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### NOTE

#### RECORD OF THE WORLD'S BIGGEST PANGOLIN? NEW OBSERVATIONS OF BODYWEIGHT AND TOTAL BODY LENGTH OF THE INDIAN PANGOLIN *MANIS CRASSICAUDATA* GRAY, 1827 (MAMMALIA: PHOLIDOTA: MANIDAE) FROM MANNAR DISTRICT, SRI LANKA

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NOTE

## Record of the world's biggest pangolin? New observations of bodyweight and total body length of the Indian Pangolin *Manis crassicaudata* Gray, 1827 (Mammalia: Pholidota: Manidae) from Mannar District, Sri Lanka

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The Indian Pangolin *Manis crassicaudata* is one of the four extant pangolin species in Asia and, has a wide distribution across southern Asia, including eastern Pakistan, Sri Lanka, and India from the foothills of the Himalaya up to southern India (Mahmood et al. 2020). *M. crassicaudata* is a predominantly nocturnal and fossorial, medium-sized mammal (Mahmood et al. 2019). The global population of *M. crassicaudata* has been identified as Endangered (EN) by the IUCN, and the species has been further included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; Mahmood et al. 2019). According to the National Red List of Sri Lanka, the Indian Pangolin is listed as 'Near Threatened' (NT) (Weerakoon 2012). It is also included in the schedule II of the Flora and Fauna Protection Ordinance (Amendment) Act No. 22 of 2009 of Sri Lanka (Perera et al. 2017).

The Indian Pangolin is the only pangolin species occurring in Sri Lanka, and the species is distributed throughout the lowlands, from coastal habitats up to 1,850m (Perera & Karawita 2020). The Indian Pangolin

population in Sri Lanka may be of special interest as it is a geographically isolated population in the Indian subcontinent (Perera et al. 2020). The population size of *M. crassicaudata* in Sri Lanka is mostly unknown (Pabasara et al. 2015; Perera et al. 2017), and their distribution appears to coincide with the range of ants and termites (Philips 1926; Karawita et al. 2020). Recent studies suggest that their abundance tend to vary across the island with a few known locations such as Kurunegala, Puttalam, Anuradhapura, Monaragala, Hambantota, Polonnaruwa, Galle, Matara, and Kalutara districts having comparatively frequent records of occurrence (Karawita & Perera 2020; Perera & Karawita 2020). In Sri Lanka, the species has been recorded from a variety of natural, semi-natural, and human-modified habitats, including tropical lowland rain forests, dry-mixed evergreen forests, sub-montane to montane forests scrublands, croplands/ agricultural lands and rural home gardens (Karawita & Perera 2020).

The literature suggests that there are intra-specific variations in Indian Pangolin's morphometrics across

