CROTALUS DURISSUS (neotropical rattlesnake): REPRODUCTION. *Crotalus durissus* is the only rattlesnake species in Brazil (Campbell & Lamar, 2004). Its reproductive cycle is seasonal and parturition occurs from December to March, during the summer (Almeida-Santos & Salomão, 1997; 2002; Barros et al., in press). Herein we present a new record of a litter of *C. durissus* from the Brazilian caatinga region, a semi arid area in northeastern Brazil.

Data about the period of copulation, timing of birth, offspring size and growth of seven newborns maintained in captivity is presented. Biometric data of these individuals are available from their birth to approximately one and a half years old. One female *C. d. cascavella,* collected in the city of Salvador (State of Bahia/Brazil) in 2001 and a conspecific male were placed in the same terrarium in early 2006 at the Butantan Institute. Mating was observed in late June 2006 (autumn) and parturition occurred in December 2006 (summer).

The female (1340 mm in snout-vent length [SVL], 90 mm tail length [TL]) gave birth to nine newborns (one dead and eight alive). One newborn died two months later leaving four males and three females. Neonates were maintained in captivity under permit from IBAMA 480548 (number 21154.003193/84-11). The young were kept individually in transparent boxes with cardboard as substrate, water and room temperature of 27.4ºC. During the first six weeks they were fed one newborn mouse per week. After this period young were fed once a week with mice weighing 5 g. Later the snakes were fed only once every two weeks.

Biometric data (body mass, SVL and TL) were recorded every three months from December 2006 to July 2008. Student t-tests were used to detect differences in mean values of SVL, TL and body mass (BM) between young males and females. The relative clutch mass (RCM = total clutch mass/ body mass of the mother + clutch mass; see Seigel & Fitch [1984]) was 0.15.

Other species of viviparous terrestrial snakes present higher values of RCM (Shine, 1992). Births generally occur during the summer for *C. durissus* from northeastern Brazil (Table 1). Body mass and length (SVL) of newborns varied according to clutch size; newborns were larger and heavier when clutch size was smaller (N = 9; this study) than when it was large (N = 17; Barros et al., in press) (Table 1). Male tails were longer than females tails ($t = -2.40$, $p = 0.03$) (Fig. 1). The presence of hemipenes inside male tails may explain these differences (Shine et al., 1999). No significant difference was observed in SVL ($t = 0.22$, $p = 0.82$) and body mass ($t = 0.15$, $p = 0.88$) between males and females that were maintained in captivity. The captive snakes also grew equally until 17 months old (Fig. 1).

Differential growth should be observed after sexual maturity is attained in snakes (Shine, 1994). The individual snakes monitored herein were likely still sexually immature, as sexual maturity is attained at 82 cm (males) and 83 cm (females) in *C. durissus* from northeastern Brazil (Barros et al., in press).

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Parturition (months/seasons)	Litter	SVL (mm)	Body mass (g)	Source
December to February (summer)	16 to 22	340 to 345	16 to 24	Cordeiro et al. (1981)
December to February (summer)	15*	401.7 (±29.1)	23.85 (±2.91)	Lira da Silva et al. (1994)
Unknown	17	294.35 (± 6.93)	22.59 (±3.54)	Barros (2007)
December (summer)	9	375 (± 5.7)	34.4 (±1.71)	This study

Table 1. Comparative data on the timing of parturition, litter size, snout-vent length and body mass of newborn *Crotalus durissus*. *Median value for 9 litters.

