

Hamadryad Vol. 35, No. 1, pp. 101 – 104, 2010.  
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**Is the enigmatic blind-snake *Cathetorhinus melanocephalus* (Serpentes: Typhlopidae) an extinct endemic species from Mauritius?**

In 1844, Duméril & Bibron (1834–54) described as *Cathetorhinus melanocephalus* a new genus and species of blind-snake collected at an unknown locality by Péron and Lesueur. No further specimens have ever been found, and the form's taxonomic uniqueness has been confirmed in a recent study by Wallach and Pauwels (2008). François Péron was a zoologist on Baudin's 1801–1803 scientific expedition (e.g., Ly-Tio-Fane, 2003; Brown, 2000); Charles-Alexandre Lesueur was his assistant and also expedition artist. The expedition travelled via Tenerife to Mauritius, on to Australia and Timor and back to Mauritius before returning to France in early 1804 via South Africa. Somewhere on this itinerary, they collected the specimen of *Cathetorhinus*, the only blind-snake they brought back from their travels (Duméril and Bibron, 1834–1854; Duméril and Duméril, 1851). Most of their specimens carry locality labels, and although a few of these are notoriously wrong<sup>1</sup>, they were conscientious collectors and the majority of their material is correctly assigned. Some, and *Cathetorhinus* is an example, lack any collection data, and this has fuelled much speculation over the years as to where the specimen came from. Wallach and Pauwels (2008) summarised the history of the specimen and commented that “the provenance of this species remains unknown: it is certainly Old World, and may be from (in order of probability) Timor, Australia, Mauritius or Tenerife”; it is registered in the Paris collection as MNHN 0138, adult, sex unknown. Until recently (see below), as Wallach and Pauwels pointed out, there was in the public domain “no mention of a small blind-snake or lizard comparable to *Cathetorhinus* in the records of the Baudin expedition or Péron

... so it appears that the Museum is responsible for attributing *Cathetorhinus* to the Baudin expedition.” However there is much in the unpublished Péron and Lesueur manuscripts that is not reported in descriptions of the expedition (see Cheke, 2010, for material relevant to Mauritius), so this apparent negative evidence is not very persuasive - and is indeed false.

While researching the ecological history of Mauritius, I had occasion to consult (via copies sent to me by Gabrielle Baglione) the Lesueur archives held in the natural history museum in Le Havre, France. Although on this island they mostly kept to areas within easy reach of the capital Port Louis (Cheke, 2010), they additionally made an excursion in late 1803 (Boullanger, 1803) into the interior via the estate of an upland planter Toussaint de Chazal. He lived in the area now known as Mondrain, on a plateau adjacent to the Tamarin Gorge (see maps in Pineo, 1988:101 and Ly-Tio-Fane, 2003:xxx). In manuscript notes on the island's fauna (MS 15037; see Cheke, in press), Lesueur wrote the following in 1803 (my translation; original French in Appendix 1):

“No snakes exist on the island, but they are found on a neighbouring island that bears the name Ile aux Serpents<sup>2</sup> - it is a remarkable thing that in two places so close to each other, given that there is only ... [blank in the text], there are these reptiles on one and they are totally missing on the other. A very small species 4–5 inches maximum and thickness in proportion is, however, an exception. It is the only one found during our stay, on Mr Chazal's land near Grand Bassin. It was found amongst stones while clearing some land; it was about 8 inches below the soil surface. I note it here because it is a phenomenon to have seen a species that is new and the only one found belonging to the island.”

The discovery location is somewhat equivocal, since Chazal's land was, by Mauritian standards, nowhere near Grand Bassin, a crater lake in then virgin forest some 9 km south of

1. Notably the now extinct monotypic endemic Mauritian boa *Bolyeria multicarinata* (Serpentes: Bolyeridae), labelled as from ‘Nouvelle Hollande’, i.e., Australia (e.g., Cheke and Hume, 2008).

2. Ile aux Serpents is a misnomer, as it is small, steep, covered in seabirds, almost vegetation-free and lacks snakes - however at the time snakes were to be found on adjacent Round Island, Flat Island and Gunners Quoin, all islets off the north coast of Mauritius (Cheke and Hume, 2008).

Mondrain, although the party proceeded to the lake from Chazal's house. Either way, in an upland locality in what was then uncleared forest, they (or possibly Chazal) found what seems to be a blind-snake given its very small size and the underground situation where it was found. In discussing this observation in a broader context, I (Cheke and Hume, 2008) considered it was probably an early record of the flowerpot snake *Ramphotyphlops braminus*, but this was before I had established that Péron and Lesueur had collected only the single blind-snake specimen on their entire expedition. The first formal attestation of *R. braminus* for Mauritius dates from 1869 (Cheke and Hume, 2008), 66 years after their visit.

Around 1900 Paul Carié, re-excavating the well-known fossil site, the Mare aux Songes in Mauritius, collected, *inter alia*, a few vertebrae 'from the middle region of the trunk' belonging to a Typhlopidae snake. These were described by Hoffstetter (1946) as a new species *Typhlops cariei*, with the following general remarks (my translation):

"belongs indisputably to the genus *Typhlops* [as then understood - ASC], but it is noticeably larger than *T. braminus* (Daudin) [= *Ramphotyphlops braminus*], the only species known in the current Mascarene fauna, to which it has perhaps been introduced. The fossil is also clearly distinguished from this latter species by various vertebral characters."

