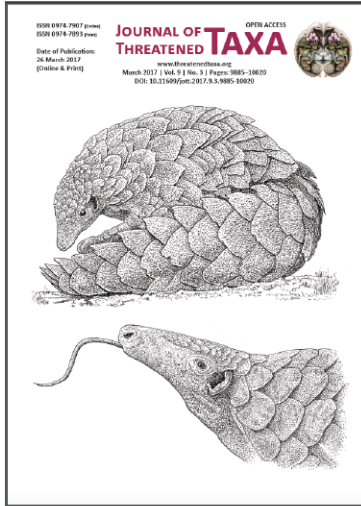


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## REVIEW

### STATUS, DISTRIBUTION AND THREATS OF KRAITS (SQUAMATA: ELAPIDAE: *BUNGARUS*) IN BANGLADESH

M.F. Ahsan & M.M. Rahman

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## STATUS, DISTRIBUTION AND THREATS OF KRAITS (SQUAMATA: ELAPIDAE: *BUNGARUS*) IN BANGLADESH

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**Abstract:** Kraits (*Bungarus* spp.) of Bangladesh were studied between January 2014 and March 2015. Five species of kraits are known to occur in Bangladesh. These are the Common Krait *Bungarus caeruleus*, Banded Krait *B. fasciatus*, Lesser Black Krait *B. lividus*, Greater Black Krait *B. niger* and Wall's Krait *B. walli*. Banded Krait is the commonest and Lesser Black Krait is the rarest krait species in the country. The status of these five kraits in Bangladesh has been assessed. The distributions have been compiled and discussed, and some reasons for their population decline have also been pointed out.

**Keywords:** Bangladesh, *Bungarus*, distribution, kraits, status, threats.

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**Competing interests:** The authors declare no competing interests.

**Author Detail:** M.F. AHSAN is currently working as Professor and well known wildlife biologist in Bangladesh; M.M. RAHMAN is a postgraduate student (wildlife and conservation biology); both from Department of Zoology, University of Chittagong, Bangladesh.

**Author Contribution:** MFA designed the study and all works was done under his supervision and improved the manuscript; MMR designed, conducted the field surveys, compiled the data and prepared draft of this manuscript.

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## INTRODUCTION

Kraits (genus *Bungarus*: Elapidae) are venomous elapid snakes. They inhabit most of the Oriental Region with the exception of the Philippines (Kuch et al. 2005). There are 16 species of *Bungarus* known (Abtin et al. 2014; Wallach et al. 2014) and 15 are restricted to the southern and southeastern Asia (Slowinski 1994; David & Ineich 1999; Kuch et al. 2005), and one in Iran (Abtin et al. 2014). Five species of kraits are known to occur in Bangladesh (e.g., Ahsan 1998; Kabir et al. 2009; Khan 2015) but their status and distribution in the country are not well understood. This study was designed to evaluate the countrywide status and to compile the distribution and point out threats to these five species.

## MATERIALS AND METHODS

The status and distribution of kraits in Bangladesh have been compiled from both primary and secondary sources for 15 months (January 2014 to March 2015). Different books (e.g., Khan 1982, 1992, 2008, 2010, 2015; Sarker & Sarker 1988; Kabir et al. 2009; Hasan et al. 2014), national and international journals, websites, literatures, reports (both published and unpublished) (e.g., Sarker 1975; Husain 1977; Montaquim 1979; Montaquim et al. 1980; Rashid 1982; Sarker & Sarker 1985; Khan 1987; Sarker & Hossain 1997; Ahsan 1998) were consulted, personal visits were also conducted in the fields. Eighteen protected areas were visited during the study period (Table 1). Data were collected through direct field observations along the existing trails or streams during 1–3 visits for each area. Searching involved in turning rocks, logs and leaf litters from twilight to early night (17:00–20:00 hr) by three persons. Preserved snake specimens in the collections of 36 different institutes and museums throughout the country were verified (Table 2). The results of all possible sources have been compiled and a distribution map has been depicted but not by GPS readings (Fig. 1). Possible threats were noted and questionnaires were made to find out major threats. The status of these species has been assessed based on the chance of being encountered during its most active period during the field visits, the availability of specimens in collections and the comments on the species in old literature records. Species that were observed more than 15 times (75%, of the total observation days), are considered very common (VC); those that were seen 10 to 14 times (50–74 %, of the total observation days)

common (C); as fairly common (FC) were regarded those spotted 5 to 9 times (25–49 %, of the total observation days); uncommon (UC) for those that were noticed 1 to 4 times (1–24 %, of the total observation days); and no sighting of the species in the field but availability in collections as preserved specimens were regarded as rare species in this list (Ahsan et al. 2015).

