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**A New *Lycodon* (Serpentes: Colubridae) from Northeast India
and Myanmar (Burma)**

by

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A new species of the colubrid snake genus *Lycodon* is described from western Myanmar and Northeast India. Morphologically, the new species is most similar to *L. laoensis*, but is distinguishable from it by its brownish black and white dorsal coloration (vs. brownish black and yellow in *L. laoensis*) and the absence of a well-developed nape band (present in *L. laoensis*). The new species increases the diversity of *Lycodon* to four in Myanmar and to five in Northeast India.

Lycodon H. Boie in Fitzinger (1826) is a genus of small colubrid snakes characterized by an arched maxillary generally with three sets of teeth separated by two diastemata, a dorsoventrally compressed head, and a vertically elliptical pupil (Smith 1943; Taylor 1965; Leviton 1965). Approximately 25 species occur in Asia (Lanza 1999). Recently, herpetofaunal surveys in Myanmar and Northeast India (by Slowinski, Htun Win, Thin Thin, Sai Wanna Gyi, San Lwin Oo, and Hla Tun in Myanmar; Pawar in Northeast India) yielded specimens of *Lycodon* from western Myanmar and Northeast India that represent a new species. Four other species, viz., *L. aulicus/capucinus*, *L. fasciatus*, *L. kundui*, *L. laoensis*, and *L. jara*, occur in Myanmar and Northeast India (Smith 1943; Dowling and Jenner 1988).

All specimens were hand collected, euthanized, fixed in 10% buffered formalin and later transferred to 70% ethanol. Comparative material was examined at the CAS (California Academy of Sciences), BMNH (Bombay Museum of Natural History), and ZSI (Zoological Survey of India). In addition, information was collected from private collections in India and field stations in various protected areas in Northeast India.

¹ Dr. Joseph Slowinski died in Myanmar on September 12, 2001, while leading a biological expedition to the extreme northeast of that country. He will be deeply missed by his academic colleagues, his students and friends, and by his many co-workers in Myanmar.

SPECIES DESCRIPTION

Lycodon zawi sp. nov.

Zaw's wolf snake

MATERIAL EXAMINED. — HOLOTYPE: CAS 210323 (Fig. 1), a male from Alaungdaw Katapha National Park (AKNP) (22°19'N, 94°29'E), Sagaing Division, Myanmar, collected 17 July, 1999, by Htun Win, Thin Thin, K. Wiseman, J. Lovette, and J. Vindum. PARATYPES: CAS 210223, a male from AKNP (22°19'N, 94°24'E), Sagaing Division, Myanmar, collected 10 July, 1999, by J. Slowinski, K. Wiseman, J. Lovette, and J. Vindum; CAS 215494, a male from AKNP (22°19'N, 94°24'E), Sagaing Division, Myanmar, collected 30 May, 2000, by Htun Win, Thin Thin, San Lwin Oo, Sai Wanna Gyi, and Hla Tun; CAS 215570, a male from AKNP (22°19'N, 94°29'E), Sagaing Division, Myanmar, collected 12 June, 2000, by Htun Win, Thin Thin, and San Lwin Oo; CAS 215599, a male from AKNP (22°19'N, 94°29'E), Sagaing Division, Myanmar, collected 14 June, 2000, by Htun Win, Thin Thin, and San Lwin Oo; CAS 216505, a male from the Gwa Township (17°39'N, 94°39'E), Rakhine State, Myanmar, collected 29 November, 2000, by J. Slowinski, Htun Win, and Hla Tun. ZSI 25346, a male from Ngengpui Wildlife Sanctuary (NgWS; 22°29'N, 92°48'E), Mizoram, Northeast India, collected 17 April, 1999, by S. Pawar; ZSI 25347, a male from Nongkhylliem Wildlife Sanctuary (NWS; 25°56'N, 91°31'E), Meghalaya, Northeast India, collected 8 May, 2000, by M. F. Ahmed; ZSI 25348, a female from Garbhanga Reserve Forest (GRF; 26°09'N, 91°33'E), Assam, Northeast India, collected 30 March, 1998, by S. Sengupta. ADDITIONAL SPECIMENS: Two more specimens, a male near Kaifung (23°39'N, 92°57'E), North Mizoram, Northeast India, and another male from Balphakram Tiger Reserve (BTR; 25°30'N, 90°45'E), Meghalaya, Northeast India, not housed in a permanent depository.

