

Notes on Cozumel Raccoon *Procyon pygmaeus* and Tres Marías Raccoon *P. insularis*

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Abstract

Photographs and observations of raccoons *Procyon* from Cozumel Island and the adjacent mainland suggest that some previously reported differences between Cozumel Raccoon *P. pygmaeus* and Northern Raccoon *P. lotor* are not diagnostic, and that Cozumel Raccoon and Tres Marías Raccoon *P. insularis* should be treated equally as either full species or as subspecies of Northern Raccoon.

Keywords: island, Northern Raccoon, *Procyon lotor*, Procyonidae

Anotaciones sobre el Mapache de Cozumel *Procyon pygmaeus* y el Mapache de Tres Marías *P. insularis*

Resumen

Fotos y observaciones de mapaches *Procyon* de la Isla de Cozumel y de tierra firme adyacente sugieren que algunas de las diferencias reportadas previamente entre el Mapache de Cozumel *P. pygmaeus* y el Mapache *P. lotor* no son suficientemente diagnósticas. Adicionalmente, que el Mapache de Cozumel y el Mapache de Tres Marías *P. insularis* deben ser tratados de forma idéntica, ya sea como la misma especie o como subespecie del Mapache.

Palabras clave: isla, Mapache, *Procyon lotor*, Procyonidae

The genus *Procyon* includes two well-defined parapatric species of raccoons: Northern Raccoon *P. lotor* and Crab-eating Raccoon *P. cancrivorus*. In addition, there are five island taxa with very small ranges, all of which are closely related to Northern Raccoon, but which were usually treated as full species up to the 1970s (Nowak 1999). Later it was realised that three West Indian taxa, namely 'Bahamas Raccoon *P. maynardi*', 'Barbados Raccoon *P. gloveralleni*' and 'Guadeloupe Raccoon *P. minor*', represent very recent human introductions of Northern Raccoon (Morgan & Woods 1986, Helgen *et al.* 2008). But the other two island taxa, Tres Marías Raccoon *P. insularis* and Cozumel Raccoon *P. pygmaeus*, remain subject to controversy. Are they well-defined subspecies or full species?

Tres Marías Raccoon differs from Northern Raccoon in its broad, strikingly robust skull, narrow molars and carnassials, and more uniform pelage coloration (Helgen & Wilson 2005). It possibly has broader front feet (the only recorded footprints were 73 mm wide when 75 mm long, while Northern Raccoon footprints of the same length are usually about 68 mm wide) and longer stride length (35–45 cm, as opposed to 20–40 cm in Northern Raccoon). It seems comparatively large-headed under field observation conditions (Dinets 2004).

Cozumel Raccoon has reduced dentition (Merriam 1901), averages 17.5% smaller in linear measurements than does Northern Raccoon from the adjacent mainland, the Yucatan Peninsula (*P. l. shufeldti*, according to Helgen & Wilson 2005; McFadden & Meiri *in press*), and is said to possess, characteristically, a black throat and golden tail (Merriam 1901). Fossil Cozumel Raccoons are known only from the Holocene (McFadden *et al.* 2008). MtDNA data suggest that Cozumel Raccoon and Northern Raccoons from Yucatan form a clade separate from Northern Raccoons from the U.S.A. (McFadden 2004); that some mainland populations of Northern Raccoon show

levels of population genetic variation similar to the difference between raccoons from Cozumel and mainland Mexico (McFadden & Meiri *in press*); and that the divergence of Cozumel Raccoon could have happened as recently as 3,050 years before present (ybp; McFadden *et al.* 2008). It is possible that Cozumel Raccoon is a result of an ancient human introduction: the earliest evidence of human presence on the Caribbean coast of Mesoamerica dates back to approximately 11,200 ybp (Hester *et al.* 1981). To my knowledge, no molecular data have been examined for Tres Marías Raccoon.

Recently, I had an opportunity to observe and photograph Cozumel Raccoons (Figs 1, 2) and Northern Raccoons from the adjacent mainland (Figs 3, 4) at close range (2–15 m). Two Cozumel Raccoons were observed near Cozumel sewage treatment plant (20°32'20"N, 86°53'34"W) on 7 July 2012; one disappeared after 15 min but the other remained in view for a further 25 min. Northern Raccoons (a group of eight) were observed for about two hours at Cenote Manati (20°16'59"N, 87°23'29"W) near Tulum, Quintana Roo, on 6 July 2012 (Fig. 5).

As Fig. 3 clearly shows, mainland raccoons can possess the black throat mark and golden tail coloration that are supposed to be distinguishing features of Cozumel Raccoon (Merriam 1901). Despite being smaller than their mainland relatives, Cozumel Raccoons were very similar to them in gait (a peculiar plantigrade gallop-like gait with left and right paws leaving prints side by side). Their footprints were indistinguishable from those of mainland raccoons in overall shape, although predictably smaller in print size (front footprint 55–60 mm wide, 60–65 mm long) and stride length (22–28 cm).

Helgen & Wilson (2005) considered Cozumel Raccoon to be a full species and Tres Marías Raccoon to be a well-defined subspecies, because the latter has "much less striking" (p. 230) morphological differences from mainland raccoons. However,



Fig. 1. Close-up Cozumel Raccoon *Procyon pygmaeus*, northwestern Cozumel Island, Mexico.



Fig. 2. Cozumel Raccoon *Procyon pygmaeus*, northwestern Cozumel Island, Mexico.



Fig. 3. Northern Raccoon *Procyon lotor*, Cenote Manati, Quintana Roo, Mexico. Note the black throat mark and the golden-yellow tail (see picture on back cover).

the authors actually found Tres Marías Raccoon to have a more distinctive skull than Cozumel Raccoon, and the only really 'striking' morphological feature of Cozumel Raccoon that they mention is its small size. Unlike many earlier authors, they did



Fig. 4. Northern Raccoon *Procyon lotor*, Cenote Manati, Quintana Roo, Mexico.



Fig. 5. Locations of raccoon *Procyon* observations mentioned in text.

not find any differences in pelage coloration between Cozumel and mainland raccoons—a result corroborated by the images presented here.

Of course, photographs of single individuals and brief visual observations are of limited use in the age of molecular systematics. However, being possibly the only zoologist to have observed both Tres Marías and Cozumel Raccoons in the wild, I find them both equally similar to Northern Raccoon. Until molecular data on Tres Marías Raccoon become available, it is probably more logical to consider them both either full species or subspecies, depending on one's preferred criteria and species concept.

Both taxa are rare in their small geographic ranges. Tres Marías Raccoon is already extinct on one of the two islands it inhabited historically, and numbers less than 250 mature individuals on the other (Zelveloff 2003). Although *The IUCN Red List of Threatened Species* lists Cozumel Raccoon as Critical-

ly Endangered (Cuarón *et al.* 2008), it does not consider Tres Marías Raccoon a separate species, so this latter falls within the Least Concern category of Northern Raccoon (Timm *et al.* 2008). The 'Conservation Species Concept' accepts elevating subspecies to species purely for alleged conservation benefit, but this is usually not scientifically justifiable (Gamauf *et al.* 2005). However, by analogy with Cozumel Raccoon, I recommend considering Tres Marías Raccoon a full species until molecular data become available.

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