

Paul Carié, Mauritian naturalist and forgotten collector of dodo bones

Paul Carié, naturaliste mauricien et collecteur oublié d'os de dodo

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Summary: Paul Carié (1876-1930) was a Mauritian industrialist and naturalist of French descent, who was affiliated with various French scientific societies and carried out research on many aspects of the zoology of the Mascarene islands. However, his work on the extinct fauna of Mauritius is now largely forgotten, probably because he published very little on that topic. Nevertheless, Paul Carié collected numerous specimens of extinct vertebrates, including dodo bones, from the famous Mare aux Songes locality, which once belonged to him. In addition, he bought dodo specimens from sites in the mountains of north-eastern Mauritius from Louis Thirioux, another early twentieth-century collector. A forgotten collection of subfossil bones brought together by Paul Carié was rediscovered in France in 2015. Dodo bones presented by Paul Carié and his descendants are now part of the collections of several museums in France and Switzerland and have been the subject of several recent studies.

Résumé : Paul Carié (1876-1930) était un industriel et naturaliste mauricien d'ascendance française, qui fut affilié à diverses sociétés scientifiques françaises et qui effectua des recherches sur de nombreux aspects de la zoologie des Mascareignes. Cependant, ses travaux sur la faune éteinte de l'île Maurice sont aujourd'hui largement oubliés, probablement parce qu'il publia très peu sur ce sujet. Néanmoins, Paul Carié récolta de nombreux spécimens de vertébrés disparus, y compris des os de dodos, à la Mare aux Songes, site qui à une certaine époque lui appartient. En outre, il acheta des spécimens de dodo provenant de sites dans les montagnes du nord-est de l'île à Louis Thirioux, un autre collectionneur du début du vingtième siècle. Une collection oubliée d'ossements subfossiles récoltés par Paul Carié a été redécouverte en France en 2015. Des os de dodos donnés par Paul Carié et ses descendants appartiennent maintenant aux collections de divers musées en France et en Suisse et on fait l'objet de plusieurs études récentes.

Introduction

Although the dodo (*Raphus cucullatus*) survived for about a century after the discovery of its native island of Mauritius by European navigators, much of what we know about it is based on studies of subfossil bones discovered in swamps and caves from the 1860s onward. Early reports on living dodos by 17th century

visitors to Mauritius are often vague and sometimes contradictory – no naturalist ever studied the dodo "in the wild" and descriptions of living birds brought to Europe are very brief and not very informative. With a few exceptions, even contemporaneous pictures and paintings of the dodo have turned out to be of limited reliability because of artistic licence and exaggeration (Ziswiler, 1996; Hume, 2006).

Moreover, little was preserved of the few dodos that were brought alive to Europe, the case of the Oxford dodo being a well known example (Pickering, 2010). The work done by a handful of naturalists who collected dodo remains on Mauritius in the late 19th and early 20th centuries is thus of primary importance for our knowledge of many aspects of the anatomy of the dodo. The best known of them certainly is George Clark, who collected a large number of dodo bones from the famous Mare aux Songes locality in the 1860s, a material which formed the basis of several studies on that extinct bird. Other well known dodo collectors were Théodore Sauzier and Louis Thirioux, whose contributions to dodo research are often mentioned (Fuller, 2002; Grihault, 2005; Hume, 2006; Parish, 2013). By comparison, although it does sometimes get mention (Grihault, 2005; Cheke & Hume, 2008; Parish, 2013), the work of Paul Carié (1876-1930) has been relatively neglected. Yet, as the co-owner of the Mare aux Songes in the early 20th century, he brought together a very large collection of subfossil bones (including those of dodos) from that locality, which are now part of European collections. In addition, through his connection with Thirioux, he also acquired dodo remains from a completely different taphonomic setting (viz. caves and screes), which also found their way to European museums. The aim of the present paper is to show how Carié's work was significant for our knowledge of the dodo and therefore deserves to be better acknowledged.