DIAGNOSIS. — *Lycodon zawi* differs from other *Lycodon* of the Asian mainland by the following combination of character states: 17 dorsal scale rows at mid-body, preocular scale present (Fig. 1), loreal scale not in contact with internasal (Fig. 1), anal scale divided, poorly-developed white crossbands on a brownish black dorsum, and without a well-developed nape band (Fig. 1). In terms of scale characteristics, *L. zawi* is similar to *L. laoensis* (Figs. 2–4), known from Northeast India, China, Malaysia, Thailand, Laos, Vietnam, and Cambodia (Lanza 1999), but differs by its brownish black and white dorsal coloration (brownish black and yellow in *L. laoensis*), the poorly-developed light crossbands (well-developed in *L. laoensis*), and the lack of a nape band. *Lycodon zawi* differs from other Myanmar and Northeast India congeners as follows: from *L. aulicus/capucinus* (Figs. 2–4) in lacking a nape band, in lacking a sharply defined white lip margin, and in having a loreal scale that does not contact the internasal scale; from *L. kundui* in lacking a nape band, having 17 mid-body scale rows (15 in *L. kundui*), and in having 8 or 9 supralabials (7 in *L. kundui*); from *L. fasciatus* (Figs. 2–4) in lacking loreal contact with the eye, in lacking well-developed light crossbands, and in having smooth dorsal scales; from *L. jara* (Figs. 2–3) in having light bands and in having a loreal scale that does not contact the internasal scale. *Lycodon zawi* resembles *L. travancoricus* (Western Ghats and southern Pakistan) and *L. tiwarii* (Andaman and Nicobar Islands; Biswas and Sanyal 1965) in scalation. From *L. travancoricus*, *L. zawi* differs by its divided anal and weakly developed light bands (*L. travancoricus* has well-developed yellow bands which bifurcate on the sides). *Lycodon zawi* differs from *L. tiwarii* in having white bands on a dark dorsum (white reticulations on a dark dorsum in *L. tiwarii*).

DESCRIPTION OF HOLOTYPE (Adult male). — Body dimensions: SVL 395 mm; tail length 85 mm; total length 480 mm. Body scalation: 183 ventrals; 45 subcaudals; 17-17-15 dorsal scale rows. Head scalation: loreal well separated from internasal and from the eye border by the preocular and 3rd supralabial; 8 supralabials, 3rd, 4th, and 5th touching eye; 1 postocular; 2+3 temporals; 9/10 infralabials, 1st to 5th infralabials contacting chin shields.

