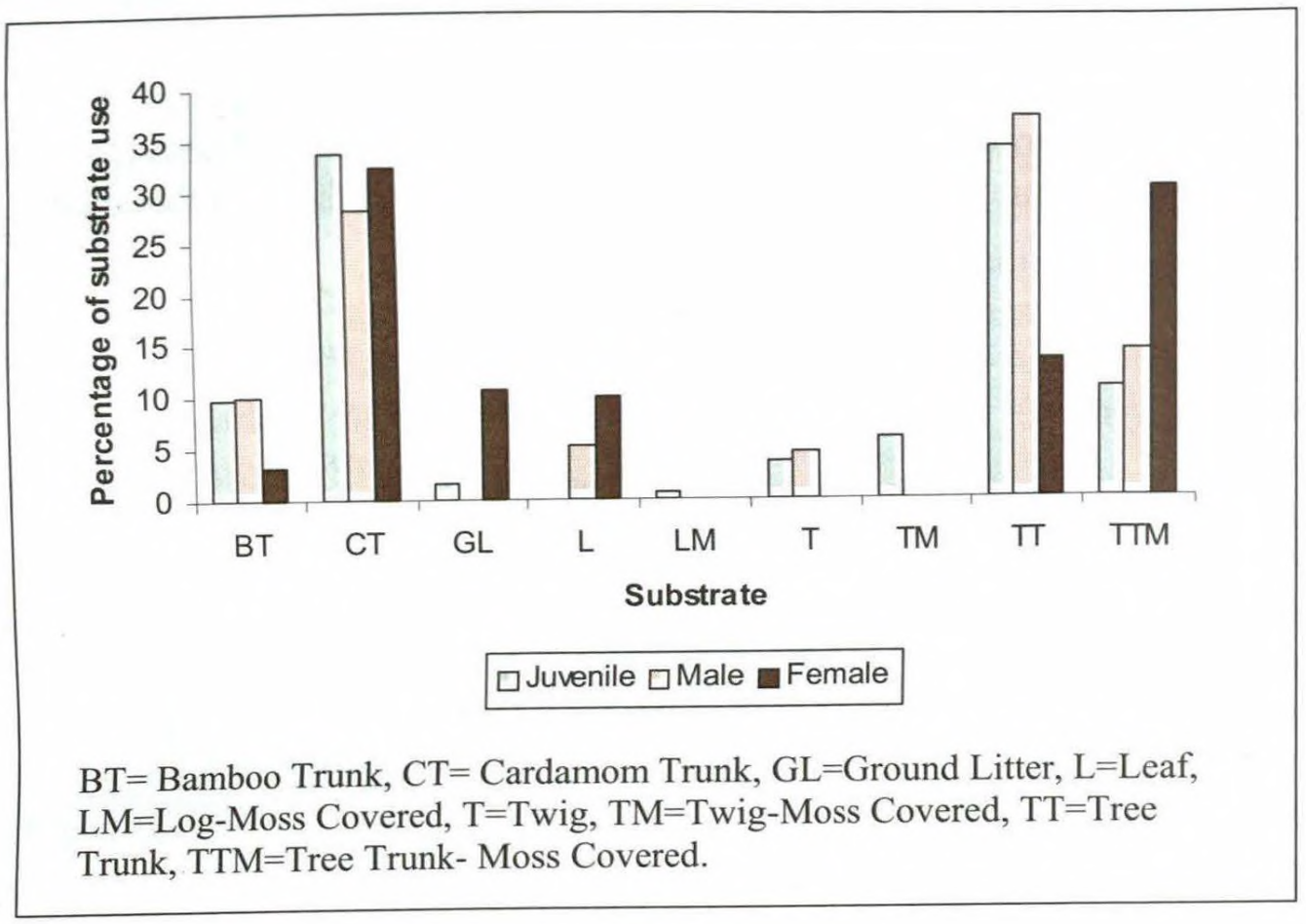
All observations were made in the eastern slope of the northern flank of the Knuckles forest range (Reverse Tern) from March to June 2002. Data were collected between 0800 to 1800 hrs in the cardamom plantation. Relevant ambient temperature, substrate and weather condition were reported simultaneously. Substrate of each lizard was noted in every minute (time sampling) following focal sampling method (Altmann, 1975). Light intensity was taken in every 30 minutes using a standard light meter. Ambient temperature of the site, where the observations were made, was noted in every 30 minutes with an alcohol thermometer throughout the study period. The weather condition was recorded according to four categories *viz* sunny, windy, misty and rainy. Males, females and juveniles were considered for the study and they were identified according to taxonomic characters, their color patterns, size (Deraniyagala, 1953), and

experience of the author. Every lizard was observed approximately from 2m distance for immunized the effect to the lizard natural behavior and a pair of binoculars ("Pentax" 8x30) was used to observe lizards from distance.