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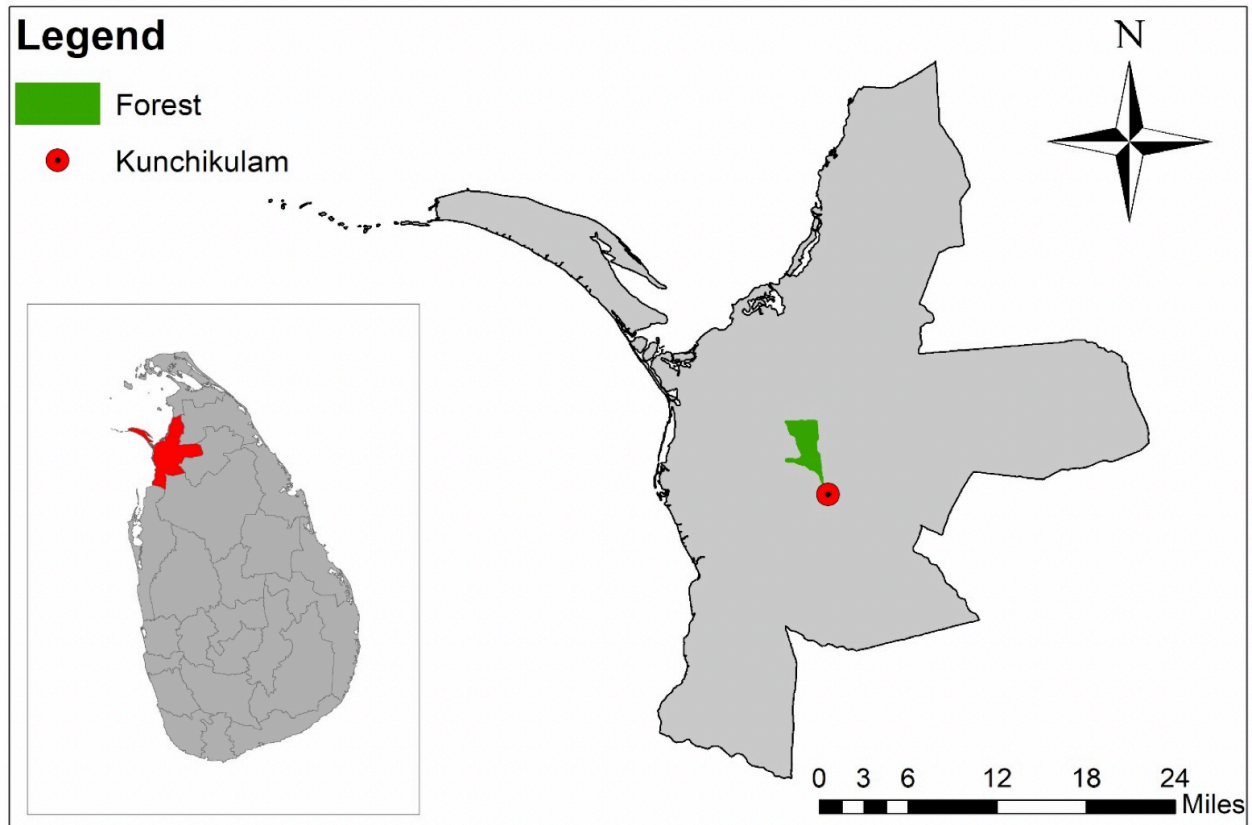


Figure 1. The Kunchikulam Forest in Mannar District, Sri Lanka where the two largest Indian Pangolin specimens were recorded.

its range (Mohapatra et al. 2015; Irshad et al. 2016; Ullmann et al. 2019). Such variations, however, remain poorly understood. Commonly reported morphometric measurements include bodyweight, total body length (length from snout to the tip of the tail), tail length, lengths of forelimbs and hindlimbs and scale frequencies (Irshad et al. 2016; Mahmood et al. 2020). Such morphometric measurements are used to define age classes and describe the sexual dimorphism of the species. For instance, Irshad et al. (2016) categorized Indian Pangolin into three age classes based on bodyweight (B) and total body length (TBL); Juveniles ( $\leq 2.5$  kg, 40–65 cm), sub-adults (2.51–8 kg, 66–120 cm) and adults ( $\geq 8$ kg,  $\geq 120$ cm). Algewatta et al. (2021) defined age classes for Indian Pangolin occurring in Sri Lanka based on bodyweight and total body length as juvenile (B:  $< 4.3$ kg TBL:  $< 56.0$ cm), subadult (B: 4.3–7.3kg TBL: 56–101 cm), and adult (B  $> 7.3$ kg TBL:  $> 101$ cm). Adult male Indian Pangolins are heavier and larger than females of the same age group (Mahmood et al. 2020).

During a study to understand the morphometric variations of *M. crassicaudata* occurring in Sri Lanka, we recorded two well-grown male pangolins killed by poachers at the Kunchikulam Forest Reserve in

Mannar District, Sri Lanka (08.75332N, 80.16419E) on 08 December 2019 (Figure 1). The two poachers were taken into custody on the same day by the Police Special Task Force, Sri Lanka, while the poached animals were

Table 1. Body measurements of the two Indian Pangolin specimens.

Specimen		KL 1	KL 2
Sex		Male	Male
Body weight(kg)		48.76	34.15
Total Length (cm)		176.8	157.5
Head Length (cm)		26.6	20.4
Snout Length (cm)		12.4	9.6
Body Length (cm)		58.8	61.50
Tail Length (cm)		91.5	75.6
Hind Foot Diameter (cm)		8.25	6.
Ear Length (cm)		14.00	10.20
Limb Lengths (cm)	Forelimb	16.5	12.7
	Hind-limb	14.0	10.2
Circumference (cm)	Shoulder	80.8	72.0
	Body	103.5	90.7
	Neck	42.0	37.2

