

Observation on the re-occurrence of Nicobar spiny shrew (*Crocidura nicobarica* Miller, 1902): A critically endangered mammal of Great Nicobar Island, India

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Abstract

The re-occurrence of Nicobar spiny shrew *Crocidura nicobarica* a critically endangered and endemic species was found at Great Nicobar Island during the survey. The morphological and osteological and its behavioral observations have been analyzed in this paper after its original description by Miller (1902).

Keywords: *Crocidura nicobarica*, Endangered Mammal, Great Nicobar Island, Spiny Shrew

Introduction

Andaman and Nicobar Islands located in the Bay of Bengal are endowed with a variety of faunal communities. These Islands are situated between the 6°-14°N latitudes and at 91°-94°E longitudes. Large size mammals are absent in both Andaman and Nicobar Islands except for a few introduced animals such as elephants, chital, barking deer, hog deer and feral goat (Rodgers and Panwar, 1988; Mohanty, 2017). Great Nicobar is the northernmost island and it incorporates 885 sq.km/ arch of Great Nicobar Biosphere Reserve (GNBR) which declared in the year 1989 under the Man and Biosphere Reserve Programme. GNBR harbors several endemic and endangered fauna in its various types of ecosystem includes rodents, bats, birds, amphibians, reptiles (Miller, 1902; Saha, 1980; Pande *et al.*, 1991). Though GNBR is one of the tsunami affected areas in India, the impact of natural calamities such as earthquakes and tsunamis are studied only for a few species present in this island. This island comprises the last remaining distinct forest types compared with those of the mainland (Rodgers and Panwar, 1988). It includes deciduous, moist evergreen forests, perennial rivers, streams and grasslands. Endemic

mammals and their ecology, distribution and status are little known from these islands. In GNBR, mammalian ecology and their population estimation are not well explored so far. In Nicobar Islands the wild pig (*Sus scrofa andamanensis* Linnaeus, 1758), Crab eating macaque (*Macaca fascicularis umbrosa* Miller, 1902), Nicobar flying fox (*Pteropus faunulus* Miller, 1902), Nicobar tree shrew (*Tupaia nicobarica* Zelebor, 1869) are common, among these the Nicobar spiny shrew (*Crocidura nicobarica* Miller, 1902) is listed as most threatened species in IUCN Red lists and baseline information is deficient.

Study Area

The present study work was carried out in Great Nicobar Island, the southernmost and largest island in the Nicobars. Great Nicobar Biosphere Reserve comprises two national parks Galatea and Campbell Bay National Parks. It harbors wide range of ecosystems with variety of fauna and flora. In 2013 it included in the man and biosphere programme of UNESCO. The Nicobarese and Shompens are the two indigenous communities living in this Island. Mount Thulier is the highest peak (657 meter msl) in this island.

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Material and Methods

Surveys were carried out in the month of August, 2012 to study the terrestrial faunal communities of GNBR. During the course of the survey single specimen of *Crocidura nicobarica* was collected by using Pit fall traps from Laxmi Nagar in Great Nicobar Island (Lat. 6° 53'375' N, Long 93° 53' 178' E, Ele-70 ft). Pit fall traps were placed in random locations and monitored on daily basis. The area was covered with dense to moderately dense forest and dense undergrowth vegetation. The species designation of the specimen was uncertain during the time of collection. The morphological characters of the animal were examined and compared with original description made by Miller (1902). Skull and dentition photographed by Leica light microscope. The specimen was preserved and deposited in the National Zoological Collection of the Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair.

Results

Material examined: One sexually matured female, length 20.5 cm, Reg.No.ZSI/ANRC-2887.

Systematics

Phylum CHORDATA
Class MAMMALIA
Order SORICOMORPHA
Family SORICIDAE Fisher, 1817
Sub-family CROCIDURINAE
Genus *Crocidura* Wagler, 1832
Crocidura nicobarica Miller, 1902

Taxonomic remarks: *Crocidura nicobarica* is endemic to Great Nicobar Island and there is no other species reported so far in this sub family from Nicobar group of islands.

Morphological Features

It was very shy and fast moving animal in the field

Fur: Very dense pelagic fur, middle of the body has slightly spiny hairs sized 6 mm in length and its looks like bristle interspersed with few longer thin hairs. The ventral side fur is very dense, short and soft. Short, velvety furs

covered on the part of lower jaw. Long and black colored Vibrissae are present in the upper jaw (Plate 1)

Colour: The color pattern differs between the dorsal and ventral surface. The dorsal surface is olive brown, silver colour reflected by light on hairs. Ears faintly dark brownish, tail and feet are uniformly pale brown color. In ventral, chest is sooty brown; between the hind limb light brownish washed with gray color. (Figure 1).