A short biography of Paul Carié

François Joseph Paul Carié (Fig. 1) was born on Mauritius on 6 November, 1876 (see biography by Halais, 1941a). He belonged to an old French-Mauritian family that had been established on the island since the 18th century. After inheriting a considerable fortune (including both land on Mauritius and property in Paris) from his uncle Thomy Thierry, he was initially successful as a plantation owner and industrialist. The sugarcane processing plant he ran on his "Mon Désert" estate was at the time one of the most modern on Mauritius. Besides his activities as a naturalist, Paul Carié spent much time and energy lobbying for the retrocession of Mauritius to France. After its discovery by Portuguese navigators in the late 16th century, the island became a Dutch possession, until it was abandoned in 1710. It was then acquired by



Fig. 1. A photographic portrait of Paul Carié, wearing a French army uniform, circa 1914 (courtesy of the heirs of Paul Carié).

France in 1715. It was conquered by the British during the Napoleonic wars, and officially transferred to Britain by the Treaty of Paris in 1814. Carié's activities in favour of a retrocession to France began before the First World War. He was mobilised in 1914 and served as translator in London and Paris. In the aftermath of the war, Carié hoped that the negotiations which led to the ill-fated Treaty of Versailles (in 1919) could include a retrocession of Mauritius to France, possibly through an exchange of territories with Britain (Carié, 1919), but this did not happen: Mauritius remained a British colony until its independence in 1968. During the war, Carié's sugar-making business declined and he sold it off and settled in Paris in 1918. There, he continued his scientific activities until his death on 19 December 1930.

Paul Carié's scientific activities

Paul Carié's was involved in many aspects of the natural history of the Mascarene islands, and more generally the Indian Ocean (Crépin, 1931). He was especially interested in entomology and ornithology, as well as in the introduction of foreign species on the islands of the In-

dian Ocean. He was a member of the French Zoological Society, of which he was president in 1923. He became a correspondent of the Muséum National d'Histoire Naturelle in 1914, and then an associate researcher in 1918. He was also general secretary of the *Société des Amis du Muséum d'Histoire Naturelle et du Jardin des Plantes* (Mangin, 1931). In 1910, and again in 1921, he was sent by the Muséum National and the French Ministry of Public Instruction on research trips to the islands of the Indian Ocean. He thus collected thousands of specimens, including living birds and turtles for the zoological garden of the Jardin des Plantes. Altogether, he discovered 125 new species on the Mascarene islands (Crépin, 1931). However, Paul Carié published relatively little on his discoveries (a partial list of his publications was provided by Cheke and Hume, 2008), and his collections were mainly studied by other scientists, sometimes a long time after his death.

Paul Carié and the extinct vertebrates of Mauritius

When he inherited the Mon Désert sugar estate, Paul Carié also became co-owner of the Mare aux Songes, the main subfossil vertebrate locality on Mauritius (Rijsdijk *et al.*, 2009). The swamp deposits there had been made famous in the 1860s by the work of George Clark, the “modest schoolteacher of Mahébourg”, as Carié described him (Carié, 1930: 212), who provided the scientific community with the first comprehensive collections of dodo bones. Clark's work had been continued two decades later by Théodore Sauzier, who also collected abundant remains of dodos and the accompanying fauna. Paul Carié conducted excavations there from 1904 to 1907, and again from 1910 to 1913 (Carié, 1930). A large amount of skeletal material was thus collected, most of it being donated by Carié to the Paris Natural History Museum. The squamate remains in that collection were described by Robert Hoffstetter in a series of notes published in the 1940s (Hoffstetter, 1945, 1946a,b). Hoffstetter named an extinct species of blind snake from Mare aux Songes *Typhlops cariei*, in honour of Carié (Hoffstetter, 1946b). Carié himself published very little about the extinct vertebrates of Mauritius. His main contribution on the topic is a critical investigation of *Leguatia gigantea*, a supposed extinct bird species from Mauritius that had been erected by the German naturalist Schlegel (Schlegel, 1858). Schlegel had based his work on

the description of a large bird - the so-called “Géant” - observed on Mauritius in the 18th century by the French traveller Leguat. Although the reality of *Leguatia gigantea*, described as a giant rail, had been accepted by various authorities on extinct birds, including Rothschild (1907), who published a fanciful reconstruction of it (Fig. 2), and Oudemans (1917), Carié (1930) conclusively showed that Leguat's report in all likelihood was based on a misidentification of flamingos, which are occasionally seen on Mauritius, and that the so-called *Leguatia* had never existed (Buffetaut, 2014). Interestingly, despite Carié's convincing demonstration, some recent authors (e.g. Balouet & Alibert, 1989) still list the Géant among the extinct birds of Mauritius.