## RESULTS

### *Bungarus caeruleus* (Schneider, 1801) (Image 1)

The Common, Indian or Blue Krait (*B. caeruleus*) is recorded from greater Kushtia (Montaquim 1979) and Dhaka (Rashid 1982) districts. Sarker & Sarker (1988) reported it from the Sundarbans area. Khan (1992) mentioned a distribution all over the country except Madhupur and Saint Martin's Island. Gieson & Rashid (1997) reported it from the Tanguar haor of Sunamganj District. It is rarely found in Chittagong region (Parvin 1999) and Chowdhury et al. (2011) confirmed it from Sylhet. It has also been reported from Dudpukuria-Dhopachari Wildlife Sanctuary (WS) (Feeroz et al. 2012), Carmichael College of Rangpur (Kabir 2013), northwestern (Rangpur) Bangladesh (Sharma et al. 2013), Teknaf WS (Hasan et al. 2013) and Rema-Kalenga WS (Feeroz et al. 2011). There are two specimens (106CU, 124CU) in the museum of the Department of Zoology, University of Chittagong, Chittagong, which were collected from the Chittagong University Campus. A good number of specimens have been preserved in the Department of Medicine at Khulna Medical College and Department of Zoology, Brajalal (BL) College, Khulna, which were collected from Khulna. Specimens were also found in Rajshahi District in 2013 and in Rangpur District in 2010 (M. Farid Ahsan pers. obs.). In this study we report it from Barisal, Comilla, Jessore, Jhalokathi, Habiganj, Khulna, Pirojpur, Sirajganj and Tangail districts. The global distribution of the species includes Afghanistan (Kral 1969), Myanmar (Chakma 2009a), India, Nepal, Pakistan and Sri Lanka (Wallach et al. 2014). It ranges from the plains up to an elevation of 1,646m (5,400ft) (Smith 1943).

### *Bungarus fasciatus* (Schneider, 1801) (Image 2)

Banded Krait (*B. fasciatus*) was reported from Rajshahi Town (Sarker 1975). Montaquim (1979) and Rashid (1982) also reported it from Tangail (Madhupur) and Mymensingh districts. Sarker & Sarker (1988) commented that it is fairly common and widely distributed. Khan (1992) mentioned it is

