

Herpetofauna

Title: Mating behaviour in the blotched blue-tongued lizard, *Tiliqua nigrolutea*, in captivity

Authors: Ashley Edwards and Susan M. Jones

Address: University of Tasmania, Private Bag 5, Hobart, Tasmania, 7001, Australia.

Corresponding author: Ashley Edwards

Email: Ashley.Edwards@utas.edu.au

INTRODUCTION

Southern or blotched blue-tongued lizards, Tiliqua nigrolutea, are large, viviparous skinks distributed throughout southeastern Australia (Cogger, 1992). Adult males can range from 25–29 cm snout–vent length (SVL) and weigh between 300 and 450 g, with females somewhat larger and heavier. In Tasmania, where this study was conducted, blue-tongued lizards occur in low altitude heath, savanna woodland and dry sclerophyll forest in the cool temperate regions of the state (Rawlinson, 1974). We studied the reproductive biology of blue-tongued lizards for five years during a PhD project examining the roles of steroid hormones in reproductive physiology and behaviour, and here we describe our observations of mating behaviours in blue-tongued lizards in captivity.

METHODS

We caught lizards by hand throughout southeastern Tasmania (Hobart: 42° 53'S, 147° 19'E): males were distinguished from females by their relatively broader heads and an examination of the cloacal opening for the musculature of the hemipenes. During our study, the animals were housed in roofed outdoor enclosures 1.9 x 3.4 x 2.1 m; these were wire-fronted, allowing access to UV light and a natural photoperiod, and we provided bark and leaf litter for the animals to hide in. Direct sunlight and a 120 W floodlight globe at the front of each cage as an additional heat source provided a temperature gradient across which the lizards could thermoregulate during their active season of spring (Sept) to mid-autumn (Apr).

The lizards were maintained on a varied diet of fresh fruits (banana, apple, pear, grapes), snails and tinned, meat variety catfood, provided two to three times weekly.

Water was available at all times. Mixed-sex groups of approximately five animals were maintained in each cage from early autumn (Mar) to early spring (Sept); during this period animals were not breeding and few interactions were observed between individuals. However, during the mating period (mid to late spring: Oct – Nov), we separated males from each other in similar, but smaller, cages because males can injure each other during fights.

OBSERVATIONS AND DISCUSSION

We observed animals once every hour each day during the mating period, and continuously until the day's end once we saw the first sign of interest of a male in a female. We first observed reproductive behaviours in our lizards in mid-spring (Oct), and we saw copulations on at least 7 occasions during the mating period. We often caught males from the wild at this time of year, or saw them killed on the roadside, probably as they searched for females, but we rarely encountered females in the wild in spring. For example, approximately 95% of road killed blue-tongues we examined in the 1995-1996 reproductive season in which sex was discernable were males. This trend is in agreement with a study on the related species, T. rugosa in South Australia, which showed that, in most cases, it was the male lizard which located the female for mating by following her scent trail, tongue-flicking at airborne signals or searching familiar sites (Bull et al., 1993).

Males would test the receptivity of a female repeatedly early in the mating period. A mating attempt by a male began by him approaching a female from the side or rear, walking with jerky, irregular movements with his body raised above the ground; at the same time tongue flicks were directed toward her head, body and cloaca (Figure 1).

He then initiated a chase around the cage, attempting to grasp a resisting female on the torso behind the front legs with his mouth (Figure 2). It often took several attempts for a male to secure his grip, as the female ran away or struggled violently. Once in position, the male curled his body around the female's, positioning his cloaca alongside hers. Using the established grip, he then took advantage of her rigidity to tilt her whole body forcibly until her cloaca became exposed. At this point, the female occasionally broke free and ran, only to be chased and recaptured by the male. The male then used one of his hind feet to scratch the female dorsally at the base of the tail several times (Figure 3). A receptive female responded by raising her tail and gaping her cloaca and allowing the male to intromit a hemipenis (Figure 4). If the female was unreceptive, she simply did not gape her cloacal opening, and eventually the male released her.

The duration of copulation was highly variable; one male was observed to maintain his grasp on a female for approximately six hours, with intromission only occurring towards the end of that time, while a mating involving two other lizards lasted only about 30 minutes. More usually, the chase and actual copulation were relatively rapid, with the male then maintaining a post-mating grip on the female for at least one hour (Figure 5), preventing her from leaving despite her attempts to do so. This may be a form of mate-guarding. However, males showed no loyalty to any particular female. Most attempted, often repeatedly, to copulate with two or more different females during the mating period, sometimes on the same day. Females became unreceptive immediately following intromission and responded to additional copulatory attempts by lunging and biting, hissing and gaping at the approaching male (Figure 6). However, one male was observed to successfully copulate twice with the same

female: this occurred without the animals separating after the first intromission. No copulatory plugs were observed, but the abdomen of mated females underwent several rhythmic contractions from posterior to anterior immediately after copulation, before the male's bite hold was released. This may be the occurrence of ovulation, or to help the sperm move into the reproductive tract.

We observed several matings in which intromission was successful, but from which females did not conceive. We cannot be certain if these represent failures of insemination or ovulation. Although males become reproductively active each year (Edwards and Jones, 2001a), females generally breed only every 2-3 years (Edwards et al., 2002). It is possible that in a captive group males may be unable to discern whether or not an individual female has vitellogenic follicles: the proximity of a receptive female may have confused mating males. However, females identified by hormone analysis as being non-vitellogenic were not receptive and did not mate, although males did still chase them.

The jerky, irregular walk observed as a male approached a female to attempt copulation has been described previously in this species as part of the limited courtship ritual of this species (Clutterbuck, pers. comm, cited in Shea, 1992). However, we observed this type of movement in several additional contexts, including male –male interactions, during both the mating period (Oct – Nov) and the less frequent male – male fights encounters in summer (Dec – Feb) when males were reproductively quiescent. During the mating period, however, the jerky walk signalled the interest of a male in a female, and usually preceded a chase. This behaviour is

similar to that documented for male Lacerta vivipara, a lizard in which there is little preliminary activity before mating (Bauwens et al., 1989).

As mentioned, two of the observed matings did not result in successful pregnancies, but the other five copulations produced healthy clutches. We have already published information about gestation length (Edwards and Jones 2001b), clutch number, reproductive frequency and relative clutch mass (Edwards et al., 2002) in blotched blue-tongued lizards.

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FIGURE LEGENDS

Figure 1. The male (below) approaches the female and tongue-flicks her head, side and cloaca.

Figure 2. The male attempts to gain a secure bite hold on the female.

Figure 3. The male (above) uses his hind leg to scratch the female (below) on the base of the tail, to stimulate her to gape her cloacal opening if she is receptive to mating.

Figure 4. Intromission between male (right) and female (left).

Figure 5. The male (behind) maintains a post-mating grip on the female (in front).

Figure 6. The female (right) becomes unreceptive as soon as she is released by the male (left) after copulation.

FIGURES