

= *Miniopterus manavi* =

Miniopterus manavi (Manavi long @-@ fingered bat) is a bat in the genus *Miniopterus* that occurs in east @-@ central Madagascar . First described in 1906 , this species was later included in the mainland African *M. minor* . A 1995 revision united populations of small *Miniopterus* from Madagascar and the Comoros as *M. manavi* , but molecular and morphological studies in 2008 and 2009 showed that this concept of *M. manavi* in fact included five different species . *M. manavi* itself was restricted to a few locations in the eastern Central Highlands and populations in the Comoros and northern and western Madagascar were allocated to different species .

Miniopterus manavi is a small , blackish or reddish @-@ brown *Miniopterus* ; its forearm length is 37 @. @ 6 to 39 @. @ 2 mm (1 @. @ 48 to 1 @. @ 54 in) . The tragus (a projection in the outer ear) is narrow and ends in an angular tip . The uropatagium (tail membrane) is well @-@ furred and the palate is flat .

= = Taxonomy = =

Miniopterus , a widespread genus of bats in Africa , southern Eurasia , and Australia , was first recorded from Madagascar by George Edward Dobson , who mentioned the larger *Miniopterus schreibersii* and the smaller *M. scotinus* (currently *M. natalensis*) in his 1878 catalog of the bats in the British Museum . In 1906 , Oldfield Thomas named the larger species *M. majori* and the smaller *M. manavi* . He regarded *M. manavi* as close to the mainland African *M. minor* , and in 1971 , R.W. Hayman and J.E. Hill placed it as a subspecies of that species . In their 1995 Faune de Madagascar review of Malagasy bats , however , Randolph Peterson and colleagues again separated *M. manavi* as a species , with *M. manavi griveaudi* (currently *Miniopterus griveaudi*) from Grande Comore as a subspecies . Peterson , who died before the review was completed , had originally divided *M. manavi* into several species occurring in different areas , but his collaborators decided conservatively to keep *M. manavi* as a single species , recommending reassessment of the status of those forms as new material would become available .

In the 2000s , molecular studies helped clarify the systematics of *Miniopterus* . In 2007 , Javier Juste and colleagues , using sequences of the mitochondrial cytochrome b gene , found that bats from Madagascar (*M. manavi*) , Grande Comore (*M. manavi griveaudi*) and São Tomé (*M. minor newtoni* ; currently *Miniopterus newtoni*) did not cluster together to the exclusion of other African *Miniopterus* ; however , their samples of " *M. manavi* " were in fact misidentified *M. majori* . The next year , Nicole Weyeneth and colleagues used cytochrome b and mitochondrial D @-@ loop sequences to assess the relationships of Comoran *Miniopterus* . They found two unrelated clades within Malagasy and Comoran samples of " *Miniopterus manavi* " , neither of which was closely related to *M. newtoni* or to Tanzanian samples of *M. minor* .

During 2009 , Steven Goodman and colleagues published two papers that found a total of five genetically and morphologically distinct species within *Miniopterus manavi* as defined by Peterson and colleagues (1995) , up to four of which can be found in a single locality . In order to determine the true identity of *M. manavi* , Goodman and Claude Maminirina obtained bats near the type locality of *M. manavi* (the site where the original material was collected , from which the species was described) for inclusion in the analysis ; they also sequenced one of Thomas 's original specimens . Among the five species they identified , *M. griveaudi* occurs on Grande Comore and Anjouan and in northern and western Madagascar ; *M. aelleni* occurs on Anjouan and in northern and western Madagascar ; *M. brachytragos* is found in northern Madagascar only ; *M. mahafaliensis* is confined to the southwestern part of the island ; and *M. manavi* itself is known only from the eastern edge of the Central Highlands . These five species are not each other 's closest relatives according to analyses of cytochrome b sequences and their similarities reflect convergent evolution . Cytochrome b suggested that the closest relative of *M. manavi* is the slightly larger *M. petersoni* from southeastern Madagascar . Two specimens of *M. manavi* differed by 1 @. @ 3 % in their cytochrome b sequences and by 2 @. @ 5 % from *M. petersoni* .

== Description ==

Miniopterus manavi is a diminutive species with fur of medium length . The upperparts are blackish or reddish brown . Other small Malagasy *Miniopterus* are lighter . The ears mostly lack hair and end in a rounded tip . The tragus (a projection on the inner side of the outer ear) is thin for most of its length , ends in an angular tip , and has a flange at the medial side (towards the midline of the animal) . The tragus is differently shaped in other species . The wings and uropatagium (tail membrane) are blackish and are attached to the upper leg at the same level , above the ankle . The uropatagium is densely haired above and more sparsely below , as in *M. mahafaliensis* and *M. brachytragos* ; *M. griveaudi* and *M. aelleni* have more nearly naked uropatagia .

In the single specimen of true *M. manavi* that Goodman and colleagues could measure , total length is 90 mm (3 @. @ 5 in) , tail length is 39 mm (1 @. @ 5 in) , hindfoot length is 6 mm (0 @. @ 24 in) , tragus length is 6 mm (0 @. @ 24 in) , ear length is 10 mm (0 @. @ 39 in) , and body mass is 6 @. @ 4 g (0 @. @ 23 oz) . The length of the forearm is known from four specimens ; it ranges from 37 @. @ 6 to 39 @. @ 2 mm (1 @. @ 48 to 1 @. @ 54 in) , averaging 38 @. @ 5 mm (1 @. @ 52 in) .

In the skull , the rostrum (front part) is rounded . The central groove in the nasal depression is relatively narrow . The frontal bones are inflated and bear a prominent sagittal crest . Further back on the braincase , the lambdoid crest is poorly developed . The middle part of the palate is flat , not concave as in *M. brachytragos* , *M. griveaudi* , and *M. mahafaliensis* . At the palate 's back margin is a short , thick posterior palatal spine .

== Distribution and ecology ==

The currently known distribution of *M. manavi* extends around the eastern margin of the Central Highlands , from the vicinity of Ambositra in the north to Vinanitelo in the south , at 900 to 1 @, @ 500 m (3 @, @ 000 to 4 @, @ 900 ft) above sea level . The 2008 IUCN Red List assesses the species as " Least Concern " , citing its wide distribution , though it is sometimes hunted for food . However , the account predates the recognition of *M. aelleni* , *M. brachytragos* , *M. griveaudi* , and *M. mahafaliensis* as separate species . Although some ecological data about *M. manavi* have been published , these need to be reevaluated with the recognition of numerous additional species within *M. manavi* . Species of *Miniopterus* generally feed on insects , breed seasonally , and roost in large colonies in caves . The myobiid mite *Calcarmyobia comoresensis* has been recorded on *M. manavi* .