

This article was downloaded by: [American Museum of Natural History]

On: 1 November 2009

Access details: Access Details: [subscription number 907210657]

Publisher Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Historical Biology

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title-content=t713717695>

How Owen 'stole' the Dodo: academic rivalry and disputed rights to a newly-discovered subfossil deposit in nineteenth century Mauritius

J. P. Hume ^a; A. S. Cheke; A. McOran-Campbell ^b

^a Bird Group, Department of Zoology, Natural History Museum, Tring Herts, UK ^b Meadow View, Bucklebury Village, nr Reading, West Berkshire, UK

Online Publication Date: 01 March 2009

To cite this Article Hume, J. P., Cheke, A. S. and McOran-Campbell, A. (2009) 'How Owen 'stole' the Dodo: academic rivalry and disputed rights to a newly-discovered subfossil deposit in nineteenth century Mauritius', *Historical Biology*, 21:1, 33 — 49

To link to this Article: DOI: 10.1080/08912960903101868

URL: <http://dx.doi.org/10.1080/08912960903101868>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

How Owen ‘stole’ the Dodo: academic rivalry and disputed rights to a newly-discovered subfossil deposit in nineteenth century Mauritius

J.P. Hume^{a*}, A.S. Cheke^b and A. McOran-Campbell^c

^a*Bird Group, Department of Zoology, Natural History Museum, Akeman St., Tring Herts HP23 6AP, UK;* ^b*139 Hurst St., Oxford OX4 1HE, UK;* ^c*Meadow View, Bucklebury Village, nr Reading, West Berkshire RG7 6PS, UK*

(Received 25 February 2009; final version received 9 June 2009)

The discovery of the first fossil Dodo remains in the Mare aux Songes marsh, Mauritius, in 1865 resulted in a race to publish on the Dodo's post-cranial anatomy. George Clark, probable discoverer of the fossil site, sent consignments of bones initially to Richard Owen (British Museum), and subsequently to Alfred Newton, Cambridge, via Alfred's brother Edward, who was stationed on Mauritius. After receiving the first consignment, Owen intercepted material intended for Alfred, and abused his position to forestall any complaints from Alfred. Owen published on the Dodo first, while Clark was financially rewarded, but Clark's ensuing arguments over the site discovery with railway engineer, Harry Higginson, and attempt to cover up the abundance of Dodo bones, thus keeping prices high, concluded in a bitter rivalry that was never resolved between Owen and the Newton brothers.

Keywords: Dodo; Mare aux Songes; Richard Owen; George Clark; Edward Newton; Alfred Newton

Introduction

Up until the mid-nineteenth century, fossil remains of the Dodo *Raphus cucullatus* (Columbiformes: Columbidae), a species unique to Mauritius that became extinct in the late 1600s (Cheke and Hume 2008), had not yet been discovered, leading some authorities to doubt its very existence (Duncan 1828; Lesson 1831; Strickland and Melville 1848; Turvey and Cheke 2008), even though a head and foot at Oxford, a foot in London and skulls in Prague and Copenhagen survived from birds caught alive. Geologist and ornithologist, Hugh Strickland, amassed all of the available information into a scrapbook entitled ‘The Dodo Book’ (Strickland 1840–1850; Baker and Bayliss 2002), which included contemporary accounts and illustrations from ships’ logs, mariners’ descriptions, and contradictory depictions of live and dead Dodo specimens that had survived the journey to Europe. This formed the foundation of the first Dodo monograph entitled *The Dodo and its kindred* (Strickland and Melville 1848), in which anatomist Alexander Melville described the physical remains. The authors were given permission to have the ‘Oxford’ Dodo head dissected (Strickland and Melville 1848; Hume et al. 2006), thus confirming that the Dodo was a giant ground pigeon, a controversial theory first postulated by Danish Professor John Theodore Reinhardt a few years earlier (Reinhardt 1842). Prior to Reinhardt's proposal, the Dodo had variously been considered a diminutive ostrich, a rail, an albatross or even a kind of vulture (Owen 1846). Strickland and Melville's monograph initiated a huge public and scientific

interest in the bird (Turvey and Cheke 2008), and the race to obtain the first Dodo fossil remains had begun.

The first Dodo bones were found in 1860 by botanist and medical doctor Philip Ayres (Anon. 1860) and transmitted to the comparative anatomist Professor Richard Owen (1804–1892; Figure 1) at the British Museum. He appears to have muddled them with some Rodrigues Solitaire *Pezophaps solitaria* bones sent around the same time by Louis Bouton (discussed in Owen 1872) and not followed them up, although Edward Newton remembered later that they came from a cave at Petite Rivière and that ‘Ayres afterwards told me that Owen had pronounced one at least to be a Dodo's’ (EN > AN 3/1/1866, 24/3, p. 228). However, Owen was introduced in 1863 to Vincent Ryan, Anglican bishop of Mauritius, whom he prompted to send word around Mauritius that if any Dodo fossils should be found he must be informed immediately (Owen 1866b). The message was received by a school teacher, George Clark (1807–1873; Figure 2), natural historian and master of a Diocesan School at Mahébourg, southeast Mauritius, who had already spent more than 30 years searching for the fossil remains of Dodo, but without success (Clark 1866). As he later told it (Clark 1866), prompted by this new interest and a lead from his school pupils, Clark's efforts were finally rewarded in September 1865; the first subfossil remains of Dodo were recovered from a marsh called the Mare aux Songes in the Plaisance Sugar Estate, 5 km from Mahébourg, and less than 1 km from Blue Bay (Figure 3(a),(b)). Clark obtained permission to dig the

*Corresponding author. Email: j.hume@nhm.ac.uk



Figure 1. Richard Owen with a moa skeleton. From Fuller (2000) with permission.

site from the proprietor of the estate, Gaston de Bissy, and hired local labour to start excavation. The men waded into the deeper, central parts of the marsh, feeling for bones using their hands and feet, and the first discoveries were made. Clark wrote to Owen (GC > RO 6/10/1865, p. 125,



Figure 2. George Clark. From Hume (2006).

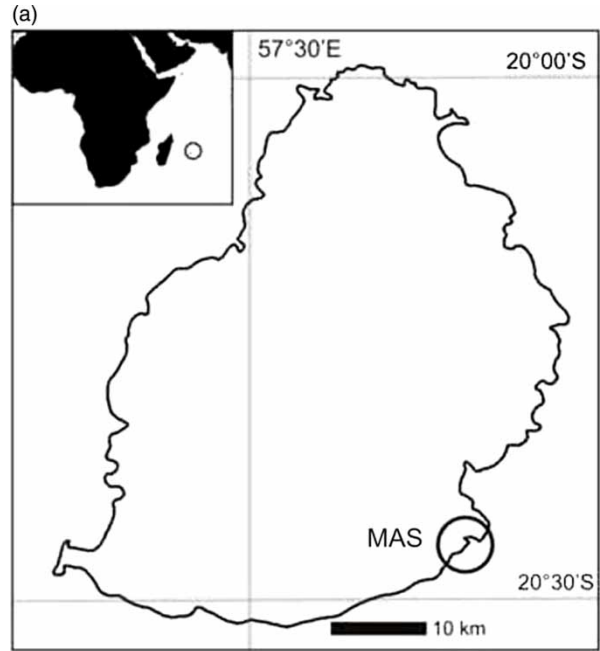


Figure 3. (a) Mauritius and Mare aux Songes. From Rijdsdijk et al. (2009); (b) Mare aux Songes. Courtesy of Lorna Steel.

published in Owen 1866b), and recorded the event with deep satisfaction:

... a sort of bog has been formed called 'La Mare aux Songes' in which is a deposit of alluvium varying in depth on account of the inequalities of the bottom, which is formed of large masses of basalt, from three to ten or twelve feet. The proprietor of the estate a few weeks ago conceived the idea of employing this alluvium as manure and shortly after the men began digging in it, when they had got to a depth of three or four feet, they found numerous bones of large tortoises, among which were a carapace and a plastron pretty nearly entire, as also several crania.