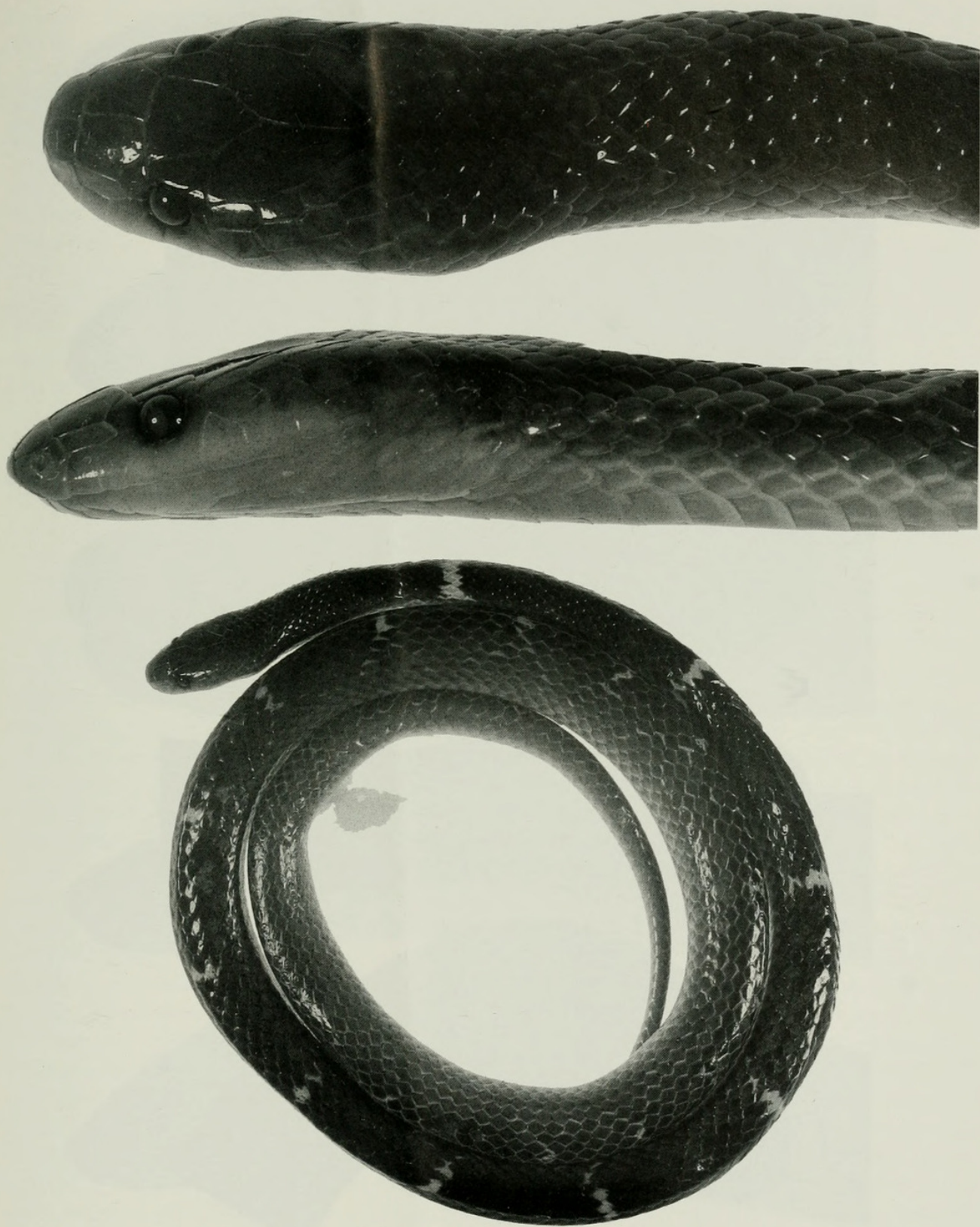


FIGURE 1. The holotype (CAS 210323) of *Lycodon zawi*.

