

= *Triaenops goodmani* =

*Triaenops goodmani* is an extinct bat from Madagascar in the genus *Triaenops*. It is known from three lower jaws collected in a cave at Anjohibe in 1996, and described as a new species in 2007. The material is at most 10 @, @ 000 years old. A bat humerus (upper arm bone) from the same site could not be identified as either *T. goodmani* or the living *T. menamena*. *T. goodmani* is identifiable as a member of *Triaenops* or the related genus *Paratriaenops* by a number of features of the teeth, such as the single @-@ cusped, canine @-@ like fourth premolar and the presence of a gap between the entoconid and hypoconulid cusps on the first two molars. *T. goodmani* is larger than the living species of *Triaenops* and *Paratriaenops* on Madagascar, and on the first molar the protoconid cusp is only slightly higher than the hypoconid, not much higher as in the other species.

= = Taxonomy and distribution = =

In 1996, a team led by David Burney collected breccias containing remains of bats and other animals from the cave of Anjohibe in northwestern Madagascar. The bats in the sample were described by Karen Samonds (previously Irwin) in her 2006 Ph.D. dissertation and a 2007 paper. She found several living species in addition to two extinct ones that she described as new, *Triaenops goodmani* and *Hipposideros besaoka*. At the time, the genus *Triaenops* was thought to include three species on Madagascar? *Triaenops auritus*, *Triaenops furculus*, and *Triaenops rufus*. Since then, Steven Goodman and Julie Ranivo have discovered that the name *rufus* is not in fact applicable to the Madagascar species and proposed the name *Triaenops menamena* for the Madagascar bats previously known as *Triaenops rufus*.

In addition, Petr Benda and Peter Vallo have removed the other two Madagascar species to a separate genus *Paratriaenops*, so that they are now known as *Paratriaenops auritus* and *Paratriaenops furculus*. The specific name of the extinct species, *goodmani*, honors Steven Goodman for his research on Madagascar bats. The material of *T. goodmani* is from locality OLD SE within the cave and is about 10 @, @ 000 years old or younger. A cladistic analysis using morphological data could not resolve the relationships of *Triaenops goodmani*, but did not place it with the other species of *Triaenops* and *Paratriaenops* studied. In a 2008 paper, Amy Russell and colleagues commented that cranial (skull) characteristics of *T. goodmani* suggest it is a member of the "*T. furculus* / *T. auritus* group", now placed in *Paratriaenops*.

= = Description = =

*Triaenops goodmani* is known from three mandibles (lower jaws): one with the fourth premolar ( $p_4$ ) and first and second molars ( $m_1$  ? 2) and two with the second and third molars ( $m_2$  ? 3). The jaw is relatively robust. The  $p_4$  resembles a canine, having a single cusp that is about as high as the highest cusp on  $m_1$  and lacking accessory shelves or cusps. The molars are narrow @-@ crowned and longer than in *T. menamena*, *P. auritus*, and *P. furculus*. Length of  $m_2$  ranges from 1 @. @ 55 to 1 @. @ 57 mm and width from 0 @. @ 98 to 1 @. @ 02 mm. On  $m_1$ , the trigonid (front group of cusps) is narrower and slightly higher than the talonid at the back. The protoconid, one of the main cusps in the trigonid, is the highest cusp, but is only slightly higher than the hypoconid (a cusp in the talonid); in living Madagascar *Triaenops* and *Paratriaenops*, the protoconid is substantially higher than the hypoconid. The paraconid, metaconid (both cusps in the trigonid), and entoconid (a cusp in the talonid) are lower than in *Paratriaenops auritus*. The hypoconulid (part of the talonid) is small but distinct and is the lowest cusp. It is separated from the entoconid by a gap. *T. goodmani* lacks a ridge, the preentocristid, connecting the entoconid to the metaconid. There is a crest (cingulum) at the front and back of the tooth. The last two molars are similar to  $m_1$ , but in  $m_2$  the talonid is only slightly wider than the trigonid and in  $m_3$  the two are of equal width. In addition, a shelf is present between the protoconid and hypoconid on  $m_2$  and  $m_3$  is smaller, lacks the gap between the entoconid and hypoconulid, and has a weak ridge between the entoconid and

metaconid . These characteristics are typical of *Triaenops* and *Paratriaenops* .

From the same site where *T. goodmani* was found , Samonds also recorded the distal ( far ) end of a *Triaenops* humerus ( upper arm bone ) , with a width of 3 @. @ 58 mm . This bone was similar to humeri of *T. menamena* , but she did not identify it as either species because of the small size difference between *T. menamena* and *T. goodmani* . In site NCC @-@ 1 ( estimated 69 @, @ 600 to 86 @, @ 800 years old ) , two *Triaenops* mandibles were recorded , one with p4 and m1 and another with m1 ? 2 and part of m3 . Relative to living *Triaenops* and *Paratriaenops* , m1 in those jaws is longer and narrower . Although sample sizes are small , the measurements do not resemble those of *T. goodmani* . In addition , the ridge between the entoconid and metaconid is stronger than in *T. goodmani* . Samonds identified these jaws only as *Triaenops* .