When I heard of this, it immediately struck me that the spot was one of the most likely possible to contain bones of the Dodo, and I gave directions to the men working there to look out for any bones they might find.

Nothing however was turned up but a fragment of what I supposed to be the humerus of a large bird. This encouraged me to look further, and my search was rewarded by the discovery of several tibiae, more or less perfect [in condition], one tarsi, one nearly perfect pelvis, and fragments of three others. . . .

A large series of Dodo remains were retrieved, and in October Clark sent the first consignment of material to Owen with the blessing of Bishop Ryan. Owen wasted no time in publicly announcing the discovery, staging highly publicised lectures and public engagements in January 1866 (Wissen 1995), before publishing the description of the Dodo's anatomy in October of that year (Owen 1866b). For his endeavours, Clark received what would have been in the 1860s the hefty financial reward of £100 for 100 bones from the British Museum, while Owen became the first person to formally describe the Dodo's post-cranial anatomy to science.

This account has become the standard version of events surrounding the discovery of the first Dodo fossil remains (e.g. Clark 1866; Wissen 1995; Fuller 2002; Hengst 2003; Grihault 2005; Hume 2006), but in reality it was a very different story, which we have reconstructed from surviving letters to Owen from Clark (noted as GC > RO), from Edward Newton to his brother Alfred (EN > AN), and correspondence to Alfred from Owen (RO > AN), Philip Sclater (PS > AN) and between Clark and Alfred (GC > AN, AN > GC), and manuscript notes left by Higginson (1859–1872). The picture is nevertheless still incomplete as Owen's letters to Clark, and Alfred's to Edward have not survived, and Edward's letter book March 1866–March 1869 (carbon copies of his correspondence) was lost when his briefcase got stolen on a train (EN > AN 10/3/1869, 24/4, p. 1).

It should be remembered throughout that the Dodo was often referred to in the nineteenth century by the Linnaean name *Didus ineptus* (e.g. in quotations below, *passim*), and that before the opening of the Suez Canal in 1869, letters to and from Mauritius took up to six or seven weeks to arrive, so there is some overlap in the timings of the events. Dates of correspondence are not necessarily consistent with the exact date of occurrence, and since the main events presented here took place over a period of just 12 months, it has not been possible to adhere to a precise chronological order. We therefore beg the reader's indulgence.

Edward Newton, Harry Higginson and Captain Mylius

Between 1859 and September 1865, a series of fortuitous events had taken place. Edward Newton (1832–1897; Figure 4), a colonial administrator, was posted to Mauritius from 1859–1877, eventually becoming Colonial Secretary (deputy governor; Cheke and Hume 2008). He was the brother of zoologist Alfred Newton (1829–1907; Figure 5), later to become the first Professor



Figure 4. Edward Newton. From Fuller (2002) with permission.

of Zoology and Comparative Anatomy at the University of Cambridge. Edward also had a keen interest in ornithology, so while stationed on Mauritius he sent specimens to Alfred and was well placed to respond immediately to any fossil discoveries there. Alfred was eager to receive possible Dodo material first, enquiring of Edward in early 1862 about the prospects for Dodo bones, Edward replying in the negative (EN > AN 29/3/1862; 24/1, p. 31). Meantime, Richard Owen was also determined to get Dodo fossil material and used one of his many connections to gain advantageous knowledge on Mauritius; as mentioned above, he had encouraged



Figure 5. Alfred Newton. From Fuller (2002) with permission.

Vincent Ryan, Bishop of Mauritius, to inform him immediately of any news.

In 1861, a civil engineer Harry Higginson (1838–1900) had obtained an appointment under Sir John Hawkshaw and Mr J.R. Mosse on the Mauritius Government Railway Staff. He left for Mauritius in April 1862, aged 24, to help in the construction of the new railway, which was going to transport both the sugar harvest and passengers around Mauritius (Higginson 1859–1872, p. 4). The contractors were Messrs Brassey and Wythes, and he worked as District Engineer for the following three and a half years until completion of the railway and then for a further year in charge of its operation. Higginson was involved in the final section of the Midland Line, which was completed on 19th October 1865 (Mosse 1869). The Midland Line started in Port Louis, the capital, passing south through Curepipe, Rose Belle and eventually Mahébourg, cutting through the Plaisance Sugar estate, within 100 m of the Mare aux Songes (Figure 6). Higginson later recalled that in September 1865 he had made a significant discovery:

Discovery of a Dodo

Shortly before the completion of the railway I was walking along the embankment one morning when I noticed some

coolies removing some peat soil from a small morass. They were separating and placing into heaps a number of bones of various sorts among the debris. I stopped and examined them as they appeared to belong to birds and reptiles and we had always been on the lookout for bones of the then mythical Dodo. So I filled my pocket with the most promising ones for further examination.

A Mr Clarke [*sic*], the Government schoolmaster at Mahebourg, had Professor Owen's book on the Dodo so I took the bones to him for comparison with the book plates. The result showed that many of the bones undoubtedly belonged to the Dodo. This was so important a discovery that Clarke obtained leave to go out to the morass and personally superintend the search for more. He eventually despatched a large quantity to the British Museum, which sold for several hundred pounds. (Higginson 1859–1872, p. 6b)

While Higginson claimed, and some recent writers (Grihault 2005; Hume and Prys-Jones 2005) clearly believed, that he was the first to find Dodo bones, other evidence suggests that Clark did in fact get there first and that Higginson misremembered the date he had visited Clark. It is evident from Higginson's travelogue that much of the detail was written retrospectively and, more importantly, no mention is made of the precise date when he walked along the railway embankment. However, the Dodo account begins with '*Shortly before the completion*

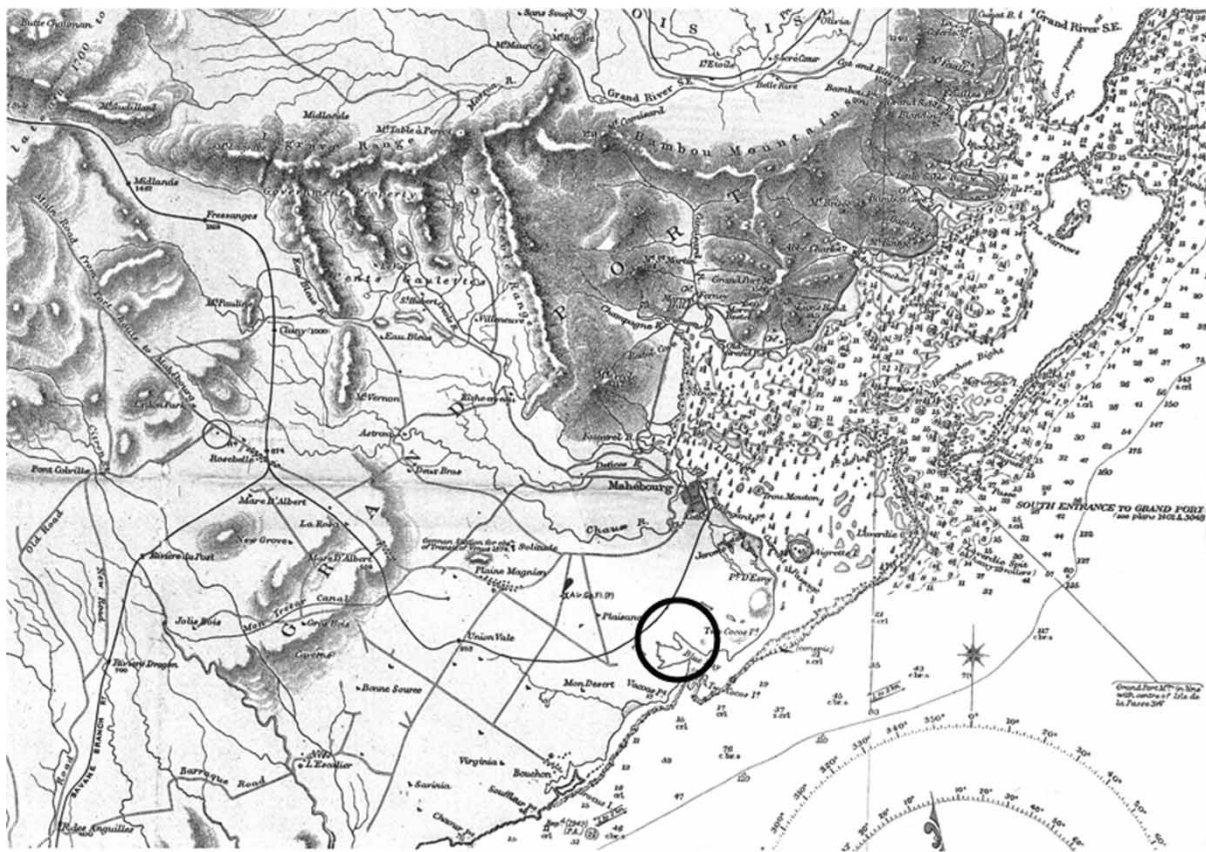


Figure 6. Map of the Mauritius railway system in 1866. Midland Line lower right, Mare aux Songes circled. From Mosse (1869).