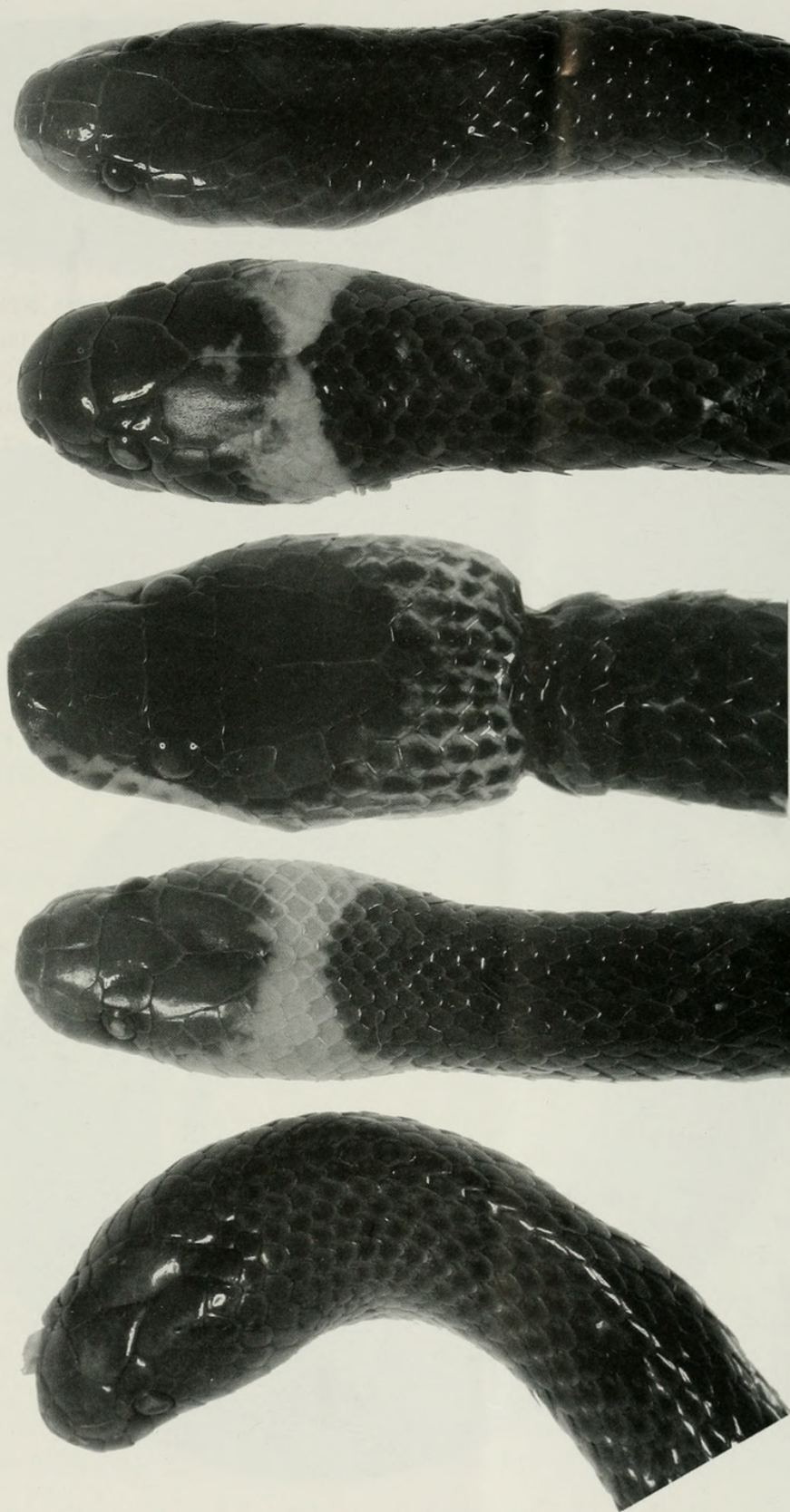


FIGURE 2. Dorsal views of heads of (top to bottom) *Lycodon zawi* (CAS 210323), *Lycodon fasciatus* (CAS 55147) from western China, *L. aulicus* (CAS 216278) from Mandalay Division, Myanmar, *L. laoensis* (CAS 73679) from Thailand, and *L. jara* (CAS 12395) from Assam, India.

