

THE DISTRIBUTION OF THE GREAT EVENING BAT *IA IO* IN THE INDOMALAYAN REGION

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Abstract: The Great evening bat (*la io*) was hitherto found in eleven localities in the Indomalayan Region. In the recent years the species was collected from two more localities by the expedition of the Hungarian Natural History Museum. Based on the descriptions of the former localities and the new records it can be proved that the great evening bat is an obligate cave-dwelling species of the subtropical limestone areas of Southeast Asia.

Key words: Indomalayan region, *la io*, distribution, ecology.

Introduction

The Great evening bat *la io* Thomas, 1902 is one of the biggest and rarest vespertilionids of the world. The description of the species was based on a single specimen, and for a long time only singly collected specimens, all of them came from China (Sowerby 1932; Sanborn 1933; Allen 1938). The first colony was discovered by Pen et al. (1962) in Sichuan, China; he described it as a new species of the genus under the name *la longimana*, separated from *la io* on the basis of the bigger size of individuals and an unicuspid I1. This taxon and also *Parascotomanes beaulieui* (Bourret 1942) from Laos were referred to the synonymy of *la io* by Topál (1970). In the same paper, based on the characteristics of the skull and especially the os penis, Topál raised back the genus *la*, formerly treated as a subgenus of *Pipistrellus* by several authors (Simpson 1945; Ellermann & Morrison-Scott 1951) to the genus status again. However, Menu (1987) based on dental characteristics referred *la* to the synonymy of *Eptesicus*, the generic distinctness of *la* is generally accepted (Corbet & Hill 1992; Koopman 1994).

Due to the scattered records, the ecology of the Great evening bat is only very insufficiently known. According to the literature, almost all the specimens were captured in caves, but Topál (1970) noted that the individuals observed in India "spend the daytime obviously not in the cave and use it only for their nocturnal quarters."

During the recent expeditions of the Hungarian Natural History Museum (HNHM) two more locations of the species were found, and the new findings yield more information on the distribution and ecology of *la io*.

Materials and methods

A first specimen of *la io* was deposited in the Hungarian Natural History Museum (HNHM) collected by Topál (1970) in India. During further zoological expeditions by

the staff of the Museum in Southeast Asia, the species was collected from the following localities:

1. Vietnam, Lao Cai Prov. Ta Phin, Cave No. 1., 1200 m, 19.11.1993. One male was collected by **G. Csorba** and **A. Bankovics**. For description of the locality see **Bankovics & Csorba** (1995).

2. Nepal, Gandaki Prov., Bimalnager, Sidda Gupha (Monk Cave), 750 m, 12.10.1994 and 12.4.1995. Altogether four males and two females were collected by **G. Csorba**, **Gy. László**, **G. Ronkay** and **L. Ronkay**. All specimens are stored in the HNHM except the one Nepalese which is placed in the Harrison Zoological Museum, Sevenoaks, Kent.

In addition to these specimens, two (including the holotype) deposited in the Natural History Museum, London were studied.

The measurements were taken by dial calipers, those of short distances and teeth under a stereomicroscope (tab.1). Abbreviations of the measurements used in this paper are as follows: FA - length of forearm; TAIL - length of tail; EAR - length of conch; SBASL - basilar length of skull from frontal edge of palate to the foremost part of ventral incision between condyles; STOTL - total length of skull, from front of canines to occiput; UCM3L - crown length of upper toothrow; ZYGW - width of skull between zygomata; MASTW - mastoid width of skull; MAND - length of mandible, between hindermost portion of articular process and anteriormost edge of II alveolus; LCM3L - crown length of lower toothrow.

Locality	FA	TAIL	EAR	SBASL	STOTL	UCM3L	ZYGW	MASTW	MAND	LCM3L
Vietnam	80.41	71.13	26.92	20.85	26.98	10.80	17.65	14.21	21.03	11.87
Nepal	78.44	69.21	26.21	20.44	26.76	10.78	17.41	14.01	20.88	11.69
Nepal	77.45	67.20	25.16	21.33	28.10	11.09	18.01	14.35	21.35	12.05
Nepal	75.91	67.15	26.32	20.26	26.43	10.85	17.02	13.89	20.36	11.70
Nepal	78.24	70.64	26.44	20.61	26.82	10.86	17.69	14.01	21.26	11.90
Nepal	77.19	70.48	26.88	21.36	27.51	10.83	17.82	14.38	21.58	11.80
Nepal	74.38	63.94	26.32	19.87	26.49	10.51	17.17	13.69	20.32	11.43

Tab.1: Measurements (in mm) of Vietnamese and Nepalese specimens of *Ia io*
The names of the Chinese localities are given according to **Sivin et al.** (1988) and **Zhao & Adler** (1993).