of the railway' whose Mahébourg line was opened on 19 October 1865 (Higginson 1859–1872, p. 6b). Clark's first letter confirming the discovery to Richard Owen is dated 6 October 1865, while Edward Newton (EN > AN 18/10/1865, 24/3, p. 162) states Clark's discovery was made 'about three weeks ago', making late September the time of the first excavation; thus the interval between Clark's and Higginson's versions of events is minimal.

Other details in Higginson's travelogue actually point towards Clark having made the first discovery. Higginson states that Clark had a copy of Owen's *Memoir* (1866b), which cannot be true, as it was not published until October the following year. However, he did have a copy of Strickland and Melville (1848), but not until it was lent to him by Edward Newton sometime after 7 October 1865 (Boyle 1867; GC > RO 5/11/1865, 24/3, pp. 128–129). The stockpiling of bones witnessed by Higginson also suggests that Clark had already spoken to Gaston de Bissy, who then sent men to collect bones, while his mention of the sale of Dodo bones to the British Museum, which did not occur until January 1866, indicates his travelogue/notes were written well after the initial discovery, probably sometime in late 1866 (Higginson 1859–1872, p. 6b).

Higginson must have sent his first consignment of Dodo bones as early as October, just after Clark's first shipment, because on 7 November 1865 Edward Newton is already referring to Higginson sending bones to York 'by the last mail' – i.e. in mid-October (EN > AN 7/11/1865, 24/3, p. 192). Higginson's donations of Dodo bones to Liverpool, Leeds and York are documented by receipts dated March and June 1866, while Leeds also received bones in late 1865 (S. Ogilvy, Asst. Curator, Nat. Sciences, York Museums Trust; J. Nunney, Curator, Nat. Sciences and Ethnography, Leeds Mus., both personal communications to AM-C, August 2003). Edward also refers to bones given to Liverpool by Higginson in February 1866 (EN > AN 4/2/1866, 24/3, p. 240), which must have been received there several weeks earlier, as he is evidently responding to a query from Alfred. This indicates that museum receipts for the Higginson material are incomplete.

Clark himself (1866a, 1866b) stated that pupils at his school had led him to the discovery in September through seeing tortoise bones dug out of the marsh. Whatever the circumstances, once the discovery was made Clark immediately went to the Mare aux Songes and negotiated a monopoly of the site with the proprietor of the estate, Gaston de Bissy (Clark 1866; Pitot 1914). Clark's employment of local labour to crudely extract material from the marsh with their hands and feet (Clark 1866) resulted in an overwhelming bias toward larger bones (Hume 2005), a fact noted by Edward Newton at the time:

I went to see Mr Clark... and he gave me the pelvis of I think a *Gallinula* found in the same marsh... It is in good

preservation and hence convinces me that the smaller bones of the Dodo are still to be found if the place is properly searched. (EN > AN 3/1/1866; 24/3:221)

Years later, when Transit of Venus naturalist Henry Slater was excavating another marsh (in the Flacq district), EN commented further that:

He [Slater] got a phalange of the first tow [toe] of the Dodo, a bone which I do not think was ever found at Mare aux Songes. (EN > AN 10/8/1874, 24/5, p. 287)

Clark (or rather his coolies) retrieved a large number of Dodo bones in September 1865, and continued collecting through October and November. Gaston de Bissy died by shooting himself accidentally on 27 October (Vinson 1968), and by early December the new (unnamed) owner of the estate had refused Clark permission to continue working (EN > AN 7/12/1865, 24/3, p. 208). Some time before he left the island in November (Barnwell 1967), Charles Boyle (1867, p. 266) saw many bones in Clark's house: 'he placed each on the corresponding drawings of the Dodo bones, a volume of which lay on his table'. The book Clark had in the house, presumably Edward Newton's copy of Strickland and Melville (1848: plates viii–xii), illustrated the Oxford specimens of skull and left foot (tarsometatarsus) of the Dodo. Newton remarked that:

The metatarsi fit the drawing in Strickland's [book] of the Dodo metatarsus most beautifully!! (EN > AN 7/10/1865, 24/3, p. 149)

So it was just the illustrations of a single left foot that clinched the identification of the Dodo on Mauritius, and it was this very illustration that Newton, Boyle, Higginson and Clark were using for comparison.

In September, Bishop Ryan was informed of the discovery (Owen 1866b, p. 19), and the first consignment of Dodo bones was ready for despatch by the next mail steamer in October, with the bishop's and civil chaplain's blessing:

Having visited the spot in question with Mr Clark I can vouch for the correctness of the fact herein stated. – Mr W.T. Banks.

Civil Chaplain Mauritius

The hon W T Banks, civil chaplain at Mauritius in this Diocese, and Mr George Clark, master of the Grammar School at Mahebourg are well known to me, and deserving implicit credit for their statements as matters of fact. 6 October 1865 (Bishop) Vincent Mauritius (Owen 1866b).

The first consignment was to be sent to Owen via Clark's son-in-law, one Captain Mylius, based at Ladbroke Terrace, Notting Hill (EN > AN, 7/10/1865, 24/3, p. 151), son of Charles Augustus Mylius, a career civil servant, former Registrar of Slaves in Mauritius and later administrator ('Civil Commissioner', 1839–1850) of the Seychelles (*Mauritius Almanac* for 1865, p. 53, Toussaint 1945;

Lionnet 1972). It appears from the correspondence that Mylius was to be the principal UK contact during all of Clark's Dodo bone transactions, although Clark actually sent the material via his brother, Samuel Clark, based at Southampton (GC > AN 17/11/1865, AN > GC 26/12/1865). Edward Newton, who first compared Clark's metatarsi to Strickland's plates on 6 October, wrote to Alfred by the same mail informing him of the discoveries, and confirming their identity as Dodo bones (EN > AN, 7/10/1865, 24/3, p. 151).

Dodo bones for sale

From numerous references made in Edward Newton's letters to Alfred, it is very evident that Clark's priority from his discovery was financial gain. Clark's annual wage at the top of the local school scale was only £290 per year, as against his rival Higginson's £450 and Edward Newton's £600–800 (*Mauritius Almanac* for 1865:12, 45, 47). In addition to hoped for profit, he will have needed to recoup his expenses in hiring labour, and consulted Edward on how best to make as much money as possible.

