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## PROVENANCE AND HISTORY OF THE THIRIOUX DODOS

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**ABSTRACT**—The exact provenance of the two associated dodo skeletons collected in the vicinity of Port Louis, Mauritius, around the turn of the 19th century is shrouded in mystery, as well as their collector, the amateur naturalist and barber Louis Etienne Thirioux (1846–1917). The most complete specimen resides in the Mauritius Institute, Port Louis, whereas the second, which is a partial composite, is in the Durban Natural Science Museum (South Africa). Early correspondence between Thirioux and Alfred Newton, Professor of Zoology and Comparative Anatomy at Cambridge University, detailed museum records kept by Ernest Chubb from the Durban Natural Science Museum, and early photographic records of Thirioux's finds shed some light on the early history of the specimens. The Port Louis specimen appears to consist of the bones of a single bird, apart from what appear to be an extra pair of lacrimals, and is essentially complete, including, for instance, the wrist bones, the patella, and the tarsal sesamoid, with the sole exception of the phalanx digiti minoris (present in the Durban specimen). These elements have never been described or illustrated before. The Durban specimen contains elements that most likely derived from a very small number of birds, possibly as few as two. Records indicate that some reconstruction has been undertaken on the Durban specimen, including the discarding of a cervical vertebra. However, regardless of unanswered questions regarding the history and provenance of the Thirioux dodo specimens, they represent the most complete, associated skeletal remains in existence.

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### INTRODUCTION

Louis Etienne Thirioux (1846–1917), an amateur naturalist from Port Louis, Mauritius, collected two of the most important dodo skeletons known to science around the turn of the 19th century. One, held at the Port Louis Mauritius Institute, is an almost complete, associated individual, whereas the second, held at the Durban Natural Science Museum, is a partial composite, possibly reconstructed from just two individuals. Thirioux's dodos were discovered in the foothills and valleys of Le Pouce and surrounding mountains, but their exact provenance has not been recorded. The importance of Thirioux's dodos cannot be overstated, as prior to their discovery, all 19th century dodo subfossil remains had been collected at the Mare aux Songes, a marsh deposit in southeast Mauritius (see Rijdsdijk et al., 2015). This material comprises unassociated bones from many hundreds of individuals. Furthermore, although a number of reconstructed skeletal mounts have been created from this material, and hundreds of individual dodo bones are available for study, determining accurate body proportions from these specimens is problematic. Here, we elaborate on the context and provenance of Thirioux's finds and provide documentation as to where he was likely to have collected the subfossil remains, and what subsequently happened to the two dodo skeletons. We document historic alterations to the skeletons, a process that is crucial to the integrity of the osteological description, because modest reconstructions that include the substitution of a small number of skeletal elements have been undertaken on both specimens, likely by Thirioux as well as by later museum technicians. Source

materials at our disposal include correspondence between Etienne Thirioux and Alfred Newton, Professor of Zoology and Comparative Anatomy at Cambridge University (Thirioux-Newton correspondence, September 27, 1899–May 11, 1907, UMZC; see also Parish, 2015), a few contemporary and early accounts of Thirioux's exploits (e.g., D'Emmerez de Charmoy, 1903; Pitot 1905, 1914; Carié, 1930; Halais, 1942), and the detailed records made between 1910 and 1951 by Ernest Chubb, the curator (and later director) of the Durban Natural Science Museum. Further information was obtained when dismantling the vertebrae of the Durban specimen for non-contact three-dimensional (3D) laser surface scanning that revealed old pencil numbering (see Claessens et al., 2015a). Although Thirioux was a general natural history collector and obtained a vast number of subfossil remains of other Mauritian birds and endemic reptiles, his dodo specimens are probably the most important, and it is the history of these specimens that are the subject of this memoir (Claessens et al., 2015b).

Our research has shed additional light on the history and provenance of Thirioux's dodos, but many of the details regarding the specimens and their collector remain a perplexing mystery.

**Institutional Abbreviations**—**DNSM**, Durban Natural Science Museum, Durban, South Africa; **MGL**, Musée Cantonal de Géologie, Lausanne, Switzerland; **MI**, Mauritius Institute, Port Louis, Mauritius; **MNHN**, Muséum National d'Histoire Naturelle, Paris, France; **UMZC**, University Museum of Zoology, Cambridge, U.K.

