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NATURAL HISTORY NOTE

First records of the Hairy-winged bat (*Harpiocephalus harpia*) from Nepal

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ABSTRACT

Harpiocephalus is a monospecific genus including only the species *Harpiocephalus harpia* and is reported only from ten countries in Southeast Asia. *H. harpia* has been reported in several habitats but has a relatively patchy distribution, and its population monitoring and ecological studies are scarce or absent in many regions. During chiropteran surveys in 2016 and 2021, three individuals of the large Tube-nosed bats (subfamily Murininae) were caught in Central and Eastern Nepal. Based on the following external morphological characteristics, the bats were distinguished from *Murina* spp. and identified as *H. harpia*: larger body, hairy and short muzzle, heavily haired feet and interfemoral membrane, long reddish hairs in dorsal pelage, white-tipped hairs over the head and neck; and whitish to greyish ventral pelage. These specimens represent the country's first records of *H. harpia* and represent a remarkable extension of the specie range as it is approximately 400 km westward from its previously known distribution area.

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Harpiocephalus is a monospecific genus and has been reported in ten countries worldwide, including Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Philippines, Thailand and Vietnam (Lin et al. 2006, Velazco & Patterson 2008, Lim et al. 2017, Csorba et al. 2019, Tang et al. 2020, Thong et al. 2021). The Hairy-winged bat (*Harpiocephalus harpia*) is globally listed as a Least Concern (L.C.) species (Csorba et al. 2019). It is externally and morphologically very similar to the *Murina* spp., but its body size is much larger, and the forearm length exceeds the 44 mm upper limit range (Zeng et al. 2015, unpublished data). The fur is thick and soft, and the overall impression varies from bright orange to buffy brown. Hairs tips of the dorsal pelage are bright and rufous with buffy middle part and grey roots, but the ventral pelage is buffy grey tips with darker roots; long brown hairs densely cover the patagium (Bates & Harrison 1997, Lin et al. 2006, Csorba et al. 2019).

Harpiocephalus harpia is a solitary species, and its typical habitats include montane primary forests near water sources (Bates & Harrison 1997, Molur et al. 2002, Lin et al. 2006, Csorba et al. 2019). In the Philippines, this species has also been reported in highly disturbed lowland, moist primary forests (Ingle 1992). However, although in general, this species occurs in several protected areas in Southeast Asia (Soisook et al. 2013, Lim et al. 2017, Thong et al. 2021), population monitoring and ecological studies have yet to be undertaken (Molur et al. 2002, Csorba et al. 2019). Amongst the little data about *H. harpia's* natural history available in the literature, we know that they seem to feed on beetles (Bates & Harrison 1997). However, the lack of knowledge about this species is general in most of its distribution areas.

On the 30th of August and the 4th of September 2016, one male and one female of the species were captured using mist-nets in the early evening in an old house situated at the border of the forest in Silinge, Raksirang Rural Municipality ward #7, Makwanpur district, Central Nepal (27.63522N 84.73895E, 830 meters above sea level) (Fig. 1). The area is comparatively arid with a dense human settlement with millet and dry paddy farming. In this area, the Indian butter tree *Diploknema butyracea* predominates the remnant dense and primary forest patches in the vicinity of the village. Few and small streams are distributed in forest patches with permanent water wells. However, almost all the forest patches were highly disturbed by the pressure of domestic animals and human activities.

On the 5th of April 2021, an adult female was mist-netted at 19:30 over the upper course of the Mai River at Sisne, Sandakpur Rural Municipality ward #2, Ilam district (27.06935N, 87.97386E, 1943 meters above sea level) (Fig. 1). The survey location is a rural area near a large primary forest dominated by oaks, with many old and fallen trees. The species was recorded approximately 10 kilometres west of the country border between Nepal and India, in the Singalila National Park, Darjeeling District, West Bengal, India. The forest patches were dense in this case, with many permanent water streams and swampy lands (Fig. 3).

The species was captured along with *Myotis muricola* and *Arielulus circumdatus* at Sandakpur, Ilam, but no other bats were recorded at Raksirang, Makwanpur. Mist-netted individuals were taken out immediately with gloved hands, kept in white cotton bags without any stress, and released immediately after taking morphometric measurements. External measurements of the captured individuals were taken using Freemans FDC 150 digital calliper and photographed by Canon EOS 1100 D with an 18-55 mm lens.

