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NATURAL HISTORY NOTES

***TROPIDODRYAS STRIATICEPS* (Vine-snake): REPRODUCTION**. Snakes of the genus *Tropidodryas* occur exclusively in the Atlantic rainforests of southeastern and southern Brazil (Amaral, 1937; Thomas & Dixon, 1977), and also Bahia state (Argôlo, 1999a,b). Two species are currently recognized: *Tropidodryas serra* (Schlegel, 1837) and *Tropidodryas striaticeps* (Cope, 1869), the first found at sea level, and the latter at higher altitudes (Sazima, pers. com.; *in* Marques, 1998). They have semiarboreal habits and diurnal activity patterns, feeding on lizards, amphibians and rodents (Thomas & Dixon, 1977; Sazima & Puorto, 1993). The young are known to use caudal luring to attract prey (Sazima & Puorto, 1993). This paper presents information on oviposition, hatching, clutch size, relative clutch mass, size and sex ratio in newborn *T. striaticeps,* a snake with broad distributional range in Brazil including ES, MG, PR, RJ, SC e SP states (Amaral, 1937), with a recent record from RS (Puorto & Albuquerque, 2000; Puorto *et al.*, 2001) and BA (Argôlo, 1999b). This species appears on the Red List of Threatened Species of Rio Grande do Sul (www.mat.pucrs/br/livrovermelho/princip.htm).

One female *T. striaticeps* (IB 65086: 840 mm in snout-vent length (SVL), 225 mm in tail length

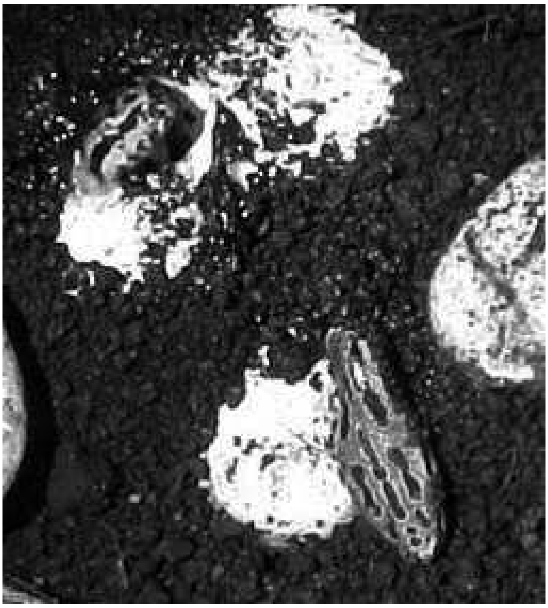

Figure 1. Hatching of *Tropidodryas striaticeps* after 162 days of incubation.

(TL) and 150 g after oviposition) collected in Arujá, São Paulo (23°24'S; 46°20'W), was brought to Instituto Butantan (IB) and laid 8 eggs on 16th January 2002. The eggs averaged 39.6 mm in length (range = 37.0–43.0 mm), 19.0 in width (range = 16.9–20.8 mm) and 8.5 in mass (range = 7.3–10.1g). The RCM (relative clutch mass) was 0.40. The eggs were incubated in a box with soil as substrate, at room temperature varying from 20 to 27°C. Hatching occurred after 162 days, there being a period of 13 days between the first and the last neonate to hatch. Male newborns (*n* = 5) averaged 250 mm SVL (range = 230–270 mm), 77 mm TL (range = 75 – 80 mm) and 7.7 g mass (average = 6.4–8.7 g). Female new-borns (*n* = 3) averaged 238 mm SVL (range = 220–250 mm), 75 mm TL (range = 70–80 mm) and 7.3 g mass (average = 6.7–8.0 g). No still-borns were observed. Sexual dimorphism did not occur in the SVL, TL and mass. It would be interesting to compare measurement data for adult specimens to verify the possibility of ontogenetic variation in morphometric data. This is the first report about egg-laying and hatching in *T. striaticeps*. Three of the newborn snakes have been deposited in the Coleção Herpetológica do InstitutoButantan (IB67862; IB67957; IB68054).

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***TRITURUS ALPESTRIS* (Alpine newt): POLYMELY**. Extra-numerary limbs in free-living amphibians have long aroused scientific attention and curiosity (e.g. Colton, 1922; Bishop & Hamilton, 1947). Potential causes of polymely – as well as other kinds of limb deformities – encompass genetic factors, injuries and developmental disturbances, which can also derive from environmental contamination with biocides, retinoids, increased exposure to ultraviolet-B and parasitic infection (Ouellet, 2000; Blaustein & Johnson, 2003).