### BIOGRAPHICAL BACKGROUND

Louis Etienne Thirioux (1846–1917) was a Mauritian barber and avid amateur naturalist who made extensive collections of the extinct vertebrate and terrestrial gastropod fauna of

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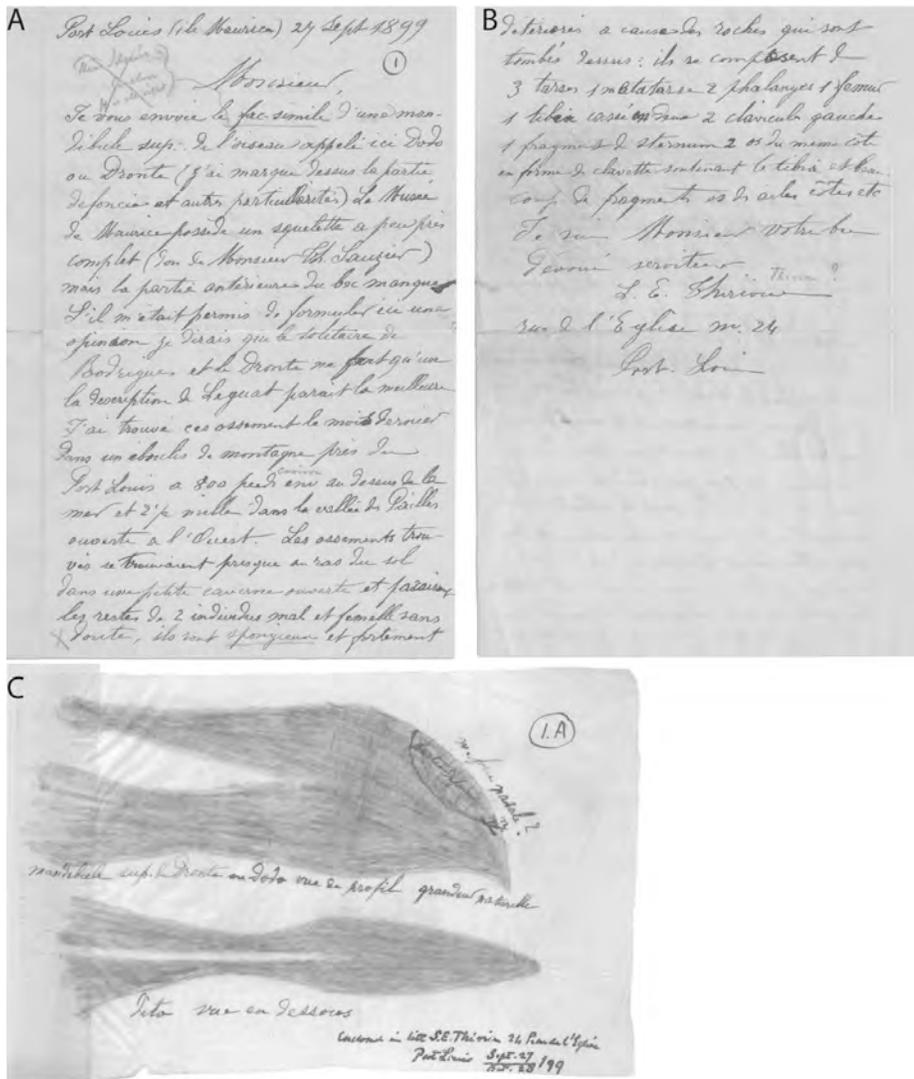


FIGURE 1. **A, B**, First letter sent by Etienne Thirioux to Alfred Newton, dated 27 September 1899, in which Thirioux reports the discovery of dodo remains in the rock fall deposits near Le Pouce Mountain. **C**, Included by Thirioux was a sketch of the cranial remains he found in August 1899. This specimen is not part of the Port Louis or Durban skeleton. UMZC Thirioux-Newton correspondence letter 1 and drawing 1A.

Mauritius. He arrived on Mauritius when young, later married Julie Thion, and in 1870 worked in Brangeon, a fashionable hairdresser in the capital, Port Louis (see Halais, 1942); very little else was recorded and not a single image or photograph of him is known. Halais (1942:222) remarked on Thirioux's character:

Like any good Figaro, and being French, Thirioux had a genius for conversation, a light and condescending prattle that covers everything to please the customer that he is festooning . . . He also loved to recite poetry, sometimes stanzas from Béranger, sometimes Victor Hugo, and sometimes it was a beautiful page of Roman history . . . [our translation].

On Thirioux's collecting, Halais further stated:

His research of the natural history of Le Pouce Mountain and the surrounding valleys, and on the mountain of Corps de Guard, had given him an ample harvest of specimens; he was studying books and had an atlas in hand. All these specimens were classified, distributed and compared with an attention to detail and with extraordinary patience, then sent to collectors or naturalists who shipped them to Europe. He could describe a bone fragment with the safety of an osteology manual, and handled them with the dexterity of a specialist; he explored a cave and many a depression, scree, and the alluvium of rivers. Here's

how this modest barber was able to work as a man of science [our translation].