**Table 2. Number of scales on each specimen by body regions.**

Specimen	Trunk	Head & Neck	Fore Limbs		Hind Limbs		Tail		Total
			Right	Left	Right	Left	Dorsal	Ventral	
KL1	145	90	48	45	38	38	78	56	538
KL2	138	87	45	45	39	41	73	52	520

**Table 3. Largest specimens recorded for the eight pangolin species recorded in the literature.**

Species	Largest Specimen Recorded		Reference
	Bodyweight (kg)	Total length (cm)	
Chinese Pangolin <i>Manis pentadactyla</i>	8.5kg	8.9cm	Shibao et al. (2004)
Indian Pangolin <i>Manis crassicaudata</i>	32.2kg	170.0cm	Sharma (2002)
Sunda Pangolin <i>Manis javanica</i>	9.1kg	137.5cm	Sulaiman et al. (2017), Save Vietnam's Wildlife (unpub. data)
Philippine Pangolin <i>Manis culionensis</i>	7.3kg	133.0cm	S. Schoppe, unpub. data
Black-bellied Pangolin <i>Phataginus tetradactyla</i>	3.6kg	93.7cm	Kingdon & Hoffmann (2013), Hatt et al. (1934)
White-bellied Pangolin <i>Phataginus tricuspis</i>	2.9kg	102.7cm	Kingdon & Hoffmann (2013), Hatt et al. (1934)
Giant Pangolin <i>Smutsia gigantea</i>	33.0kg 38.0kg	179.8cm 172.0cm	Kingdon (1971), Hatt et al. (1934), S. Nixon & N. Matthews (unpub. data), Newton et al. (2019)
Temminck's Pangolin <i>Smutsia temminckii</i>	16.1 kg	124.0cm	Coulson (1989), D.W. Pietersen (unpub. data)

being transported out of the forest on a motorbike. The animals have been photographed at the location (Images 1–4) and transferred to the veterinarian office of the Department of Wildlife Conservation at Kilinochchi for the postmortem and subsequent legal procedures. The cause of death of both pangolins was assault on the head with a sharp object.

We recorded the morphometric measurements of the two fresh carcasses following the protocols described in Perera et al. (2020). The specimens were coded as KL1 and KL2 (Images 1–4). All measurements were taken at the veterinarian's office of the Department of Wildlife Conservation at Kilinochchi under the supervision and observation of the chief veterinary surgeon. The morphometric measurements recorded from the two specimens are summarized in Table 1.