Results

In Vietnam the presence of the species was proved by a single mandible (**Topál** 1970). The new specimen in Vietnam was collected by mist-net erected in front of a cave, when the bat left the cave at the beginning of dusk. *Ia io* was captured together with the following species: *Rhinolophus pearsoni*, *Rh. sinicus*, *Hipposideros armiger*, *Miniopterus schreibersi*. This locality is situated in an extensive limestone area with several caves, surrounded by agricultural areas and disturbed secondary forest. The survival of the species is endangered by the collection of bats by hill tribes for consuming.

The Nepalese datum is the westernmost known locality of this species. The first individuals were caught at twilight with a mist-net erected in the spacious entrance of

the cave during the collection at autumn. From the estimated 20-30 specimens 3 males were taken. In spring, at the same cave, the bats started to leave the cave before sunset. In this case the majority of the captured individuals were females. Of the three specimens taken, one was a pregnant female with one embryo. At both occasions the following species were captured together with *la io*: *Rhinolophus pearsoni*, *Rh. pusillus*, *Rh. affinis*, *Hipposideros armiger*, *Miniopterus schreibersi*. The area is one of the few limestone landscapes of Nepal; in the surroundings there are only small forest fragments among the cultivated fields. The survival of this population seems to be safe, since the cave is guarded by the local people as a sacred place.

The series of Nepalese specimens gives the opportunity to supervise the diagnostic characters given by **Pen** (1970) in the description of *la longimana*. The specimens stored in the HNHN regarding their forearm measures (tab.1) are completely within the range given by **Pen**, and the shape of the first upper incisor varies even within the same population being either bicuspid or unicuspid.

	Locality (country, province, settlement)	Reference/voucher specimens	collected specimens
1.	China, Hubei, Changyang	Thomas 1902	1 male
2.	China, Jiangsu, Nanjing	Sowerby 1932	1 (sex?)
3.	China, Guizhou, 40 mls SW of Wenshui	Sanborn 1933	1 male
4.	China, Sichuan, Yanjingggou	Allen 1938	2 (sex?)
5.	China, Yunnan, Kunming	SDM	4 (sex?)
6.	China, Sichuan, Huidong	Pen et al. 1962	2 male, 53 female
7.	China, Jiangxi, ?	NHM	1 female
8.	Laos, Tran-ninh, ?	Bourret 1942	1 male
9.	Thailand, Chiangmai, Chiang Dao	Allen & Coolidge 1940	1 male
10.	Vietnam, Ha Nam Ninh, Cuc Phuong	Topál 1970	1 mandible
11.	India, Assam, Mausmai	Topál 1970	1 male
12.	Vietnam, Lao Cai, Ta Phin	Bankovics & Csorba 1995	1 male
13.	Nepal, Gandaki, Bimalnager	HNHN, HZM	4 male, 2 female

Tab.2: Records of *la io*

SDM = State Darwin Museum, Moscow; **NHM** = The Natural History Museum, London; **HNHN** = Hungarian Natural History Museum, Budapest; **HZM** = Harrison Zoological Museum, Sevenoaks

Unfortunately, the published distribution maps of the species (**Corbet & Hill** 1992; **Lekagul & McNeely** 1977) are incomplete and unreliable due to the difficulties to locate the Chinese geographical names. Therefore, based on the published records and museum specimens (tab.2) the distribution map of *la io*, depicting all of the known localities, is presented (fig.1). All non-Chinese specimens come from limestone areas; in the case of the Chinese specimens the information is often uncomplete. Therefore all the Chinese limestone areas are plotted on the distribution map, as possible sites where *la io* may occur.