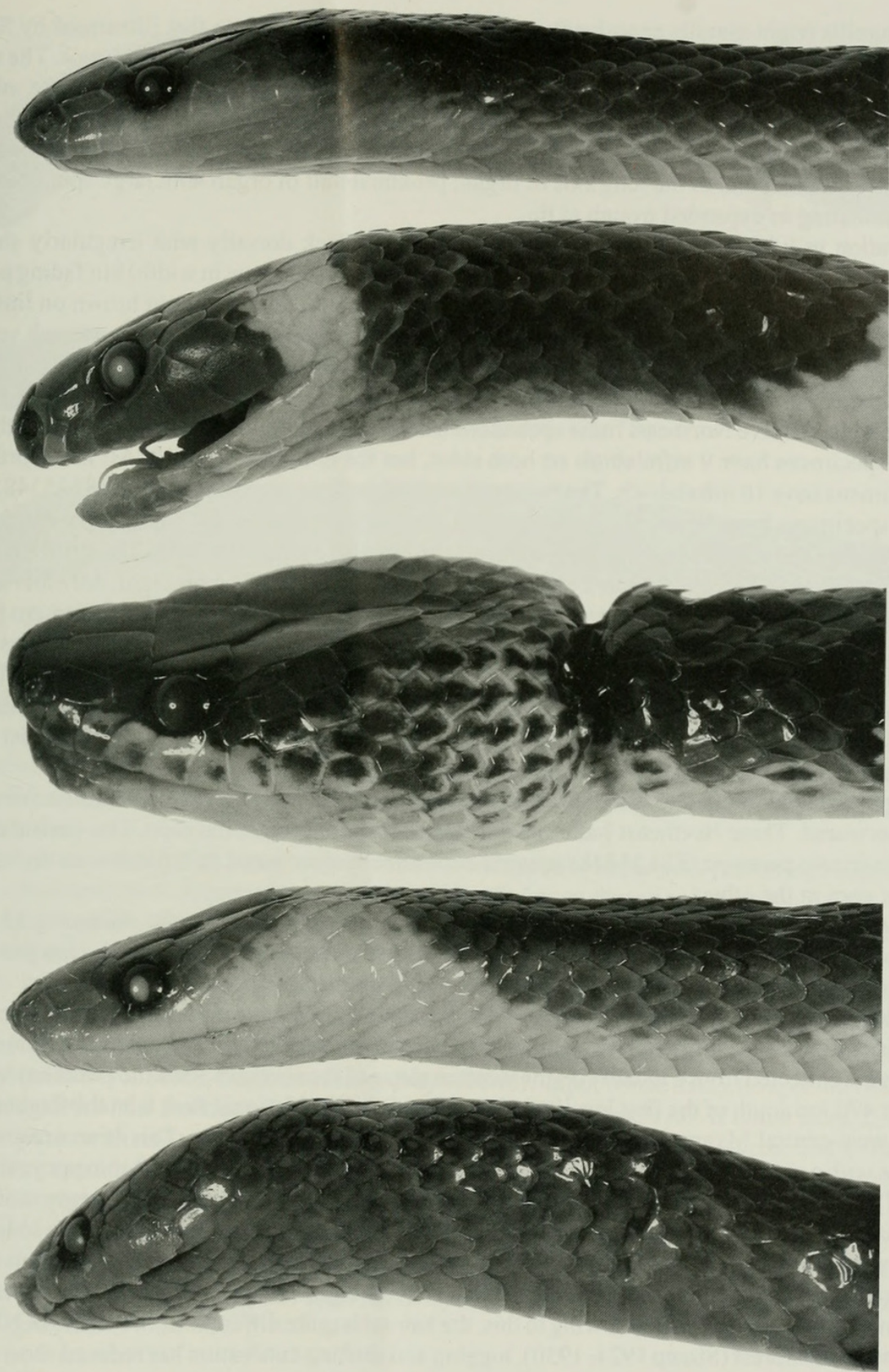


FIGURE 3. Lateral views of heads of (top to bottom; same snakes as in Fig. 2) *Lycodon zawi*, *L. fasciatus*, *L. aulicus*, *L. laoensis*, and *L. jara*.

The maxilla (right maxilla examined) is arched and similar in form to that illustrated by Smith (1943, fig. 88) for *L. aulicus*. Two diastemata separate the maxillary teeth into three groups. The anterior group is composed of three small teeth followed posteriorly by two enlarged teeth; the middle group is composed of five equal teeth; the posterior group is composed of two enlarged teeth.

Everted hemipenis extending to 8th subcaudal; unforked; distal half characterized by longitudinal flounces perpendicular to the long axis of organ; proximal half of organ with large spines; sulcus single, terminating in expanded trough at tip.

Coloration in life (same as in preservative): brownish black dorsally with irregularly shaped white transverse bands, the bands well developed anteriorly (one scale row in width) but fading posteriorly; faint, diffuse light band on nape; head dark brown dorsally, fading to light brown on lips; tail uniform brown dorsally without white bands; venter cream with dark lateral corners on each ventral scale.

VARIATION. — Four of six Myanmar specimens have 8 supralabials on both sides, but two have 9/8 supralabials. All five Northeast India specimens have 9 supralabials on both sides. Five of the six Myanmar specimens have 9 infralabials on both sides, but the holotype has 9/10. All five Northeast India specimens have 10 infralabials. The holotype, a paratype from Northeast India (ZSI 25348), and two other specimens from Northeast India have 2+3 temporals on both sides. Another paratype from Northeast India (ZSI 25347) has 2+3 temporals on the left and 3+4 on the right. The third paratype from Northeast India (ZSI 25346) has 2+1 temporals on the left and 2+2 on the right. All other specimens, from Myanmar, have 1+2+3 temporals. The holotype and two other Myanmar specimens (CAS 210223, 1/1 postocular; CAS 216505, 2/1 postocular) have one postocular; all other specimens have two postoculars. Ventrals in males range from 179 to 186 in the Myanmar specimens and 190 to 194 in the Northeast India specimens; the single female specimen (ZSI 25348) from India has 207 ventrals; subcaudals in males range from 45 to 67 in the Myanmar specimens and 70 to 75 in the Northeast India specimens; the single female from India has an incomplete tail.

