

**FIRST RECORD OF *LYCODON CARDAMOMENSIS*
FROM THAILAND, WITH A KEY TO THAI LYCODON
(SERPENTES: COLUBRIDAE)**

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ABSTRACT

Lycodon cardamomensis, a species up to now known only from its holotype, a juvenile male from southwestern Cambodia, is here added to the Thai herpetofauna on the basis of three adult specimens of both sexes from Khao Soi Dao Tai and Makok Waterfall, Chanthaburi Province, southeastern Thailand. The Thai specimens are described and compared to the holotype, and the first data on intraspecific variation and on behavior and diet in captivity are provided. This species is briefly compared with other species of the genus, and an identification key to the seven species currently known from Thailand is provided.

Key words: Chanthaburi, Colubridae, *Lycodon cardamomensis*, Khao Sabab, Khao Soi Dao, Thailand

INTRODUCTION

The mountainous area of Khao Soi Dao in Chanthaburi Province, southeastern Thailand, has proved to be very rich in terms of diversity and endemism. For instance, it is the place where the holotype of the recently described *Cnemaspis chanthaburiensis* Bauer & Das, 1998 was collected. The snake *Gongylosoma baliodeirum cochranae* (TAYLOR, 1962) is still known only by its holotype from Khao Soi Dao (COX, 1991: 207). CHAN-ARD ET AL. (1999) illustrated 15 reptile species from this mountain range, including “*Trimeresurus* sp.”, subsequently identified as *Trimeresurus vogeli* David, Vidal & Pauwels, 2001. Khao Soi Dao is also home to numerous amphibian species (four from this locality were illustrated by CHAN-ARD ET AL., 1999), including the near-endemic frog *Paa fasciculispina* (Inger, 1970) (BRINGSØE, 2002). SODERBERG (1967) listed a few amphibians

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and a reptile (*Physignathus cocincinus* Cuvier, 1829) from the mountain, etc. During herpetological reconnaissances in 2002 in order to obtain additional information on the biodiversity of that area, two of us (TC and MS) collected a *Lycodon* species which proved to be different from all six *Lycodon* currently recorded from Thailand, but similar to a species described the same year on the basis of a juvenile specimen from Cambodia near the border with Thailand. We thus provide hereafter a detailed description of the second to fourth known *Lycodon cardamomensis* Daltry & Wüster, 2002, the first adults, the first female, and the first specimens recorded from Thailand, accompanied by the first data on its diet and behavior in captivity.

MATERIALS AND METHODS

The Thai specimens were preserved in 70% ethanol, and are kept at the Thai Natural History Museum, Technopolis, Pathumthani, Thailand (THNHM), and at the Department of Recent Vertebrates, Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (IRSNB). Ventral scales were counted after the method of DOWLING (1951). Symmetric head scale counts are given left/right.

Abbreviations: poO: postocular scales; pV: preventrals (i.e. first ventral scales wider than long but not contacting the first dorsal row); SC: subcaudal scales, terminal point excluded; SVL: snout-vent length; TaL: tail length; TL: total length; TaL/TL: ratio tail length / total length; Ven: ventral scale(s).

RESULTS

New Localities

The Thai specimens were found at Khao Soi Dao Tai (IRSNB 16549; March 7, 2002; leg. M. Sumontha), Soi Dao Wildlife Sanctuary, Soi Dao District, and at Makok Waterfall, Phriew Waterfall National Park (formerly Khao Sabab National Park), Khlung District (THNHM 1463–64 [field numbers 4365–66]; April 9, 2002; leg. T. Chan-ard), both localities being situated in Chanthaburi Province, Southeast Thailand. These new localities are situated about 100 km westwards from the type locality of *Lycodon cardamomensis* in southwestern Cambodia (Phnom Samkos Wildlife Sanctuary, Cardamom Mountains, Pursat Province, 12°25'N; 103°02'E).

Description of the Thai Specimens

Data of the IRSNB specimen are given first, followed, if they differ, by the data for THNHM 1463 between square brackets. Only a few data could be noted on the specimen THNHM 1464, which is in a poor state of preservation. These data are given below and in Table 1.