Thirioux spent Sundays and holidays reading up on science and hiking around the Moka range, a chain of mountains in Mauritius that separate the mountainous regions of the south from the flat plains of the north. He also explored Corps de Garde Mountain to the south of the Moka range. In 1899, Thirioux started collecting subfossil remains of the Mauritian fauna and began corresponding with Alfred Newton (1829–1907), Professor of Zoology and Comparative Anatomy at the University Museum of Zoology, Cambridge, U.K. (UMZC Thirioux-Newton correspondence 1–40 [September 27, 1899–May 11, 1907]). His correspondence included drawings and photographs of the specimens (Figs. 1, 2), and Thirioux was eager to have his collection studied professionally. It is apparent from Thirioux's correspondence that financial gain was not paramount in his dealings with Newton, which was unlike George Clark who had supplied Newton with dodo material for sale some 35 years earlier (Hume et al., 2009; Rijdsdijk et al., 2015). In 1901, Thirioux offered to sell his entire collection to Newton, asking him for a reasonable price (UMZC Thirioux-Newton correspondence 16 [August 27, 1901]). However, Newton only offered a paltry £20, plus the



FIGURE 2. Example of the dodo materials discovered by Thirioux (UMZC Thirioux-Newton correspondence photo 9B). Materials include a fragmentary cranium, a quadrate, maxillary and mandibular rostral elements, palatine and jugal fragments, atlas, axis, and a fragmentary thoracic vertebra (see also Parish, 2015). Photograph sent by Thirioux to Alfred Newton on September 5, 1900 (received October 8, 1900). UMZC Thirioux-Newton correspondence inclusion 9B.

expenses of insurance and carriage (UMZC Thirioux-Newton correspondence 17A [December 20, 1901]). It is apparent that Thirioux did not accept the offer and was probably insulted by it, because correspondence with Newton ended for 2 years (UMZC Thirioux-Newton correspondence 20 [February 14, 1902]). Thirioux resumed correspondence with Newton on September 17, 1904, when Thirioux acknowledges Newton's (1904) letter to the prestigious scientific journal 'Nature' honoring Thirioux's discoveries. During the intervening 2 years, Thirioux had sold his collection (but not the dodos) to the Mauritius Institute for around £80 (UMZC Thirioux-Newton correspondence 21 [September 17, 1904]). However, Thirioux became impatient about the lack of interest shown in his material, especially from the director of the institute, Donald d'Emmerez de Charmoy (e.g., UMZC Thirioux-Newton correspondence 28, 33 [August 21, 1906; February 3, 1907]). In late 1906 or early January 1907, Thirioux bought back part of the collection and sent them as a gift to Cambridge with a request that Newton himself should describe the material (UMZC Thirioux-Newton correspondence 29 [January 11, 1907]). By 1907, Alfred Newton was 78 years old and his abilities were now in decline, so he asked Thirioux that a modification should be made to his offer so that another 'competent osteologist' could do the work (UMZC Thirioux-Newton

correspondence 29B [February 23, 1907]). Alfred Newton died five months later on June 7, 1907. Thirioux continued to send subfossil remains to Hans Friedrich Gadow (1855–1928), a German ornithologist who was curator of the Strickland Collection at Cambridge. Thirioux's last donation to Cambridge was sent on July 24, 1908. From 1910 to 1913, Paul Carié, Thirioux's sponsor and whose family owned the Mare aux Songes fossil locality (Cheke and Hume, 2008), retraced Thirioux's excavation sites and collected more subfossil vertebrate specimens (Carié, 1930). He sent these along with material previously collected by Thirioux to the Muséum National d'Histoire Naturelle, Paris (data taken from MNHN museum labels).

Thirioux's son was employed in the judiciary on Rodrigues (Halais, 1942), a small island administered by Mauritius and situated about 670 km to the east. At some point after 1912, Thirioux, who was then in his late 60s or early 70s, visited or stayed with his son on the island. In 1917, aged 71, Thirioux traveled to Ile Fregate, one of the small islets situated in the lagoon surrounding Rodrigues, and purportedly collected the last two specimens of the Rodrigues day gecko *Phelsuma edwardnewtoni* (Boulenger, 1884; Vinson and Vinson, 1969). These specimens were sent to Paul Carié who donated them to the MNHN (Cheke and Hume, 2008). This discovery was Thirioux's final contribution to natural history; he died in June of that year in Port Mathurin, the capital of Rodrigues (Halais, 1942). One of us (J.P.H.) searched the Port Mathurin graveyard at Anse Anglais to see if Thirioux's headstone was still present, but without success.

In addition to dodo remains, Thirioux collected hundreds of subfossil bones of other Mauritian birds and reptiles, including an endemic starling, *Cryptopsar ischyrrhynchus* Hume, 2014, and a partially associated skeleton of Mauritian lizard-owl *Mascarenotus sauzieri* (Newton and Gadow, 1893) (Hume, 2013, 2014). Thirioux's discoveries also include such treasures as the most complete skeletal material known of the extinct Mauritian red rail *Aphanapteryx bonasia* (Sélys Longchamps, 1848) and the Mauritian giant skink *Leiopisma mauritiana* (Günther, 1877). Therefore, his important contributions to Mauritian palaeontology have been remembered. The vernacular and specific names of Thirioux's gray parrot *Psittacula bensoni* (Holyoak, 1973) and Thirioux's wood pigeon *Columba thiriouxi* Hume, 2011, are named in Thirioux's honor (Hume, 2007, 2011).