The general color pattern is identical in all specimens, except for some white bands on the tail in several specimens. Three Northeast India specimens have a faint spot on the nape. The ventral coloration of the female paratype (ZSI 25348) consists of erratically distributed dark patches on the ventral scales, not seen in the others.

ETYMOLOGY. — The specific name is a patronym in the genitive singular, honoring U Khin Maung Zaw, Director of the Myanmar Nature and Wildlife Conservation Division, who has provided critical assistance to our survey of the herpetofauna of Myanmar.

DISTRIBUTION AND NATURAL HISTORY. — In Myanmar, *Lycodon zawi* is currently known from two localities in the west (Fig. 5): five specimens collected from AKNP in the Sagaing Division, and one specimen collected from a locality on the western slope of the southern Rakhine (Arakan) Mountains, over 470 km south of the first locality. Alaungdaw Katapha National Park is in the Sagaing Division in west-central Myanmar, approximately 160 km west of Mandalay. This is an area of low mountains with a maximum elevation of 1000 m. Rainfall at AKNP averages 1500 mm per year (Tun Nyo 1997), and the park consists of a mosaic of deciduous forest types, from closed canopy moist deciduous forest to indaing, a savanna of stunted dipterocarp trees. The single Rakhine Yoma specimen came from the forests near Gwa in the Rakhine State, approximately 170 km west of Yangon (Rangoon). Rainfall in the southern Rakhine mountains is quite high, averaging over 5000 mm per year (data from Myanmar government). Owing to this, the habitat is quite different from that in AKNP. Originally evergreen forest (Stamp 1924, 1930), logging and shifting cultivation has reduced most of the forest to extensive bamboo stands (Collins et al. 1991).

In Northeast India, *L. zawi* has been collected at five localities (Fig. 5). All localities are in low to mid-elevation hill tracts receiving medium to high precipitation (above 2000 mm per year); all sites harbor, or formerly harbored, low to mid-elevation moist tropical evergreen to semi-evergreen forest. Four of the five localities, viz., NgWS, NWS, BTR, and GRF, are protected. As in Myanmar, habitat

