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**Short Note**

Vipin Chaudhary* and Rakesh S. Tripathi

# First record of Little Indian field mouse, *Mus booduga* (Gray 1837) (Rodentia: Muridae), from cold arid region of Leh-Ladakh, Jammu and Kashmir, India

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**Abstract:** *Mus booduga* (Gray 1837) is a mesic rodent, recorded for the first time from the cold arid region of Leh-Ladakh, Jammu and Kashmir, India. The species was collected from crop fields and nearby areas from different altitudes ranging from 3187 to 3768 m above mean sea level. The paper describes the external measurements and diagnostic features of *M. booduga* collected from Leh-Ladakh region. Earlier records had shown its altitudinal distribution from 250 to 3695 m above mean sea level from Uttarakhand in the Himalayan region, however in the present study the mouse was collected up to an altitude of 3768 m which is the highest elevational record of this species for the Himalayan range.

**Keywords:** altitude; distribution; Leh; *Mus booduga*; trapping.

Q1: The text "*Leggada booduga* Gray, Charlesworth's Mag. Nat. Hist. 1:586" seems to be unclear in the sentence "Little Indian field.....". Please check and amend

Rodents are one of the most diverse groups of mammals with 2277 species recorded worldwide, whereas 103 species have been reported from India (Wilson and Reeder 2005, Pradhan and Talmale 2009). The Little Indian field mouse, *Mus booduga* (Gray 1837) (*Leggada booduga* Gray, Charlesworth's Mag. Nat. Hist. 1:586) is one of the smallest and widely distributed rodent species in India. Perusal of extant literature revealed that the Little Indian field mouse is distributed in East Pakistan, India, South Nepal, Sri Lanka and Bangladesh (Blanford 1891, Ellerman 1961, Chesemore 1970, Roberts 1977, Posamentier 1989, Aplin et al. 2016). A recent molecular phylogeny by Shimada concluded that the Myanmar *Mus* previously attributed to *M. booduga* were representing a different clade (Shimada et al. 2010) and these authors retracted the distribution range of the species in the East to Bangladesh. In India *M. booduga* is reported from almost every part of country viz., from Arunachal Pradesh in the east to Rajasthan and Gujarat in the west and from Jammu and Kashmir in the north to Tamil Nadu and Andaman and Nicobar Islands in the south (Hinton and Lindsay 1926, Ellerman 1961, Biswas and Tiwari 1966, Prakash et al. 1971, Sharma and Sharma 1976, Mandal 1981, Chakraborthy 1983, Agrawal 2000, Idris et al. 2003, Birah et al. 2012).

The earliest record of rodents of British India by Blanford (1891) did not mention occurrence of *Mus booduga* from the Himalayan region, however Wroughton (1914) for the first time reported it from the Kumaon region in Nainital and Almora Districts in Uttarakhand at altitudes varying from 250 to 2155 m above mean sea level. Lindsay (1926) has also reported it from Gopalpur (*c* 2770 m) (Kangra Valley, Himachal Pradesh). Agrawal (1980) and Mandal (1981) reported its occurrence from the eastern offshoot of the Himalayas in North Eastern Hill regions including Arunachal Pradesh. Mandal (1984) reported this species from Nelang village in Uttarkashi district (Uttarakhand) which, till the present report, was the highest altitudinal range (*c* 3695 m) of distribution of *M. booduga* in the Himalayas. Regarding its distribution in Jammu and Kashmir State (India), the species has been mainly reported from Jammu sector (*c* 315 m) by Varma (1968); Punch, Udhampur, Jhajjar Kotli and Bhaderwah by Sharma and Sharma (1976) and Chakraborthy (1983).

However, the present study, for the first time reports its occurrence at high altitudes in cold arid regions of Leh-Ladakh (Jammu and Kashmir). In the field surveys undertaken during June–September, 2014–2016, *Mus booduga* was collected from crop fields and field stores in rural areas and from stores and godowns in urban areas of Leh-Ladakh district (Jammu and Kashmir) at an altitudinal ranges from 3187 to 3768 m above mean sea level. This field mouse was the only rodent species recorded from crop fields and field stores, however in urban areas of Leh the species inhabited the stores and godowns along with Turkish rat, *Rattus pyctoris* (Hodgson 1845) (Table 1). During the study period, 44 specimens of *M. booduga* were collected using live Sherman traps. The males (27)

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**Table 1:** Collection localities of *Mus booduga* in Leh-Ladakh region (Jammu and Kashmir).

