

# Morphological Examination of the Pugmark of Different Wild Animals: A Prospective Study

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## Abstract

In the current investigation, a sample of 20 pugmarks from 10 various creatures were collected from different territories. The collection was done using photographic techniques. Each pugmark sample from a variety of animal species was first collected, and then each one was carefully inspected to compare the forefoot and hindfoot of that particular animal species. A comparison of the forefoot and hindfoot was done on the basis of physical examination, such as shape, size, dimension, dew marks, claw marks, and specific features. From the observation, it was interpreted that the forefoot and hindfoot of the same animal species have different characteristics that are not the same. From the perception, it was clear that the pugmarks are indistinguishable, which implies that each pugmark is different from various species; no two pugmarks are the same. Pugmarks allow us to not only perform species identification but also determine if a creature has a forefoot or hind hoot, as well as recognise the individual species and determine whether a creature has a forefoot or hind hoot.

**Keywords:** Pugmarks; Photography; Animals; Fore Foot; Hind Foot.

## INTRODUCTION

Pug marks are animal footprints left by various species of animals as they move or run from one place to another.<sup>1</sup> Pug marks are unique to each animal and are widely used as a diagnostic tool to identify specific animal species and in situations such as poaching, hunting, and animal assault. When animals move from one place to another, they

leave their own footprints.<sup>2</sup> Pug footprints are the most common animal species footprints in Hindi. The word "PUG" also means foot. Various words are used to define pug marks for some animals. Pug marks can be used as particular evidence linking animal sightings to crime scenes.<sup>3</sup> Pug footprints are very important in wildlife forensics. This is because, although wild animals are infrequently seen by humans, their presence can be detected by the footprints they leave on various surfaces such as dirt, sand, and snow.<sup>4,6</sup> Each type of animal has its own pug mark and different characteristics that can be used to distinguish the animal.<sup>7</sup> Pugmarks are used by wildlife forensic experts to identify individual characteristics such as malformations as well as population characteristics such as age and gender.<sup>8</sup> A prospective study carried out by Karanth *et al.* on using pugmark photography and recapture samples to estimate wildlife population densities. They used statistical models to estimate wildlife density and used pugmark identification

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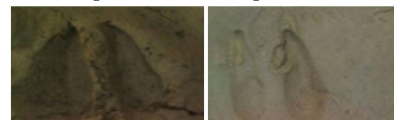
as an important part of their study.<sup>9-11</sup> Pug marks can be used to identify front or hind paw pug marks.<sup>12</sup> The names “forefoot” and “hind foot” designate a specific animal limb or limbs, particularly a quadruped limb or legs. There are some forefoot and hindfoot differences.<sup>13,14</sup> The limbs at the front or front of the body of an animal are called the forefoot, sometimes called front legs or forelimbs.<sup>15</sup> The limbs on the back or rear of the body of an animal are called hind legs, sometimes also called hind legs or hind limbs.<sup>16</sup> Each pug has its own characteristics and class traits that set it apart from other animal groups. Pug marks can also be checked forensically, as they can provide reliable data on the occurrence of various species in the study area, species abundances, sex ratios, etc. To achieve this goal, a project called “Identification of Pugmarks of Different Wildlife” was carried out with mixed results.<sup>17</sup>

Studying animal injuries from a forensic outlook is critical to reducing animal crime due to the increase in animal-related crime, especially in rural and remote areas. Similar to how human tracks are often discovered at crime scenes, traces of fangs have also been noted there.<sup>18</sup> Pugmark allows us to track rebellious animals that may pose a threat to humans or other animals. Pugmarks are very important in identifying the species of a certain animal. Regarding the animal that committed the crime, Pugmark can give useful data. Different animals have different and dissimilar pugmarks.<sup>19</sup>

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**Table No:1** Characteristics of Fore Foot and Hind Foot pugmarks

Animal name	Shape		Size		Dew mark		Specific features:	
	Hind foot	Fore foot	Hind foot	Fore foot	Hind foot	Fore foot	Hind foot	Fore foot
<i>Deer</i>	Up-side Down heart shaped	Oval	Small	Small	Absen	Absent	The tip of the hooves is mark slightly pointed, the bottom is arc-shaped.	Tip of the hooves are slightly pointed and bottom is circular Shape.



## METHODOLOGY

### Collection of Sample


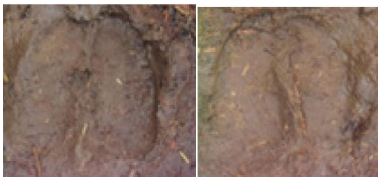

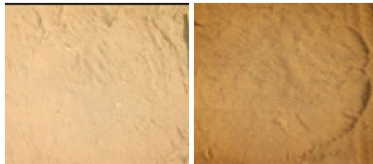


In the present work, a total of 20 samples of pugmarks from 10 different animals were collected from different areas of Mathikettan Shola National Park in the Idukki district of Kerala with the permission of the Munnar Wildlife Warden. The collection of pugmark samples from different animals was done using digital cameras. The pug mark left on the surface is then measured by using a scale that is placed around the pug mark design so that the length and width of the pug mark can be measured. At the end, about three or four photos of the pugmark from different angles with a digital camera were clicked, so it was easy to observe the pugmarks. During the collection of samples, it must be ensured that each photo is clear to the naked eye. None of the photos were blurred. Traces from the animal’s hind and front feet were collected for study.