Sex: adult female (verified by tail dissection) [adult male (hemipenes everted)]. **Habitus:** Body elongate, subcylindrical (flat below: Ven and SC keeled). Head distinct from neck, markedly flattened. SVL: 436 [709] mm. TaL: 109 [187] mm. Eye moderate with vertically

elliptic pupil. **Body scalation:** 3 pV + 223 Ven [1 pV + 222 Ven]. Anal single. 92 SC, divided. Dorsal scales in 19-17-15 rows; two apical pits per dorsal, but absent on the first row. Vertebral, paravertebral rows and the adjacent dorsal row keeled with keels more visible on the posterior part of the body; all other rows very feebly keeled and the two lowest totally smooth. Scale row reduction from 19 to 17 by fusion of rows 3 and 4 at the level of ventrals 15 [9] at left and 23 [10] at right side; reduction from 17 to 15 by fusion of rows 2 and 3 at Ven 150 [3 and 4 at Ven 141] at left, and fusion of rows 3 and 4 at Ven 148 [2 and 3 at Ven 141] at right side. **Head scalation:** 8/8 supralabials, of which 3rd to 5th enter the orbit on each side; 1/1 preocular; 1/1 loreal; 3/2 [2/2] poO; 1/1 supraocular; 2+3/2+3 temporals; 10/10 infralabials, 5/5 first contacting the anterior chin shields (the 5th contacting only by a point); two pairs of chin shields. No contact between loreal and eye (separated by 3rd supralabial-preocular contact) [loreal reaching the eye by a single point]. Prefrontals about twice as long as internasals. **Coloration in life:** See figure 1. Dorsal surface of body and tail black, with 13 pinkish-orange bands across the body (excluding the nuchal collar) and six across the tail. Median part of these bands speckled with dark brown. Belly whitish with central black specks increasing in density posteriorly, giving a black posterior ventral color, but less at the places where the dorsal rings join the belly. **Coloration in alcohol:** See figure 2. Identical to color in life, except that all pink color disappeared, and faded to a whitish color, identical on dorsal rings and on the venter.

The third adult, unsexed, specimen THNHM 1464, is in such a poor state of preservation that it allowed to record only its ventral and subcaudal numbers (see Table 1). Its anal scale is single. Its midbody scale row number is 17, reduced to 15 before vent. Its coloration is similar to that of the above mentioned specimens. It was collected together with THNHM 1463; its habitus, coloration, pattern and available meristic data leave no doubt on their conspecificity.

Biological Notes

All three Thai specimens were collected by night on tree trunks in the forest, and they were obviously excellent climbers. IRSNB 16549 was kept captive in Bangkok in a spacious terrarium with climbing facilities and a water recipient from March 7 to May 17, 2002. During this period, it shed its skin three times (on March 18, April 13 and May 10); i.e., at regular intervals of about 25 days. The last shedding was fully observed and began at about 2300 h. The two days preceding each shedding, it spent much time immersed in the water recipient. Within these ten weeks it ate in total 5 adult and 1 juvenile *Cosymbotus platyurus* (SCHNEIDER, 1792), 2 adult *Hemidactylus frenatus* Duméril & Bibron, 1836 (Gekkonidae), and 2 adult *Riopa bowringii* (GÜNTHER, 1864) (Scincidae): i.e., a mean of one lizard per week, although it had been proposed more. The last three prey items (1 adult *C. platyurus* on May 4, another on May 11 and a juvenile on May 14) were offered freshly killed but were readily accepted. Live juvenile *Hoplobatrachus tigerinus* (DAUDIN, 1802) (Anura: Ranidae) were several times presented in the terrarium, but did not seem to have raised any interest. The snake ate prey items in day or night time, but was mainly active at night. It was not aggressive, and did not bite if gently handled, but bit repeatedly when roughly handled. When excited and ready to bite, it shook its tail very quickly.