He [Clark] is anxious however to make money out of it, and asked me whether I thought he could sell them, I told him I thought Owen might [*buy some*]. (EN > AN 7/10/1865, 24/3, p. 151)

At Clark's request, Edward urged Alfred to keep the news of the discovery quiet and down play the abundance of specimens that had been recovered:

Mr Clark has been to see me again and begged I will not write anything home that may infirm [*sic*] the sale of his bones. (EN > AN 7/10/1865, 24/3, p. 152)

This would obviously also help to keep the price high. Edward expected Captain Mylius to consult Alfred Newton about the best way of making money from the bones, but had already suggested to Clark that a sale at Stevens might be a good route (EN > AN 4/11/1865, 24/3, p. 173). Clark wanted also to keep the quantitative details of 'his' discovery secret on Mauritius (although publishing a general account, Clark 1865), but as it is a small island, word soon got around:

Mr Clark is working to make as much money from his discovery as he can, so do not let out to anyone how plentiful the bones are... I fear however that the whole thing is now too much blown, and plenty of people will search and find ample remains. (EN > AN 18/10/1865, 24/3, pp. 157–8)

Indeed other Dodo material had also begun arriving in England and Newton wrote of several people who had bones, but only some of these can be identified (see below):

I know some half a dozen people or more who have got bones, but only one beside Clark, the Gov^r [*Henry Barkly*]

and myself that have got a sternum. (EN > AN 7/11/1865, 24/3, p. 182)

Most notable was a large series collected by Higginson, who sent consignments home well before himself returning to Britain in November 1866:

I sent a box full to the Liverpool, York and Leeds museums from which, in the former, a complete skeleton was erected. This is the only spot in the world [*Mare aux Songes*] where these bones have been found; and all that are now to be seen in various collections came out of the same bog, only 200 feet in diameter. (Higginson 1859–1872, p. 6b)

Edward Newton confirmed their significance:

The Liverpool bones were I believe sent by a man of the name of Higginson. I believe they are a very good lot. As many as Clark sent and perhaps among them some that he has not got. (EN > AN 4/2/1866, 24/3, p. 240)

Clark mentioned in a letter to Owen that an unnamed person had paid people to go at night to remove bones without authorisation (GC > RO, date missing [? December 1865/January 1866], p.123 and below). Higginson never explained how he obtained his Dodo material – an issue that Clark makes very clear to Owen (1866b); therefore he must remain a possible suspect. Unlike Clark, however, Higginson appears not to have been after financial gain and donated the specimens to the three museums where they still reside along with the original correspondence (S. Ogilvy, Asst. Curator, Nat. Sciences, York Museums Trust; J. Nunney, Curator, Nat. Sciences and Ethnography, Leeds Museum; C. Fisher, Curator, Liverpool Museum, all personal communications to AM-C, August 2003). Including Edward Newton, other interested parties were also evidently visiting the site during the excavation, and in some cases making their own collections, albeit mostly acquired from Clark (EN > AN, *passim*). Archibald Anson (later Sir), of the Royal Artillery and chief of Mauritius Police, received some Dodo and giant tortoise *Cylindraspis* spp. material from Clark for the Woolwich Institute, but was asked not to present them until sometime after arriving back in the UK (EN > AN 7/11/1865, 24/3, p. 182). A further purchase was made via Edward by Edgar Layard from the Cape Museum, who had sent £15.00 for specimens (EN > AN 7/12/1865, 24/3, p. 209), and another railwayman, Chief Engineer Walmsley Stanley, also had a collection, from which Edward was able to swap several of his more common leg bones (tarsometatarsi) for a much rarer humerus (EN > AN 4/2/1866, 24/3, p. 237). In addition Clark sent a good selection of bones to Charles Coquerel for the museum in nearby Réunion (Gervais and Coquerel 1866) either late 1865 or early 1866, but there is no information available to suggest that he received payment.

Edward Newton himself was also interested in making money from Dodo bones.

Sir H.B. [Henry Barkly, Governor of Mauritius] professed that we should subscribe to work out the marsh ourselves, and I think that would be the best plan if Clark would consent, but unless he did I should not like to interfere with him. (EN > AN 18/10/1865, 24/3, p. 158)

Clark evidently did not immediately agree; after remarking that Clark had monopolised the Mare aux Songes and Dodo sales from it to date, Newton (EN > AN, 4/11/1865, 24/3, p. 173) said Clark would allow him a share in *subsequent* finds, but also commented that he, Sir Henry Barkly and the above-mentioned Stanley were going to start a Dodo Company 'limited to us three', and work another marsh that they thought might be as productive as the Mare aux Songes (EN > AN 7/11/1865, 24/3, p. 175). This venture proved unsuccessful:

various other marshes have been searched for Dodo's bones by the Railway engineers, the Hon. Ed. Newton and others, but without any success. (GC > RO 17/11/1865, p. 134)

This was confirmed by Edward (EN > AN 18/11/1865, 24/3, p. 191), but the idea for making money was certainly on their minds, and there is no question in any of the contemporary writings of what we would now consider the 'national heritage' value of the finds. In November 1865, Clark asked Edward Newton to ask Alfred if he would manage sales for him in the UK (EN > AN 7/11/1865, 24/3, p. 181), but the spread of alternative sources would ultimately erode Clark's monopoly and the value of the material.

When Alfred broke the news of the arrival of a box of Rodrigues Solitaire bones to the British Association for the Advancement of Science in September 1865, Philip Sclater proposed funding, and the Association voted £50.00 'for research with respect to the Didine birds of the Mascarene Islands' (EN > George Jenner 27/10/1865 (24/3, pp. 167–9, Wollaston 1921). Although Edward initially kept back £30 for Dodo work in Mauritius, it was all eventually used to finance cave excavations on Rodrigues promoted by Edward (EN > Jenner loc. cit., Newton and Newton 1869).

Academic blackmail

Although the first consignment from Clark was always intended for Owen, Edward Newton clearly expected Alfred to have been able to have sight of them (EN > AN 18/10/1865, 24/3, p. 161), and indeed Owen himself initially offered just that (RO > AN 8/11/1865). Edward sent bones of his own (given by Clark) to Alfred on 7 November (EN > AN 7/11/1865, 24/3, p. 183), and in his following letter (EN > AN 18/11/1865, 24/3, p. 192) noted that Clark had sent Alfred 'a very fair set' of bones, evidently via Mylius; a further batch to Mylius (via Samuel Clark in Southampton) for Owen was sent on 24 November, together with several sets for Alfred intended for sale (GC > AN 23/11/1865, EN > AN 3/1/1866, 24/3, p. 223). Alfred had

immediately written a descriptive manuscript based on the new Dodo material, which he submitted for publication in November (EN > AN 4/3/1866, 24/3, pp. 247–8), possibly to Philip Sclater, secretary of the Zoological Society of London and editor of its journals. However, Owen appears to have approached Mylius after the material arrived in London with a new plan. Earlier, writing on 5 November, Clark had innocently asked:

I shall be much obliged by you giving Alfred Newton an attestation as to the fact of these being the bones of the *Didus ineptus*, to facilitate the sale of some wh. I have sent him. (GC > RO 5/11/1865, pp. 128–9)

Of the batch sent on 24 November to Owen, Clark asked Owen to forward any surplus to Alfred, which implies that Clark had sent a separate lot to Owen in addition to the sale bones intended to go via Alfred:

Of the last [*multiple cervical vertebrae and ribs*], please do take what you may find useful to making up a skeleton, and hand over the others to Alfred Newton Esq. (GC > RO 23/11/1865, p. 135)

While Alfred got his consignment sent on 7th November, Owen struck a new deal with Mylius and retained all the material sent on the 24th November. It appears that Mylius was a forceful character and decided what was best without Clark's consent, as Clark appeared totally oblivious to what was going on until well into January 1866. On 12 December 1865 Alfred read a letter from Clark before the Zoological Society announcing the discovery, adding that Dodo bones would also be available at auction (Newton 1865a, 1865b). This meeting seems to have been the trigger for Owen's intervention. Prior to the announcement, Owen and Alfred Newton had been engaging in friendly correspondence. Alfred had applied to become the first Professor of Zoology and Comparative Anatomy at Cambridge in 1865 (Wollaston 1921), and Owen congratulated Alfred on his application, and wrote a testimonial in his favour:

I rejoice that you aim at the Professorship which I trust the Senate will establish. I know no man more likely to develop [*sic*] a good race of young zoologists. I inclose [*sic*] this sincere but I fear imperfect expression of my opinions of your qualifications: & I shall concentrate my interest exclusively in your behalf. I trust I may have the gratification of congratulating you on your appointment. (RO > AN 26/10/1865)