#### PROVENANCE OF THIRIOUX'S DODOS

Thirioux started collecting remnants of the extinct vertebrate fauna of Mauritius in 1899 (UMZC Thirioux-Newton correspondence 1A [September 27, 1899]; D'Emmerez de Charmoy, 1903). Thirioux collected specimens in a cave, in crevasses and depressions, and in boulder scree (Halais, 1942), all in areas that were within walking distance from the capital, Port Louis. He worked in the foothills and valleys surrounding Le Pouce Mountain, including Anse Courtois (now completely developed), Vallée des Prêtres (Pitot, 1905, 1914), and beneath Snail Rock; he also collected on the Plaine des Roches to the east (Hume, 2011) and Corps de Garde Mountain to the south (Pitot, 1905, 1914; Halais, 1942; Fig. 3). Thirioux stated in his correspondence that he excavated in scree 800 feet above sea level on the mountain close to Port Louis, and also 2.5 miles into the Vallée des Pailles open to the west (UMZC Thirioux-Newton correspondence 1A [September 27, 1899]) (Fig. 1). Later he mentioned that he collected in glacia (an erosional or depositional incline with a gently sloping surface) in the valleys of Le Pouce at 1300 feet altitude and Vallée des Pailles, the two localities separated from each other by a small peak (UMZC Thirioux-Newton correspondence 34 [April 26, 1907]). Newton (1904) publicized Thirioux's discoveries in a letter to the editor of 'Nature,' in which he referred to a letter from Thirioux dating from 1899 that described the

discovery of the remains of at least two dodo skeletons in the caves and rockfall deposits near Le Pouce. In his letter of September 27, 1899, which included a drawing of the dodo specimen, and that of October 10, 1899 (UMZC Thirioux-Newton correspondence 2 [October 10, 1899]), Thirioux described a limited assemblage of partial remains that were 'spongy' and strongly deteriorated by rock falls. Thus, the remains indicated in Newton's letter to 'Nature' (1904) were almost certainly not the Thirioux skeletons described in this memoir (Claessens et al., 2015b).

**The Port Louis Skeleton**—The Port Louis dodo skeleton obtained by Thirioux was likely found after 1902 during the above-mentioned hiatus in the correspondence with Newton, or later. In his 1903 report on the bird fauna of Mauritius, Donald D'Emmerez de Charmoy (1903), Mauritian government entomologist and curator at the Mauritius Institute, listed a nearly complete single individual dodo skeleton that had been found by Thirioux. A photograph taken in ca. 1901 of a dodo skeleton that Thirioux was mounting may be this specimen (Fig. 4), but its present whereabouts and the photographer are unknown, and certain parts, especially vertebrae, are clearly derived from different specimens and could even include bones from the Mare aux Songes. Furthermore, D'Emmerez de Charmoy did not imply that it was part of the collection in the Mauritius Institute; thus, Thirioux's Port Louis and Durban specimens were not discovered until after 1901. Pitot (1905) stated that Thirioux, at the time of writing, had succeeded in setting up his own complete skeleton of the Dodo, which suggests that the Port Louis dodo was still in Thirioux's possession, at least until 1905. Furthermore, Pitot (1914) mentioned that a mounted dodo skeleton, put together by Alfonse Milne-Edwards, the comparative anatomist based at the MNHN, had been donated to the Mauritius Institute by Théodore Sauzier, who reworked the Mare aux Songes under a government auspice in 1889 (Newton and Gadow, 1893). This

specimen, which still resides at the Mauritius Institute, was assembled from Mare aux Songes material in Cambridge and sent to Milne-Edwards, and further elements were donated by Thirioux (Koenig, 1939). Pitot (1914) included a photograph (Fig. 5) of a mounted specimen in his article, which suggests that it represents the Milne-Edwards dodo donation, but in fact the specimen is most likely the Port Louis dodo collected by Thirioux. If true, this confirms that the specimen was in the Mauritius Institute from at least 1914 and makes it the first known image. However, Pitot's (1914) article is an abridged, translated version of his earlier work (Pitot, 1905), so the later date of 1914 may still not be an accurate one; Thirioux's dodo could have been in the Mauritius Institute from at least 1905. Unfortunately, we have been unable to find any more information about exactly how and when the Port Louis dodo came into the possession of the Mauritius Institute at Port Louis.