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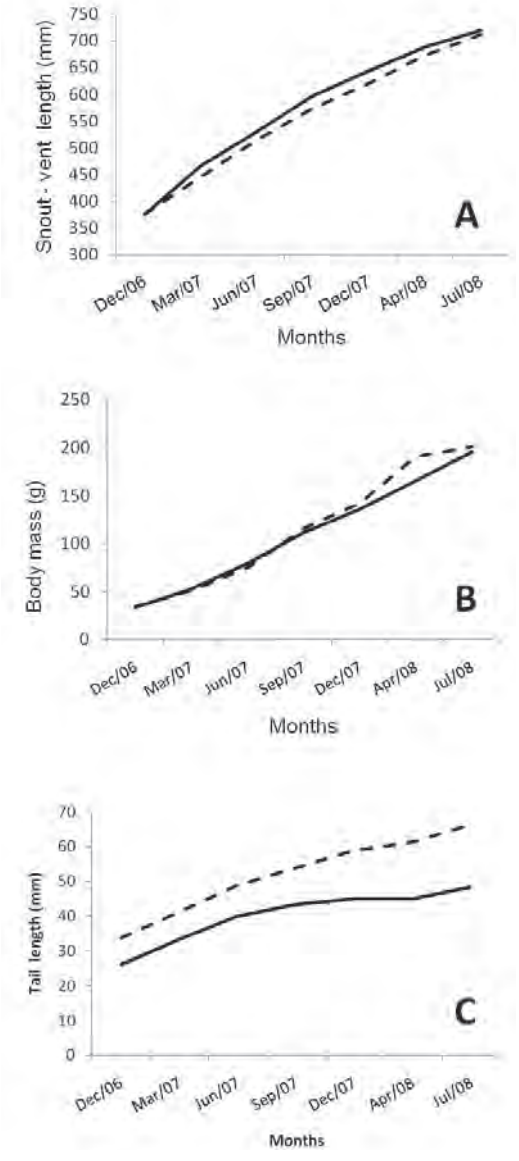

Figure 1. *Crotalus durissus* growth curves; male (dotted line) and female (continuous line). A. Snout-vent length. B. Body mass. C. Tail length.

DIPSAS ARTICULATA (Central American snail-eater): MAXIMUM SIZE. *Dipsas articulata* is an uncommon, arboreal and nocturnal snake with a distribution ranging from lowland tropical forests from southeastern Nicaragua to northwestern Panama. On 24 February 2011 at 22:06 we captured an adult male *D. articulata* perched at a height of 4 m in a tree in Caribbean lowland tropical wet forest of Tortuguero National Park, Limón Province, Costa Rica (Fig. 1). The individual measured 501 mm snout-vent-length, 218 mm tail length, and weighed 16 g. At a total length of 719 mm, this specimen represents the longest known record of *D. articulata*, exceeding the largest previous published size record of 712 mm total length (Savage, 2002).

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Figure 1. *Dipsas articulata*. Photograph by Alex Figueroa.

PELOPHYLAX LESSONAE (pool frog): PREDATION BY EURASIAN OTTER *LUTRA LUTRA*. During surveys carried out as part of a project to reintroduce the northern clade pool frog *Pelophylax lessonae* to England (Buckley & Foster, 2005), Eurasian otter *Lutra lutra* has been detected at the reintroduction site, in Norfolk, eastern England. The site includes many ponds. The nearest major waterway is a river approximately 2.25 km away at its closest point.

On 26 March 2010, during a night-time, torchlight survey for amphibians, an adult otter was observed in one of the ponds. That particular pond supported great crested newts *Triturus cristatus* and smooth newts *Lissotriton vulgaris* but, at that time, no other amphibian nor fish. During 2010 and 2011, three spraints (otter faeces) were found near to ponds that have been used by pool frogs and which support populations of sticklebacks, primarily nine-spined *Pungitius pungitius* but also small numbers of three-spined *Gasterosteus aculeatus*. The spraints were soaked, separated, and examined by two of us to identify fish and bird (DF) and amphibian remains (CGO).

Spraint 1 was found (18 July 2010) on the bank of a pond used by pool frogs. Bullhead *Cottus gobio* was the most abundant prey item in the spraint, but it also contained bones of eel *Anguilla anguilla*, brown trout *Salmo trutta*, at least two cyprinid species, including minnow *Phoxinus phoxinus*, and some large invertebrates (Table 1). There were no amphibian, bird or mammal remains.

Spraint 2 was found (29 April 2011) on a cut tree stump located between two ponds that are the most frequently used by pool frogs. The material was in poor condition, owing to digestion, but some bones were still identifiable to species. It contained at least one subadult male common frog *Rana temporaria* and one unsexed subadult pool frog (including a diagnostic left ilium). The spraint also included the remains of invertebrates, small fish and a rallid bird, most likely a moorhen *Gallinula chloropus*.