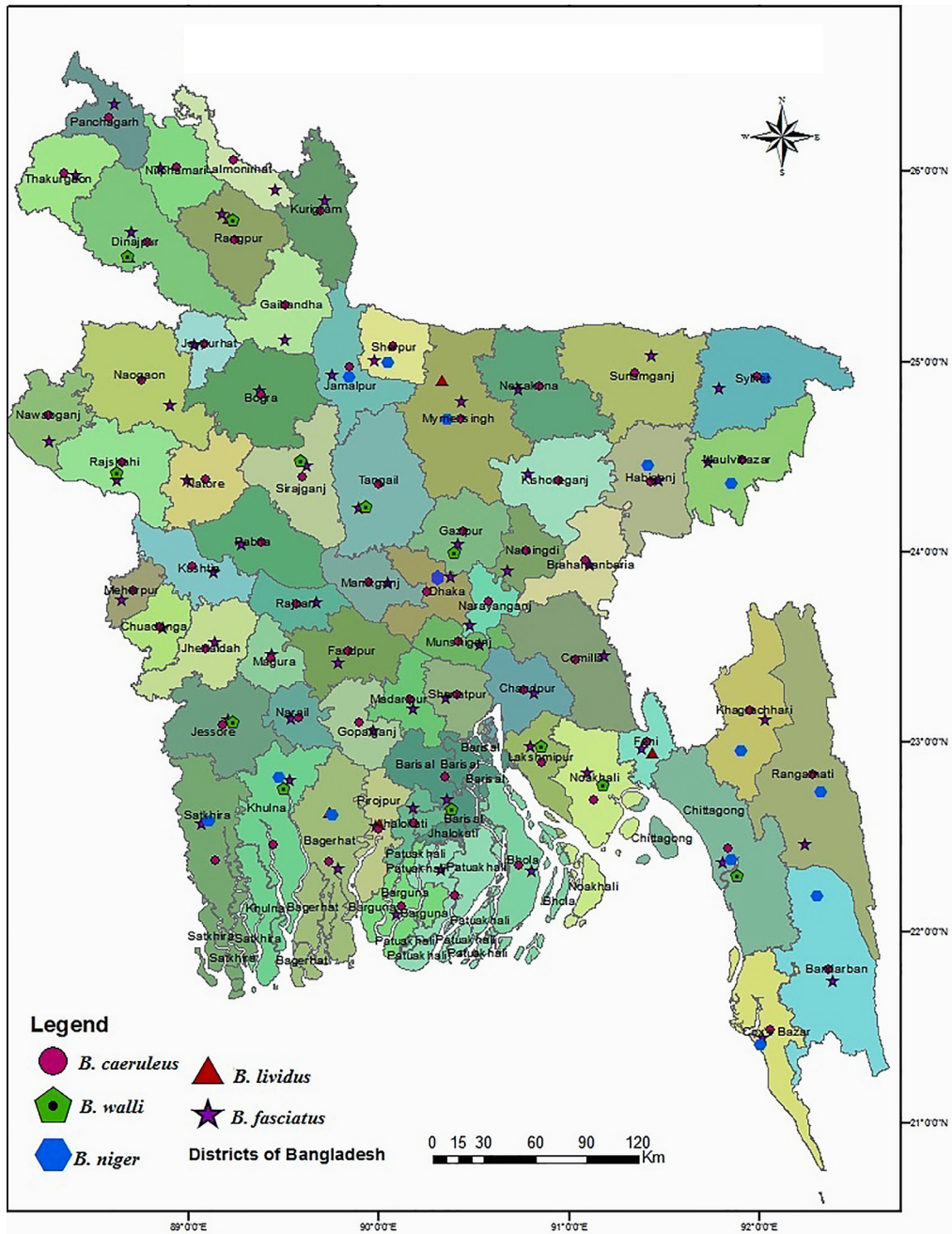


Figure 1. Distribution map of snakes of the genus *Bungarus* in Bangladesh.



Image 1. *Bungarus caeruleus*

widely distributed in the country and very common in Chittagong region (Parvin 1999). It has been reported from Madhupur National Park (NP) (Reza 2007); Nijhum Dweep NP (Rabbi 2009); Sylhet (Chowdhury et al. 2011) and Tanguar haor of Sunamganj (Alam et al. 2012). Rahman et al. (2012) have confirmed it from the adjacent area of the Padma River, Rajshahi. One specimen is preserved in the Zoological Museum of the Dinajpur Govt. College (M. Farid Ahsan pers. obs. in 2003). It is recorded from the Dudpukuria-

**Table 1. Visited protected areas of Bangladesh for studying snakes of the genus *Bungarus*.**

	Name of protected areas	Area (ha)	Location	No. of visits	GPS Coordination
<b>National Parks (NP)</b>					
1	Ramsagar NP	27.75	Dinajpur	1	25°33'16.34"N & 88°37'17.13"E
2	Himchari NP	1729	Cox's Bazar	2	21°21'06.32"N & 92°03'12.71"E
3	Lawachara NP	1250	Moulavibazar	2	24°20'26.78"N & 91°47'50.41"E
4	Kaptai NP	5464	Rangamati	3	22°30'16.86"N & 92°12'08.81"E
5	Nijhum Dweep NP	16352.23	Noakhali	2	22°22'12.18"N & 91°07'30.22"E
6	Satchari NP	242.91	Habiganj	1	24°07'47.88"N & 91°26'19.95"E
7	Baroiyadhala NP	2933.61	Chittagong	3	22°40'43.62"N & 91°40'37.72"E
8	Kuakata NP	1613	Patuakhali	1	21°48'32.79"N & 90°08'15.42"E
9	Singra NP	305.69	Dinajpur	1	25°53'21.54"N & 88°33'48.77"E
<b>Wildlife Sanctuaries (WS)</b>					
10	Chunati WS	7763.97	Chittagong	2	21°55'37.91"N & 92°03'31.10"E
11	Fashiakhali WS	1302.43	Cox's Bazar	2	21°42'52.37"N & 92°05'02.86"E
12	Hajarikhil WS	1177.53	Chittagong	2	22°42'20.43"N & 91°41'22.40"E
13	Teknaf WS	11615	Cox's Bazar	3	20°54'24.10"N & 92°15'50.41"E
<b>Safari Parks</b>					
14	Bangabandhu Sheikh Mujib Safari Park	600	Cox's Bazar	2	21°40'11.39"N & 92°05'19.06"E
<b>Eco Parks</b>					
15	Sitakunda Botanical Garden and Eco Park	808	Chittagong	3	22°36'14.14"N & 91°40'57.42"E
16	Banshkhali Eco Park	1200	Chittagong	1	21°59'23.67"N & 91°58'57.63"E
17	Tilagar Eco Park	45.34	Sylhet	1	24°54'56.74"N & 91°54' 18.92"E
<b>Reserve Forests</b>					
18	Inani Reserve Forest	12000	Cox's Bazar	3	21°13' 57.22"N & 92°04' 04.77"E