**The Durban Skeleton**—It took Ernest Charles Chubb (1884–1972), curator and later director of the Durban Museum, more than 6 years to acquire the DNSM Thirioux dodo specimen (Chubb, 1948). In 1912, a representative of the Mauritius Institute, most probably D'Emmerez de Charmoy, visited Chubb to inquire about obtaining South African natural history specimens (see Chubb, 1948). In turn, Chubb inquired with D'Emmerez de Charmoy about the possibility of acquiring a dodo skeleton for the DNSM and was intrigued to learn that the Mauritius Institute had two dodo skeletons on display, namely, the one assembled out of Mare aux Songes skeletal elements by Milne Edwards and a second one, on loan from Thirioux (Chubb, 1948), which was

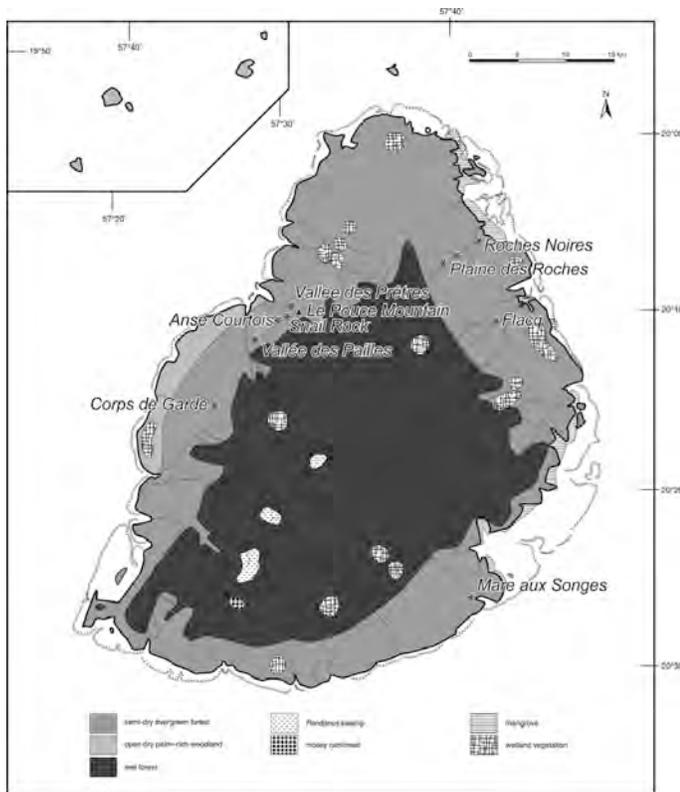


FIGURE 3. Map showing general location of Thirioux sites around Port Louis (Anse Courtois; Vallée des Prêtres; Vallée des Pailles; Snail Rock) and elsewhere (Corps de Garde Mountain; Plaine des Roches). Map adapted from Cheke and Hume (2008).



FIGURE 4. Photo taken in ca. 1901 by an unknown photographer of an incomplete composite dodo skeleton that Thirioux was reconstructing in that year. Materials seen in this image do not match those seen in the MI and DNSM skeletons described in this memoir; the fate of the dodo shown in this photo is unknown. UMZC Thirioux-Newton correspondence letter 19, photo 19A; sent 26 December 1901.



FIGURE 5. Photo of mounted dodo specimen at the MI, figured in Pitot (1914), likely representing the Port Louis Thirioux specimen.

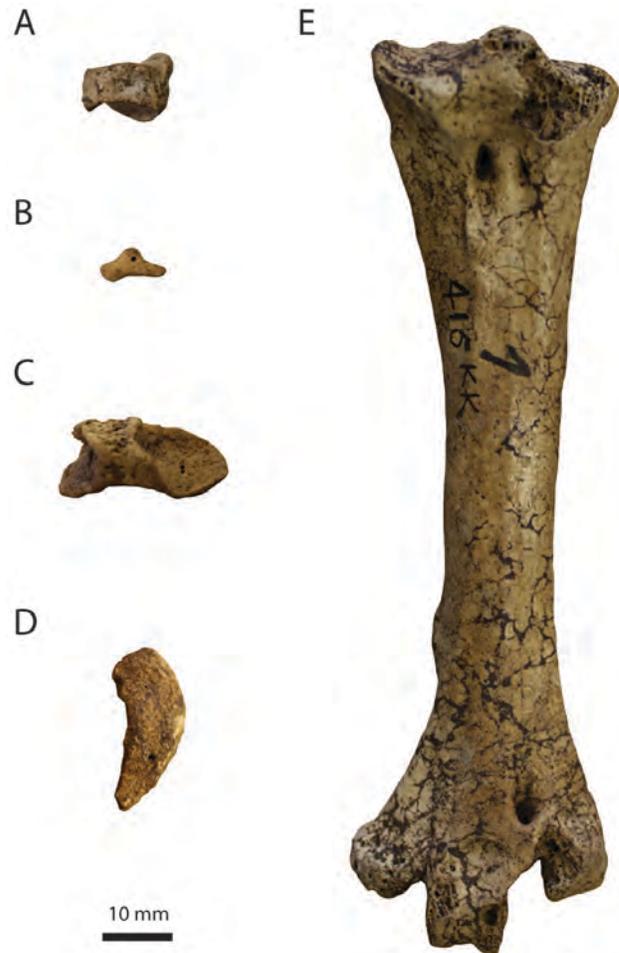


FIGURE 6. Photos of rare skeletal elements from the UMZC Thirioux collection (UMZC 415.KK), **A**, radiale; **B**, phalanx digiti minoris; **C**, patella; **D**, intertarsal sesamoid; and a more common element, the tarso-metatarsus (**E**), showing slightly abraded extremities, light whitish color, and exhibiting mottling of the outer cortex with brown sediment, not observed in the Durban or Port Louis skeletons.