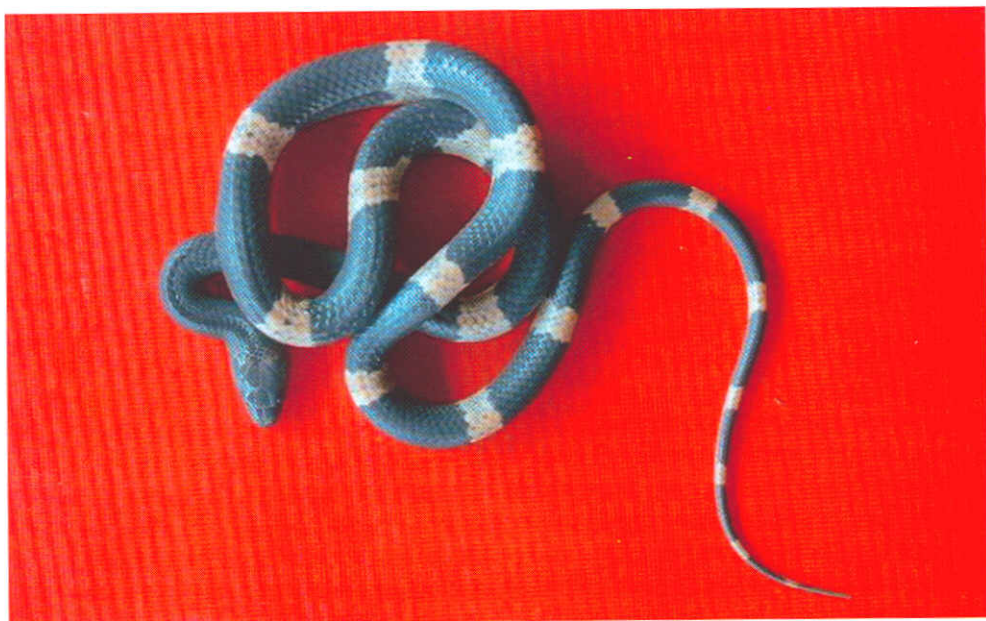


Figure 1. Dorsal view of *Lycodon cardamomensis* (IRSNB 16549) in life. Photography by V. Aranjelovic and O.S.G. Pauwels.



Figure 2. Dorsal view of the holotype of *Lycodon cardamomensis* (right) from Cambodia and IRSNB 16549 from Thailand. Note the change of colouration due to preservation (compare with Fig. 1). Photography by O.S.G. Pauwels.

DISCUSSION

By the combination of the following characters: weakly keeled dorsals in 19-17-15 rows, 13 and 6 pinkish-orange bands across the body and tail respectively, one preocular and one loreal, 2 or 3 poO and 2 anterior temporals, our Thai specimens are easily distinguished from the other congeneric Thai species (*L. butleri* Boulenger, 1900, *L. capucinus* Boie, 1827, *L. effraenis* Cantor, 1847, *L. fasciatus* (Anderson, 1879), *L. laoensis* Günther, 1864 and *L. subcinctus* Boie, 1827) and other *Lycodon* (see Table 1 in DALTRY & WÜSTER, 2002). In several characters, notably a single (vs. divided) anal scale, higher numbers of Ven and SC and the colour pattern, etc., they differ from the recently described *L. zawi* from India and Myanmar (SLOWINSKI *ET AL.*, 2001). Our Thai specimens show only minor differences in scalation (see Table 1), color and pattern with the holotype of *L. cardamomensis*, but many traits are identical or similar: ratio TaL/TL, 19-17-15 dorsal scale rows, two apical pits per dorsal (no apical pits on the first dorsal scale row) (that character was not specified in the original description, but later noted by WÜSTER, pers. comm., 2 Dec. 2002; and pers. obs.), keeled Ven and keeled divided SC (although it is not indicated in the original description, the holotype has keeled SC: WÜSTER, pers. comm., 2 Dec. 2002, and pers. obs.), single anal scale, 8/8 supralabials of which 3rd to 5th contact the eye, 1/1 preocular scale, 1/1 loreal, two anterior temporals, 10/10 infralabials with 5 first contacting first pair of chin shields, and so on.

Table 1. Comparison between the Cambodian and the Thai *Lycodon cardamomensis*.

Collection number	Sex	SVL (mm)	TaL (mm)	Ratio TaL/TL	pV + Ven	SC	PoO
BMNH 2000.70 (holotype)	Male	252	64	0.25	1 + 215	93	3/3
IRSNB 16549	Female	436	109	0.25	3 + 223	92	3/2
THNHM 1463	Male	709	187	0.27	1 + 222	92	2/2
THNHM 1464	?	?	?	?	1 + 222	86	?