Spraint 3 was found (9 May 2011) on a fallen log lying in the primary breeding pond used by pool frogs. Pool frogs were present and males were calling at the time when the spraint was found

Spraint	**1**	**2**	**3**
Date	18-07-10	29-04-11	09-05-11
Invertebrate	*Dytiscus* sp. Odonate larva *Melolontha melolontha*	*Dytiscus* sp. Aeshnidae larvae	-
Fish	*Anguilla anguilla* *Phoxinus phoxinus* At least one other cyprinid species *Salmo trutta* *Cottus gobio*	Gasterosteidae sp. *Cottus gobio*	*Phoxinus phoxinus* *Salmo trutta* Gasterosteidae sp.
Amphibian	-	*Rana temporaria* (subadult male) *Pelophylax lessonae* (subadult)	-
Bird	-	Rallidae sp. (probably *Gallinula chloropus*)	-

Table 1. Prey identified in otter spraint.

but it contained bones of fishes only (Table 1.).

The only fish species known to occur in the ponds are sticklebacks. The remains of other fishes in the spraints suggest that these prey were captured elsewhere, consistent with otter either passing through the site, or temporarily visiting. The remains of a pool frog in one of the spraints demonstrate that this reintroduced amphibian is prey for otters. The European otter occurs throughout western Europe (MacDonald & Barrett, 1993), encompassing the range of the pool frog.

Amphibians, mainly anurans, are a significant prey item for the otter, usually secondarily to fish, with numbers taken peaking during the amphibians' aquatic phases such as hibernation and breeding (e.g. Weber, 1990; Clavero et al., 2005; Britton et al., 2006). The scarcity of pool frog remains in spraint at this site suggests that predation of this species has, so far, not been extensive. Otters are opportunistic predators and so although they are unlikely to prey preferentially on amphibians, high rates of predation can occur when the latter are aggregated in water bodies (e.g. Cogălniceanu et al., 2010). An otter chancing upon a breeding aggregation of pool frogs could seriously harm the reintroduction programme while the establishing population remains small and confined to only a few ponds.

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PSEUDEMYS CONCINNA (river cooter): UK ALIEN SPECIES. The farming and export of *Trachemys scripta elegans* for the pet trade and subsequent releases into the wild have been a concern for environmentalists for many years. Releases have resulted in the establishment of feral populations across the globe, including the UK. As a consequence *T. s. elegans* has been identified as one of the world's top 100 invasive species (Lowe et al., 2000). In 1998 the UK government banned *T. s. elegans* imports but other species (or subspecies), including several types of sliders (*T. s. scripta* and *T. s. troosti*) and river cooter (*Pseudemys concinna*) continue to be imported. Although *T. s. elegans* is apparently unable to reproduce successfully in the UK it can persist for many years and sightings of feral terrapins in northern areas of the UK usually concern only this species (RM pers. obs.). This note reports on a sighting of a different terrapin species in northern England.

On 28 July 2011 one of us (JSB) photographed a terrapin basking near the edge of the Leeds/ Liverpool Canal near Saltaire (53°50`N). The weather was sunny and warm and the selected basking site was a log in a semi-shaded area (Fig. 1 above). The terrapin had been seen swimming in the canal some weeks earlier and had an estimated straight-line carapace length of approximately 28 cm and would hence be an adult. It was seen again on 21 August at 08:20 emerging onto the same log to bask. It quickly returned to the water at the approach of cyclists but by 09:12 was back basking on the log. Further observations of basking were made at the same location on 22 August at 02:45 when water temperature was 18.6°C and the air temperature 15.5°C. A further sighting on 4 September, during mainly overcast weather, enabled a photograph of the neck markings (Fig. 1 below).

The canal is frequently used for pleasure boating, disturbing its muddy base, which may explain why the shell pattern is not particularly distinct and appears to differ daily. Wide yellow stripes on the underside of the neck with the central chin stripe dividing to form a Y-shaped mark, and notching at the rear of the carapace indicate it is a river cooter *P. concinna* from the eastern USA (Ernst & Lovich, 2009). The tail and front claws are short suggesting it is female.