**Image 2. *Bungarus fasciatus*****Image 3. *Bungarus lividus***

Dhopachari WS (Feeroz et al. 2012), Teknaf WS (Hasan et al. 2013), Rema-Kalenga WS (Feeroz et al. 2011), and Baraiyadhala NP (Karim 2014). In this study we report it

from Chittagong University Campus, Fashiakhali WS and Bagerhat, Barisal, Comilla, Jessore, Patuakhali, Pirojpur and Rangamati districts. This common elapid snake's

Table 2. Examined zoological collections of Bangladesh for holdings of snakes of the genus *Bungarus*.

	Districts	Institutes	Geographic Location	Voucher Number	Number of Specimens
1	Barisal	Govt. Brajamohan (BM) College	22°42'41.29"N & 90°21'18.45"E	BM-10, 24, 25, 31	4
2	Patuakhali	Patuakhali Govt. College	22°21'14.93"N & 90°20'36.09"E	PGC-14	1
3	Patuakhali	Patuakhali Govt. Women College	22°21'32.71"N & 90°20'45.49"E		
4	Pirojpur	Govt. Sohrawardi College	22°34'58.92"N & 89°58'00.33"E	GSCP-13, 09, 16, 28	4
5	Chittagong	Chittagong Medical College	22°21'33.50"N & 91°49'49.06"E	MRGM-539, 583	4
6	Chittagong	Govt. City College	22°19'56.34"N & 91°49'52.34"E	GCC-6	2
7	Chittagong	Hazi. M. Mohsin College	22°21'10.99"N & 91°50'07.57"E		
8	Chittagong	Chittagong College	22°21'10.00"N & 91°50'17.21"E	CC-4,16	2
9	Chittagong	Department of Zoology, CU	22°28'12.53"N & 91°46'52.21"E	81bCU, 124CU, 410CU	27
10	Chittagong	Institute of Marine Sciences and Fisheries, CU	22°28'08.90"N & 91°46'49.38"E	IMSFCU-7	1
11	Chittagong	Institute of Forestry and Environmental Sciences, CU	22°27'40.32"N & 91°47'46.51"E	IFESCU-03	1
12	Chittagong	Hathazari College	22°30'07.48"N & 91°48'45.26"E	HC-7	1
13	Chittagong	Fatikhari Degree College	22°41'27.36"N & 91°47'30.72"E		
14	Chittagong	Kuaish Burishchar Sheikh Mohammad City Corporation College	22°24'30.64"N & 91°51'40.80"E		
15	Chittagong	Patiya Govt. College	22°17'31.67"N & 91°58'53.29"E		
16	Chittagong	Gasbaria Govt. College	22°12'59.86"N & 92°01'34.60"E		
17	Chittagong	Satkania Govt. College	22°04'34.54"N & 92°03'27.96"E	SGC-06	1
18	Comilla	Comilla Victoria Govt. College	23°27'26.39"N & 91°09'58.28"E		
19	Cox's Bazar	Cox's Bazar Govt. College	21°25'22.13"N 92°01'12.09"E		
20	Rangamati	Rangamati Govt. College	22°39'50.03"N & 92°09'44.40"E	GRC-2,9	2
21	Dhaka	Department of Zoology, DU	23°43'35.28"N & 90°24'09.28"E		4
22	Dhaka	Department of Zoology, JnU	23°42'32.29"N & 90°24'34.81"E		1
23	Dhaka	Bangladesh National Museum	23°44'14.04"N & 90°23'39.83"E		3
24	Tangail	Govt. Sadat College	24°13'14.74"N & 89°58'32.48"E		
25	Tangail	Bangabandhu Bridge Regional Museum	24°23'21.73"N & 89°48'58.09"E	R-11, 53, 186, 205	8
26	Bagerhat	Govt. Prafulla Chandra (PC) College	22°39'55.91"N & 89°46'58.30"E	PC-33, 36	2
27	Jessore	Govt. Michael Modhusudan (MM) College	23°09'37.85"N & 89°12'07.30"E	GMMC-12, 13	2
28	Khulna	Govt. Brajalal (BL) College	22°53'03.28"N & 89°31'45.90"E	BL-20	2
29	Khulna	Khulna Medical College	22°49'42.82"N & 89°32'18.21"E	KMC-04,06	13
30	Chapai Nawabganj	Nawabganj Govt. College	24°35'39.17"N & 88°16'26.60"E	BDS-103, 121	2
31	Rajshahi	Rajshahi College	24°21'53.79"N & 88°35'45.52"E	BDS-76	1
32	Rangpur	Carmichael College	25°43'12.54"N & 89°15'16.80"E		
33	Dinajpur	Dinajpur Govt. College	25°38'59.35"N & 88°38'41.26"E	BD 410, 411	2
34	Habiganj	Brindaban Govt. College	24°22'28.56"N & 91°24'43.98"E		
35	Sunamganj	Sunamganj Govt. College	25°03'53.17"N & 91°24'51.57"E	SGCZM-1	3
36	Sylhet	Murari Chand (MC) College	24°53'58.37"N & 91°54'15.60"E	MCC-3, 10	2