DALTRY & WÜSTER (2002) noted that the scale row reduction from 19 to 17 occurred more posteriorly in *L. cardamomensis* than in *Dinodon septentrionalis* (at the level of ventrals 12/13 vs. 3-7); it occurs also more posteriorly in our Thai specimens (15/23, 9/10). The Cambodian and Thai specimens show comparable sites for the reduction from 17 to 15 rows (respectively at the level of Ven 140/140, 150/148 and 141/141). On our Thai specimens, keels are present on the five uppermost scale rows, and even very weakly on the lowest (adjacent to the paravertebral row); the Cambodian one is slightly more keeled, since keels are present on the nine median rows. In all specimens, keels are more visible posteriorly. Color patterns are identical; the venter of the Thai, adult, specimens being more speckled with black. The Thai specimens have 13 light bands on body, *contra* 12 in the holotype; all specimens have 6 bands on the tail. The Thai specimens have

pinkish-orange body and tail dorsal bands while the juvenile holotype was described as having white bands in life. Nevertheless, we regard those differences as acceptable within an intraspecific variation. DALTRY & WÜSTER (2002) indicated that the closest species is *Lycodon ruhstrati* (FISCHER, 1886), but that *L. cardamomensis* differs from it by having 3 poO (*contra* 2 in *L. ruhstrati*) and many less bands on body and tail (12 dorsal and 6 tail bands in the holotype of *L. cardamomensis*, *contra* at least 22 dorsal and at least 11 tail bands in *L. ruhstrati*). POPE (1935: 192) noted that in *L. ruhstrati* the dorsal bands can number from 22 to 36, and the tail bands from 12 to 17. DALTRY & WÜSTER (2002) insisted on the important geographical separation between both taxa, *L. ruhstrati* being known from southern China, Taiwan and the Ryukyu Islands (southern Japan). It seems clear that the number of poO does not distinguish *L. cardamomensis* from *L. ruhstrati*, but the difference in the number of bands being very striking, and their number being apparently constantly low in *L. cardamomensis*, we regard *L. cardamomensis* and *L. ruhstrati* as separate, although closely related, species.

With the addition of *L. cardamomensis* to the fauna, *Lycodon* species in Thailand can be identified as follows:

1. Loreal and preocular scales both present 3
 Either the loreal or the preocular absent 2
2. Preocular absent, both prefrontal and loreal scales in contact with eye, anal divided *L. subcinctus*
 Loreal absent, prefrontal in contact with the 2nd and 3rd supralabials, anal entire; Southern Thailand
 *L. effraenis*
3. Anal divided 4
 Anal single 5
4. Anterior chin-shields not more than 1.5 times longer than posterior ones; loreal in extensive contact with internasal, when adult no crossbands on body *L. capucinus*
 Anterior chin-shields 2 to 3 times longer than posterior ones; loreal not or in short contact with internasal (very rarely an extensive contact); yellow crossbands on forepart of body in adults *L. laoensis*
5. Loreal entering the orbit, more than 20 light bands on body 6
 Loreal excluded from orbit or punctually in contact, 12 to 13 light bands on body; Eastern Thailand
 *L. cardamomensis*
6. One anterior temporal scale southern Thailand *L. butleri*
 Two anterior temporal scales *L. fasciatus*

CONCLUSIONS

The major herpetological interest of Khao Soi Dao and Chanthaburi Province is still reinforced by the presence of the near-endemic *L. cardamomensis*. Southeast Thailand endemics such as *Cnemaspis chanthaburiensis*, *Cyrtodactylus sumonthai* Bauer, Pauwels & Chanhome, 2002, *Gongylosoma baliodeirum cochranæ* and the records of *L. cardamomensis* both on Khao Soi Dao in Thailand and the Cardamoms in Cambodia, are additional clues for hypothesizing that highlands in the area could have constituted refuges

for evergreen forest and its species during the glaciation periods of the Pleistocene (see BAUER & DAS, 1998). DALTRY & WÜSTER (2002) expressed some concerns regarding the future of their new species, which was then only known from the sole type locality in an area threatened by logging activities. Its discovery in two protected areas in Thailand is thus, at a conservation point of view, an excellent news. It is also indicative that much herpetological work remains to be done in the area before a complete regional list of taxa can be established. The Thai ophiofauna, taking into account eight recent new snake records since 2000 (the additions of *Amphiesma bitaeniatum* by DAVID & PAUWELS, 2000, and *A. khasiense* by CHANHOME ET AL., 2001, *Macrocalamus lateralis* by CHAN-ARD ET AL., 2002, *Xenochrophis punctulatus* by PAUWELS ET AL., 2002, and the descriptions of *Typhlops roxanae* Wallach, 2001, *Oligodon jintakunei* Pauwels, Wallach, David & Chanhome, 2002, *Trimeresurus fucatus* Vogel, David & Pauwels, 2004, *Trimeresurus gumprechtii* David, Vogel, Pauwels & Vidal, 2002 and *Trimeresurus vogeli* David, Vidal & Pauwels, 2001, cf the most recent list provided by DAVID ET AL., 2004), presently includes 187 taxa, terrestrial, freshwater and marine taxa altogether. *Lycodon cardamomensis* is thus the 188th.