Hoffstetter apparently only compared the vertebrae to *R. braminus* and a single fossil species, *T. grivensis*, from the Miocene in France, but remarked that "current distribution indicates that medium or large sized species [of blind-snake] always, in the islands that shelter them, show endemic characteristics" – hence, he described his Mauritian subfossils as a new species.

Given that Mauritius once harboured an endemic typhlopidae, that Péron and Lesueur found one there, and that they brought home only one blind-snake, it seems logical to infer that the animal from de Chazal's estate is one and the same as the enigmatic *Cathetorhinus* specimen in Paris. Against this, Lesueur described the length of his find as 4–5 French inches (109–136 mm), firmly in the normal range of adult *R. braminus* (around 120 mm in Mauritius, Cole, 2009; average of 1,286 specimens worldwide 128

mm, Wallach, 2009), while the *Cathetorhinus* specimen (Wallach and Pauwels, 2008) actually measures 178 mm (= 6.6 French inches). This is a bit larger than the maximum 170mm usually allowed for *braminus* (e.g., Daniel, 2002; Branch, 1988), though Glaw and Vences (1994) reported 175mm and Wallach (2009) commented that a very small number reach 190+ mm, up to 203 mm. However, Lesueur appeared to be writing from memory without the specimen actually before him, so, impressed by its small size, he may have exaggerated how tiny his snake actually was.

Proving a connection between *Cathetorhinus* and '*Typhlops*' *cariei* is not likely to be easy. Bones from the Mare aux Songes have very poor DNA preservation (e.g., Shapiro et al., 2002; Rijdsdijk et al., 2009), and a specimen preserved in alcohol for 200 years is equally unlikely to be productive of DNA sequences. Although examining its central vertebrae should establish the relationship with *cariei* (or not), given that the specimen is both unique and a type, permission to dissect is unlikely to be given. Wallach (in litt.) was not permitted to examine its gut, and extracting a vertebra would be more damaging, but the necessary detail could be imaged using synchrotron microtomography (e.g. Betz et al., 2006; Tafforeau et al., 2006). However, it may not be possible to identify typhlopidae with certainty to species level using vertebrae alone, so gut contents could also be used to establish its original locality, if endemic or other characteristic fauna, pollen or parasites were to be found. Hence, given the importance of establishing the provenance of this specimen, and also of establishing what would be yet another endemic genus for the isolated island fauna of Mauritius, I would urge the Paris authorities to permit internal examination of this specimen. Meanwhile, I have alerted the Mauritian Wildlife Foundation and researchers at the University of Mauritius to look out for any unusual blind-snakes in case '*cariei*' survives unseen, though in recent years only *R. braminus* and *Typhlops porrectus* have been recorded (Cole, 2009 and in litt.). The latter was first reported quite recently (Lever, 2003; Cheke and Hume, 2008), the first specimen being found on the lagoon islet of Ile Mangénie in 1993 (Carl Jones in litt.). It must have been present for some time to have reached off-

shore islets (Cheke and Hume, 2008), but Cole's claim (2009) that it arrived "in the 1800s", is without physical evidence (Cole in litt.), however plausible. It should be noted that at the time of Péron and Lesueur's passage, potential blind-snake predators, such as tenrecs, *Tenrec ecaudatus* and house-shrews, *Suncus murinus* had only been introduced relatively recently, although rats, *Rattus* spp. had been there for much longer (Cheke and Hume, 2008). Since then the omnivorous Indian mongoose, *Herpestes auropunctatus* has been added to the fauna (ibid.) - so the endemic blind-snake's chances of continued survival, despite its cryptic lifestyle, are not good, although the discovery, in 1973, of a previously unreported small semi-fossorial forest skink, *Gongylomorphus fontenayi* (Cheke and Hume, 2008:168) is perhaps an optimistic precedent.

My thanks to Van Wallach, Ivan Ineich, Nik Cole and Vincent Florens for discussions around the identity of *Cathetorhinus*, *Typhlops cariei* and Mauritian blind-snakes, and Gabrielle Baglione for transmitting to me copies of many manuscript items from the Lesueur Collection in Le Havre. Van Wallach and Olivier Pauwels as referees made helpful comments which have improved the paper.

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*Received: 18 November 2009.*

*Accepted: 6 December 2009.*

#### Appendix 1

Original French text of Lesueur's remarks on Mauritian snakes

The original French text of Lesueur's remarks on Mauritian snakes reads (his non-standard orthography): "Les ophidiens n'existent point sur l'isle mais ils se rencontrent sur une île très voisine qui porte le nom de l'île aux serpens - c'est une chose très remarquable que sur deux points si voisin l'un de l'autre pourqu'il n'y a que ... [*a blank in the text*] il y ait de ces reptiles sur l'un & qu'ils manquent tout a fait dans l'autre. Une très petite espèce de 4 a 5 p [= pouces] au plus & grosse en proportion fait cepend exception. C'est la seule qui fut trouvée pendans notre sejour, sur l'habitation de Mr Chazal près du grand bassin on le decouvrit [en] dans des pierres en défrichant un terrain [*sic*]; elle étoit a 8 [pouces] environ endessous du sol. Je l'indique ici parceque c'est un phénomène que [*sic*] d'en avoir vu une espèce qui est nouvelle & la seule l'on ait rencontrée appartenant à l'île.»