presumably the Port Louis skeleton. Thirioux's other dodo skeleton, which eventually was purchased by the DNSM, was almost certainly not held at the Mauritius Institute during this time. Chubb and D'Emmerez de Charmoy agreed upon an exchange of specimens between both institutions, but ultimately the deal fell through due to insufficient funds at the Mauritius Institute to acquire the Thirioux skeleton for exchange with the DNSM (Chubb, 1948). Through intermittent communication with a series of Mauritian naturalists over the years, Chubb continued to follow through on the Thirioux dodo specimen. Based on a new inquiry from Mauritius regarding the acquisition of specimens in 1917, Chubb learned that Thirioux had passed away, and via his heirs and intermediaries, Chubb was finally successful in purchasing the highly desired second dodo skeleton from his widow and son; the purchase was finally completed in 1918. George Antelme, a Franco-Mauritian landowner with an interest in natural history and who had an association with the Mauritian Institute, helped arrange shipping to Durban. The dodo skeleton arrived in Durban in December 1918. As early as March 1919, Chubb published a brief note in the *Annals of the Durban Museum* to announce the purchase of the dodo skeleton, highlighting some of its unique preserved features (Chubb, 1919). This publication appears to have remained the sole published scientific study of the Durban Thirioux specimen to this date.

**Disarticulated Remains**—In addition to Thirioux's mounted dodo skeletons in Port Louis and Durban, several of the disarticulated dodo remains he collected survive in the collections of the UMZC, MNHN, and MGL (Fig. 6A–E). These elements were mostly forwarded by Thirioux himself, reflecting his desire to have his discoveries of generally rare skeletal elements examined by the scientific establishment.

## RECONSTRUCTION AND MODIFICATIONS

### Port Louis Specimen

The Port Louis specimen remains in a comparatively very good condition. Coloration, (relative) size, fit, and the extreme rarity of several of the elements strongly suggest that (almost) all of the surviving elements belong to a single individual. Furthermore, a supply of disarticulated remains to 'build' this skeleton, especially the rare elements of the skull, wing, and leg bones, would simply not have been available at this time. The overall coloration of the skeletal remains is beige to light brown with occasional darker speckling, similar to other material collected by Thirioux and quite distinct from the generally tannin-stained remains from Mare aux Songes. The texture of the bones collected by Thirioux also differs from that of the remains uncovered at Mare aux Songes. The Thirioux materials typically have a less smooth surface texture than the collagen-rich Mare aux Songes bones, likely due to etching of the remains found by Thirioux in the acidic Mauritian volcanic soil.

The sternum of the Port Louis specimen is somewhat darker in coloration, especially on the outer surface, but the interior is lighter and similar to the long bones in the skeleton. The pelvis is

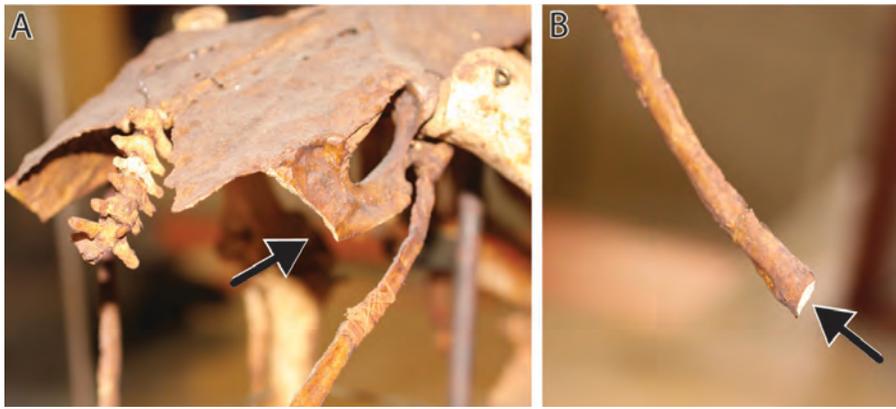


FIGURE 7. Photo of relatively recent damage to pelvis in the MI specimen. **A**, oblique posterior view of the pelvis, showing the light-colored breakage surface of the postacetabular portion of the right iliac wing; **B**, oblique posterior view of the right pubis, showing a light-colored breakage surface. Arrows point to break.

also much darker than the rest of the skeleton and is much more similar to remains from Mare aux Songes. However, breaks along the posterior margin of the iliac blades and the pubis are light beige and grainy in cross-section (Fig. 7), unlike that observed along break lines in the collagen-rich, tannin-stained remains from Mare aux Songes. The application of a thin layer of varnish may have led to discoloration of the outer surface of the pelvis, similar to portions of the skull, where the varnish is peeling from the nasal bones. We conclude, therefore, that the sternum and likely also the pelvis were part of the same original association of bones that contributed to the Port Louis specimen. Portions of the sternum and of the pelvis of the Port Louis specimen have been reconstructed in plaster.