Fig. 2. An artist's impression of *Leguatia gigantea* Schlegel, the imaginary “giant rail” of Mauritius. Carié (1930) showed that Leguat's report of the “Géant” was in all likelihood based on sightings of flamingos. Chromolithograph by F.W. Frohawk, from Rothschild (1907).

Carié's conclusion about the non-existence of *Leguatia gigantea* was based both on a thorough examination of the reports by Leguat and other early travellers, and on the results of excavations on Mauritius, which had yielded "countless remains" of birds, turtles, lizards and bats, but not a single bone of the "Géant". Carié alluded to excavations at Mare aux Songes, both his own and those of his predecessors, and also to the researches carried out in other parts of the island, notably those of Louis Thirioux (1846-1917). Thirioux was born in France, but emigrated to Mauritius at an early age and became a hairdresser in Port-Louis. In his spare time, he collected living molluscs and subfossil vertebrates in the mountains of the northern part of Mauritius (Montagne du Pouce, Montagne du Corps de Garde). Although Thirioux's contribution to dodo research is occasionally mentioned (Fuller, 2002; Grihault, 2005), few details are usually provided about his activities, beyond the fact that the specimens he collected ended up in the hands of collectors and naturalists who sent them on to Europe (Halais, 1941b). However, the recent

description of the exceptional dodo skeletons discovered by Thirioux and kept in Port-Louis and Durban has revived interest in this rather forgotten collector (Claessens & Hume, 2015). Carié himself, in his article on *Leguatia* (1930) noted that Thirioux searched the caves and crevices on the mountain slopes, "with an admirable patience and perseverance", and found complete skeletons of the dodo and *Aphanapteryx*, as well as remains of other birds, turtles and lizards. It also appears that Carié was one of the naturalists who acquired Thirioux's finds. In an introductory note to a memoir by Louis Germain on terrestrial and freshwater molluscs from the Mascarene islands, Carié (1921) noted that part of the material described in that work had been collected by Thirioux during his explorations of the mountains of northern Mauritius, in the course of which he also found subfossil bones (Fig. 3). In addition, he mentioned that on several occasions he had purchased collections from Thirioux. This explains some aspects of the dodo specimens donated by Carié to European museums.

