

living rooms of salamander homes, we perhaps had only access to their attics on the stony plots.

QUINN & GRAVES (1999) reported that in northern Michigan groups of *P. cinereus* were found in high quality habitat (without giving details on group size or sex composition) and that under identical laboratory conditions salamanders from Michigan displayed an aggregated spatial distribution, in contrast to conspecifics from Virginia, who formed a uniform distribution. They speculated that differences in availability of cover objects and food, and perhaps also predation pressure, might cause this geographical variation in territoriality. While our results highlight the difficulties of studying the social behaviour of animals that spend much of their lives underground, they suggest that variation in spatial organization of salamander populations – in response to habitat structure – does occur at a much smaller geographical scale than discussed by QUINN & GRAVES (1999).

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**REFERENCES:** GILLETTE, J. R. & JAEGER, R. G. & PETERSON, M. E. (2000): Social monogamy in a territorial salamander.- *Animal Behaviour*, Amsterdam; 59: 1241-1250. JAEGER, R. G. & PETERSON, M. E. & GILLETTE, J. R. (2000): A model of alternative mating strategies in the redback salamander, *Plethodon cinereus*; pp. 441-450. In: BRUCE, R. C. & JAEGER, R. G. & HOUCK, L. D. (Eds.): *The biology of plethodontid salamanders*; New York (Kluwer Academic/Plenum Publishers). JAEGER, R. G. & PETERSON, M. E. & GOLLMANN, G. & GOLLMANN, B. & TOWNSEND, V. R. Jr., (2001): Salamander social strategies: living together in female-male pairs.- *J. Herpetol.*, St. Louis; 35: 335-338. JAEGER, R. G. & WICKNICK, J. A. & GRIFFIS, M. A. & ANTHONY, C. A. (1995): Socioecology of a terrestrial salamander: juveniles enter adult territories during stressful foraging periods.- *Ecology*, Washington, D. C.; 76: 533-543. LANG, C. D. & JAEGER, R. G. (2000): Defense of territories by male-female pairs in the redback salamander (*Plethodon cinereus*).- *Copeia*, Lawrence; 2000: 169-177. MATHIS, A. (1991): Territories of male and female terrestrial salamanders: costs, benefits, and intersexual spatial associations.- *Oecologia*, Berlin; 86: 433-440. MATHIS, A. & JAEGER, R. G. & KEEN, W. H. & DUCEY, P. K. & WALLS, S. C. & BUCHANAN, B. W. (1995): Aggression and territoriality by salamanders and a comparison with the territorial behaviour of frogs; pp. 633-676. In: HEATWOLE, H. & SULLIVAN, B. K. (Eds.): *Amphibian biology*; vol. 2:

Social behaviour; Chipping Norton, New South Wales, Australia (Surrey Beatty and Sons). PETRANKA, J. W. (1998): *Salamanders of the United States and Canada*. Washington and London (Smithsonian Institution Press), pp. xvi+587. QUINN, V. S. & GRAVES, B. M. (1999): Space use in response to conspecifics by the redback salamander (*Plethodon cinereus*, Plethodontidae, Caudata).- *Ethology*, Berlin; 105: 993-1002. SAYLER, A. (1966): The reproductive ecology of the redback salamander, *Plethodon cinereus*, in Maryland.- *Copeia*, Lawrence; 1966: 183-193.

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### *Bungarus sindanus* BOULENGER, 1897, an addition to the venomous snake fauna of Afghanistan

The Sind Krait, *Bungarus sindanus*, was described by BOULENGER (1897) based on three specimens from Umarnot and Sukkur (Sind, Pakistan). Because of its great superficial similarity to the Common Krait, *Bungarus caeruleus* SCHNEIDER, 1801, its occurrence within the wide range of the latter, and despite having 17 rather than 15 dorsal scale rows, this taxon was long regarded as a subspecies, or the name as a junior synonym, and its representatives as rare individual mutations of *B. caeruleus* (e.g., WALL 1913, 1919; SMITH 1943; MINTON 1962, 1966; MERTENS 1969).

KHAN (1984) rediscovered and revaluated *B. sindanus* and recognized three populations of kraits with 17 dorsal scale rows on the Indian subcontinent: a Cholistan-Rajasthan Desert population (*sindanus* s. str.), a Gangetic population (*Bungarus walli* WALL, 1907, referred by KHAN [1984] to the synonymy of *sindanus*), and a population in the northwestern highlands of Pakistan. Later, KHAN (1985) resurrected *walli* as a subspecies of *B. sindanus* and described the northwestern highland population as a new subspecies, *B. sindanus razai*. The holotype and the two paratypes of this form were collected near Makerwal, Mianwali District, Punjab, Pakistan. An additional specimen was recorded from the type locality (KHAN

1986) and another one with head scale abnormalities, considerably extending the range of this taxon east of the Indus River to southwestern Kashmir (KHAN 1997), but otherwise no additional information on these rare snakes has been published (KHAN 2002).