CU = University of Chittagong; DU = University of Dhaka; JnU = Jagannath University

worldwide distribution includes Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, Thailand, Vietnam (Stuart et al. 2013), Macau, Nepal (Wallach et al. 2014), and Sri Lanka (Günther 1864). It ranges from

20–2,300 m (Stuart et al. 2013).

### ***Bungarus lividus* Cantor, 1839 (Image 3)**

Lesser Black Krait (*B. lividus*) is reported by Smith (1943) and Khan (1992) from Rangpur District of



Image 4. *Bungarus niger*



Image 5. *Bungarus walli*

Bangladesh. Recently, it was recorded from Carmichael University College of Rangpur (Kabir 2013) and Dinajpur (Sharma et al. 2013). Two specimens (BD 410, BD 411) are preserved in the collection of the Zoological Museum of the Dinajpur Govt. College in 2003 (M. Farid Ahsan pers. obs.). One specimen was collected from Mymensingh District in 2008 and one from Feni District in 2009 through Chittagong Medical College Hospital (M. Farid Ahsan pers. obs.). During this study period we found two specimens in the museum collections of the Department of Zoology, Govt. Sohrawardi College, Pirojpur and Govt. Prafulla Chandra (PC) College, Bagerhat. Globally, *B. lividus* occurs in Bangladesh, India, Nepal and ranges up to 340m (Wallach et al. 2014).

#### ***Bungarus niger* Wall, 1908 (Image 4)**

An individual of the Greater Black Krait (*B. niger*), from unknown origin in Bangladesh was kept for a brief period in Dhaka Zoo in the 1990s (Sarker & Sarker 1985). Khan (1992) reported a skin of this species in the market in Dhaka and commented that it might be present in Mymensingh and Sylhet districts. It is recorded from the Sundarbans and is expected that the species might occur in other plain lands (Islam 2009). It is also recorded from Chandanaish, Fatikchari, Chittagong University Campus in Chittagong as well as from Dighinala (Khagrachhari) and Khagrachhari districts in the Chittagong Hill Tracts (Faiz et al. 2010). Faiz et al. (2010) also commented that its distribution is country-wide. Recently, it has been reported from Dudpukuria-Dhopachari WS (Feeroz et al. 2012), Teknaf WS (Hasan et al. 2013) and Baraiyadhala NP (Karim 2014). It was found from Chittagong Hill Tracts (Bandarban, Khagrachhari, Rangamati and Kaptai NP), Sherpur, Jamalpur, Habiganj, Moulavibazar (including Lawachara NP), Sylhet, Chittagong, Cox's

