

# The craniodental structure of a Large-toothed Ferret Badger *Melogale personata* from Nepal

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## Abstract

Large-toothed Ferret Badger *Melogale personata* and Small-toothed Ferret Badger *Melogale moschata* are challenging species to visually differentiate in the field. Only an inspection and measurement of the teeth can confirm the species. After a gap of about 185 years, there have recently been several records of Large-toothed Ferret Badger from different parts of central Nepal, although the identifications have not all been based on dentition. The specimen described herein was differentiated from Small-toothed Ferret Badger on the basis of dentition (specifically the larger fourth premolar). This record, from Godawari, Lalitpur District, strengthens the evidence that the Large-toothed Ferret Badger is found further west than is shown on the current IUCN distribution map.

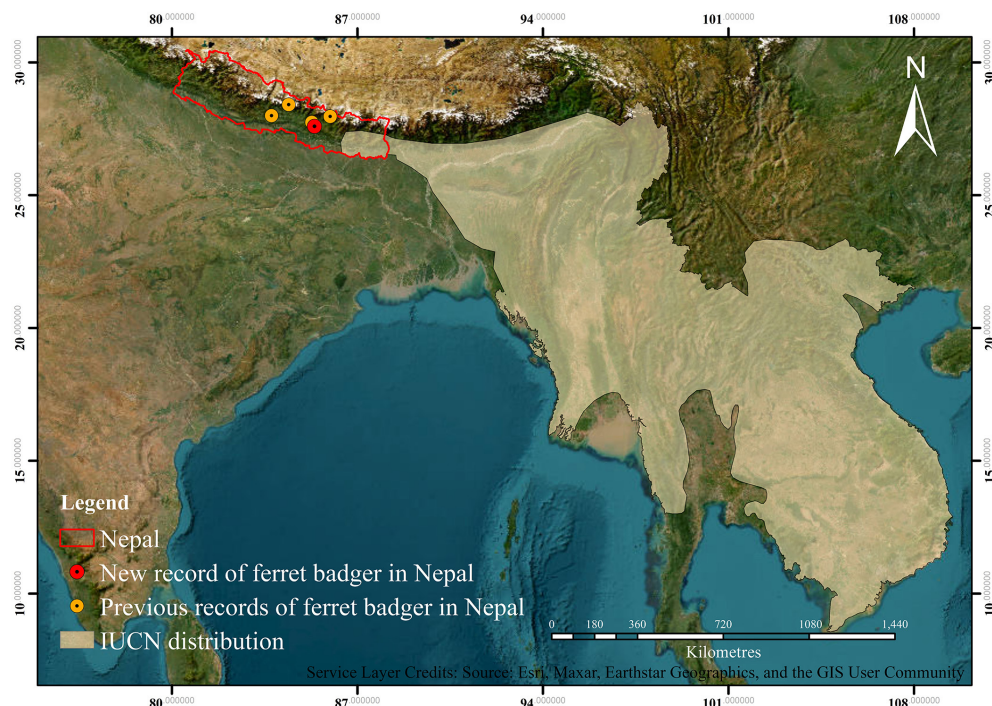
**Keywords:** dentition, *Melogale moschata*, morphology, Mustelidae, skull, Small-toothed Ferret Badger

The Large-toothed Ferret Badger *Melogale personata* is a relatively large ferret badger, with a total length of 550 to 630 mm and weighting 1.8 kg (Pocock 1941). It has been recorded in north India, Nepal, Bangladesh, Myanmar, Thailand, Cambodia, Laos, Vietnam and South China (Pocock 1941, Kakati et al. 2014, Duckworth et al. 2016, Baral et al. 2022).

Small-toothed Ferret Badger *Melogale moschata* and Large-toothed Ferret Badger *M. personata* are sympatric in much of their known ranges (Proulx et al. 2016). As the pelage varies considerably within each species, and many of the main pelage character-

istics overlap in size, color and uniformity between the two species, the pelage cannot be used to distinguish them. The only reliable morphological features for differentiating the two species are differences in dental characteristics and the temporal crest on the skull (Allen 1938, Pocock 1941).

A dead male ferret badger was found on 22 November 2022 by Father Vijay Toppo S. J. near the St. Xavier's school, Godawari Municipality ward number 3, Lalitpur District, Bagmati Province, Nepal (27°35'13"N, 85°22'47"E and elevation 1540 m asl; Figs. 1, 2). The dead animal was found just outside



**Fig. 1.** The red dot shows the new record of Large-toothed Ferret Badger *Melogale personata* from Godawari, Nepal; yellow dots show the previous records of species from different parts of Nepal and the species's mapped distribution from The IUCN Red List of Threatened Species (Duckworth et al. 2016).