River cooters are mainly herbivorous as adults and capable of hibernating at the bottom of ponds for several months (Ernst & Lovich, 2009) and hence have the potential to survive for long periods in the UK. Non-native species may disrupt ecological systems by predation or through competitive exclusion, but the numbers of *P. concinna* imported are small compared to the former trade in *T. s. elegans* hence they may not present the same level of threat. However, their influence on UK ecosystems is unknown.

Figure 1. First sighting on 28 July shows what appears to be a carapace covered in silt (above). Neck markings are those of a river cooter, which is supported by the serrations at the rear of the carapace (below).

We are grateful to Christine Tilley (British Chelonia Group) for assistance with identification.

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RANA SYLVATICA (wood frog): LARVAL DURATION. *Rana sylvatica* is a widespread North American frog that breeds primarily in ephemeral wetlands in early spring. The duration of the larval period varies among populations and is influenced by temperature, latitude, altitude, density and pond-drying. Time to metamorphosis is a highly important life history trait in this species, as ephemeral wetlands typically dry by mid-summer in the eastern United States. Wood frog tadpoles that do not complete metamorphosis before pond-drying perish. In 2010 and 2011, I collected wood frog egg masses (total n = 33) from Pennsylvania Game Lands #176, Centre County, Pennsylvania, USA, and raised a subset of tadpoles from each clutch to metamorphosis in the laboratory. I observed a mean larval duration of 62.2 days ± 0.65 SE for a total of 564 tadpoles that survived to metamorphosis, with larval duration ranging from 34 to 118 days.

One tadpole (not included in the above average) spent 147 days (almost five months) in the larval phase before metamorphosing. This tadpole hatched in the laboratory on 4 April 2011, sprouted one hind limb on 26 August and the second hind limb on 28 August 2011, thus completing metamorphosis approximately three months later than the average tadpole in our study population. At metamorphosis, this individual had a snout-vent length of 11 mm and was 0.612 g, which was close to the averages of other individuals at metamorphosis in this population. Although all tadpoles were raised in the laboratory under a constant temperature (22.2°C), the majority of tadpoles completed metamorphosis before their respective ponds dried in the field. The larval duration of this unusual tadpole even exceeds by 14 days the maximum duration of a high-altitude population in the Shenandoah Mountains, Virginia, where larval duration is typically very long, ranging from 82 to 133 days (Berven, 1982). This intra-population variation is notable in a species with strong selection on larval duration due to pond-drying. This specimen will ultimately be deposited in the Langkilde Laboratory, Penn State University, Pennsylvania, with a voucher number of 1:1.5H.28 Aug 11.

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RHINELLA GRANULOSA and ***PHYSALAEMUS KROYERI***: INVERTEBRATE DYTISCID PREDATORS. The dytiscid family of predatory water beetles comprises a large number of species distributed almost worldwide. It includes some of the main predators of adults and larvae of several anuran species, as reported by researchers since 1960s (see Wells, 2007). Dytiscids are important predators of adults and larvae of anurans (Rubbo et al., 2006; Wells, 2007), playing a fundamental role in the demographic control of amphibian populations (Ideker, 1979; Formanowicz, 1986; Holomuzki, 1986). In addition to anurans, the diet of adults and larvae of dytiscid beetles includes invertebrates (e.g., molluscs, crustaceans, insects, and leeches) and vertebrates such as small fish.

In the present study, we report two events of anuran predation by dytiscids: adults of *Megadytes*

(*Bifurcitus*) *lherminieri* (Laporte, 1835) preying on an adult of *Rhinella granulosa* (Spix, 1824) (Anura, Bufonidae) and larvae of *Rhantus* (*R.*) *calidus* (Fabricius, 1792) preying on larvae of *Physalaemus kroyeri* (Reinhardt and Lütken, 1862) (Anura, Leiuperidae).