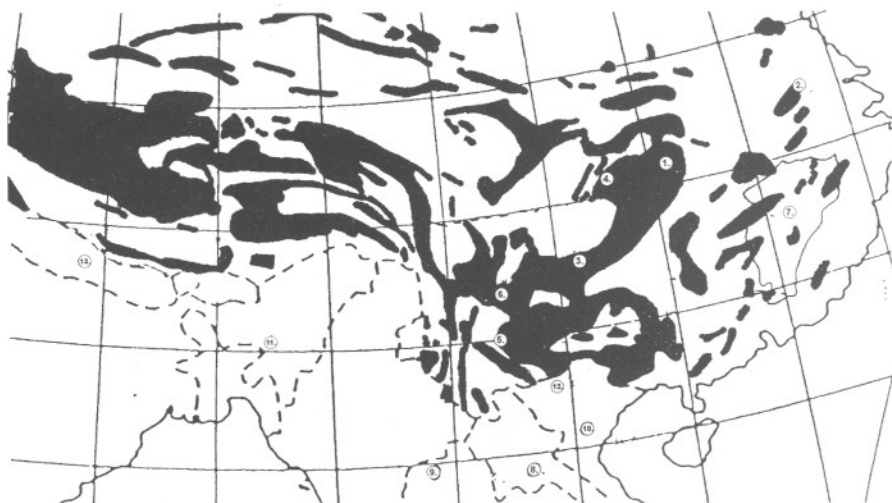


Fig.1: Distribution of *Ia io*. For the numbers of localities see tab.2. The black areas indicate limestone ranges in China. In the case of locality 7, only the province is known; therefore the limits of the province are indicated on the map

Discussion

Based on the study of specimens from the same Nepalese population I conclude in agreement with the findings of **Topál** (1970) that the species or even the subspecies status of *Ia longimana* is not approved neither by the measurements of the forearm nor by the shape of the upper incisor. By the comparison of distribution data and geological maps it can be proved that the Great Evening Bat is a year-round cave-dwelling species of the subtropical limestone areas. In the studied Nepalese population the individuals form a mixed colony at least during spring when gravid females are in majority. This observation is in high agreement with the findings of **Pen et al.** (1962). The bats can leave very early the cave where they roost, sometimes well before dusk/twilight and during the night might turn up at other caves for resting, as it is known in the case of several insectivorous bat species (**Kunz** 1982).

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References

- Allen, G.M.** (1938): The mammals of China and Mongolia. — Natural History of Central Asia, **11**, 629 pp.
- Allen, G.M. & H.J. Coolidge** (1940): Asiatic primate expedition collections. — Mamm. Bull. Mus. Comp. Zool. Harv., **97(3)**: 131-166.
- Bankovics, A. & G. Csorba** (1995): Report on a collection trip to Vietnam in 1993. — Folia ent. hung., **56**: 5-8.
- Bourret, R.** (1942): Les Mammifères de la collection du Laboratoire de Zoologie de l'Ecole Supérieure. — Not. Trav. Ecole Sup. Sci. Univ. Indochinoise **1**: 1-44.
- Corbet, G.B. & J.E. Hill** (1992): The mammals of the Indomalayan region. — Nat. Hist. Mus. Publ., Oxford University Press, 488 pp.
- Ellermann, J.R. & T.C.S. Morrison-Scott** (1951): Checklist of Palaearctic and Indian mammals (1758-1946). London, 810 pp.
- Koopman, K.F.** (1994): Chiroptera Systematics. Handbook of Zoology, vol. VIII. Mammalia, Part 60. — Walter de Gruyter, Berlin, New York, 217 pp.
- Kunz, T.H.** (1982): Roosting Ecology of Bats. — In: Ecology of Bats (ed. T.H. Kunz). Plenum Press, New York, London, 1-55.
- Lekagul, B. & J.A. McNeely** (1977): Mammals of Thailand. — Sahakarnbhat Co., Bangkok, 758 pp.
- Map of soluble rock types in China** (1985) (ed. Institute of Karst Geology, Chinese Academy of Geological Sciences), Cartographic Publishing House, Beijing.
- Pen, H.S., Y.T. Kao, C.K. Lu, T.C. Feng & C.H. Chen** (1962): Report on mammals from Southwestern Szechwan and Northwestern Yunnan. — Acta Zool. Sinica, **14** (Suppl.): 105-132.
- Sanborn, C.C.** (1933): Bats from Szechwan and Kweichow, China. — Proc. Biol. Soc. Wash., **46**: 55-56.
- Simpson, G.G.** (1945): The principles of classification and a classification of mammals. — Bull. Amer. Mus. Nat. Hist., **85**: 350 pp.
- Sivin, N., F. Wood, P. Brooke & C. Ronan** (1988): The contemporary atlas of China. — Weidenfeld and Nicolson, London, 200 pp.
- Sowerby, A.** (1932): The bats of China. — China J., **17**: 299-305.
- Thomas, O.** (1902): On two new mammals from China. — Ann. Mag. Nat. Hist., **10** (Ser. 7): 163-166.
- Topál, Gy.** (1970): The first record of *Ia io* Thomas, 1902 in Vietnam and India, and some remarks on the taxonomic position of *Parascotomanes beaulieu* Bourret, 1942, *Ia longimana* Pen, 1962, and the Genus *Ia* Thomas, 1902 (Chiroptera: Vespertilionidae). — Opusc. Zool. Budapest, **10**: 341-347.
- Zhao, E. & K. Adler** (1993): Herpetology of China. — Contr. Herpet. **10**. Society for the Study of Amphibians and Reptiles, Oxford, Ohio, 522 pp.