In the highlands of Pakistan north-west of the upper Indus Valley, kraits with 17 dorsal scale rows had previously been recorded from the following localities: Jatta in southern Waziristan, Tank and Dera Ismail Khan in Dera Ismail Khan District, and Fort Sandeman (now Zhob) in northern Baluchistan (PITMAN 1913; WALL 1914; INGOLDBY & PROCTER 1923; KHAN 1984, 1985).

In this communication I report on a krait in the collection of the Naturhistorisches Museum Wien (NMW 35010) originating from Khowst in eastern Afghanistan. This juvenile male *B. sindanus* measuring approximately 471 mm total length was obtained between 3 and 5 June 1967 by the late Professor Karl H. RECHINGER, then Director of the Botany Department in the Naturhistorisches Museum Wien, after it had been killed by locals in the vicinity of the houses of German farmers in the outskirts of Khowst (also spelled Khost, Province of Paktia, Afghanistan). The severely damaged snake has at least, but probably not many more than 202 ventrals, 46-47 undivided subcaudals, and dorsal scales arranged in 19-17-17 rows. On the body, 50 chevron-like to rhomboid, chocolate-brown dorsal blotches that do not extend onto ventral scales are separated by light interspaces; ten similar blotches on the tail are well-defined only basally but fused distally where light interspaces are reduced to a vertebral spot. The ventral sides of head, body and tail are uniformly yellowish to cream coloured. Scale counts and colour pattern of the Khowst specimen of *B. sindanus* agree well with KHAN's (1984, 1985) description of the northwestern highland population (*B. s. razai*) of this species. The question whether this population merits taxonomic recognition as proposed by KHAN, or rather represents a case of clinal variation in ventral scale numbers (the only diagnostic character mentioned in the original description) is the subject of studies in progress.

The specimen from Khowst extends the known geographical distribution of *B. sindanus* about 130 km north-west from previously published collecting localities and adds this taxon to the venomous snake fauna of Afghanistan. KRÁL (1969) already recorded *B. caeruleus* from the Kabul River valley of eastern Afghanistan, and both species may occur in sympatry or parapatry in parts of eastern Afghanistan. Nothing has been published about the venom of *B. sindanus*, however, it seems reasonable to assume that it is just as highly toxic as that of other krait species and that the current lack of information on bites caused by this species is due to confusion with its common congener *B. caeruleus*. Envenoming by *B. sindanus* should be expected to result in severe neuromuscular paralysis and is likely to be associated with a high mortality in the absence of appropriate medical treatment. Since antivenom raised against the venom of one krait species may not be effective against the venom of another (WARRELL et al. 1983; CHANHOME et al. 1999), it remains to be shown whether commercially available antivenoms against *B. caeruleus* venom will effectively neutralize *B. sindanus* venom. Studies on the venom of this species and its possible medical importance are clearly indicated.

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**REFERENCES:** BOULENGER, G. A. (1897): A new krait from Sind (*Bungarus sindanus*).- J. Bombay Nat. Hist. Soc., Bombay; 11: 73-74 + Pl. CHANHOME, L. & WONGTONGKAM, N. & KHOW, O. & PAKMANEE, N. & OMORI-SATO, T. & SITPRUJA, V. (1999): Genus specific neutralization of *Bungarus* snake venom by Thai Red Cross banded krait antivenom.- J. Natural Toxins, Fort Collins; 8: 135-140. INGOLDBY, C. M. & PROCTER, J. B. (1923): Notes on a collection of reptilia from Waziristan and the adjoining portion of the N. W. Frontier province.- J. Bombay Nat. Hist. Soc., Bombay; 29: 117-130. KHAN, M. S. (1984): Rediscovery and validity of *Bungarus sindanus* BOULENGER.- The Snake, Nitta-gun; 16: 43-48. KHAN, M. S. (1985): Taxonomic notes on *Bungarus caeruleus* (SCHNEIDER) and *Bungarus sindanus* BOULENGER.- The Snake, Nitta-gun; 17: 71-78. KHAN, M. S. (1986): A noteworthy collection of amphibians and reptiles from north-western Punjab, Pakistan.- The Snake, Nitta-gun; 18: 118-125.

