A description of a clutch of the Indo-Chinese rat snake, *Ptyas korros* (Schlegel, 1837), with notes on an instance of twinning

Simon Dieckmann, Gerrut Norval, and Jean-Jay Mao

The Indo-Chinese rat snake (*Ptyas korros* [Schlegel, 1837]), also sometimes referred to as the gray rat snake, has a wide natural distribution, extending from parts of India, east through southeast Asia (excluding the Philippines), to China and Taiwan (Pope, 1935; Kuntz, 1963; Orlov, Murphy and Papenfuss, 2000). In Taiwan, *P. korros* is a fairly common species and tends to inhabit grassy and wooded foothill areas all over the island (Kuntz, 1963; Lue, Tu and Shang, 2002). Herein we describe a clutch from a *P. korros* specimen from Taiwan.

On March 30, 2013 a pair of *P. korros* that was collected from the wild in August 2011, was observed mating while in captivity, and on May 22, 2013, the female oviposited. After the length, width, and weight (total clutch mass) of the eggs (Fig. 1) were recorded (Table 1), they were placed inside an incubator. The incubation temperature varied from ca. 28 °C during the day, to ca. 24 °C during the night. The relative clutch mass was calculated using the formula: (the total clutch weight / the maternal post-oviposition weight) x 100 (Shine, 1980). After an incubation period of 55 days, four of the six *P. korros* eggs successfully hatched. To avoid injury to the hatchlings (Fig. 2), no attempts were made to measure their lengths, but their weights were recorded and it was determined that they were three females and one male. The two remaining eggs that failed to hatch were kept in the incubator for two additional days, after which they were removed and dissected. It was found that one was infertile, while the other contained two dead neonates (twins); one (no weight was recorded) considerably smaller than the other (weight = 2 g).

Embryos of reptilian twins seldom survive and hatch successfully (Schmidt, 1995), so our finding is not out of the ordinary. Twinning may take place, if in the early stages of embryonic development, the embryo is separated into two independent embryos (single-egg twins), or if two ova, each with its own yolk sac, are enclosed within the same eggshell (two-egg twins; Schmidt, 1995). Two-egg twins usually have eggs that are slightly larger than other normal eggs from the same clutch. So, since none of the *P. korros* eggs described

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Figure 1. The six Indo-Chinese rat snake (*Ptyas korros*) eggs described herein, prior to being placed inside the incubator (photographed by Simon Dieckmann).
Table 1. A summary of the information pertaining to reproduction in the Ptyas korros female specimen described herein. Where applicable the mean and standard deviation values are given in parenthesis (mean ± SD).

<table>
<thead>
<tr>
<th>Maternal post oviposition body mass (g)</th>
<th>201</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch size</td>
<td>6</td>
</tr>
<tr>
<td>Egg length (mm) (n=6)</td>
<td>38 - 40 (38.8 ± 1.0)</td>
</tr>
<tr>
<td>Egg width (mm) (n=6)</td>
<td>18 - 20 (19.0 ± 0.9)</td>
</tr>
<tr>
<td>Total clutch mass (g)</td>
<td>51</td>
</tr>
<tr>
<td>Relative clutch mass</td>
<td>25.37%</td>
</tr>
<tr>
<td>Incubation period</td>
<td>55 days</td>
</tr>
<tr>
<td>Hatching body weight (g) (n=4)</td>
<td>6-8 (7.3 ± 1.0)</td>
</tr>
</tbody>
</table>

Lin et al. (2012) found that P. korros females from three localities in China oviposited from mid-June to mid-July, and that individuals from lower latitude localities oviposited earlier than females from higher latitude localities. Considering the proximate position of Taiwan in relation to mainland China, our findings suggest that P. korros females from Taiwan oviposited earlier than those reported by Lin et al. (2012) due to the lower latitude of the island. Further studies are required to determine whether there are variations in the oviposition time of P. korros females from northern and southern Taiwan.

Tu (2004) stated that in Taiwan P. korros females usually produce clutches of eight to 12 eggs. Zhao (2006) stated that P. korros clutches usually consists of ca. nine eggs, and Pope (1935) reported one to nine eggs per clutch from specimens from other parts of the range of this species. In the study by Lin et al. (2012), clutch sizes ranged from four to 17. The results of the study also suggested that P. korros females adjust their clutch sizes rather than egg sizes according to available energy (Lin et al., 2012). The clutch size described herein falls within the ranges described by Pope (1935), and Lin et al. (2012).

Table headings.

Figure 2. One of the Indo-Chinese rat snake (Ptyas korros) hatchlings described herein (photographed by Simon Dieckmann).
Tu (2004) provided no egg size descriptions, but based on the descriptions reported by Pope (1935) and Lin et al. (2012), the egg sizes can vary from 31.7-48.2 mm in length and 16.3-23.5 mm in width. The sizes of the eggs described herein are thus normal. Lin et al. (2012) noted some geographic variations in the shapes of the eggs of *P. korros*. More descriptions are required to determine to what extent the eggs of *P. korros* from populations in Taiwan differ from those from other populations.

The only clutch mass descriptions we found were those made by Lin et al. (2012) for *P. korros* females from three localities in China. Although the total clutch mass and relative clutch mass described herein are within the ranges reported by Lin et al. (2012), they are much smaller than the mean values reported in that study. Further study is thus suggested to determine the extent of the clutch masses and relative clutch masses of *P. korros* females from Taiwan.

In a study by Du and Ji (2002) it was found that in *P. korros* an increase in incubation temperature resulted in a significant decrease in the incubation period, and affected the body sizes of the hatchlings, but it had no affect on deformity incidence rates, sex ratios, or hatching success rates. The incubation period from our study is similar to that (ca. 50 days) reported by Tu (2004) and that reported by Du and Ji (2002) for eggs incubated at 30º C. The incubation period of our study can thus be considered normal and it is unlikely that the incubation temperature was responsible for the twinning.

To our knowledge, this is the first description of a relative clutch mass and a reported instance of twinning in *P. korros* from Taiwan. Our report also indicates some aspects of the reproductive biology of *P. korros* in Taiwan that require further study.

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**References**