Both *Megadytes lherminieri* and *Rhantus calidus* have a wide geographic distribution. According to the biogeographic categories proposed by Benetti & Garrido (2004) *M. lherminieri* is a Neotropical species, found from Mexico to Argentina, while *R. calidus* is an interamerican species, found from Canada to Patagonia. Few studies have focused on the ecology of this group of coleopterans. Most are taxonomic studies and do not report on the diet of these species (Benetti & Régil, 2004; Ferreira Jr. et al., 1998).

On 22 October 2010, we observed a breeding event of *Rhinella granulosa*, in a semi-permanent water body (11 x 7 m) in the rural municipality of Jequié, Bahia state (13º56'34.5"S, 40º06'31.6"W, altitude of 700 m above sea level). *Rhinella granulosa* is a small frog with a wide geographic distribution (from northern Rio de Janeiro to eastern Minas Gerais, Espírito Santo, Bahia, Piaui, and eastern Maranhão to Pernambuco and Rio Grande do Norte) (Frost, 2011). Two adult *M. lherminieri* were observed attacking and preying on an adult male of *R. granulosa* (SVL = 50.2 mm) (Fig. 1). Before the attack, the frog was floating, possibly actively searching for females, a strategy widely used by frogs of this genus during reproductive events (Haddad & Bastos, 1997; Dayton & Fitzgerald, 2001; Wells, 2007; Narvaes & Rodrigues, 2009). During the attack, the anuran was turned upside down by the two *M. lherminieri*. While partially submersed, the body fluids of the frog were consumed in approximately 40 minutes by the predators. Only the skin and venom glands remained.

Reports of the predation of adult vertebrates by dytiscid beetles are relatively rare in the literature (e.g., Ideker, 1979; Johnson et al., 2003; Caputo et al., 2006). Among invertebrates it is more commonly described for species that present a needle-like proboscis (Haddad & Bastos, 1997; Brasileiro et al., 2003). The absence of a more specialised buccal apparatus in *M. lherminieri* (masticatory apparatus) might indicate a learning process regarding the most palatable portions of anurans or mechanisms to detect the venom produced by the skin and/or paratoid glands of *R. granulosa.*

The second incidence of predation was observed in the laboratory. On 19 November 2010 two clutches of *Physalaemus kroyeri* were collected from another semi-permanent water body (5 x 3 m) in the same region and maintained in the laboratory. After tadpoles emerged (24 hrs), larvae of *R. calidus* were also observed, presumably originating from eggs laid on the foam nest. The individuals observed during the predation events were fixed in 10% formalin (adult anuran) and/or fixed in 70% ethanol, and deposited in the zoological collection of the State University of Southwest Bahia, municipality of Jequié, Bahia state, Brazil.

On 26 November 2010 another nest of the same anuran species was collected from the same water body and maintained in the laboratory without removing larvae of *R. calidus*. All eggs and newly-emerged tadpoles were preyed upon by the larva of *R. calidus*, which also consumed its siblings. Egg deposition on clutches of anurans may be an adaptive behaviour for *R. calidus*, ensuring a food source for its offspring.

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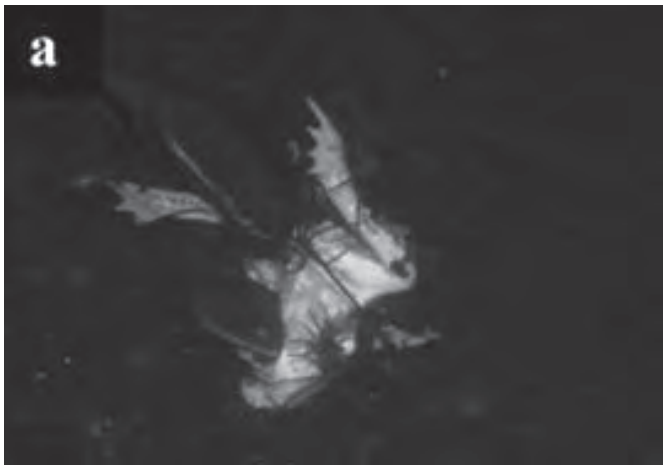

Figure 1. Adult male of *Rhinella granulosa* being preyed upon by two individuals of *Megadytes lherminieri*.

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