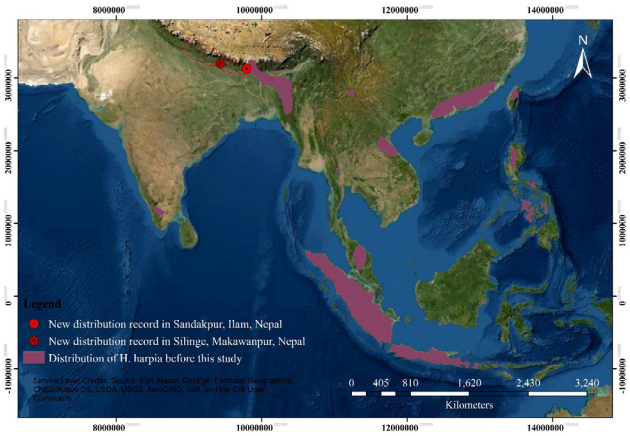

Fig. 1 - Map showing the global distribution of *Harpiocephalus harpia* (shaded area, after Csorba et al. 2019) and the recent records from Nepal (red circles). Source baseline map**:** Esri, Maxar, GeoEye, Earthstar, Geographics, CNES/Airbus DS, USGS, AeroGRID, IGN and GIS user.

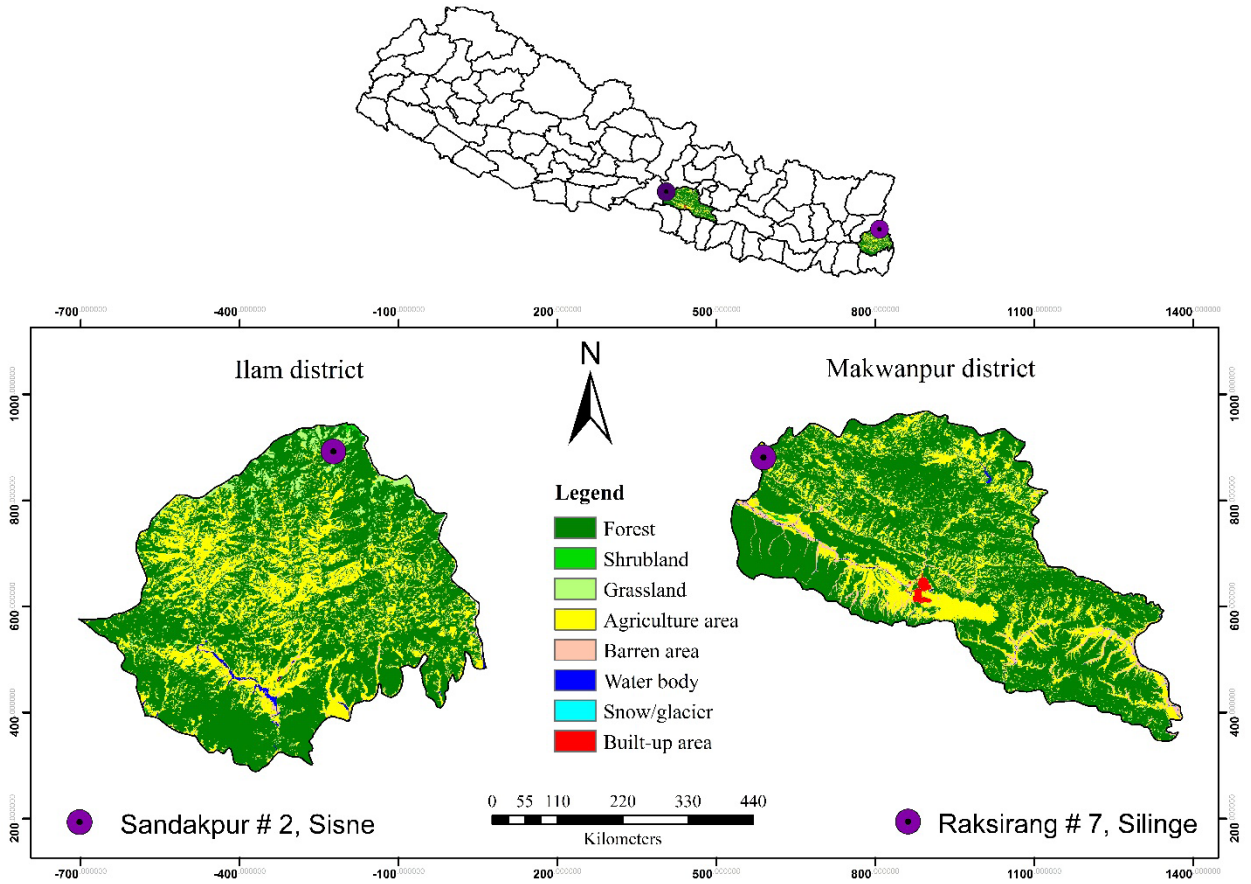

Fig. 2 - Map showing records of *Harpiocephalus harpia* in Raksirang # 7, Siling, Makwanpur and Sandakpur # 2, Sisne, Ilam. Green color represents Forest and yellow color represents agriculture area. Source map: The map taken from National land cover 2010 (Uddin et al. 2015)

The dorsal and ventral pelage was thick and extremely soft, dorsally with bright rufous hair tips, darker roots, and greyish ventrally (Fig. 4). The tail tip extended 2.34 mm from the interfemoral membrane. External measurements were in line with the range given by Bates & Harrison (1997) (Table 1). Both females showed post-lactating nipples.

The current records from Silinge, Makwanpur district 830 m.a.s.l. and Sisne, Ilam district 1943 m.a.s.l. are the first and second locality records of *H. harpia* in Nepal. The locality in Ilam is close to the Sikkim and Darjeeling records in India (Bates & Harrison 1997), whereas Makwanpur represents a remarkable extension of the specie range as it is approximately 400 km westward from its previously known distribution area. Reduction and fragmentation of habitat are major threats all over the country. Using citizen science and different strategies to increase awareness of the current bat conservation need will be an effective way to protect this species and other species of bats.