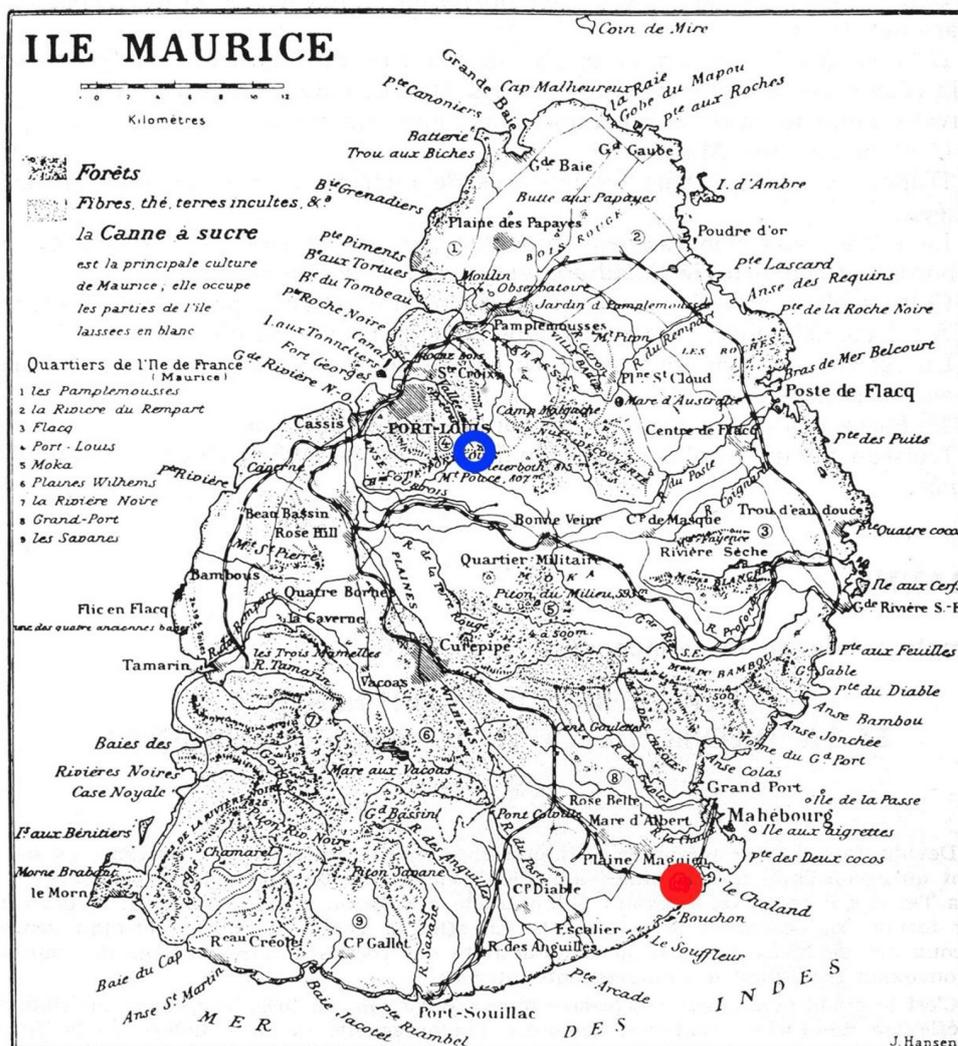


Fig. 3. Map of Mauritius (from Carié, 1919) showing the location of Mare aux Songes (red dot) and of Thirioux's localities (blue circle) in the mountains near Port-Louis.

Paul Carié's dodo specimens

Several museums in Europe hold collections of dodo bones donated by Paul Carié. Not unexpectedly considering Carié's close association with this institution, the National Museum of Natural History in Paris is one of them. Janoo (1996) described a *Raphus cucullatus* skull from the Paris collection, the label of which bears "Vallée aux Prêtres" as geographical origin, as well as Carié's name. Other specimens in Paris apparently were collected by Thirioux. The "light rosewood tint" of the skull is very different from the usual brown colour of Mare aux Songes specimens (Janoo, 1996). The Vallée aux Prêtres is in the mountains just east of Port-Louis, in northeastern Mauritius. The specimen was in all likelihood collected there by Thirioux and then purchased by Carié. There may be more dodo material donated by Carié in the Paris Museum.

A second French museum in which dodo bones donated by Carié are kept is the museum

("Fabrique des Savoirs") at Elbeuf-sur-Seine (Seine-Maritime, Normandy), which holds a large natural history collection, largely brought together in the late 19th and early 20th century in relation with the activities of a local natural history society. Paul Carié donated a set of dodo bones, together with mollusc specimens, to the Elbeuf museum in 1923 (Coulon, 1923; Coulon & Saint-Amand, 1922,1923). A description of the dodo material was published by Angst and Buffetaut (2010). The Elbeuf material includes both specimens showing the typical brownish colour of Mare aux Songes bones and others which are much lighter, almost white (Fig. 4). The latter bones are in all likelihood from Thirioux's localities in the mountains of north-eastern Mauritius (see below).