Bazar (M. Farid Ahsan pers. obs. [1990–2013]) and Savar (Dhaka) during this study. Its worldwide distribution includes Bangladesh, Bhutan, Nepal, Northeastern India (Wallach et al. 2014), and Myanmar (Faiz et al. 2010). It is recorded from Kaski District in Nepal at 1,450m altitude (Sharma et al. 2013).

#### ***Bungarus walli* Wall, 1907 (Image 5)**

Wall's Krait (*B. walli*) is distributed in Rangpur and Dinajpur districts of Bangladesh (Khan 1992). One live specimen was collected by a snakebite victim from Ramgoti Upazila of Noakhali District through Chittagong Medical College Hospital in 2006 and another dead specimen from Rajshahi Medical College Hospital in 2010 (M. Farid Ahsan pers. obs.). In 2007, one dead specimen was brought to Dhaka Medical College Hospital by a snakebite victim from Gazipur (M. Farid Ahsan pers. obs.). Recently, the species was recorded from Laksmipur (Laxmipur) District (Sharma et al. 2013). In this study we report from Barisal, Jessore, Khulna, Sirajganj and Tangail districts. The species is supposed to be an endemic snake of the Indian subcontinent (Chakma 2009b). It has been reported from Bangladesh, India and Nepal (Wallach et al. 2014) and is recorded up to 100m above sea level (Wall 1907).

#### **DISCUSSION**

The five *Bungarus* species (*B. caeruleus*, *B. fasciatus*, *B. lividus*, *B. niger* and *B. walli*) are distributed in Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Indonesia, India, Lao PDR, Macau, Malaysia, Myanmar, Sri Lanka, Nepal, Pakistan, Singapore, southern China, Thailand and Vietnam (Slowinski 1994; David & Ineich 1999; Kuch et al. 2005; Wallach et al. 2014). It is evident from the above discussion



that kraits are in general southern, southeastern and middleeastern Asian snakes. Two species (Common Krait and Banded Krait) are common in Bangladesh, one species (Greater Black Krait) is uncommon, and the remaining two (Lesser Black Krait and Wall's Krait) are rare; IUCN Bangladesh (2015) mentioned the status of *B. caeruleus* and *B. fasciatus* as "Least Concern", and *B. lividus*, *B. niger* and *B. walli* as "Near Threatened". *B. fasciatus* is the commonest among the five native *Bungarus* species in Bangladesh. Both *B. caeruleus* and *B. fasciatus* are widely distributed in the country, but the former is very common in Khulna and the latter in Chittagong districts. *B. lividus* is the rarest one and confirmed reports on it reveal that the species occurs in the northern, northwestern, southeastern and southwestern parts of Bangladesh. This species may be absent in mixed evergreen forests of northeastern and southeastern parts of the country. *B. niger* is widely distributed all over the country except western and northwestern parts, and commonly found in northern, northeastern and southeastern parts of the country. *B. walli* is another rare species and dispersed in the central, northwestern, southeastern (partly) and southwestern parts of the country. It is mostly found in the belts of rivers and canals especially sandy 'char' [Bengali: sand bank] areas. The species may also be absent in the districts of western side of the Padma River and mixed evergreen forests of northeastern and southeastern parts of the country. It is a common species in Tangail and Sirajganj districts.

Kraits have great medicinal and ecological value in Bangladesh but the survival of these species is threatened due to the direct or indirect impacts of the ever-increasing human population of the country. Habitat destruction through forest clearing and alteration, infrastructure development, agricultural expansion, spreading out of human settlements, road kill, killing due to fear, and illegal exports as well as the misconceptions of human beings about snakes are the major threats for these species. Illegal capturing of *B. fasciatus* is reported for use in traditional medicines. Generally, specimens with a weight above 2kg are captured for illegal markets.

Kraits are key components of the natural ecosystem and should be conserved. We hope that this study will support any further study on this medically important, timid and often docile snakes and facilitate development of conservation strategies.