Figure 1. Box indicated the reverse turn.

Source:IUCN Sri Lanka (2003)

Figure 2. Habitat of the study area with Cardamom plants.



BT= Bamboo Trunk, CT= Cardamom Trunk, GL=Ground Litter, L=Leaf, LM=Log-Moss Covered, T=Twig, TM=Twig-Moss Covered, TT=Tree Trunk, TTM=Tree Trunk- Moss Covered.

Figure.3. Substrates used by juvenile, male and female lizards.

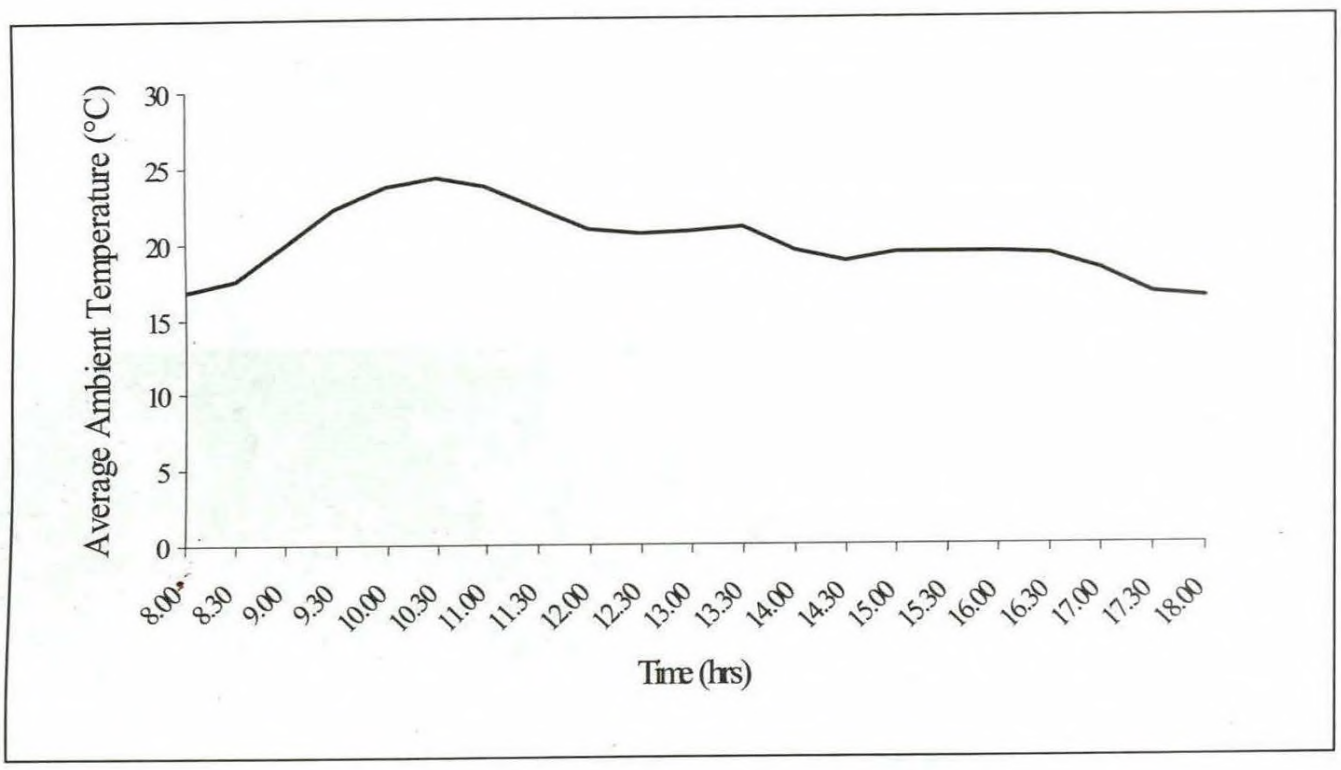


Figure 4. Average ambient temperature in the study site throughout day.

RESULTS

Substrate preference of the lizards

The most preferred substrates were tree trunks (Juveniles = 34.3%, males = 37.3%, females = 13.5%) and cardamom trunks (Juveniles = 33.5%, males = 28.2%, females = 32.2%) throughout the study period. The lizards next used moss covered tree trunks (Juveniles = 10.7%, males = 14.5%, females = 30.5%) and bamboo trunks (Juvenile = 9.8%, male = 10%, female = 3.2%) out of the total observed time period of a day. The animals spent less than 10% of the total

observed time on ground litter, logs, moss covered logs, twigs and moss covered twigs (Figure 3).

Weather condition of the study period

During the study period weather fluctuated through out the day from sunny to rainy conditions from 0800hrs to 1130hrs there was a gradual increasing in the sunny condition. When the noon, sunny condition was gradually started to turning to the windy condition till 1330hrs. In the afternoon the weather conditions of the study area was misty and late afternoon there was a rainy condition.

