Table 2. Photosynthetic rate (*Pn*), stomatal conductance (*Gs*) and transpiration rate (*E*) of tree seedlings in the three plots (P1–P3). Values are mean ± SE, $N = 15$ seedlings

	Pn (μmol m^{-2} s^{-1})*			*Gs* (mmol m^{-2} s^{-1})*			*E* (mmol m^{-2} s^{-1})*		
Species	P1	P2	P3	P1	P2	P3	P1	P2	P3
Cinnamomum	6.38^{A} (0.09)	6.16^{AB} (0.07)	6.10^{B} (0.07)	36.30^{A} (0.38)	36.80^{A} (0.28)	37.20^{A} (0.42)	112.88^{A} (1.17)	117.86^{AB} (0.94)	120.76^{B} (1.39)
Litsea	5.54^{A} (0.04)	5.90^{B} (0.07)	5.88^{B} (0.06)	45.76^{A} (0.61)	47.20^{B} (0.23)	48.30^{B} (0.28)	147.22^{A} (1.97)	153.84^{B} (0.91)	162.6^{C} (0.97)
Neolitsea	4.44^{A} (0.05)	4.82^{B} (0.04)	4.78^{B} (0.04)	48.12^{A} (0.29)	49.20^{B} (0.39)	49.04^{B} (0.33)	173.72^{A} (1.02)	184.46^{B} (1.44)	180.74^{B} (2.76)
Persea	5.90^{A} (0.07)	5.80^{A} (0.07)	5.10^{B} (0.07)	43.60^{A} (0.36)	42.68^{A} (0.34)	40.30^{B} (0.29)	136.80^{A} (1.13)	125.06^{B} (0.99)	121.62^{C} (0.88)
Phoebe	5.98^{A} (0.07)	6.40^{B} (0.03)	4.88^{C} (0.10)	38.20^{A} (0.36)	41.60^{B} (0.16)	39.14^{C} (0.22)	120.30^{A} (1.14)	137.78^{B} (0.61)	127.9^{C} (0.71)
Syzygium	5.18^{A} (0.07)	5.06^{A} (0.09)	5.18^{A} (0.06)	46.24^{A} (0.28)	47.80^{B} (0.42)	47.36^{B} (0.32)	157.76^{A} (0.97)	164.62^{B} (1.47)	166.38^{B} (1.58)
Turpinia	4.92^{A} (0.05)	5.41^{B} (0.07)	6.34^{C} (0.07)	52.16^{A} (1.73)	42.60^{B} (1.83)	31.30^{C} (0.41)	267.02^{A} (8.87)	218.22^{B} (9.37)	183.28^{C} (1.23)

*For given parameter, within rows, plots not sharing the same uppercase letters denote significant differences ($P < 0.05$) among them for that species.

most responsive in terms of growth and physiological traits to altitudinal gradients. On the other hand, RGR, *Pn* and *Gs* of *Litsea*, *Neolitsea*, *Persea*, *Phoebe* and *Sygygium* were least responsive to changing altitude. Thus they may have the ability to acclimate to a wider range of environmental conditions prevailing in these tropical montane forests. This kind of species-level understanding of variation in physiological and growth rates, and their interaction with altitude-driven variables will have implications for predicting plant responses to possible alteration in the microclimate triggered by climate change and anthropogenic disturbances.

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U. M. CHANDRASHEKARA

Kerala Forest Research Institute Sub Centre,
Nilambur,
Chandakunnu 680 653, India
e-mail: umchandra@rediffmail.com

Observations on morphometry, egg size and juveniles of the endemic caenophidian snake *Xylophis perroteti* (Dumeril, Bibron and Dumeril, 1854) in the Nilgiris, Western Ghats, India

The caenophidian snake genus *Xylophis* Beddome, 1878, is endemic to the southern Western Ghats region of peninsular India[1–3]. Within the genus *Xylophis*, three species are currently recognized – *Xylophis perroteti* (Dumeril, Bibron and Dumeril, 1854), *Xylophis stenorhynchus* (Gunther, 1875) and a new species *Xylophis captaini* (Gower and Winkler, 2007). Among these snakes, *X. perroteti* has restricted distribution in the Nilgiris and Wayanaad in North Kerala[3–6]. This snake found in high ranges of the Western Ghats over 1500 m altitude in Kerala and Tamil Nadu[3]. Very few studies have been carried out on this species; mostly only short notes[3–6]. Almost nothing is known about the ecology and biology of *X. perroteti*. Any information on this genus is thus of both immediate and potentially broader interest[7]. The present study describes morphometry, egg size and juveniles of *X. perroteti.*

The study was conducted in the upper Nilgiris, southern Western Ghats, Tamil Nadu, lying between 11–12°N lat. and 76–77°15′E long. Total area of the Nilgiris district is 2543 km^2. These hills are in fact a mountainous plateau formed at the junction of the Eastern Ghats and Western Ghats. The elevation ranges between 300 and 2700 m amsl. Temperature shows a wide range of variation, during summer it may exceed a maximum of 21–25°C, while minimum temperature is during winter 10–12°C. Major vegetation types in the upper Nilgiris are Montane shola grasslands and plantations of exotic species such as wattle (*Acacia* spp.), blue gum (*Eucalyptus* spp.) and pine (*Pinus* spp.).