Fig. 3 - Recorded habitat of *Harpiocephalus harpia* in Raksirang, Makawanpur, arid and village area (A) and Sandakpur, Ilam, over the Mai river (B).

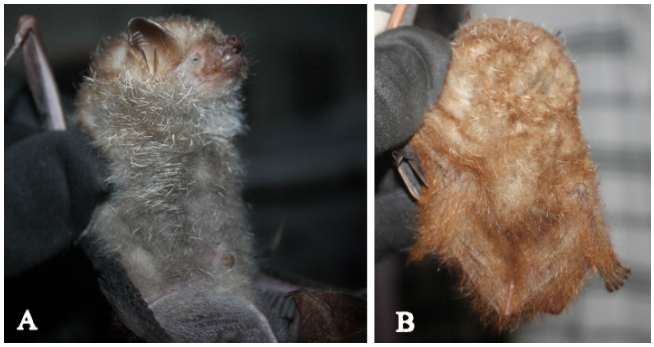

Fig. 4 - Live portrait of *Harpiocephalus harpia* from Ilam showing the pelage from a lateral (A) and dorsal (B) view.

Table 1 - External measurements of *H. harpia* from Nepal (in mm) with reference ranges from Bates & Harrison (1997). T – Tail length, E – Ear length, H.F. – Hindfoot length, TIB – Length of the tibia, F.A. – Forearm length, Tr – Tragus, 5MT – Fifth metacarpal, 4MT – Fourth metacarpal, 3 M.T. – Third metacarpal, 1ph3MT – First phalanx of the third metacarpal, 3D1P – First phalanx of the third digit, 2ph3MT- Second phalanx of the third metacarpal, 3D2P – Second phalanx of the third digit, 1ph4MT – First phalanx of the fourth metacarpal, 4D1P – First phalanx of the fourth digit, 2ph4MT – Second phalanx of the fourth metacarpal, 4D2P – Second phalanx of the fourth metacarpal, 1ph5MT – First phalanx of the fifth metacarpal, 5D1P – First phalanx of the fifth digit, 2ph5MT – Second phalanx of the fifth metacarpal, 5D2P – Second phalanx of the fifth digit

Morphometric characteristics	Raksirang, Makwanpur 30th of August, 2016	Raksirang, Makwanpur 4th of September, 2016	Sandakpur, Ilam 5th of April, 2021	Bates & Harrison (1997)
T (mm)	51	47		40.00-50.00
E (mm)			17.13	17.00-18.00
HF (mm)	11	9	11.04	11.00-14.00
TIB (mm)	21	21	22.57	
FA (mm)	52	51	49.72	44.10-50.10
Tr (mm)	11	11	8.74	
5MT (mm)	46	46	47.48	42.20-47.2
4MT (mm)	47	45	47.94	42.30-47.60
3MT (mm)	51	50	49.18	44.40-49.00
1ph3MT (3D1P) (mm)	23	24	21.27	
2ph3MT (3D2P) (mm)		22	20.58	
1ph4MT (4D1P) (mm)	15	16	14.23	
2ph4MT (4D2P) (mm)	17	17	17.03	
1ph5MT (5D1P) (mm)	14	15	13.78	
2ph5MT (5D2P) (mm)	16	15	15.85	