### Procedure for Examination

After collecting pug marks, each pug mark was observed individually. The hind and front feet of different animals have been observed. Various characteristic traits were identified, and it can be easily determined which pug mark belongs to which animal. To determine the characteristics of different signs, various sources on the Internet were used. After fully examining the known sample, the unknown sample is compared for characteristics with the known sample for species identification.

## RESULT AND DISCUSSION

After analyzing all samples of pugmarks from different animal species, the following results were obtained:

<i>Nilgiritahr</i>	Kidney shaped mark	Oval shape	Medium	Small	Absent	Absent	Gap is present between the hooves forming a v shaped.	Tip of the hooves marks are circular and the bottom is Arch in shape.
								
<i>Gaur</i>	2 Bilaterally symmetrical marksome what circular shape	2 bilaterally symmetrical mark shape	Large	Large	Absent	Absent	Complete shape of mark is up-side down heartshape.	Complete shape of mark is apple shape.
								
<i>Wolf</i>	Up-side down heart shaped heel pad	Up-side down heart shaped heel pad	Medium	Medium	Absent	4 marks are present	Front of heel pad has 1 lobe and rear has 2 lobes.	The heel pad is smaller than the front heel pad.
								
<i>Elephant</i>	Round	Oval	Large	Large	Absent	Absent	Scales marks are present.	The hoof is not Cloven.
								
<i>Wild Boar</i>	2 Bilaterally Symmetrical mark shape	2 bilaterally symmetrical mark shape	Medium	Medium	Present	Absent	Marks of dew claws present behind.	Marks of dew claws present behind.
								
<i>Indian Hare</i>	Some what oval shape	some what baby human footprint shape	Small	Large	Absent	Absent	Five toe shown on front feet.	Five toes shows on rear feet.
								

<i>Jungle Cat</i>	Central pad is circular is what oval	Central pad some in shap shape	Medium	Medium	Absent	Absent	Front of heel has 2 lobes and rear has 3 lobes.	Front of the heel has 1 lobe and rear has 2 lobes.
								
<i>Bison</i>	2 bilaterally symmetrical mark shape	2 bilaterally symmetrical shape some what oval shape	Large	Large	Absent	Absent	Uneven size hooves mark are formed i.e one hooves marks is larger than other mark.	The top and bottom of the hoof marks are arc-shaped.
								
<i>Bear</i>	Oval or Elongated	Oval or Elongated	Medium	Large	Present	Present	Wide and Flat with long Sharp claws.	Contains broad rear pad and 5 toes.
								

From Table 1, it is clearly shown that pugmarks in different species vary in shape, size, dimensions, etc. It also shows that the forefoot and hindfoot of the same animal also have some differences.

The figure represents the number of toes on an animal. The number of toes can vary between different animal species and even between individuals of the same species based on factors

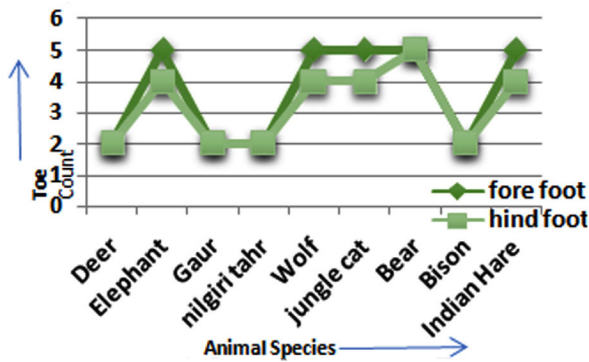


Fig. 1: Number Toe count in different animal species

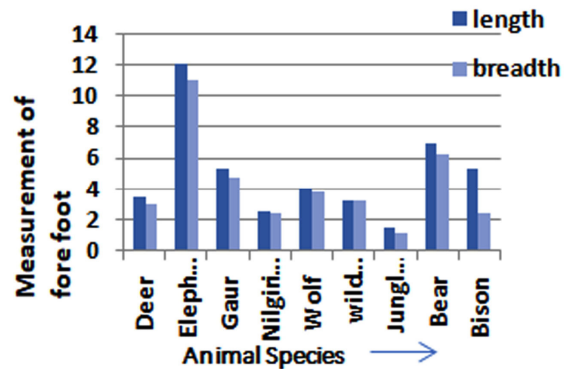


Fig. 2: Measurement of fore foot pugmark of different animal species

such as species, age, weight, and individual variation of the animal species.

In this figure it represents the length and breadth of hint fozzotprint of different animal species. Here the X-axis gives the measurement of hind foot and Y-axis gives the different animal species.

This figure represents the length and breadth of fore foot print of different wild animals. X-axis gives the measurement of fore foot and Y-axis gives the different animal species.

These measurements can vary based on the factors such as, species, age, weight and individual variation of the animal species.

## CONCLUSION

After the complete examination of the tracks of different animal species, it was concluded that, for each and every different species pugmark, a different number of characteristics were present, and accordingly, it was possible to successfully identify the specific species through their pugmarks. On both the forefoot and hind foot of different animals, different features have been found. It is not only able to identify species by their pugmark but also determine where the forefoot or hindfoot of specific animals is. There are also some similarities among the different types of pugmarks. Pugmarks of different species are distinct, not the same. There are specific features found in each pugmark that can be used to distinguish species of the same family. For example, Gaur and bison have almost the same pugmark because they belong to the same family, but there is a unique feature in each animal's pugmark that can distinguish them.

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