Tail: Tail unicolored, Bristle hairs sparsely present in two third of the tail. Tip of the tail is not sharper (Plate 1)

Mammary glands: There are two inguinal mammary glands on each side. Looks like two separate spots without surrounding hairs.

Head: Head and snout sized 3.6 cm. Snout has numerous long black hairs on both sides, the tip of the snout is divided into two, nostrils open at tip of the snout. The eyes are very small, naked, without eyebrow. Ears have small outer pinna covered with short brownish fur on its outer surface.



Figure 1. Field photograph of *Crocidura nicobarica* Miller, 1902.

Skull and Dentition

The skull is characterized by slightly domed braincase and slender rostrum. Inter- orbital region is shorter. Pair of upper incisor is larger than other succeeded teeth. The genus *Crocidura* is characterized by the possession of three upper unicuspid teeth, unicuspids are heavy. First

unicuspid is slightly larger than other two. The second and third are sub-equal in size. Premolar and molar edges are not overlapped. The third molar tooth is medium in size. The third molar teeth is consistently small than other (Plate 2)

Comparison

The comparative morphological features of two species of *Crocidura* such as *Crocidura andamanensis* and *Crocidura nicobarica* are given in Table 1 and 2. Morphometry of this species is distinguishable among the other species of *Crocidura* known from oriental region. Miller noted that *Crocidura nicobarica* is distinct by its very large size, sooty brown colour pattern. Hence, Miller, 1902 placed this animal in separate species designation. Skull and dentition clearly shows that the specimen was not from the genus *Suncus*. Three upper unicuspid teeth are distinguished characters of this genus *Crocidura*.

The skull has consistently different measurements (See Table 1). Morphological characters such as dorsal sooty brown color, interspersed spiny silvery hairs and white long hairs on tail distinguished this species from other genus. Comparable cranial measurements and similar morphological characters with the description of Miller, 1902 strongly support this species comes under the genus *Crocidura* and must be consider as possible the species *Crocidura nicobarica* represented from Great Nicobar island.

Discussion

Soricidae family is very large which comprises of 26 genus and 376 species around worldwide. Among them, 9 genus and 31 species is found in south Asia. Where as in India is represented by 24 species under 9 Genera (Molur *et al.*, 2005). This is a very ancient family with modern genera appearing in the Miocene period at Eurasia and it has

Table 1. Comparative morphometry of two species of the genus *Crocidura* (Measurements in mm)

Category	<i>Crocidura andamanensis</i> , Miller, 1902	<i>Crocidura nicobarica</i> Miller, 1902	<i>Crocidura nicobarica</i> Miller, 1902 (Present work)
TL	200	210	205
HB	114	120	120
T	86	90	85
HF	26	24	19
HL	-	-	36
FLL	-	-	23
HLL	-	-	35
GL	25.6	27	27
BL	24.8	26	25.4
PL	11	11.8	12
BL	22	24	25
WPMM	3.2	3.6	4
MB	11	11.6	12
LB	6	6.2	5
M	15	15	15
MTR	12	12.8	8
MR	11	12	7

(TL - Total Length, HB - Head and Body, T - Tail, HF - Hind Foot, HL - Head Length, FLL - Fore Limb Length, HLL - Hind Limb Length. Cranial Measurements - GL - Greatest Length (exclusive of incisors), BL - Basal Length, PL - Palatal Length, BL - Basilar Length, WPMM - Width of Palate between Middle Molars, MB - Mastoid Breadth, LB - Lachrymal Breadth, M - Mandible (without incisor), MTR - Maxillary Tooth Row, MR - Mandibular Tooth Row)

two sub families Crocidurinae (white toothed shrew) and Soricinae (red toothed shrew) (Dotsch and Koenigswald, 1978). The sub-family Crocidurinae belongs to Soricomorpha (Molur *et al.*, 2005) where it comes under former order Insectivora which represented 3 genus and 16 species in India and 4 genus 20 species in south Asia. Among these 3 genera the species *Crocidura nicobarica* is endemic to Great Nicobar Island. Crocidurinae possesses un-pigmented tooth (Alfred *et al.*, 2006) so that they were also named as white toothed shrew. Biodiversity hotspots are now faced critical situation due to human overexploitation, deforestation, introduction of species and developmental activities (Nair *et al.*, 1989). In spite of several studies there is no conclusive detailed information on the endemic mammals of Nicobar. The *Crocidura nicobarica* is one among them. It is commonly called Nicobar spiny shrew, Nicobar shrew, white toothed shrew and was described by Miller in 1902. Until now, during the period of 1975 the species was observed but doubtfully and there is no voucher specimen again from Campbell Bay National Park in Great Nicobar Island

(Saha S, 1980). In subsequent years there was no record of this species. Shrews were widely distributed throughout the world including India and they lives in all terrestrial habitats (Schmidt, 1994) mainly tropical moist deciduous and evergreen forests. Record of this species and its study indicates the need for more in-depth, rapid assessments. Further efforts like population estimation, habitat study and captive culture (Molur *et al.*, 2005) are very effective to recover the population.