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REFERENCES

BATES, P. J. J. & HARRISON, D. L. (1997). Bats of the Indian Subcontinent. ed.: Harrison Zoological Museum. Kent, UK, 258 pp.

CSORBA, G., BUMRUNGSRI, S., FRANCIS, C., BATES, P., ROSELL-AMBAL, R. G. B., TABARANZA, B., HEANEY, L., MOLUR, S. & SRINIVASULU, C. (2019). *Harpiocephalus harpia*. The IUCN Red List of Threatened Species 2019: e.T99711843A22045367. https://doi.org/10.2305/IUCN.UK.2019-3.RLTS.T99711843A22045367.en

INGLE, N. R. (1992). The natural history of bats on Mt. Makiling, Luzon Island, Philippines. *Silliman Journal*, 36(1): 1-26.

LIM, V-C., RAMLI, R., BHASSU, S. & WILSON, J-J. (2017). A checklist of the bats of Peninsular Malaysia and progress towards a DNA barcode reference library. *Plos One*, 12(7): e0179555. https://doi.org/10.1371/journal.pone.0179555

LIN, L-K., HARADA, M., MOTOKAWA, M. & LEE, L-L. (2006). Updating the occurrence of *Harpiocephalus harpia* (Chiroptera: Vespertilionidae) and its karyology in Taiwan. *Mammalia*, 70(1-2): 170-172. https://doi.org/10.1515/MAMM.2006.024

MOLUR, S., MARIMUTHU, G., SRINIVASULU, C., MISTRY, S., HUTSON, A. M., BATES, P. J. J., WALKER, S., PRIYA, K. P. & PRIYA, A. R. B. (2002). Status of South Asian Chiroptera: Conservation Assessment and Management Plan (C.A.M.P.). Workshop report. ed.: Zoo Outreach Organisation, Conservation Breeding Specialist Group South Asia, and Wildlife Information & Liaison Development Society. Coimbatore, India, 154 pp.

SOISOOK, P., KARAPAN, S., SATASOOK, C. & BATES, P. J. J. (2013). A new species of *Murina* (Mammalia: Chiroptera: Vespertilionidae) from peninsular Thailand. *Zootaxa*, 3746(4): 567-579. https://doi.org/10.11646/zootaxa.3746.4.4

TANG, X., YU, W. & WU, Y. (2020). Mitochondrial genome of the *Harpiocephalus harpia* (Chiroptera: Vespertilionidae) from China. *Mitochondr DNA Part B*, 5(1): 996-998. https://doi.org/10.1080/23802359.2020.1720539

THONG, V. D., DENZINGER, A., SANG, N. V., HUYEN, N. T. T., THANH, H. T., LOI, D. N., NHA, P. V., VIET, N. V., TIEN, P. D., TUANMU, M. -N, et al. (2021). Bat diversity in Cat Ba biosphere reserve, Northeastern Vietnam: a review with new records from mangrove ecosystem. *Diversity*, 13(8): 376. https://doi.org/10.3390/d13080376

UDDIN, K., SHRESTHA, H. L., MURTHY, M. S. R., BAJRACHARYA, B., SHRESTHA, B., GILANI, H., PRADHAN, S. & DANGOL, B. (2015). Development of 2010 national land cover database for the Nepal. *J Environ Manage*, 148: 82-90. https://doi.org/10.1016/j.jenvman.2014.07.047

VELAZCO, P. M. & PATTERSON, B. D. (2008). Phylogenetics and biogeography of the broad-nosed bats, genus *Platyrrhinus* (Chiroptera: Phyllostomidae). *Mol Phylogenet Evol*, 49(3): 749-759. https://doi.org/10.1016/j.ympev.2008.09.015

ZENG, X., CHEN, J., DENG, H., XIAO, N. & ZHOU, J. (2015). A new species of *Murina* from China (Chiroptera: Vespertilionidae). *Ekoloji*, 27(103): 9-16.