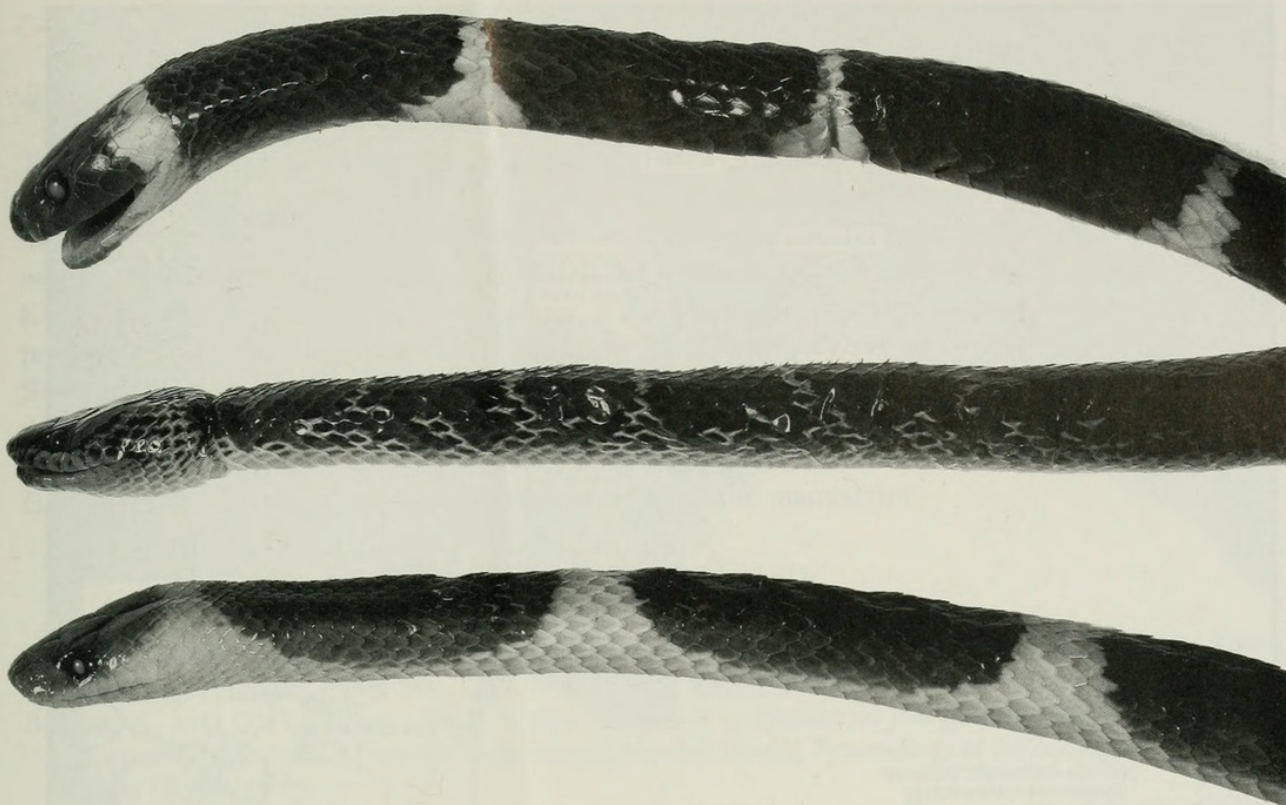


FIGURE 4. Anterior bodies of (top to bottom; same snakes as in Fig. 2) *Lycodon fasciatus*, *L. aulicus*, and *L. laoensis*.

alteration due to slash-and-burn cultivation is a major problem for habitat conservation in Northeast India (Ramakrishnan 1992). In fact, the specimen (ZSI 25346) from NgWS was caught while fleeing a burning slash-and-burn plot near the sanctuary boundary.

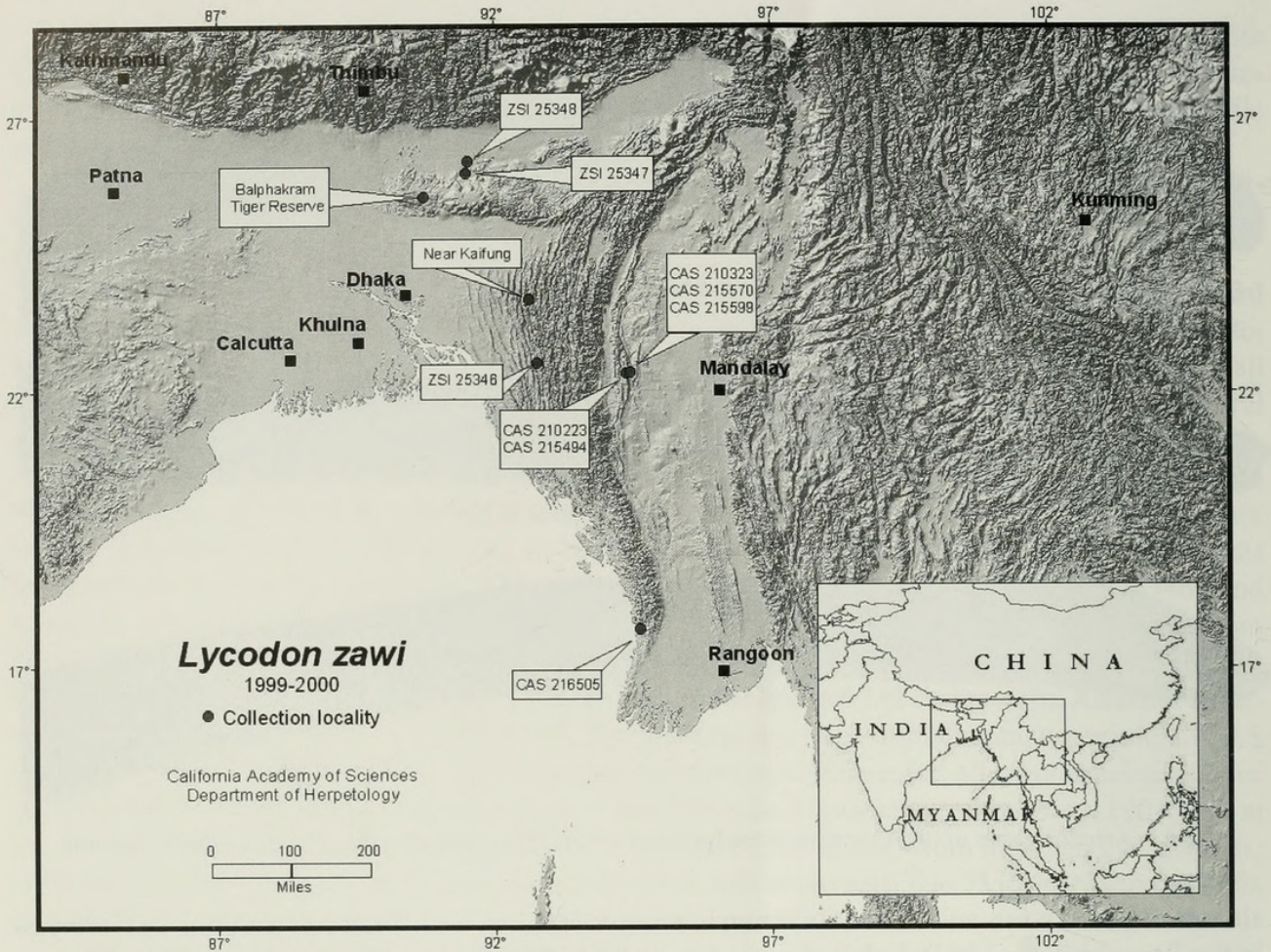
All evidence suggests that *L. zawi* is a nocturnal species, apparently preferring riparian forests. Most specimens were found active at night along streams at elevations less than 500 m. Although there are extensive tracts of bamboo in Northeast India-Myanmar, no specimens were found in bamboo habitats.