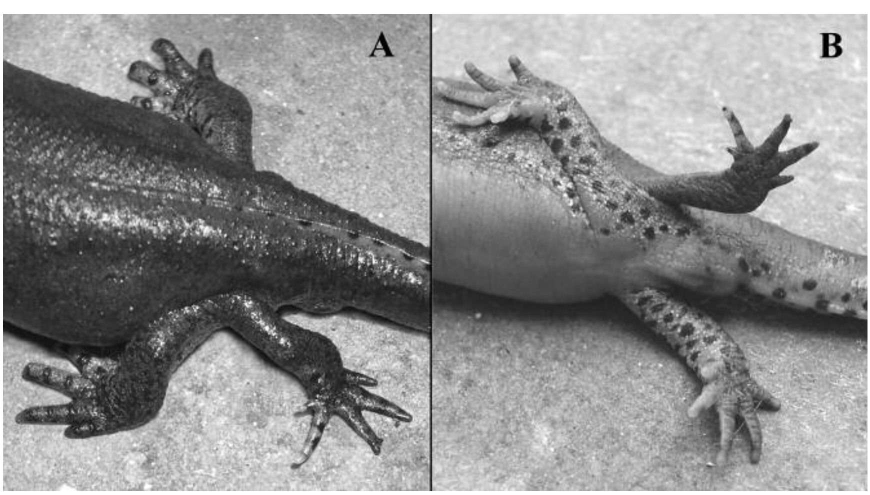
Polymely has been reported in many species of amphibians, although more frequently in anurans than in urodeles. In particular, only a few cases have been described to date for the family Salamandridae (see Recuero-Gil & Campos-Asenjo, 2002 and references therein). In the present note we document the first occurrence of polymely in the Alpine newt, *Triturus alpestris* Laurenti. The species is a medium-sized newt widely distributed over central and south-central Europe (Gasch *et al.*, 1997), inhabiting a variety of both deep and shallow water bodies and showing a wide altitudinal distribution (Griffiths, 1996).

The studied individual was found on 21st May 2005 near a pond located in a woody area dominated by beeches (*Fagus sylvatica*), close to the Camaldoli Hermitage (northern Apennines, Italy; latitude: 43° 48' 24'' N; longitude: 11° 49' 11'' E; altitude 1080 m a.s.l.). The existence of an Alpine newt population at this site was first reported by Lanza (1965), and it is considered of particular interest due to the abundance of paedomorphic individuals, and also because of recent conservation concerns (Tedaldi & Scaravelli, 1994). The studied individual (Figure 1) was a 108 mm long adult female (total length, measured with steel calliper; ± 0.1 mm), gravid, and showing a metamorphic phenotype. It presented an extra-numerary left hind limb, pointing backward, between the normal hind limb and the base of the tail. This extra limb appeared a little underdeveloped, with a total length (18 mm) which was 82% of the normal one (22 mm), and a generally thinner shape. Apart from this, it was normally shaped, and was provided with a foot with five toes. The movements of this extra limb appeared to passively follow those of the normal limb, without contributing to the animal's terrestrial locomotion. Thus, the extra limb appeared non-functional, and did not seem to worsen the general conditions of the individual, whose body size was at the upper bound of that observed for adult females of its species (e.g. Lanza, 1983), and which was otherwise healthy.

At the site where the polymelic Alpine newt was found, we also observed several hundred individuals of both the same species and two other newt species: *Triturus carnifex* (Italian crested newt) and *T. vulgaris* (Smooth newt). No other individuals were found showing the same or any other evident morphological abnormalities.

Since the studied individual was released a few after being found and examined, causal factors underlying the observed morphological anomaly cannot be indicated unequivocally. Nevertheless, the absence of chemical contamination at the study

Figure 1. Pelvic region of the polymelic Alpine newt individual. A: dorso-lateral view; B: ventro-lateral view.



site (unpublished data), its overall structure with abundant shields against direct UV-B radiation, both in terrestrial and aquatic habitats, and the lack of further malformed newts among the several hundred examined at this site, lead us to regard environmental factors or parasitic infections as unlikely, and to favour endogenous causes or injuries as the most likely explanations. In particular we cannot rule out the possibility that the extra-numerary limb derived from an abnormal regeneration process. Newts and salamanders are able to regenerate a wide range of complex structures, such as limbs (reviewed in Nye *et al.*, 2003), after their removal. During the regeneration process a sub group of stem cells migrates to cover the wound surface. Many different cell types accumulate under the wound epidermis and dedifferentiate, leading to the formation of a regeneration blastema. This structure gradually grows and proliferates, and the cells that compose it differentiate and reproduce the missing structure. It is possible to speculate that repeated injuries occurring during this process could lead to an abnormal regeneration process and eventually to an extra-numerary limb (Nye *et al.*, 2003).

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ZONOSAURUS LATICAUDATUS **(Western girdled lizard): SEMIAQUATIC DEFENSIVE BEHAVIOUR**. *Zonosaurus laticaudatus* is a medium sized lizard with an average SVL of 135mm (Glaw & Vences, 1994) which can be identified by the presence of a lateral fold of skin which runs along the neck terminating at the inguinal region, dorsolateral stripes that begin behind rather than on the head, strongly keeled dorsal scales and the possession of prefrontal scales that are clearly in contact with each other (Glaw & Vences, 1994).