William Flower, Conservator at the Royal College of Surgeons, and Philip Sclater also wrote testimonials to support Alfred's application; but Owen made sure that Alfred knew that his carried extra weight:

I have sent my request on your behalf to both Dons. & I don't doubt but the M of T^r [Master of Trinity; William Whewell] will be swayed by any testimonial of mine in your favour. Could you send me a Copy of your acct. of the leg bones of *Didus* or *Pezophaps*. (RO > AN 6/11/1865)

Meantime, Owen was busily planning his coup, and in writing to Alfred, used putative feelings of Bishop Ryan and George Clark as reasons why he should be the sole recipient of the Dodo material, repeating his request for the above mentioned draft paper Alfred had already prepared on the subject:

As soon as the Mauritian bones sent to me by Mr Clark arrive I will let you know, & you can see them at your leisure; Mr C. & the bishop will, I think, expect me to describe them & give the Discoverer credit for his painstaking: you will understand their feeling possibly some disappointment were I to make these treasures over to another, as I gladly would do to you, being over-full of work. In prospect of this little additional 'straw' I wrote for the copy of your last labour of *Didus*. (RO > AN 8/11/1865)

Alfred had met Owen and Mylius on the day of the Zoological Society meeting, unaware of any dealings that had taken place between the two men. He was following George Clark's requests to the letter, and had scheduled Clark's shipment of Dodo bones to be sold at Stevens's auction on 5 January 1866; these bones, shipped on 24th November, came through unusually quickly:

As I informed you I was about to do, on the 12th inst I came to London expressly for the purpose of communicating your discovery – in your own words – to the Zoological Society. In the course of the day I saw Professor Owen [*crossed out*]. The announcement created, as I expected it would, very considerable interest – and I afterwards took the opportunity of mentioning to many persons who were present that the bones would be almost immediately sold by Mr Stevens with whom I had arranged that the 5th Jan^y (which was the earliest day available) should be fixed for the sale. I also acquainted Capt. Mylius with what I had done. A few days after, the two boxes of bones, forwarded through Mr Samuel Clark reached me at Cambridge in safety & I at once set to work to divide them into sets such as I thought would be most suitable for a sale . . . The small parcel addressed to Prof^r Owen I forwarded to him, & I hear from him that it reached him safely . . . (AN > GC 26/12/1865)

Alfred received a letter from Mylius on 19 December 1865, with the shock news that Mylius and Samuel Clark had agreed with Owen that he would now receive all the Dodo material:

. . . On the 19th inst. Captain Mylius wrote to me (but being absent from Cambridge I did not get the letter till some days later) to say that after conferring with Prof. Owen and your brother Mr Samuel Clark, he had come to the conclusion it would be to your advantage that I should hand over to them the bones for disposal, and that his letter would relieve me of all responsibility. To this I replied that under the circumstances I of course must comply with their wishes though otherwise most willing to act as your agent in these matters . . . (AN > GC 26/12/1865)

Alfred was disappointed and surprised, though he refrained from openly implicating Owen as instigator of the new deal:

. . . I have unfortunately not yet been able to see Capt. Mylius, though I have twice proposed an appointment with him. I hope however I may have that pleasure tomorrow & then place in his hands the bones which you sent me for sale. I trust that you will not think I have betrayed the confidence with which you honoured me. It was impossible for me to set up my opinion against those of your family & a man of Professor Owen's eminence. The steps I had taken would, I believe, have been instrumental to your interests had I been able to continue them. I can only say that I trust you will be no loser ultimately by the change of plan & agents. (AN > GC 26/12/1865)

Philip Sclater was put in a rather awkward position as intermediary. Owen also appears to have leant on him to convince Alfred that he, Owen, had superior rights.

There is a box here for you which perhaps contains Dodo's bones. Owen has got *his* – a nearly complete skeleton. I saw it today – very fine – 2 good sterna [The box mentioned may in fact have been unrelated to Dodos, as Newton already had his material in Cambridge (above)].

I think the best thing you can do with your lot – if you will take my advice – is to hand them over to Owen in order that he may take out any bones that are deficient in his series, and so render the Brit. Mus. Collection complete.

Owen will put back in your box other bones in return for any he may select – so as to make an equally valuable collection for sale at Stevens. (PS > AN 19/12/1865)

Alfred appears to have taken this advice and offered his own bones, but Owen rejected them: 'I have told him [Clark] that this you offered to do, but Owen would not accept your advances' (EN > AN 4/2/1866).

Such was the importance of the events that correspondence even took place on Christmas Day:

I am not much surprised to hear what you say about Owen, but if you have made the offer that is quite sufficient – and you have done all I wished – I see the bones are advertised at Stevens . . . (PS > AN 25/12/1865)

After Owen rejected Alfred's offer of his own bones, he seems to have held on to them, although unsure of his right to do so, writing to Clark that "I hardly know how far I am now justified in keeping the beautiful and interesting specimens which were to be my 'honorarium', since I have been able to do so little for you" (AN > GC 26/12/1865), but Clark clearly told him to keep them and even offered a couple more:

With regard to your brother's delicate proposal not to retain the bones, as the business has been taken out of his hands, I have only to reply *ignod [? quod] dedi dedi* [what I've given, I've given] & I am happy to be able to add to what he has, an ulna and a radius, should they be wanting in his set. (EN > AN 4/2/1866; 24/3, pp. 238–9, quoting a letter to him from Clark)

Although Owen must have offered money to Clark earlier in anticipation, on 13 January 1866 The British Museum trustees authorised him to buy 100 Dodo bones for £100

(BM Trustees' minutes, Ref. c.10.919; Vinson 1968). Having thus secured, as he thought, the best bones, Owen made a pre-emptive claim for publication by presenting a preliminary paper at a meeting of the Zoological Society on 9th January 1866; at this stage he was unaware of Higginson's shipments. In addition, he made an indignant fuss about not having had all the bones sent to him, writing an intemperate complaining letter to Bishop Ryan, which was passed to the Governor (Sir Henry Barkly) who showed it to Edward (EN > AN 4/2/1866, 24/3, p. 239).

Under normal circumstances, Alfred had ample reason to file a complaint and almost certainly would have done had not Owen had power over his professorship application which, according to Edward (see below), was in great danger of failure due to Owen's powerful influence. Alfred was therefore forced to relinquish his claim, which allowed Owen to publish on the Dodo first. Edward could only remark on the bitterness he felt towards Owen, and did so in the most uncompromising way:

I must say that I feel very indignant about the conduct of Owen in the case of Clark's Dodos. He has shown himself to be a very mean minded illiberal sort, and I am very much vexed that I [*sic*, ? = he] should have been the cause of so much annoyance to you... and I greatly fear that Owen may injure you for the professorship in a vindictive manner. (EN > AN 4/2/1866, 24/3, pp. 235–6)

As Owen was now in complete control, it must have been particularly frustrating for Alfred, as even the lots sent by Clark for sale at auction (the Stevens sale, see below) passed via Mylius through Owen's hands, which enabled Owen to choose the best and give to the rest his imprimatur as 'real Dodo', which may have been some small consolation to the vendor!

...subsequent sets of bones transmitted from the Mauritius, and from which I was privileged to select the most perfect specimens for the present memoir, got into the market, and were sold by auction since the present memoir was in type, as bones certified by me to be of the Dodo. (Owen 1866b, pp. 21–22, footnote)

Furthermore, Owen argued that possession of the best material was a prerequisite for publication priority, which provided him with a complete monopoly, expressing his

sincere and grateful acknowledgements to those *gentlemen* [his italics] into whose hands these lots have fallen, who have forborne their own advantage and refrained from rushing into print with figures from inferior specimens... (Owen 1866b, pp. 21–22, footnote)

His '*Gentlemen*' in italics looks like a particularly snide remark, suggesting that in fact the individuals were quite the opposite. Having rushed out his talk in January, Owen had to wait months for the artwork to be completed, and leaned on the *gentlemen* not to publish in the interim:

... necessarily awaiting the lithographing of 'illustrations', which every true promoter of science for its own sake

must have desired to see as the best-selected materials would permit to be given. – R.O., June 1866. (Owen 1866b, pp. 21–22, footnote)

When finally completed, the illustrations included two vertebrae borrowed from Higginson's gift to the Liverpool museum (Owen 1866b, p. 53, pl.V), presumably via curator Thomas John Moore (1842–1892) and honorary director, Rev. Henry H. Higgins (Clem Fisher, Personal communication to J.P. Hume 03.02.09).