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REFERENCES

- BAUER, A. M., AND I. DAS. 1998. New Species of *Cnemaspis* (Reptilia: Gekkonidae) from Southeastern Thailand. *Copeia* 1998(2): 439–444.
- BAUER, A. M., O. S. G. PAUWELS, AND L. CHANHOME. 2002. A new species of cave-dwelling *Cyrtodactylus* (Squamata: Gekkonidae) from Thailand. *Nat. Hist. J. Chulalongkorn Univ.* 2(2): 19–29.
- BRINGSØE, H. 2002. Herpetologische Beobachtungen im Khao Soi Dao, Ost-Thailand. 1. Der Stachelbrust-Riesenfrosch, *Paa fasciculispina* (Inger, 1970). *Sauria* 24(1): 9–16.
- CHAN-ARD, T., W. GROSSMANN, A. GUMPRECHT, AND K.-D. SCHULZ. 1999. *Amphibians and Reptiles of Peninsular Malaysia and Thailand. An illustrated checklist. Amphibien und Reptilien der Halbinsel Malaysia und Thailand. Eine illustrierte Checkliste.* Bushmaster Publ., Wuerselen: 1–240.
- CHAN-ARD, T., S. THONG-AREE, AND Y. CHUAYNKERN. 2002. Diversity study on Amphibians and Reptiles in Hala-Bala Wildlife Sanctuary, Yala and Narathiwat Provinces. Unpublished report to BRT. Pathum Thani, National Science Museum and Bangkok, Royal Forest Department: 118 pp. (in Thai).
- CHANHOME, L., O. S. G. PAUWELS, P. JINTAKUNE, AND P. DAVID. 2001. Catalogue of the Herpetological Collection of the Queen Saovabha Memorial Institute, Thai Red Cross Society, Bangkok. Part I. Snakes (except Elapidae and Viperidae). *Bull. Maryland Herpetol. Soc.* 37(2): 49–72.

- COX, M. J. 1991. *The Snakes of Thailand and their Husbandry*. Krieger Publ. Co., Malabar, Florida: i-xxxviii + 526 pp.
- DALTRY, J. C., AND W. WÜSTER. 2002. A new species of Wolf Snake (Serpentes: Colubridae: *Lycodon*) from the Cardamom Mountains, southwestern Cambodia. *Herpetologica* 58(4): 498–504.
- DAVID, P., M. J. COX, O. S. G. PAUWELS, L. CHANHOME, AND K. THIRAKHUPT. 2004. When a bookreview is not sufficient to say all: an in-depth analysis of a recent book on the snakes of Thailand, with an updated checklist of the snakes of the Kingdom. *Nat. Hist. J. Chulalongkorn Univ.* 4(1): 47–80.
- DAVID, P., AND O. S. G. PAUWELS. 2000. Book review. T. Chan-ard, W. Grossmann, A. Gumprecht & K.-D. Schulz. *Amphibians and Reptiles of Peninsular Malaysia and Thailand. An illustrated checklist. – Amphibien und Reptilien der Halbinsel Malaysia und Thailand. Eine illustrierte Checkliste. Russian J. Herpetol.* 7(1): 87–90.
- DOWLING, H. G. 1951. A proposed standard system of counting ventrals in snakes. *Brit. J. Herpetol.* 1: 97–99.
- PAUWELS, O. S. G., P. DAVID, W. NUTPHAND, AND C. CHIMSUNHART. 2001. First record of *Xenochrophis punctulatus* (Günther, 1858) (Serpentes: Colubridae: Natricinae) from Thailand. *Hamadryad* 26(2): 259–264.
- POPE, C. H. 1935. *The reptiles of China. Turtles, Crocodilians, Snakes, Lizards*. New York, American Museum of Natural History, Natural History of Central Asia, No. 10.
- SLOWINSKI, J. B., S. S. PAWAR, HTUN WIN, THIN THIN, SAI WANNA GYI, SAN LWIN OO, AND HLA TUN. 2001. A new *Lycodon* (Serpentes: Colubridae) from Northeast India and Myanmar (Burma). *Proc. California Acad. Sci.* 52(20): 397–405.
- SODERBERG, P. 1967. Notes on a collection of herpetological specimens recently donated to the Centre for Thai National Reference Collections. *Nat. Hist. Bull. Siam Soc.* 22(1–2): 151–166.