Minor modifications have been made to the skull of the Port Louis specimen. An extra set of unfused lacrimal bones has been glued into the orbit on both sides. In addition, the palatines and pterygoids have been glued in position on the palatal surface. The left and right palatines and pterygoids are of unequal size, which may be due to different degrees of abrasion and bone loss, but the original association of both contralateral elements with the Port Louis cranium cannot be guaranteed. At some point after 2003, when the wings and pelvis were shown to be intact (see Den Hengst, 2003), damage appears to have occurred to the specimen, possibly due to a fall, as evidenced by breakage of the alar portions of the ilia and the distal tips of the pubis (Fig. 7A, B).

The Port Louis dodo skeleton is also remarkable in that it preserves the small and distal wing elements, the right and left phalanges proximalis and right phalanx distalis of the *digiti majoris*, and the right and left phalanges *digiti alulae*; it only lacks the phalanx *digiti minoris*. The *os carpi radiale* and *os carpi ulnare* are also both preserved, small skeletal elements that are not known from the Mare aux Songes and are unique to the Thirioux discoveries. In the hind limb, the patellae and tarsal sesamoids are present (see Claessens et al., 2015a).

### Durban Specimen

The Durban dodo specimen is a composite reconstructed from at least two individuals and arrived in Durban in December 1918. Chubb appeared to have agreed to the purchase of the specimen sight unseen (Chubb, 1948); thus, the photograph of the mounted skeleton (Fig. 8), published in his article in the March issue of the *Annals of the Durban Museum* (Chubb, 1919), can be dated to the period between December 1918 and March 1919. In April 1919, Chubb asked his assistant, David R. Boyce, to remount the skeleton, and Boyce finished rearticulating the skeleton in September 1919. Unfortunately, the modifications made by Boyce did not benefit the integrity of the specimen, whose composite bones were repositioned in an

anatomically inaccurate pose, heavily varnished and covered with plaster in the pelvic region (Fig. 9). Also, one of the vertebrae of the specimen, the 10th cervical, was discarded at this time, as can be seen via careful comparison of the historic photographs of the specimen (Figs. 8–10). Our careful dismounting of the cervical vertebral column for individual scanning of the cervical vertebrae revealed old pencil numbering on the prezygapophyses of the vertebrae, possibly from the 1919 remount but likely from Thirioux (similar pencil handwriting is present on the ribs of the Port Louis specimen). The pencil numbers on the prezygapophyses run from 3 (on C3) to 9 and then from 11 onward, confirming the absence of C10 noted in the photographic evidence. The reason for the discarding of the 10th cervical vertebra is unknown. Certainly, the fit between the 9th and 11th cervical vertebrae is not perfect. It is interesting to note that Chubb



FIGURE 8. Photo of Durban Museum specimen prior to remount, taken between December 1918 and March 1919, first published in Chubb (1919). Arrow indicates cervical vertebra 10, which is still present in the specimen immediately after arrival to Durban. Surprisingly, Chubb (1919) mentions the presence of only 18 presynsacral vertebrae, although 19 are present on the photographed skeletal mount.

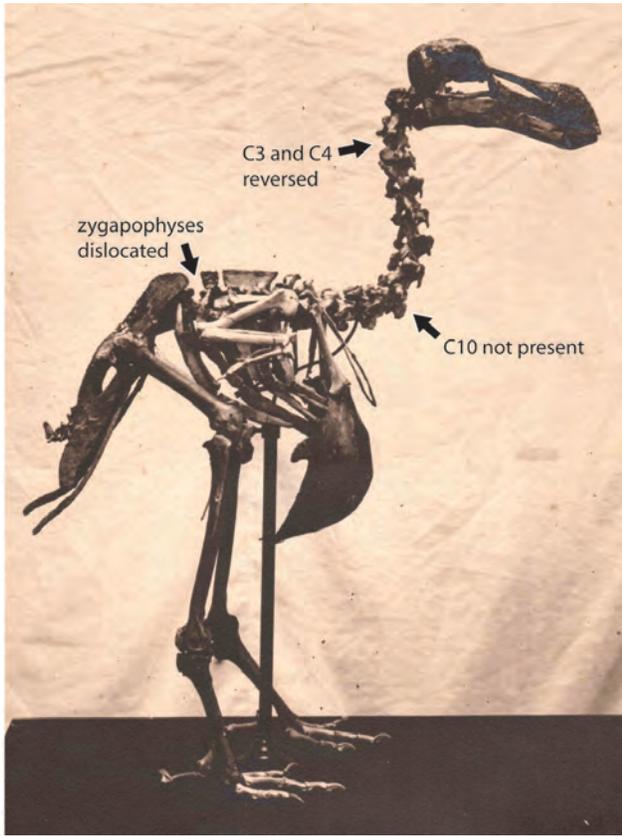


FIGURE 9. Pre-1948 photo of Durban Museum specimen, after remount (probably taken before the end of September 1919, prior to placement of the remounted skeleton back on public display). Arrows indicate the modifications made in the cervical vertebral column (discarding of C10, reversal of C3 and C4), change to a more upright pose with concomitant change in angle between the pelvis and last presynsacral thoracic vertebra, thus dislocating the zygapophyses and orienting the pelvis too vertically. The sternum is also oriented too vertically in the new mount.