Not only did Alfred have to relinquish access to the best Dodo bones promised to him, but he also had to withdraw the Dodo manuscript that had already been submitted. The success of his application as professor was now paramount, forcing Alfred to remain on speaking terms with Owen. Again, Edward makes his feelings known:

I am very glad you have made it up with Owen, but no man I think could have behaved worse. Can you not get hold of your paper on the Dodo which you have withdrawn and send it to me – I might perhaps prig [= borrow, steal] something from it for a paper I mean to read before I go home on presenting some Rodriguez bones to the society here. (EN > AN 4/3/1866, 24/3, p. 247)

Clark, for whom the Owen's coup was clearly a surprise, also sympathised with Alfred but made careful use of his words. Edward guessed that Clark feared Owen, and perhaps the fear of losing further financial deals reduced Clark to fairly neutral comments, as quoted by Edward:

'I feel very grateful [*sic*] to him (i.e. you) [AN] for the kind interest he expresses in my affairs, & still more for the quiet and gentlemanly way in which he put up with what would be to a person in any wise touchy, a cause of much vexation. I fancy, this is strictly confidential, that Prof. Owen must have expressed some little feeling of jealousy at not having *all* the bones submitted to him... I need say no more on this disagreeable topic. From yourself and your brother I have met with the most gentlemanly and candid behaviour, for which I shall ever feel grateful'... Clark, I think, is evidently afraid of Owen, and though he feels that you have been shabbily treated, yet he thinks that perhaps Mylius was right in handing them [the bones] all over to Owen. (EN > AN 4/2/1866, 24/3, pp. 238–9)

Clark had asked Edward about writing his own Dodo book and how much money he could make from it, and also about publishing in *The Times* but appears not to have succeeded in doing so. In his correspondence, Edward had the final say about Owen and was very obviously still fuming over his behaviour, though his letter (hastily written as usual) could be misread: although reading as if referring to Clark, 'brute' almost certainly refers to Owen:

I have sent some extracts from your letter for Mr Clark's benefit, and though the man [Owen] is a brute, I feel sure he [Clark] is quite satisfied with all I have done, & he told me he was sorry his friends in England had interfered in the matter. (EN > AN 4/3/1866, 24/3, p. 247)

No doubt because his Cambridge professorship application was about due to be considered on 1 March 1866 (Wollaston 1921; PS > AN 2/3/1866), Alfred grudgingly conceded defeat, and made a short announcement concerning the discovery that same month (Newton 1866, p. 128):

The most perfect series has been transmitted to Professor Owen, by whom they will be described in the 'Transactions of the Zoological Society'. The next perfect set is, thanks to Mr. Clark, in our own possession, and the remainder, which also passed through our hands, are shortly to be disposed of by Mr. Stevens, the well-known natural-history agent.

This 'next perfect set' was used to construct a second, almost complete, skeleton, which may still be seen at the University Museum of Zoology, Cambridge.

Slater was also aware of Owen's potential negative input to Alfred's professorship:

... I am sorry to hear there is likely to be any opposition to the professorship... (PS > AN 27/1/1866)

but was now concerning himself with another Owen publication. Owen had sent him a manuscript describing a new species of parrot from a single lower jaw, which had been sent by Clark along with the Dodo material (see below). The manuscript was originally intended for the Proceedings or Transactions of the Zoological Society, but Owen appears to have offered it to Alfred's *Ibis* journal as some sort of peace offering [PS > AN 15/2/1866 and 19/2/1866]. This was eventually accepted by Alfred (Owen 1866a) but it was little consolation for losing the main prize.

Alfred Newton and Richard Owen continued to bicker for another five years. As Alfred was now in a position of academic power, he published a note that Owen had received solitaire bone material many years previously collected by James Morris, a teacher and vice-president of the Royal Society of Arts and Sciences of Mauritius (Barnwell and Béchet 1943), without informing him, and once this was known, ignoring a specific request from Edward to see the material (Newton and Newton 1869, p. 329; EN > AN *passim* in 1869–1872). Owen immediately responded to this enquiry, publishing a counter claim (Owen 1869, pp. 30, 31), but it led to a series of rather ill-tempered written exchanges [AN > RO 5/1/1872; RO > AN 7/1/1872]; this was to be the last time that they corresponded.

Having successfully silenced his main adversary, and overruling Clark's desire to make the first published statement, which had held Alfred back (EN > AN *passim*), Owen wasted no time in publicly announcing and monopolising the discovery and gave a series of highly publicised lectures in January 1866 (Wissen 1995). Having had the best choice of fossil specimens, Owen (1866b) produced his monograph on the Dodo entitled *Memoir on the Dodo* in October, formally describing the Dodo's

anatomy to science. He had won the race with Newton to describe the bird first, but the delay in printing his *Memoir* allowed Alphonse Milne-Edwards in Paris to produce in April the first illustrated account of the finds, from bones he had bought at the March sale (Milne-Edwards 1866; Vinson 1968; see below for sale details). Owen's first paper was read before the Zoological Society 9 January 1866 (Sclater 1866; Owen 1869), before Clark could publish on the subject in Britain, as Clark's (1866) *Ibis* paper did not appear until April, although he had pseudonymously published an article in a Mauritian newspaper (Clark 1865), and attempted to publish in *The Times* (above). Edward had encouraged Clark to write about the discovery for the journal *Ibis* (edited by Alfred) in October 1865 (EN > AN 3/1/1866, 24/3, pp. 223, 228), but Clark had developed a problem with his eyesight that delayed the article; he eventually wrote it in January (as indicated on the publication itself). Apart from his 1866 paper, Clark's (1869) only other published contribution was a reprint of his 1865 account expanded with some insightful suggestions about Dodo ecology, while a footnote from Edward Newton suggests for the first time that pigs were probably responsible for the Dodo's demise. This was the last time Clark wrote on the subject.

Dodo bones *en masse*

Unfortunately for Clark, his financial profiteering was short-lived. As early as November 1865 he stated to Owen that no more Dodo bones could be found:

These are the last Dodo bones I shall have to send, all attempts at finding any elsewhere have failed, even guided by the experience I have acquired. (GC > RO 23/11/1865, p. 135)

Since the new owner of the marsh had banned further digging, his remarks may have been, in a sense, correct in relation to new finds, but he was keeping a reserve of duplicates to sell via Alfred and was undoubtedly aware that more bones were there were he able to get at them. Back in October Edward had speculated on a huge abundance:

I have some more bone news for you and plenty more Dodo remains have been found at the same spot by Mr Clark, and yesterday as we had occasion to go down the railway, the Gov^r and several others including myself inspected the marsh. There are I have no doubt remains of 100s or perhaps 1000s of Dodos (EN > AN 18/10/1865, 24/3, p. 154)

He later (if only temporarily) reined back his estimate, when Higginson told him in early November that he thought 'the present hole is pretty well exhausted' (EN > AN 18/11/1865, 24/3, p. 191). Clark was evidently disingenuously trying to keep the price high, as other collectors were obtaining material and sending it home. Edward (EN > AN 4.11.1865, 24/3, p. 173)

suggested that an auction at Stevens would bring in the best profit for Clark and Mylius's surplus material. The best bones plundered by Owen, the remaining material was finally sold in eight lots at the Stevens auction rooms on March 13 1866 (Anon. 1866), delayed from the originally intended date of 5 January.