Ambient temperature in the study site

Ambient temperature variations between 0800 – 1800 are shown in Fig. 04. In the morning average ambient temperature of the study site was 16.8 °C. The temperature slowly increased with the time and it was highest (24.25 °C) between 1000 – 1100 am. After 1200 noon average ambient temperature of the site gradually decreased and it was about 16.25 °C at 1800 hrs (Figure 4).

DISCUSSION

Most used substrate by lizards was cardamom trunks (Figure 3). Flowers of the cardamom plants supports many kinds of insects as a food source for *C. tennenti*. Further, foliation of cardamom bushes provides a good opportunity for basking as the trunks expose to the sunlight more frequently compared to other substrates (author's comment). Therefore, lizards preferred to hang on the cardamom trunks and next most used substrate was tree trunks (Figure 3). Moss-covered tree trunks used as the substrate by female lizards many times (30.5%) compared to juvenile (10.7%) and male (14.5%) lizards. Bamboo trunks, ground litter, logs, moss Covered logs, twigs and moss-covered twigs were used less than 10% of the total observed time (Figure 3). Moss covered surfaces have been preferred least frequently; may be due to low temperature of the substrate brought about by trapped moisture unless it is a tree trunk that directly exposed to the sun light. The color of the body of *C. tennentii*, lizards was frequently changed when lizards were changed the substrate as most of the reptiles are doing, as a defensive mechanism (Pough, 2001).

During the study period weather was fluctuated sunny to rainy conditions. In the morning average ambient temperature was low (16°C) in the study site due to the heavy mist and drizzling. The selected habitat is situated in the east side of the Knuckles forest range. Therefore, during the morning hours the light intensity is gradually increased within the study site. Because of that, the average ambient temperature has been increased (highest temperature was recorded as 24.25°C around 10.30 hrs) during 0900 to 1100 hrs. After the noon the average ambient temperature was fluctuated between 20°C to 16°C till night was fallen. (Figure 4). At the night lowest average ambient temperature in the study site was recorded 14°C.

ACKNOWLEDGEMENTS

I would like to thank Mr. D.B.Ekanayake, the owner of the Cardamom plantation in Riverse-turn, where the study was conducted, for granting me permission to carry out the study. Mr. Mendis Wickramasinghe, the instructor of the reptiles group and my colleagues of the Young Zoologists' Association of Sri Lanka (YZA), helped me to lead this project to be successful. The staff members of the Biodiversity Section of IUCN –The World Conservation Union- Sri Lanka are also acknowledged for providing me with references. Finally, I appreciate the help given by Dr. C.N.B. Bambaradeniya for his assistance in completion of this project and the report subsequently.

REFERENCES

Altmann, J. (1975). Observational study of behavior: sampling methods. Allee laboratory of animal behavior, University of Chicago, Chicago, Illinois, U. S. A.

Bambaradeniya, C.N.B. and Samarasekara, V.N. (2001). An overview of the threatened herpetofauna of South Asia. IUCN - The World Conservation Union, Sri Lanka country office, 53, Horton place, Colombo 07, Sri Lanka. Pp 98-101.

Clarke, A. (1996). The influence of climate change on the distribution and evolution of organisms. In the Animals and temperature (Ed. Johnston. I.A. & Bennett. A.F.). Society for experimental biology, Seminar series 59,University press, Cambridge. Pp 377- 407.

De Rosayro, R.A. (1958). The climatic and vegetation of the Knuckles region of Ceylon. Ceylon Forester. 3: 201-260.

Deraniyagala, P.E.P. (1953). A colored atlas of some vertebrates from Ceylon. Vol. II. Ceylon National Museums, Colombo. Pp 59-63.

Manamendra-Arachchi, K. and Liyanage, S. (1994). Conservation and distribution of the agamid lizards of Sri Lanka with illustrations of the extent species. Journal of South Asian Natural History. 1(1):77-96.

Ministry of forestry and environment. (1999). Biodiversity Conservation in Sri Lanka. Ministry of forestry and environment, "Sampathpaya", Rajamalwatte Road, Battaramulla, Sri Lanka. 18p.

Pethiyagoda, R. and Manamendra-Arachchi, K.N. (1998). A revision of the endemic Sri Lankan agamid lizard genus *Ceratophora* Gray, 1835, with description of two new species. Journal of South Asian Natural History. 3(1):1-50.

Pough, F.H. *et al.* (2001). Herpetology. Second edition. Prentice-Hall, Inc. New Jersey.USA. Pp 431-464.

Senanayake, F.R. (1979). Notes on the lizards of the genus *Ceratophora*. Loris. 15(1):18-19.