

A description of an Asian king snake (*Dinodon rufozonatum rufozonatum* [Cantor, 1842]) clutch size from central western Taiwan

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The Asian king snake (*Dinodon rufozonatum rufozonatum*), has a very wide distribution and naturally occurs in parts of eastern China, Korea, Japan (Goris and Maeda, 1997; Szczerbak 2003), and eastern Russia (Kharin and Akulenko 1998; Maslov and Kotlobay 1998), while the other subspecies, the Ryukyu red-banded snake (*Dinodon rufozonatum walli* Stejneger, 1907) has a distribution restricted to a few islands in Japan (Goris and Maeda, 1997). *Dinodon r. rufozonatum* (Fig.1) is the only member of the genus *Dinodon*, that is known to naturally occur in Taiwan, where it is very common all over the island (Kuntz, 1963; Lue, Tu and Shang, 2002).

In the morning of the 18th of July 2010, two eggs (visually estimated to have a length of ca. 3 cm, and a width of ca. 2 cm) were found in the water bowl of a cage, housing a female *D. r. rufozonatum*. The *D. r. rufozonatum* (ca. 78 cm total length; 160.9 g post-oviposition body mass) was caught from the wild in early May 2010 along hiking trail No. 9 in Dakeng, Taichung County, central western Taiwan. Early in the afternoon of the same day, another five eggs were found in a corner of the cage, and in the evening one more egg was found in a moss-filled container (Fig.2) that had been placed in the cage after eggs were found the second time. In the morning of the 21st of July 2010, a final egg was found in the moss-filled container.

No egg dimension measurements were taken, but the egg masses were recorded, and ranged from 4.5 to 5.5 g, with a mean of 4.86 g (SD = 0.3). By using the formula, (the total clutch weight / the maternal post-oviposition weight) X 100 (Shine, 1980), the relative clutch mass was calculated to be 27.16%. All the eggs were placed inside an incubator, but after a few days had a very foul odor and had to be discarded.

As stated by Pope (1929), the reproductive biology of *D. rufozonatum* appears to be poorly studied. There have been some reference to clutch sizes of this species (Table 1), but very few egg dimensions or relative clutch



Figure 1. The Asian king snake (*Dinodon rufozonatum rufozonatum*) is a very common snake species in Taiwan, and is usually associated with habitats in the vicinity of water (photographed by G. Norval).

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Figure 2. The *Dinodon rufozonatum rufozonatum* with an egg in the moss-filled container (top), and all the eggs laid on the 18th of July 2010 (bottom) (photographed by S. Dieckmann).

mass descriptions were reported on by the authors. Pope (1929,1935) reported two clutches, both consisting of

Table 1. Reported clutch size descriptions for *Dinodon rufozonatum*. 1. The locality from which the snake came is not known, so it is not possible to determine the subspecies. 2. Is believed to be *Dinodon rufozonatum rufozonatum* due to the locality from which the snake came.

Species	Clutch size	Relative clutch mass (%)	Reference
<i>Dinodon rufozonatum</i> ¹	9	Not stated	David, 1989
<i>Dinodon rufozonatum</i> ¹	2*	Not stated	David, 1989
<i>Dinodon rufozonatum</i> ¹	6	Not stated	David, 1989
<i>Dinodon rufozonatum</i> ¹	5	Not stated	David, 1989
<i>Dinodon rufozonatum</i> ²	6–12	Not stated	Lue, Tu and Shang, 2002
<i>Dinodon rufozonatum</i> ²	11	Not stated	Pope, 1929
<i>Dinodon rufozonatum</i> ²	11**	Not stated	Pope, 1929
<i>Dinodon rufozonatum</i> ²	ca. 8	Not stated	Tu, 2004
<i>Dinodon r. rufozonatum</i>	ca. 10	Not stated	Goris and Maeda, 1997
<i>Dinodon r. rufozonatum</i>	9	27.16	This study
<i>Dinodon r. rufozonatum</i>	6–7	Not stated	Goris and Maeda, 1997
<i>Dinodon rufozonatum walli</i>	3	36.1	Ota and Azuma, 2006
<i>Dinodon rufozonatum walli</i>	2	26	Ota and Azuma, 2006

* – some of the eggs were consumed by an occupant of the cage, so the clutch size is incomplete. ** – three of the eggs were poorly developed.

11 eggs, and described the dimensions of one egg as 15 X 13 mm. Although no measurements were taken, the eggs described here in visually do not correspond with that dimension (Fig.2). Instead, they closer resemble the eggs (mean length = 45.3 mm; mean width = 13.3 mm; mean mass = 4.91 g), and relative clutch mass (26%) of the second clutch of *Dinodon rufozonatum walli*, described by Ota and Azuma (2006), although the number of eggs ($n = 2$) is much fewer than the number described here in (Table 1).

Evidently, the reproductive biology of *D. r. rufozonatum* in Taiwan, and very likely other areas as well, deserves further empirical study. To our knowledge this is the first reported *D. r. rufozonatum* relative clutch mass description from Taiwan.

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References

David, P. (1989): *Dinodon rufozonatum* (Annulated Chinese wolf snake). Bull. Soc. Herp. Fr. **52**: 74 (in French).

Goris, R.C., Maeda, N. (1997): Guide to the amphibians and reptiles of Japan. Florida: (Krieger Publishing Company). 285 pp.

Kharin, V.E., Akulenko, M.V. (1998): Rare and little-known snakes of north-eastern Eurasia. 1. A new record of *Hierophis spinalis* (Colubridae) from Russian Far East. Modern Herpetol. **8**: 160–169 (in Russian).

Kuntz, R.E. (1963): Snakes of Taiwan. Quarterly J. Taiwan Mus. **16**: 11–12.

Lue, K.Y., Tu, M.C., Shang, G.S. (2002): The Changing World — Guidebook of Amphibians and Reptiles of Taiwan. Taipei: SWAN. 347 pp. (In Chinese)

Maslov, D.A., Kotlobay, A.A. (1998): *Dinodon rufozonatum* (Red Banded Snake). Herpetol. Rev. **29**: 111–112.

Ota, H., Azuma, M. (2006): Reproduction of the two endemic lycopontines of the southern Ryukyus in captivity (Reptilia: Colubridae). Akamata. **17**: 5–8. (in Japanese)

Pope, C.H. (1929): Notes on reptiles from Fukien and other Chinese provinces. Bull. Amer. Mus. Nat. Hist. **58**: 335–487.

Pope, C.H. (1935): The reptiles of China: turtles, crocodilians, snakes, lizards. Nat. Hist. Cent. Asia. Amer. Mus. Nat. Hist. **10**: 1–604.

Szczerbak, N.N. (2003): Guide to the reptiles of the eastern Palearctic. Florida: Krieger Publishing Company. 260 pp.

Shine, R. (1980): “Costs” of reproduction in reptiles. Oecologia (Berl.). **46**: 92–100.

Tu, M.C. (2004): Big surprise of snakes. Taipei: Yuan-Liou Publishing Co. Ltd. 279 pp. (In Chinese).