KHAN, M. S. (1997): A report on an aberrant specimen of Punjab Krait *Bungarus sindanus razai* KHAN, 1985 (Ophidia: Elapidae) from Azad Kashmir.- Pakistan J. Zool., Lahore; 29 (3): 203-205. KHAN, M. S. (2002): A guide to the snakes of Pakistan. Frankfurt (Edition Chimaira), 265 pp. KRÁL, B. (1969): Notes on the herpetofauna of certain provinces of Afghanistan.- Zoologické Listy, Brno; 18 (1): 55-66. MERTENS, R. (1969): Die Amphibien und Reptilien West-Pakistans.- Stuttgarter Beitr. Naturkunde, Stuttgart; 197: 1-96. MINTON, S. A. JR. (1962): An annotated key to the amphibians and reptiles of Sind and Las Bela.- American Mus. Novit., New York City; 2081: 1-60. MINTON, S. A. JR. (1966): A contribution to the herpetology of West Pakistan.- Bull. American Mus. Nat. Hist., New York City; 134 (2): 31-184. PITMAN, C. R. S. (1913): Kraits in the Dera Ismail Khan District.- J. Bombay Nat. Hist. Soc., Bombay; 22: 636. SMITH, M. A. (1943): The Fauna of British India including Ceylon and Burma. Vol. 3: Serpentes. London (Taylor & Francis), 583 pp. WALL, F. (1907): A new krait from Oudh (*Bungarus walli*).- J. Bombay Nat. Hist. Soc., Bombay; 17: 608-611. WALL, F. (1913): On the common (*Bungarus caeruleus*) and Sind kraits (*Bungarus sindanus*).- J. Bombay Nat. Hist. Soc., Bombay; 22: 402-403. PL. C-D. WALL, F. (1914): The common and Sind krait (*Bungarus caeruleus* and *sindanus*). A correction.- J. Bombay Nat. Hist. Soc., Bombay; 22: 808. WALL, F. (1919): A 17 scale krait (*Bungarus caeruleus*) from Bangalore.- J. Bombay Nat. Hist. Soc., Bombay; 26: 1046. WARRELL, D. A. & LOOAREESUWAN, S. & WHITE, N. J. & THEAKSTON, R. D. G. & WARRELL, M. J. & KOSAKARN, W. & REID, H. A. (1983): Severe neurotoxic envenoming by the Malayan krait *Bungarus candidus* (LINNAEUS): response to antivenom and anticholinesterase.- British Med. J., London; 286: 678-680.

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## Record of the Malayan Krait, *Bungarus candidus* (LINNAEUS, 1758), from Nias Island, Indonesia

The Malayan krait, *Bungarus candidus* (LINNAEUS, 1758), is a medically important elapid snake species with a wide distribution including mainland southeast Asia, peninsular Malaysia, the Indonesian islands of Sumatra, Java, Bali, and Bawean and Karimunjawa off the north coast of Java (DE ROOIJ 1917; SMITH 1943; DE HAAS 1950; SUPRIATNA 1995; DAVID & VOGEL 1996; ISKANDAR & COLIJN 2001). Specimens of *B.*

*candidus* were also reported from the major sea ports Manado and Ujungpandang in Sulawesi (BOULENGER 1896; DE ROOIJ 1917). It remains however doubtful whether current populations of kraits exist on this island, and it has been suggested that the records from Sulawesi were the result of accidental introductions by humans, or based on incorrectly labeled specimens (ISKANDAR & TJAN 1996).

Here we report on a specimen of *B. candidus* deposited in the Institut für systematische Zoologie, Museum für Naturkunde der Humboldt-Universität zu Berlin (ZMB 50724; coll. RAAP, 1896) from Nias, Province of Sumatera Utara, Indonesia. The snake is an adult female with a snout-vent-length of 675 mm, a tail length of 98 mm, 216 ventrals and 44 subcaudals. It represents the first record of the Malayan Krait for Nias and any of the other islands located along the west coast of Sumatra (from northwest to southeast, these are: Simeulue, the Banyak Archipelago, Nias, the Batu Islands, the Mentawai Islands [Siberut, Sipura, North and South Pagai], and Enggano).

Nias Island lies approximately 105 km (airline) off the west coast of Sumatra. Although trade contact with Sumatra may have had a history of several hundred years, development of the Mentawai Islands by missionaries and local government started mostly with the beginning of the 20<sup>th</sup> century (DRING et al. 1990). Maps of sea level changes in the Indo-Australian Archipelago (VORIS 2000), on the other hand, indicate land connections between Nias and Sumatra at about the same sea level that would allow for dry passage of the Sunda Strait between Sumatra and Java.

The only other species of krait known from the islands west of Sumatra, the Red-headed Krait (*Bungarus flaviceps* REINHARDT, 1843), was also collected on Nias (VAN LIDTH DE JEUDE 1890; BRONGERSMA 1948). Unlike *B. candidus*, the brilliantly coloured and secretive *B. flaviceps* depends on primary rainforests and is rarely if ever seen in cultured lands or human settlements (KUCH & SCHNEYER 1996). Consequently, its potential for accidental dispersal by humans is probably much lower than that of its more opportunistic congener. We are thus inclined to interpret the fact that both species

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