Once Owen got news of Higginson's additional material, and realised from the intended sale lots that far more bones existed than had been made available to him, he wrote to Bishop Ryan complaining that Clark had not sent all of his Dodo material to him:

The Governor showed me Owen's letter to the B [=bishop] of Mauritius [Ryan], which the latter had sent him to read – he says that it was a pity that Mr Clark had not sent all the bones to him, as that if they became scattered about some of the most important portions of the skeleton might be lost sight of – but he makes no mention of you [i.e. Alfred]. (EN > AN 4/2/1866, 24/3, p. 239)

At his end, Clark was unhappy about the price that Owen had procured him, despite having acquiesced in Owen's coup, and by using his monopoly being still able to prevent flooding of the market:

He did not seem very satisfied with the sale to the Brit. Mus., which I consider a good one, as I have little doubt 1000s good sets can easily be obtained if the place is properly worked. This is of course *entre nous*, but Clark knows my opinion and believes in it, but of course won't allow it. (EN > AN 4/2/1866, 24/3, pp. 239–40)

Although Clark managed to wriggle out of most of the ensuing arguments, he had all along sought favour with both parties, playing one against the other. As his ploy had now been exposed, he began 1866 busily apologising to Owen, justifying himself and trying to downplay the whole issue, and in April even asking Alfred Newton to exchange bones already in his possession for any Owen might want (GC > RO, 15/4/1866, pp. 119–20). Clark's credibility was seriously in jeopardy, so he wrote to Owen accusing two unnamed persons of undermining his discovery and stealing material:

... Judge then of my surprise at seeing an extract from his letter so worded as to allow it to be implied that they were bones which he had *discovered*, and that he had only supposed them to belong to the Dodo, when he was perfectly certain of the fact, and making no mention of the way in wh. he had procured them. I believe, herein, that he cannot supply anything like as complete an assortment as I have sent, and therefore hope they will not injure the sale of mine.

Another person whose name I will not mention, having endeavoured to get some bones from me, in vain, employed people to go at night and steal some, which they did; and he carried them to England, perhaps to boast of them as his discovery. (GC > RO, date missing [? late January/February 1866], 123)

We have not been able to positively identify either impostor here (the previous page of the letter is missing)

though the former may have been Higginson. The latter cannot have been him as he did not leave Mauritius until October 1866 (Higginson 1859–1872, p. 6b), and if he had been paying people to illicitly obtain bones, it would be rather odd that he was not trying to get financially reimbursed. Correspondence associated with a small collection housed at the Bolton Museum, but originally from Salford Museum, gives the name Frank Plant as the supplier, but this material did not arrive until later in 1866 (D. Craven, Personal communication to J.P. Hume, 7 November). Plant was known to Edward, and appears to have been a small-time trader, whom Edward commissioned unsuccessfully to get live birds from Madagascar (EN > Plant 2/2/1864, EN > AN 31/3/1864, 3/7/184; 24/2:89–90, 117, 168); however, he is never mentioned in connection with Dodos, and we do not know when he left Mauritius. Two men who both left Mauritius in late 1865, and were associated with Clark after the discovery was made, have to be above suspicion: Charles Boyle, retiring Chief Commissioner of Railways (i.e. both Stanley's and Higginson's boss), who had seen the Dodo bones at Clark's house, and the aforementioned chief of police, Archibald Anson. The latter left on 7 November with some of Edward's bones for Alfred and a small collection of Dodo bones bound for Woolwich Institute, but these were presented to him by Clark (EN > AN 7/11/1865, 24/3, p. 182). Anson's lot also included tortoise bones (EN > AN 4/2/1866, 24/3, p. 241), which he later gave to the British Museum (Gray 1867). Boyle provided the following information in a footnote:

I have read this [*Clark's account*] since my return to England, having left Mauritius shortly after Mr Clark's discovery. Indeed, I believe I had the honour of being a fellow-traveller with a box of Dodo relics sent home by another ornithologist of repute. (Boyle 1867, p. 265)

but this presumably refers to the bones being carried by Anson from Edward for Alfred (the description of the sender fits Edward), or those shipped by Clark for Alfred on 7 November or for Owen and Alfred on the 24th; we do not know on which date Boyle sailed.

Despite earlier disclaimers to Owen, Clark, writing in January 1866, admitted in his *Ibis* article published in April 1866 having found remains of 'many Dodos' (Clark 1866, paper dated 6/1/1866), and must, in addition to those he sent Alfred for sale at Stevens, have sent Owen more bones from his stock, for which he appeared, also in April, to be negotiating further remuneration from the British Museum (second quotation below), while still asserting that there was no immediate prospect of more bones:

I sent with the last you received various series of bones, some in excellent preservation. I have requested Mr Newton to allow you to exchange any you have for any among them, as it may probably happen that you may thus

make a better adjustment of the different parts. . . . Various persons have explored marshes in the hopes of finding remains of the Dodo, but I have not heard of a single instance of success. Mr E. Newton is about to prosecute researches in the marsh from wh. I obtained mine, but it is not likely that he can do so successfully before Aug. or Sept^r, the water being now too deep to permit of any work being carried on in it. I hope and believe that you will find among the bones with Mr Newton one or more sternums in wh. the side processes are very nearly perfect; should you not, I have one wh. I will reserve for you. (GC > RO 5/4/1866, pp. 117–8)

I had many letters to write by last mail, wh. I hope will plead my excuse for neglecting to reply to that part of your letter wh. proposed offering to the Trustees of the Brit. Museum in my name, the Dodo bones I last sent you, I beg you will have the kindness to do. I had expressed a wish to that effect to Capt. Mylius, but it may probably have escaped his notice. . . . You have no doubt received my authorisation to exchange any bones you have, for others comprised in the lot sent, in charge of Mr Newton. Strange to say, there is no present appearance of the finding of any other deposit of Dodo bones. Will you kindly mention this to persons thinking of purchasing, as it may favour the sale of those I have sent. (GC > RO, 15/4/1866, pp. 119–120)

Edward did indeed intend to re-work the marsh, and in June 1866 got an estimate from chief railway engineer Stanley to drain it with steam pumps (£54.10.0 to get the pumps in place + daily labour and fuel @ 13 shillings/day; MS in archives of the Royal Society of Arts and Sciences, Mauritius). Edward had £30 of British Association money in reserve for further work, but this was not enough; however, the local Royal Society refused to contribute on the grounds that it was too expensive (Vinson 1968), and nothing happened.

Interestingly, the same logistical problems mentioned by Newton about draining the site still apply (see Rijdsdijk et al. 2009), as attempts at pumping the site have proved unsatisfactory. Newton remarks on a natural barrier [which is still in place (J.P. Hume, Personal observation, 18.10.08)] that prevents the water from running off:

To be able to do justice to the discovery the water must first be got out of the basin; this could be done either by pumping it over the rocky barrier some five or six feet higher than its present level, or by cutting a drain through it. The latter would be a superior work but more effectual. When the water is run-off, there will be no difficulty in carefully digging out the peat and even sifting it if necessary when dry. (EN > AN 18/10/1865, 24/3, pp. 158–159)

The Mare aux Songes comprises three large basins (Rijdsdijk et al. 2009; Figure 7), but further observations (J.P. Hume, Personal observation, 18.10.08) based on Edward's account confirm that a fourth, but now dry, smaller basin exists, higher up slope than the others and separated from them by the aforementioned rocky barrier. This may have in fact been the site in which Clark had been working: as stated by Higginson (1859–1872, p. 6),

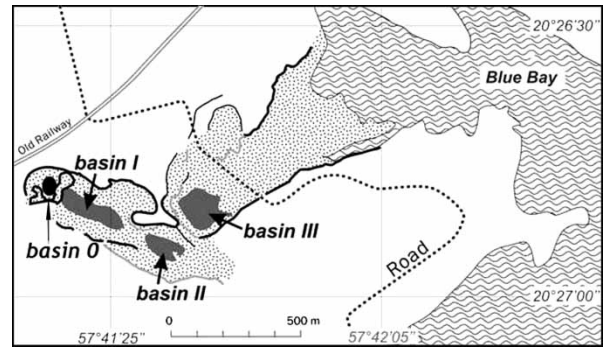


Figure 7. Detail of the Mare aux Songes basin. Modified from Rijdsdijk et al. (2009). Basin 0 indicates the probable 1865 excavation site.

this site can be seen from the remains of the railway embankment and fits better with his remark about the marsh being ‘just 200 feet in diameter’.