**Table 1.** Craniodental measurements of the skull of the Large-toothed Ferret Badger *Melogale personata* (Natural History Museum, Tribhuvan University, accession number 249) collected in Godawari, Lalitpur District, Nepal.

| No. | Characters   | Values (mm) |
|-----|--|-------------|
| 1   | Condylobasal length  | 67.87       |
| 2   | Neurocranium length  | 41.82       |
| 3   | Viscerocranium length  | 38.07       |
| 4   | Minimum palatal length   | 8.02        |
| 5   | Palatal length   | 36.56       |
| 6   | Maxillary tooth-row length   | 25.47       |
| 7   | Length of upper carnassial tooth   | 8.48        |
| 8   | Greatest length between oral border of auditory bulla and aboral border of occipital condyle | 20.60       |
| 9   | Length of auditory bulla   | 15.83       |
| 10  | Zygomatic width  | 44.41       |
| 11  | Mastoid width of skull   | 32.14       |
| 12  | Postorbital width  | 19.00       |
| 13  | Interorbital width   | 18.95       |
| 14  | Width of rostrum   | 11.99       |
| 15  | Greatest palatal width   | 23.61       |
| 16  | Width of auditory bulla  | 10.56       |
| 17  | Width of upper molar   | 7.52        |
| 18  | Cranial height   | 30.82       |
| 19  | Total length of mandible   | 50.93       |
| 20  | Length between angular process and the intra-dental  | 49.63       |
| 21  | Mandibular tooth row length  | 30.41       |
| 22  | Length of lower carnassial tooth   | 8.23        |
| 23  | Height of vertical mandibular ramus  | 23.06       |
| 24  | Length of upper molar  | 4.20        |
| 25  | Length of upper canine   | 7.84        |
| 26  | Width of upper canine  | 3.38        |
| 27  | Length of lower molar  | 2.87        |
| 28  | Width of lower molar   | 2.71        |
| 29  | Width of lower carnassial tooth  | 4.14        |
| 30  | Talonid length of lower carnassial tooth   | 3.53        |
| 31  | Length of lower premolar   | 3.41        |
| 32  | Width of upper second premolar   | 1.66        |
| 33  | Height of upper second premolar  | 2.09        |
| 34  | Width of lower second premolar   | 3.28        |
| 35  | Height of lower second premolar  | 3.72        |

the boundary of the school. This area is bordered by a community forest, the National Botanical Garden and a suburban residential area. The National Botanical Garden is in the southern corner of the Kathmandu Valley and in the foothills of the Phulchowki Mountain. The habitat of the area includes mixed broad-leaved forest (Lamichhane et al. 2014).

The animal was given to the Natural History Museum, Tribhuvan University, Swayambhu, Kathmandu District. Three sets of craniodental measurements were taken using a Freemans FDC 150 digital caliper and the average values recorded (Table 1). Photographs of the skull were taken using an EOS 1100D Canon DSLR camera with an 18–55 mm lens (Fig. 3). The measurements taken followed Thomas (1922) and Nadler et al. (2011). The skin and skull of the specimen were preserved at the Natural History Museum, Tribhuvan University (accession number 249).

The specimen was identified as Large-toothed Ferret Badger on the basis of the large size of its upper fourth premolar, which is considered diagnostic feature (Schank et al. 2009, Mudappa 2013, Abramov & Rozhnov 2014).

Two species of badger-like mustelids – Ratel *Mellivora capensis* and Large-toothed Ferret Badger *Melogale personata* are known from Nepal (Amin et al. 2018). There have been four published records of Large-toothed Ferret Badger in Nepal since 2020 (Table 2). One of these was a camera-trap photograph taken in Shivapuri Nagarjun National Park, Kathmandu District (Koju et al. 2021), about 25 km east of the site where the dead specimen we describe here was found. However, camera-trap photographs cannot be reliably used to distinguish between Large-toothed and Small-toothed Ferret Badgers. The other three records were in Surichaur, Lamjung