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References

- Allen, G.M.** (1938): The mammals of China and Mongolia. — Natural History of Central Asia, **11**, 629 pp.
- Allen, G.M. & H.J. Coolidge** (1940): Asiatic primate expedition collections. — Mamm. Bull. Mus. Comp. Zool. Harv., **97(3)**: 131-166.
- Bankovics, A. & G. Csorba** (1995): Report on a collection trip to Vietnam in 1993. — Folia ent. hung., **56**: 5-8.
- Bourret, R.** (1942): Les Mammifères de la collection du Laboratoire de Zoologie de l'Ecole Supérieure. — Not. Trav. Ecole Sup. Sci. Univ. Indochinoise **1**: 1-44.
- Corbet, G.B. & J.E. Hill** (1992): The mammals of the Indomalayan region. — Nat. Hist. Mus. Publ., Oxford University Press, 488 pp.
- Ellermann, J.R. & T.C.S. Morrison-Scott** (1951): Checklist of Palaearctic and Indian mammals (1758-1946). London, 810 pp.
- Koopman, K.F.** (1994): Chiroptera Systematics. Handbook of Zoology, vol. VIII. Mammalia, Part 60. — Walter de Gruyter, Berlin, New York, 217 pp.
- Kunz, T.H.** (1982): Roosting Ecology of Bats. — In: Ecology of Bats (ed. T.H. Kunz). Plenum Press, New York, London, 1-55.
- Lekagul, B. & J.A. McNeely** (1977): Mammals of Thailand. — Sahakarnbhat Co., Bangkok, 758 pp.
- Map of soluble rock types in China** (1985) (ed. Institute of Karst Geology, Chinese Academy of Geological Sciences), Cartographic Publishing House, Beijing.
- Pen, H.S., Y.T. Kao, C.K. Lu, T.C. Feng & C.H. Chen** (1962): Report on mammals from Southwestern Szechwan and Northwestern Yunnan. — Acta Zool. Sinica, **14** (Suppl.): 105-132.
- Sanborn, C.C.** (1933): Bats from Szechwan and Kweichow, China. — Proc. Biol. Soc. Wash., **46**: 55-56.
- Simpson, G.G.** (1945): The principles of classification and a classification of mammals. — Bull. Amer. Mus. Nat. Hist., **85**: 350 pp.
- Sivin, N., F. Wood, P. Brooke & C. Ronan** (1988): The contemporary atlas of China. — Weidenfeld and Nicolson, London, 200 pp.
- Sowerby, A.** (1932): The bats of China. — China J., **17**: 299-305.
- Thomas, O.** (1902): On two new mammals from China. — Ann. Mag. Nat. Hist., **10** (Ser. 7): 163-166.
- Topál, Gy.** (1970): The first record of *Ia io* Thomas, 1902 in Vietnam and India, and some remarks on the taxonomic position of *Parascotomanes beaulieu* Bourret, 1942, *Ia longimana* Pen, 1962, and the Genus *Ia* Thomas, 1902 (Chiroptera: Vespertilionidae). — Opusc. Zool. Budapest, **10**: 341-347.
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