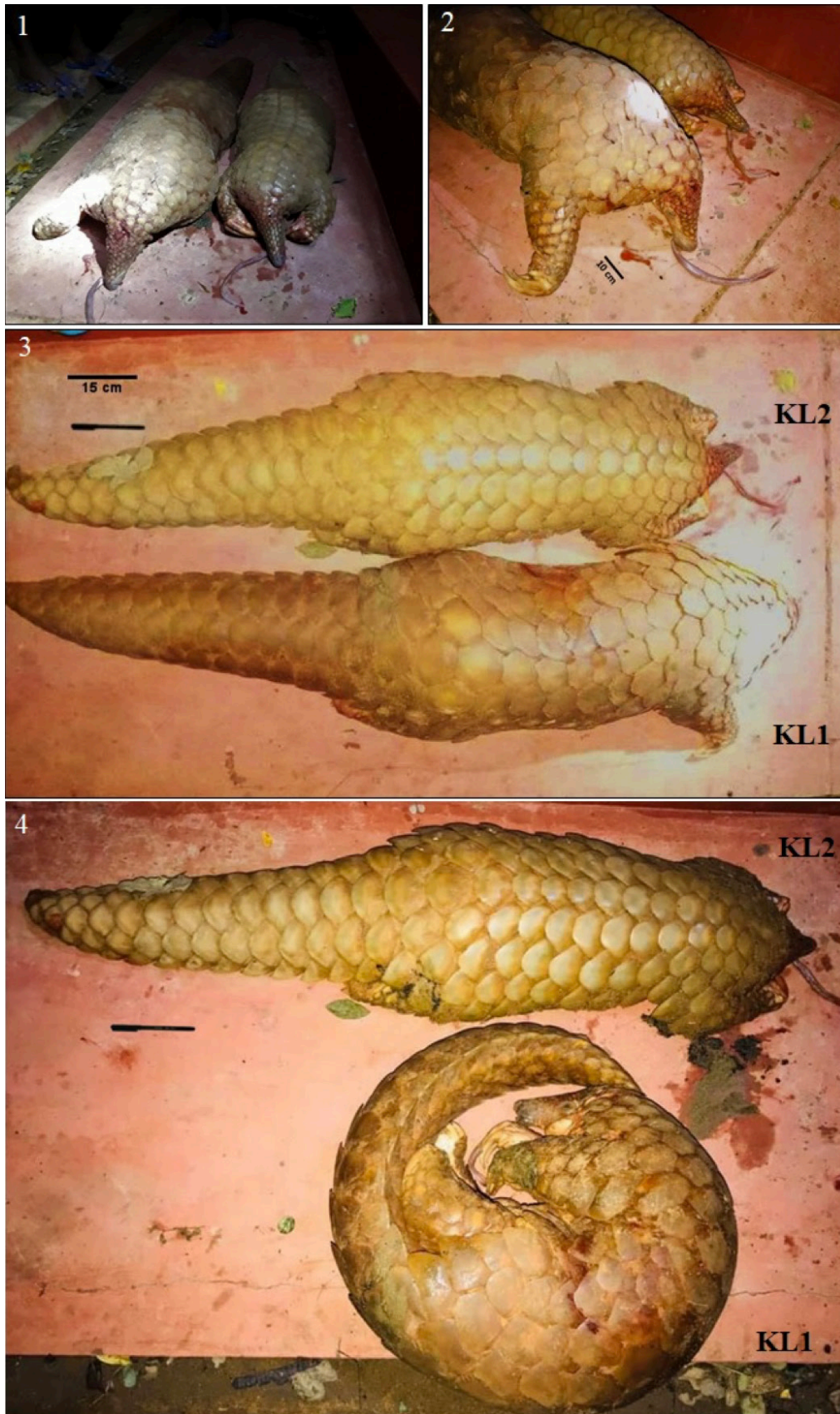
Following the protocols and guidelines specified in Perera et al. (2020) for body scale counting and scale type identification, body scale counts were performed. The number of scales observed in each specimen is reported by body regions in Table 2. The specimen KL1 had 538 body scales (436 broad rhombic scales, 70 elongated kite-shape scales, and 32 folded-shape scales in the tail) while the specimen KL2 had 520 body scales (418 broad rhombic scales, 72 elongated kite-shape scales and 30 folded-shape scales in the tail).

After taking the body measurements and scale counts, the two pangolin carcasses were destroyed by

the Veterinary Division Kilinochchi as per the court order issued by the Magistrate Court. Hence, further studies on the two specimens were not possible.

On average, adult Indian Pangolins can weigh between 8 and 16kg and measure about 148cm in total body length (Mahmood et al. 2020; Roberts & Bernhard 1977). The largest Indian Pangolin specimen has been recorded from Rajasthan, India, an adult male weighing 32.2kg and measuring 170cm in total body length (Sharma 2002). The largest Indian Pangolin recorded from Pakistan weighed 20kg and measured 147.3cm in total body length (Irshad et al. 2016). In this study, we recorded two male Indian Pangolin specimens from Mannar District of Sri Lanka, weighing 48.76kg and 34.15kg with the total body length measuring 176.8cm and 157.5cm, respectively. Both these new records exceed the maximum bodyweight reported for an Indian Pangolin in the literature. These two new records and observations from other range countries (India and Pakistan) provide novel insights into the maximum growth of the male Indian Pangolins.

There are eight extant species of pangolins in the world. The largest specimen recorded so far in literature for each species is summarized in Table 3. The Giant Pangolin *Smutsia gigantea* is considered the largest of all pangolin species, with the body weight of an adult exceeding 30kg and total body length measuring between 140 and 180 cm (Hoffmann et al. 2020). The



Images 1–4. Photographs of the two Indian Pangolins (coded as KL2 and KL2) taken at the DWC Assistant Director Office at Madu, Mannar District, Sri Lanka. © Buddhika Vidanage.

largest specimen of Giant Pangolin recorded so far is an adult male weighing 38kg with a total body length of 172cm from Gabon (Newton et al. 2019).

Compared to the published information, the male Indian Pangolin (KL1) recorded from Mannar District of Sri Lanka exceeded the maximum body weight and total body length recorded so far in the literature for any of the pangolin species. Hence, this individual could be considered as the largest pangolin documented so far. Such “extreme” observations highlight the dearth of knowledge we have on the morphometric variations of Indian Pangolins and call for further studies on the species.

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