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#### Articles

**An updated report on the distribution and conservation status of the endangered Cat's Head Rockrose *Helianthemum caput-felis* (Magnoliopsida: Violales: Cistaceae) in Algeria**  
-- Jonás C. Agulló, Ana Juan, Manuel B. Crespo, María Ángele Alonso & Alejandro Terrones, Pp. 9885–9891

**A comparative study of the diet of the Indian Eagle Owl *Bubo bengalensis* (Franklin, 1831) from two distinct habitats in the Tamil Nadu - Puducherry area, southern India**  
-- M. Eric Ramanujam & Tushita Singh, Pp. 9892–9902

#### Review

**Status, distribution and threats of kraits (Squamata: Elapidae: *Bungarus*) in Bangladesh**  
-- M.F. Ahsan & M.M. Rahman, Pp. 9903–9910

#### Communications

**Ecology of marine macro algal flora of Visakhapatnam coastal areas, Bay of Bengal, India**  
-- I. Vishnupriya Sowjanya & P.S. Raja Sekhar, Pp. 9911–9919

**Distribution pattern, population estimation and threats to the Indian Pangolin *Manis crassicaudata* (Mammalia: Pholidota: Manidae) in and around Pir Lasura National Park, Azad Jammu & Kashmir, Pakistan**  
-- Faraz Akrim, Tariq Mahmood, Riaz Hussain, Siddiqa Qasim & Imad-ul-din Zangi, Pp. 9920–9927

**Impact of vehicular traffic on vertebrate fauna in Horton plains and Yala national parks of Sri Lanka: some implications for conservation and management**  
-- Suranjan Karunaratna, Sudheera Ranwala, Thilina Surasinghe & Majintha Madawala, Pp. 9928–9939

**Forest ghost moth fauna of northeastern India (Lepidoptera: Hepialidae: *Endoclita*, *Palpifer*, and *Hepialiscus*)**  
-- John R. Grehan & Vijay Anand Ismavel, Pp. 9940–9955

**First record of tapeworm *Moniezia* (Cestoda: Anoplocephalidae) infections in Leopards: Coprological survey of gastrointestinal parasites of wild and captive cats in Sri Lanka**  
-- Vishvapali Kobbekaduwa, Caroline Fillieux, Ashan Thudugala, R.P.V. Jayantha Rajapakse & Rupika S. Rajakaruna, Pp. 9956–9961

#### Short Communications

**Macrofungi in two botanical gardens in southwestern India**  
-- Mundamoole Pavithra, Kandikere R. Sridhar & Ammatanda A. Greeshma, Pp. 9962–9970

**A report on some butterflies (Lepidoptera) from Ladakh in Jammu & Kashmir and Lahaul in Himachal Pradesh, India**  
-- Sanjay Sondhi, Balakrishnan Valappil, Yash Sondhi & Anchal Sondhi, Pp. 9971–9987

**Status, abundance and habitat preference of butterflies (Insecta: Lepidoptera) in Chittagong University Campus, Chittagong, Bangladesh**

-- Ibrahim Khalil Al Haidar, M. Mizanur Rahman, M. Farid Ahsan & M. Ariful Islam, Pp. 9988–10003

**A preliminary report on the impact of road kills on the herpetofauna species in Nilgiris, Tamil Nadu, India**  
-- P. Santhoshkumar, P. Kannan, A. Veeramani, A. Samson, S. Karthick & J. Leonaprinicy, Pp. 10004–10010

#### Notes

**Lifecycle and fecula measurements of *Cheritra freja* (Lepidoptera: Lycaenidae), as relevant to the different larval stages**  
-- Tharaka Sudesh Priyadarshana & Ishara Harshajith Wijewardhane, Pp. 10011–10013

**New distribution record of Nagarjunasagar Racer *Platyceps bholanathi* (Reptilia: Squamata: Colubridae) in Sigur, Nilgiris landscape, India**  
-- Arockianathan Samson, Palanisamy Santhoshkumar, Balasundaram Ramakrishnan, Sivaraj Karthick & Chandrashekaruni Gnaneswar, Pp. 10014–10017

**A first report of the presence of the Indian Wild Pig *Sus scrofa cristatus* from Kajinag Range, Kashmir, India**  
-- Riyaz Ahmad, Intesar Suhail & Yash Veer Bhatnagar, Pp. 10018–10020