This species belongs to the family Gerrhosauridae and is one of 17 genera endemic to Madagascar. Members of this genus have been divided into one of three different categories dependent upon their distribution across the island: those with very restricted distributions, those occurring across regions within well-defined bioclimatic areas and those with very broad distributions across bioclimatic zones (Raselimanana, 2003).

Zonosaurus laticaudatus fits into the third of these categories as it is found in three separated areas located in the northwest, west, and south (Raselimanana, 2003). Two possible explanations have been forwarded to explain this current distribution. The first suggests that at some point this species must have possessed a continuous distribution over Madagascar and that the current disjunct range is the result of local extirpation in certain zones or separation of populations associated with ecological change (Raselimanana, 2003). The alternative theory is that populations originated in the southeast with subsequent expansion into the west and north (Raselimanana, 2003).

This relatively large and conspicuous species has been the focus of numerous studies that have resulted in detailed behavioural observations (see Avery, 1979; Brygoo, 1985; Glaw & Vences, 1994, Henkel & Schmidt, 2000; Raselimanana, 2003 and Raselimanana *et. al*., 2005). These observations have highlighted certain aspects of its ecology that may be responsible for its current distribution. Firstly, this species is highly adaptable with regard to structural microhabitat as rupicolous, terrestrial and arboreal behaviour has been documented (Raselimanana, 2003). Secondly, it does not appear to be limited by the physical factors of temperature and humidity as populations have been found in dry, humid, and transitional forest (Raselimanana, 2003). Finally, *Z. laticaudatus* is a generalist, opportunistic feeder with a varied diet which is known to include invertebrates and fruit (Urbani & Bels, 1995).

This paper intends to add to this current knowledge by documenting the behaviour of individuals from a population located in the south of the island. In particular, it draws attention to previously undocumented observations and highlights how (together with the existing ecological knowledge detailed above) they may have contributed to the current wide and disjunct distribution of this species across Madagascar.

Figure 1. *Zonosaurus laticaudus*. Spet Lacs, 2005. Photograph © N. D'Cruze.

In January 2005 The Frontier-Madagascar Forest Research Programme conducted a biodiversity survey in the Sept Lacs region (S 23° 28' - S 23° 31', E 44° 04' - E 44° 10'), which is a core area of gallery forest found in the Parc Regional de Belomotse, southeast Madagascar. Behavioural observations of this species were made between 14th January and 28th January, during the wet season.

Members of this population appeared terrestrial in nature as all sightings occurred on the forest floor. Individuals typically selected exposed rocks in open areas amongst vegetation on which to bask and were observed displaying typical 'heliotherm shuttling' behaviour as described by Avery (1979). This behaviour was responsible for the majority of sightings which occurred between 10:00 and 12:00 hr in the morning and 14:00 and 16:00 hr in the afternoon when the sun was at its strongest.

Interestingly, of the 11 lizards observed during this period, 4 individuals were missing forelimbs. Although limb regeneration has been observed in both *Z. ornatus* (Brygoo, 1985) and *Z. haraldmeieri* (Raselimanana, 2000) this is a phenomenon which has not been recorded in populations of this species before. Predators such as snakes of the genus *Leioheterodon* and birds of prey such as *Falco eleonorae,* which were also observed in the area, are most likely responsible for these injuries.

Additionally, during this study one individual displayed a previously undescribed semi-aquatic defensive flight response. When disturbed while basking on a rock adjacent to a medium sized pool, this individual dived into the water in an attempt to escape. Once in the water this lizard swam for approximately 50 cm before diving down to a depth of around 20 cm, submerging itself in the layer of leaf litter substrate located at the bottom. It remained there for approximately three minutes before surfacing for air and returning once again to the bottom of the pool. This type of behaviour has been previously observed in *Zonosaurus maximus* (known locally as the 'petite caiman') which is renowned for its semi aquatic nature (Glaw & Vences, 1994). However, until now it was the only member of this genus that has been known to flee into water in times of danger.

In conclusion this paper details two new observations regarding the behavioural ecology of this species. Firstly this lizard is able to survive serious injuries resulting from predation events that might prove fatal for other organisms. Secondly it documents semi aquatic behaviour which may have allowed this species to overcome hydrographic dispersal barriers (e.g. the Onhilay River in the south) which are believed to be responsible for the highly restricted ranges of other closely related species such as *Z. trilineatus* (Raselimanana, 2003).

If considered in conjunction with the current knowledge regarding the ecology of this species these observations have far reaching implications with regards to the ubiquitous distribution of this species. Upon crossing hydrographic dispersal barriers the generalist attitude of this species towards structural microhabitat, microclimatic conditions, and its diet would have been instrumental in allowing it to survive in widely contrasting habitats. This information suggests that range extensions into the west and north of the island are a feasible explanation for the current distribution of this species.

Although this paper has served to highlight previously unrecorded aspects of the ecology of this endemic Malagasy lizard, further research into its behavioural ecology are required in order to ascertain conclusive evidence regarding its role in the distribution of this species.

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