Visual encounter survey method[8] was used to collect data in the field for two years between January 2013 and December 2014. Samplings were carried out during morning and evening hours during every month. Searches were made on several micro habitats like under leaf litter, on boulders, fallen logs and in the bushes. Gravid females were identified by palpation. Adult and sub males were

Figure 1. Striped narrow-headed snake *Xylophis perroteti* observed in the Nilgiris.

identified by the presence of hemipenis. Snout-vent length (SVL) and tail length (TL) were measured with an inch tape (LC = 1 mm). Eggs width and length were measured with a Vernier caliper. Snakes and eggs were weighed using a Pesola® spring balance (accuracy 0.5 g). Identification of sex was mainly based on the scale counting and presence of hemipenis in males as reported in the literature[1,3,9]. Data were also collected from road-killed specimens. Variations in morphometric data such as SVL and weight between male and female snakes were analysed using two-sample *t*-test. Data analyses were done using statistical software PAST.

During the study period, a total of 28 live gravid females and eight road-killed gravid females, 20 males and 21 juveniles were recorded. Males were mostly observed during the end of the pre-monsoon (March–April) and beginning of the southwest monsoon (May–June) seasons. The gravid females were recorded during southwest monsoon (May–August), and mostly observed during the middle of the southwest monsoon seasons (June and July), while juveniles were mostly noticed during the end of southwest monsoon (July and August).

In the gravid females SVL ranged from 405 to 655 mm with a mean of 498.6 ± 65.3 mm. Male SVL ranged from 314 to 456 mm with a mean of 369.8 ± 59.5 mm. The tail length of gravid females ranged between 20 and 42 mm with a mean of 29.92 ± 5.3 mm. The tail length of males ranged between 45 and 70 mm with a mean of 57.2 ± 9.6 mm. Body mass of gravid females ranged from 60 to 120 g with a mean of 80 ± 16.6 g. Male body mass ranged from 25 and 60 g with a mean of 38.7 ± 12.3 g.

A total of 28 live gravid females were examined, of which 6–15 eggs were felt by palpation. Moreover, 7–10 eggs were noticed from eight road-killed gravid female specimens and the eggs were weighed from 2 to 6 g with a mean of 3.5 ± 1.4 g. Egg length was between 26 and 36 mm with a mean of 31 ± 3.4 mm, while width ranged from 11 to 15 mm with a mean of 12.6 ± 1.3 mm.

A total of 21 juveniles were observed, of which 8 were identified as males and 13 as females through scale count. SVL ranged from 134 to 250 mm with a mean of 185.3 ± 35.8 mm. The tail length was between 9 and 26 mm with a mean of 15.8 ± 6.1 mm. The body mass ranged from 5 to 10 g with a mean of 7 ± 1.5 g.

Females were longer (mean = 498.6 mm, $t = 5.8$, $P < 0.01$) and heavier (mean = 80 g, $t = 7.9$, $P < 0.01$) than males, but males had longer tail (mean = 57.2 mm, $t = 10.1$, $P < 0.01$) when compared to females.

In the present study, gravid females and juveniles were observed during the southwest monsoon season (May–August). Four gravid females were observed during July and Wall[4] observed eight young ones during June–August. Therefore, this study confirmed that the breeding season of *X. perroteti* was during the southwest monsoon. Egg-laying and hatching of juveniles occurred mostly in the middle (June and July) and end of the southwest monsoon (July and August) season. Similar finding was made by Pizzatto and Marques[10]; since egg-laying occurs mainly in the middle of the rainy season, and thus most eggs will be incubated during the warmer and wetter months. Egg-laying in warmer periods is suitable for embryonic development[11]. Occurrence of males was mostly observed during the end of pre-monsoon (April and May) and beginning of the southwest monsoon (June and July) seasons. This phenomenon may be due to active mating season for the species. Males are captured with greater frequency than females during this season. This is may be due to the male mate-searching behaviour[12].

Females are longer and heavier than males; larger sized females may have evolved to increase reproductive success by increasing fecundity[13,14], egg size[15] and clutch size[16]. The previous study reported[4] that the clutch size ranged between 6 and 12. The present study found much higher clutch size (6–15).

Males have longer tail when compared to females. This is because longer tail may provide larger area to accommodate larger hemipenis, which would be beneficial to attain higher reproductive success[17]. Thus sexual dimorphism in size, shape and colour is more common among snakes[18].

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P. SANTHOSHKUMAR*
P. KANNAN

Department of Zoology and Wildlife Biology,
Government Arts College,
Udhagamandalam 643 002, India
**For correspondence.*
e-mail: santhopalani@gmail.com