Paul Carié also donated dodo bones to the Musée Cantonal de Géologie in Lausanne, Switzerland (Anonymous, 2007). According to the archives of the museum, the specimens were sent to Maurice Lugeon, who was then professor of geology at the University of Lausanne, in 1907. They comprise about 30 bones, some dark



Fig. 4. Two femora of *Raphus cucullatus* donated by Paul Carié to the Elbeuf Museum in 1923. Above, 8.0.67, a brown-coloured specimen from Mare aux Songes. Below, 9.0.67, a whitish specimen in all likelihood collected by Thirioux.

brown, others whitish in colour, which have been mounted to produce an incomplete composite skeleton. A handwritten note by Carié (kindly communicated by R. Marchant) provides not only a list of the bones sent to Lausanne, but also important information about their provenance. In it, Carié mentions that the white bones come from Mr Thirioux's excavations in the screes and caves in the vicinity of Port-Louis, while the brown ones come from Mare aux Songes (which at that time belonged to Carié). On the basis of this note, it seems extremely likely that the bones donated by Carié to the Elbeuf museum also have this dual origin.

It cannot be excluded that dodo material donated by Paul Carié may exist in other European collections. A composite mounted skeleton, illustrated in Carié (1976), was still preserved by descendants of Paul Carié until recently (J. Carié, personal communication). However, records show that the dodo bones held by the museums of Lyon and La Rochelle were not provided by Paul Carié, but purchased from Natural History dealers.

Discovery of a new collection brought together by Paul Carié

As shown before, the natural history work done by Paul Carié was very important and permitted to increase significantly the number of specimens known from Mauritius. In 2015, this story took a new turn, when the descendants of Paul Carié contacted one of us (D.A.)

because they were clearing the old family house close to Paris and had found some old specimens which they thought might be of scientific interest. A rapid investigation of this collection quickly showed that it contained various very interesting specimens. This new collection includes an important number of modern molluscs, insects and eggs. Unfortunately, the exact origin and history of these specimens are unclear and in the absence of documents will be difficult to elucidate. The second part of this collection includes a large number of vertebrate bones. These can be divided into two groups: modern vertebrates including mainly rodents and birds, the origin of which is unknown, and a very large number of subfossil specimens, including mainly bones of giant turtles (*Cylindraspis*), bats and dodos (Fig. 5). The origin of these bones is clearer, the brown ones are from the Mare aux Songes, and the white dodo bones may be from various caves as already explained by Carié himself (see above). Finally, several drawings and written documents are also associated with these specimens. All these specimens have been donated to the Elbeuf Museum, where previous specimens from Paul Carié were already kept. The complete collection is kept together and has been inventoried with collection numbers. Some of the dodo bones were used for the recently published first histological study of dodo bones (Angst *et al.*, 2017; Angst, 2018) and other bones are currently studied by an international team, which shows the importance of this new collection and of the work done by Paul Carié.



Fig. 5. Dodo bones belonging to the collection rediscovered in 2015 and donated by Paul Carié's heirs to the Elbeuf Museum.

Conclusion

Although Paul Carié published very little on the dodo or other subfossil vertebrates from Mauritius (apart from his debunking of *Leguatia*), his contribution to our knowledge of the Mauritian extinct fauna was far from negligible. Like other local naturalists, including George Clark, Théodore Sauzier and Louis Thirioux, he gathered large collections of bones which were mostly sent to European institutions and studied there. As noted above, Carié's collection in the Paris Natural History Museum was the basis for Hoffstetter's descriptions of various hitherto unknown elements of the extinct herpetofauna of Mauritius. By the time Carié presented sets of dodo bones to museums in Paris, Elbeuf and Lausanne, the osteology of *Raphus cucullatus* was already well known, so that this material was mostly used for display purposes rather than as a basis for new descriptions. Nevertheless, dodo specimens in Paris (Janoo, 1996) and Elbeuf (Angst & Buffetaut, 2010) were described a long time after Carié (and Thirioux) collected them, and some of this material has been used for recent studies on the weight of the dodo (Angst *et al.*, 2011), and to do the first bone histological study permitting to distinguish for the first time the males and the females and to observe the moulting events and propose a timing for these events during the year (Angst *et al.*, 2017; Angst, 2018).

In addition to his published papers on the living fauna of the Mascarenes, Paul Carié's achievements as a collector of remains of the extinct vertebrates of Mauritius definitely deserve to be remembered.

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