| Villages | Elevation (m) | Latitude | Longitude | General habitat |
|---|---|---|---|---|
| Stakmo | 3768 | 34° 2′ 8.02″ N | 77° 43′ 16.49″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Sankar | 3572 | 34° 10′ 26.58″ N | 77° 35′ 7.61″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Saboo | 3550 | 34° 7′ 58.36″ N | 77° 38′0.83″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Stakna | 3288 | 34° 0′ 18.13″ N | 77° 41′ 6.54″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Thiksey | 3259 | 34° 3′ 24.57″ N | 77° 40′ 1.06″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Chuchot Gongma | 3258 | 34° 2′ 8.02″ N | 77° 43′ 49″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Shey | 3250 | 34° 4′ 23.45″ N | 77° 38′ 21.45″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Choglamsar | 3236 | 34° 6′ 42.36″ N | 77° 35′ 15.83″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Phey | 3187 | 34° 8′ 0.55″ N | 77° 27′ 57.22″ E | Crop fields (*Hordeum vulgare*, *Triticum aestivum*, *Phragmites australis*) |
| Leh city | 3407 | 34° 9′ 9.30″ N | 77° 34′ 37.39″ E | Godowns (stored rice and wheat grain) |

outnumbered the females (17) in the collection (sex ratio: 1.59:1.0). All the trapped animals were released to the site of capture after recording their body weight (g), external measurements (mm) and diagnostic characteristics. However, one female specimen was sent to Zoological Survey of India (ZSI) for confirmation of identification. The specimen was identified as *M. booduga* (Gray 1837) and deposited as National Zoological Collection vide registration No. V/3582, at Desert Regional station (DRS), ZSI, Jodhpur (Rajasthan), India. We provide here a description and measurements of its diagnostic characteristics.

The external measurements of the specimens are as follows: (mean ± standard error of mean): head body (HB): ♂ 69.88 ± 7.11 mm ♀ 73.23 ± 4.49 mm; tail length (Tl): ♂ 69.48 ± 8.03 mm ♀ 73.29 ± 5.87 mm; hind foot (Hf): ♂ 16.52 ± 1.01 mm ♀ 16.47 ± 1.12 mm; ear (E): ♂ 10.41 ± 1.05 mm ♀ 11.05 ± 1.20 mm.

The cranial measurements obtained for specimen V/3582 (one female) are: occipitonasal length (onl): 17.5 mm; condylobasal length (cbl): 16.9 mm; length of nasals (nasl): 6.5 mm; palatal length (pal): 10.7 mm; length of maxillary tooth row (mtr): 3.8 mm; length of diastema (dial): 3.1 mm; length of tympanic bulla (bl): 3.2 mm; length of anterior palatal foramina (apf): 3.2 mm; zygomatic width (zw): 10.3 mm; interorbital width (iw): 3.1 mm; mandibular length (ml): 7.2 mm.

Other characteristics: the body weight of *Mus booduga* in the present collection showed no significant variation between sexes. The pool data on body weight ranged between 15 and 25 g (mean ± standard error of mean: 17.06 ± 0.68 g). Tl was 100% or slightly less than HB length. Dorsal surface was dark brown with soft fur and the ventral surface white in colour with a bicoloured tail (dark above and light below). Forelegs and hind feet were with four and five toes, respectively, all bearing claws.

All these characteristics and measurements fit within the original diagnostic characteristics of *Mus booduga* except that the HB of the newly collected specimens is slightly larger than the mean HB reported in the literature (i.e. mean HB: 69 and 73 mm in present collection against 56–63 mm as reported by Agrawal 2000). But for the other external characteristics the specimens fit within the range variation of the species. The new collected specimens of *M. booduga* from a cold arid region differed in the colour of their dorsum (dark brown) compared to those inhabiting hot arid regions viz., Bikaner, Jodhpur, Pali, Sirohi in Rajasthan (light brown or sandy colour), however the venter in both the collections were white.

Mandal (1984) reported the highest altitudinal record of *Mus booduga* from Nelang (*c* 3695 m) of the Himalayan region in Uttar Kashi District, Uttarakhand. However, in the present study, the mice have been recorded from altitudes ranging from 3187 to 3768 m above mean sea level, which may be regarded as the highest altitudinal distribution record of mice in the Himalayan region. From the observations it may be concluded that croplands and field stores provide an ideal habitat for Little Indian field mouse as it supplies energy rich food and safe shelter for survival in cold arid regions.

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Q3: Please check and confirm the acknowledgment section

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