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Plate 1. *Crocidura nicobarica* Microscopic structure a) Fore limb, b) Hind limb, c) Tip of tail, d) Dorsal fur, e) Long black hairs in snout, f) Long white hairs in tail and g) White tooth.

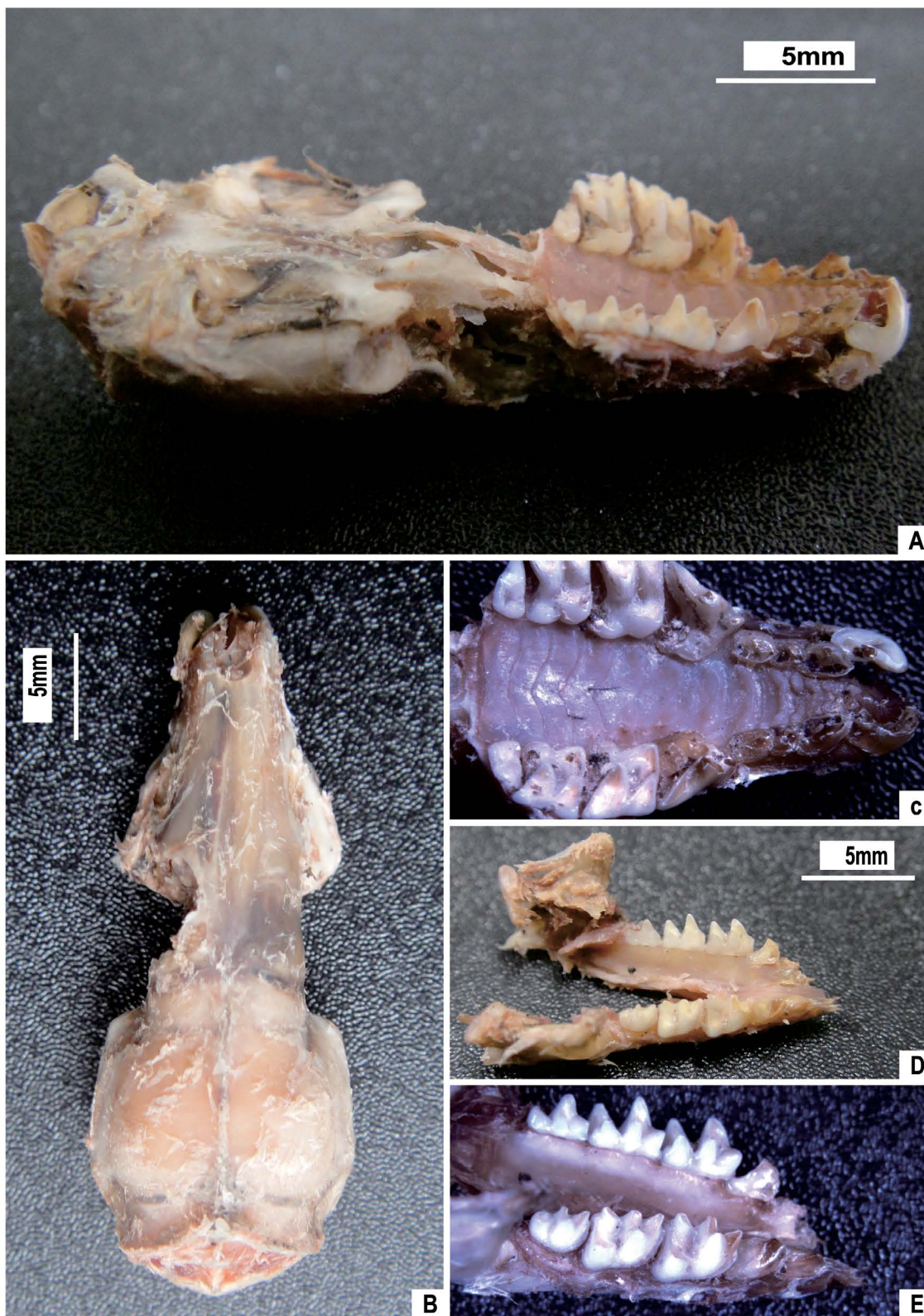


Plate 2. The skull and dentition of *Crocidura nicobarica* in Dorsal, ventral, microscopic view.