(1919) described the prepelvic (i.e., postnotarial) thoracic vertebra as presynsacral vertebra number 18, in accordance with the then more recent interpretation of dodo axial anatomy by Newton and Gadow (1893), which was contrary to Owen’s (1866) interpretation (see Claessens et al., 2015a). However, the photograph of the newly arrived DNSM Thirioux dodo (Fig. 8; Chubb, 1919) showed 19 presynsacral vertebrae. Whether the discarding of cervical vertebra 10 was a conscious choice during the 1919 remount to present the specimen according to the anatomical interpretation of Newton and Gadow (1893), or whether it might have been for other reasons, or simply due to accident remains unknown. It is interesting to note that the Port Louis Thirioux dodo possesses 19 presynsacral vertebrae, similar to the Durban specimen prior to the 1919 remount. A search of the collections of the DNSM did not turn up the disassociated 10th cervical vertebra. Cervical vertebrae C3 and C4 were also transposed in the 1919 remount (Figs. 8, 9), and this was the arrangement that the mounted cervical vertebral column was found in prior to disassembly of the neck for 3D laser surface scanning by L.C. in January 2012 (see Claessens et al., 2015a).

The downward angle of the caudal end of the pelvis of the remounted Durban specimen is incorrect, as shown by the lack of articulation with the postzygapophyses of presynsacral vertebra 19: they are so far apart that they are not even close to overlapping (Fig. 9), as they would have in life. Further damage to the specimen includes the loss of the left sternal rib of presynsacral vertebral segment 20, and the alular digit of the right wing, which was reported as present by Chubb (1919) and visible on the earliest known photo of the specimen (Fig. 8), yet it is no longer present with the specimen today.

The cranium of the Durban specimen is not preserved and was reconstructed by Thirioux, and the maxilla and mandible have also undergone reconstructive work. The mandible is largely complete and reconstruction was mostly undertaken to connect the pars intermedia and pars caudalis mandibulae. The reconstruction of the cranium of the Durban specimen was executed rather crudely, and its flat roof more closely resembles that of the solitaire than that of the dodo, although other aspects of the skull certainly indicate familiarity with dodo cranial anatomy. Portions of the sternum and the pelvis of the Durban specimen were also reconstructed (see Claessens et al., 2015).



FIGURE 10. Annotated photograph of the rearranged cervical vertebral column after 3D scanning in January 2012. Rearrangement undertaken by L.C. based on early documentation of the specimen and anatomical fit. C3 and C4 have been repositioned in their proper locations, and vertebrae have been rotated to rearticulate pre- and postzygapophyseal joint facets.

Unlike the Port Louis dodo, the Durban dodo is a (partial) composite, including elements from at least two different birds, based on the mismatch of the articular surfaces of cervical vertebrae 11 and 12, and mismatch of the coloration of several different bones of the hind limbs, including the pedal phalanges. An exact determination of which elements were formerly associated is now near impossible to undertake by examination of their preservation and morphology, although the skeletal elements of many body regions, such as the pectoral girdle, are very closely matched and almost certainly associated. However, regardless of the lack of a preserved cranium and the damage done to the specimen during its 1919 remounting, the Durban specimen is still exceptional and truly a prize possession that could only have come out of Etienne Thirioux's collection. As in the Port Louis dodo, the specimen preserves the patellae and tarsal sesamoids. The Durban dodo's right wing is one of the most complete known, and it is the only wing that preserves the phalanx digiti minoris, which is missing from the Port Louis specimen (a disarticulated phalanx digiti minoris is also known, from the UMZC Thirioux collection [Fig. 6B], and from photographic evidence from the Thirioux-Newton correspondence [Photo 13A; included with letter 13, dated January 31, 1901]). In addition, the Durban specimen contains the right and left phalanx proximalis, the right phalanx distalis of the digiti majoris, and both the left and right ossa carpi radialis. The ossa carpi ulnaria are missing (but are present in the Port Louis specimen). The eighth cervical vertebra exhibits a callous growth that appears to be of pathological origin.

### CONCLUSIONS

Ultimately, the Port Louis and Durban specimens of dodo collected by Thirioux remain an enigma. All that can be stated with certainty about the most complete dodo specimens in the world is that they were collected after 1902, somewhere in the valleys around Le Pouce Mountain. Louis Etienne Thirioux, the hairdresser and amateur natural historian from Port Louis, has left a dodo legacy, but unfortunately exactly when and where he obtained his dodos will now probably never be known.

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