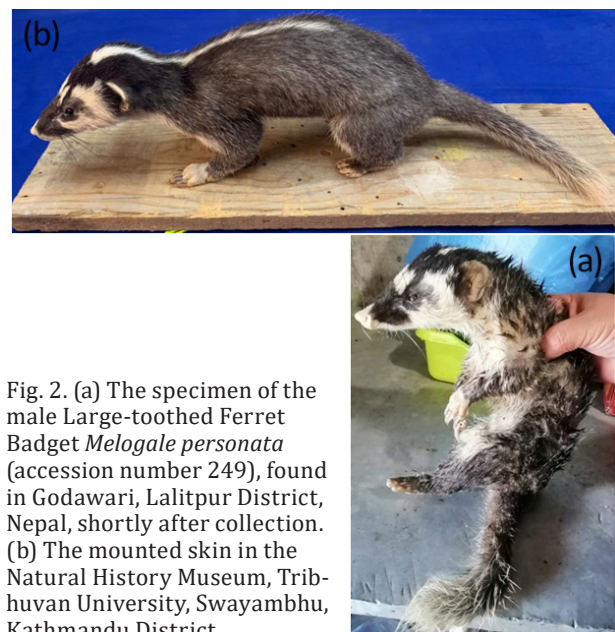
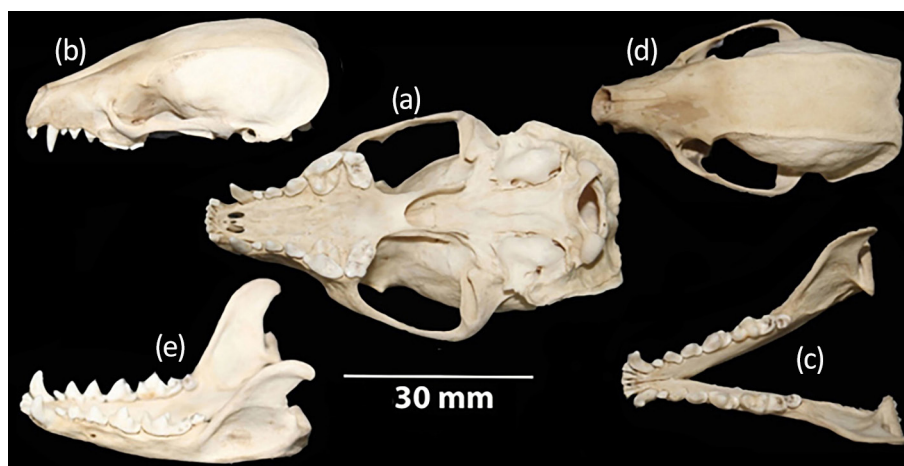


Fig. 2. (a) The specimen of the male Large-toothed Ferret Badger *Melogale personata* (accession number 249), found in Godawari, Lalitpur District, Nepal, shortly after collection. (b) The mounted skin in the Natural History Museum, Tribhuvan University, Swayambhu, Kathmandu District.



**Fig. 3.** Skull of the Large-toothed Ferret Badger *Melogale personata* (Natural History Museum, Tribhuvan University: accession number 249): (a) ventral view; (b) lateral view; (c) occlusal aspect of mandible; (d) dorsal view; (e) lateral view of mandible.

District (Baral et al. 2022), Bhotekoshi, Sindupalchok District (Pathak et al. 2022) and in Waling, Syangja District (Bhatta et al. 2021). However, only Baral et al. (2022) based the identification of some of their records on the relative size of the upper fourth premolar. The record detailed in this paper is the first confirmed record of Large-toothed Ferret Badger in the Kathmandu Valley.

### Acknowledgements

We would like to express our sincere gratitude to the Father of St. Xavier's School, Vijaya Toppo, and Asmita Thapa, Godawari, for the coordination and hand-over of the dead specimen of the Large-toothed Ferret Badger to the Natural History Museum, Tribhuvan University, Swayambhu, Kathmandu District, Nepal, and for providing information. The comments and suggested revisions by Alexei Abramov greatly improved the quality of this paper.

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**Table 2.** Published records of Large-toothed Ferret Badger *Melogale personata* from Nepal since 2017.

| District                                   | Elevation (m asl) | Date of record(s)       | Characters         | Record type                                |
|--|-------------------|-------------------------|--------------------|--|
| Shivapuri Nagarjun National Park Kathmandu | 1400              | November 2017           | Koju et al. 2021   | Camera-trap                                |
| Syangja                                    | 975               | June 2020               | Bhatta et al. 2021 | Live observation of a juvenile             |
| Lamjung                                    | 1024              | January 2017, July 2020 | Baral et al. 2022  | Two live observations and two dead animals |
| Sindhupalchok                              | 1617              | January 2021            | Pathak et al. 2022 | Live observation                           |
| Lalitpur                                   | 1540              | November 2022           | This paper         | Dead male                                  |





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