= Cryptoprocta spelea =

Cryptoprocta spelea , also known as the giant fossa , is an extinct species of carnivore from Madagascar in the family Eupleridae , which is most closely related to the mongooses and includes all Malagasy carnivorans . It was first described in 1902 , and in 1935 was recognized as a separate species from its closest relative , the living fossa (Cryptoprocta ferox) . C. spelea is larger than the fossa , but otherwise similar . The two have not always been accepted as distinct species . When and how the larger form became extinct is unknown ; there is some anecdotal evidence , including reports of very large fossas , that there is more than one surviving species .

The species is known from subfossil bones found in a variety of caves in northern , western , southern , and central Madagascar . In some sites , it occurs with remains of C. ferox , but there is no evidence that the two lived at the same time . Living species of comparably sized , related carnivores in other regions manage to coexist , suggesting that the same may have happened with both C. spelea and C. ferox . C. spelea would have been able to prey on larger animals than its smaller relative could have , including the recently extinct giant lemurs .

= = Taxonomy = =

In 1902 , Guillaume Grandidier described subfossil carnivoran remains from two caves on Madagascar as a larger " variety " of the living fossa (Cryptoprocta ferox) , C. ferox var. spelea . G. Petit , writing in 1935 , considered spelea to represent a distinct species . Charles Lamberton reviewed subfossil and living Cryptoprocta in 1939 and agreed with Petit in recognizing two species , naming this species from a specimen found at Ankazoabo Cave near Itampolo . The specific name spelea means " cave " and was given because of the location of its discovery . However , Lamberton apparently had at most three skeletons of the living fossa , not nearly enough to capture the range of variation in that species , and some later authors did not separate C. spelea and C. ferox as species . Steven Goodman and colleagues , using larger samples , compiled another set of Cryptoprocta measurements that was published in a 2004 article . They found that some subfossil Cryptoprocta fell outside the range of variation of living C. ferox , and identified those as representing C. spelea . Grandidier had not designated a type specimen for the species , and to maintain C. spelea as the name for the larger form of the fossa , Goodman and colleagues designated a specimen to serve as the type specimen (specifically , a neotype) .

Lamberton recognized a third species , Cryptoprocta antamba , on the basis of a mandible (lower jaw) with abnormally broad spacing between the condyloid processes at the back . He also referred two femora (upper leg bones) and a tibia (lower leg bone) intermediate in size between C. spelea and C. ferox to this species . The specific name refers to the " antamba " , an animal allegedly from southern Madagascar described by Étienne de Flacourt in 1658 as a large , rare , leopard @-@ like carnivore that eats men and calves and lives in remote mountainous areas ; it may have been the giant fossa . Goodman and colleagues could not locate Lamberton 's material of Cryptoprocta antamba , but suggested that it was based on an abnormal C. spelea . Together , the fossa and C. spelea form the genus Cryptoprocta within the family Eupleridae , which also includes the other Malagasy carnivorans ? the falanouc , the fanalokas , and the Galidiinae . DNA sequence studies suggest that the Eupleridae form a single natural (monophyletic) group and are most closely related to the mongooses of Eurasia and mainland Africa .

= = Description = =

Although some morphological differences between the two fossa species have been described , these may be allometric (growth @-@ related) , and in their 1986 Mammalian Species account of the fossa , Michael Köhncke and Klaus Leonhardt wrote that the two were morphologically identical . However , remains of C. spelea are larger than any living C. ferox . Goodman and colleagues found that skull measurements in specimens they identified as C. spelea were 1 @.@ 07 to 1 @.@ 32 times as large as in adult C. ferox , and postcranial measurements were 1 @.@ 19 to 1 @.@ 37

times as large . The only specimen of C. spelea in which condylobasal length (a measure of total skull length) could be ascertained measured 153 @.@ 4 mm (6 @.@ 04 in) , compared to a range of 114 @.@ 5 to 133 @.@ 3 mm (4 @.@ 51 to 5 @.@ 25 in) in adult C. ferox . Humerus (upper arm bone) length in twelve C. spelea is 122 @.@ 7 to 146 @.@ 8 mm (4 @.@ 83 to 5 @.@ 78 in) , averaging 137 @.@ 9 mm (5 @.@ 43 in) , compared to 108 @.@ 5 to 127 @.@ 5 mm (4 @.@ 27 to 5 @.@ 02 in) , averaging 116 @.@ 1 mm (4 @.@ 57 in) , in the extant fossa . Body mass estimates for C. spelea range from 17 kg (37 lb) to 20 kg (44 lb) , and it was among the largest carnivores of the island . By comparison , adult C. ferox range from 5 kg (11 lb) to 10 kg (22 lb) .

= = Distribution , ecology , and extinction = =

Cryptoprocta spelea is the only extinct member of the order Carnivora known from Madagascar ; recently extinct Madagascan animals also include at least 17 species of lemurs , most of which are larger than the living forms , as well as elephant birds and Malagasy hippopotamuses , among others . Subfossil remains of the giant fossa have been found in Holocene cave sites from the northern end of Madagascar along the west coast to the far south , and in the central highlands . Some sites have yielded both C. spelea and smaller remains referable to the living species , C. ferox ; however , lack of robust stratigraphic knowledge and no available radiocarbon dating on subfossil Cryptoprocta bones makes it uncertain whether the two species lived in the same region at the same time . The size ratio between the two species is within the range of ratios seen between similar @-@ sized living cats and mongooses found in the same areas , suggesting that the two species may have been able to occur together .

With its large size and massive jaws and teeth , C. spelea was a formidable , " puma @-@ like " predator , and in addition to smaller lemurids , it may have eaten some of the big , now extinct subfossil lemurs that would have been too large for C. ferox . No subfossil evidence has been found to definitively show that lemurs were its prey ; this assumption is based on the diet of the smaller , extant species of fossa . Other possible prey include tenrecs , smaller euplerids , and even young Malagasy hippopotamuses . Its extinction may have changed predation dynamics on Madagascar .

The IUCN Red List currently lists C. spelea as an extinct species ; why and when it became extinct remains unknown . However , local people on Madagascar often recognize two forms of fossa , a larger fosa mainty (or " black Cryptoprocta ") and a smaller fosa mena (or " reddish Cryptoprocta ") . There are also some anecdotal records of very large living fossas , such as a 2 @-@ m (7 ft) , 30 @-@ kg (70 lb) fossa at Morondava . Goodman and colleagues suggested that further research may demonstrate that there is more than one species of fossa yet alive .