In both Myanmar localities, as well as most of the localities in Northeast India, *L. zawi* is sympatric with *L. aulicus* and/or *L. fasciatus*. All localities of *L. zawi* from Northeast India are south of the Brahmaputra river, which is an important biogeographical barrier in that region (Mani 1974; Ripley and Beehler 1990). Despite recent surveys (Pawar, unpublished data), no specimens have been obtained north of the Brahmaputra river, including the eastern Himalayas. If found there, *L. zawi* may be sympatric with as many as three other species of *Lycodon*: *L. jara*, *L. aulicus*, and *L. laoensis*.

Three specimens of *Lycodon zawi* from Myanmar had prey items in their alimentary tracts: CAS 210223 contained the partially digested head of a small skink; CAS 215494 contained the rear torso and tail of a small skink; CAS 215599 contained a hind limb and the tail of a small skink. In each case, the skink appears to be *Sphenomorphus maculatus*, which is common along streams in Myanmar. One specimen (ZSI 25346) kept by Pawar in captivity for 28 days fed on geckos (*Hemidactylus frenatus* and *H. garnoti*).

DISCUSSION

Lycodon zawi seems to be common where it occurs. Its recent discovery is not surprising, because western Myanmar and Northeast India remain very poorly surveyed. Recent surveys of this region by the authors have brought to light new records and species for the region (Slowinski and Wuster 2000;

FIGURE 5. Distribution of *Lycodon zawi* in Myanmar and India.

Pawar and Biswas 2001; Pawar and Choudhury 2000). It is also possible that specimens of this species exist in local museums in India, perhaps misidentified as *L. aulicus* or *L. laoensis*, to which the new species bears superficial resemblance. In general, *L. zawi* is easily differentiated by its combination of morphology and color pattern. It is apparent from the above description that there is some variation both within and between Northeast India and Myanmar samples. The apparent differences between the ventral scale counts of the Myanmar and Northeast India populations suggests geographic differentiation.

ADDITIONAL MATERIAL EXAMINED

Lycodon laoensis.—CAS 73679 (Thailand), CAS-SU 8523 (Penang, Malaysia), CAS 15966 (Kerala, India).

Lycodon aulicus.—CAS 216278 (Mandalay Division, Myanmar), CAS 215387 (Sagaing Division, Myanmar), CAS 215396 (Sagaing Division, Myanmar), CAS 215422 (Sagaing Division, Myanmar).

Lycodon fasciatus.—CAS 55147 (China), CAS 172715 (Chiang Mai Province, Thailand).

Lycodon jara.—CAS 17210 (Orissa, India), CAS-SU 12395 (Assam, India).

Lycodon tiwarii.—ZSI 20849 (no locality available), CAS 20851 (no locality available).

Lycodon travancoricus.—CAS-SU 15967 (Kerala, India).

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