Despite the intensity of dealings and publicity surrounding the discovery, little initial interest was shown on Mauritius. Clark (1865) published an anonymous account of his finds in the local newspaper, the *Commercial Gazette*, but the discovery went unmentioned in the 1865 transactions of the Royal Society of Arts and Science, Mauritius, of which Clark was not a member. However, once the excitement surrounding the discovery filtered back from England, he was belatedly fêted and proposed for honorary membership by the island's Governor Sir Henry Barkly on 13 April 1866, accorded on 28 June (Vinson 1965; Anon. 1869). The lack of interest can be excused, given that there were more pressing issues for the Mauritian public at the time: the Dodo discoveries coincided with a devastating malaria epidemic which began in 1865 and raged during 1866 to 1868, killing 48,000 people in three years, over 13% of the population (Small and Power 1868; Pike 1873; Teelock 2001). Edward's wife, Mary Kerr, and their child succumbed in 1870; Edward also contracted the disease around the same time and remained thereafter too ill to do much fieldwork (Cheke and Hume 2008).

Clark himself, due to deteriorating health, travelled to England in 1869 for medical treatment, returning to Mauritius in 1871 (GC > AN 23/2/1871).

Clearly Dodo bones were still being slipped onto the market:

Poor old Clark went home a month ago. . . . He was somewhat better but very excited at leaving. I did not know he was going in this ship therefore never saw him to say good bye. I wish you would send the money for the last lot of bones sold to his brother who is an alderman Clark at Southampton. (EN > AN 6/5/1896, 24/4, p. 39)

Despite Edward reporting that ‘from what I hear I believe his memory has quite gone’ (EN > AN 9/2/1870, 24/4,

p. 194), he appears to have been well enough to correspond with Alfred in May 1870:

I am very glad to hear of the improvement in your brother's health, wh. I hope has continued & that he has regained his usual health & vigour. The notes on the Dodo I most want are those I sent first and I shd also be glad to have that number of the Ibis wh. contains your notes on the Aphanapteryx.

I am in about the same state, but am following D^r Willis's directions, hoping by patient attention to his prescriptions to recover that strength, the want of wh. obliges me to write such a wretched scrawl. When you write to your brother, pray assure him of my best wishes for his recovery. (GC > AN 15/5/1870)

Clark died in Mahébourg in 1873, aged 65 (Vinson 1965).

Aftermath

Owen, having beaten the opposition, made one serious mistake in interpreting the evidence. Although one cannot fault Owen's osteological descriptions, he reconstructed the bird in his 1866 memoir using the most famous of the contemporary Dodo paintings, one by the Dutch artist Roelandt Savery dating from 1626 (Figure 8). The life-size original was bequeathed to the British Museum by George Edwards in 1761 (Hume 2006), thus available to Owen, and Owen (1866b) fitted the skeleton into an outline traced around Savery's Dodo image, which he believed, following Edwards, to have been painted from a living bird (Owen 1867). This produced an unnatural, squat and overly obese Dodo, which became the orthodox image of the bird (Figure 9). Owen (1869) published again on the Dodo three years later (Figure 10), this time rectifying his mistake by reconstructing the bird in a natural more upright position, but the original image stuck; Owen has been associated with it ever since.



Figure 8. Dodo by Roelandt Savery. From Hume (2006).

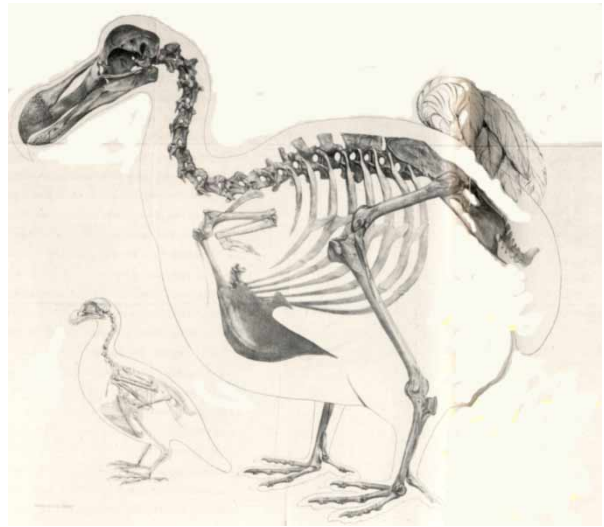


Figure 9. The first attempt at reconstructing the Dodo skeleton by Owen (1866b).

Alfred, got his reward for failing to describe the Dodo's anatomy first, by becoming Professor of Zoology and Comparative Anatomy at Cambridge in March 1866 (Woollaston 1921), and thereafter turned his attention to the Dodo's closest living relative, the Solitaire *P. solitaria* of neighbouring Rodrigues Island. Edward had travelled to Rodrigues, albeit briefly (Newton 1865a, 1865b), but once back on Mauritius had organised a series of excavations in Rodriguan caves paid for by the British Association money (EN > George Jenner 27/10/1865 (24/3,



Figure 10. Owen's (1872) new and more upright reconstruction.

pp. 167–9), Newton and Newton 1869). Over 2000 bones were recovered and sent to Cambridge, where Alfred and Edward formally described the solitaire's anatomy (Newton and Newton 1869). Although Owen remained scientifically active, publishing a supplementary paper on the Dodo (Owen 1869, 1872), the damage to his reputation caused by his anti-Darwinian views resulted in his losing interest in this group of birds and he withdrew deeper into a creationist view of the world (Rupke 1994; Wissen 1995; Cadbury 2000; Dean 2008). He died in 1892, aged 88 years.

The Newton brothers continued researching other extinct species from Mauritius and its two neighbouring islands, Réunion and Rodrigues. Despite the interest in the Dodo and the potential financial gain from the bones, it was not until 1889, when funding became available, that the marsh was scientifically analysed (Newton and Gadow 1893). The Dodo had so overwhelmed the original excavations that only two other species were formally recognised. As mentioned above, among the bone consignments that Owen received from Clark was a single mandible of a large but now extinct parrot, the Raven Parrot *Lophopsittacus mauritianus* (Owen 1866a). This parrot, and the abundant tortoises (Günther 1873), were the only other fossil taxa actually described from the entire excavation of the marsh in 1865, although Clark (1866) also reported finding 'many [bones] belonging to the Flamingo, formerly abundant in Mauritius, the Whimbrel, still common there, the Gallinule, also plentiful at present, and to the Egret, which had disappeared within the present century'. In 1874 Henry Slater picked up two lizard jaws on the old Mare aux Songes spoil heap (EN > AN 16/9/1874, 24/4, p. 289), leading to the discovery of the extinct giant skink *Didosaurus* (now *Leiopisma*) *mauritianus* (Günther 1877), and his colleague George Gulliver got numerous Dodo bones that he sent to George Rolleston at the University Museum in Oxford (letters dated 19/8/1874 and 6/9/1874, preserved in the University Museum of Zoology, Oxford).

In 1889, a government-funded excavation of the Mare aux Songes by Théodore Sauzier (Newton and Gadow 1893) recovered six new, but now extinct species: a night heron *Nycticorax mauritianus*, owl *Mascarenotus sauzieri*, goose *Alopochen mauritianus*, duck *Anas theodori*, coot *Fulica newtoni* and harrier *Circus (alphonsi) maillardi*. Paul Carié, whose family had inherited the estate in 1902 (Burgh-Edwardes and Pierrot 1946), subsequently collected a large series of subfossil remains including Dodo, which he sent to Paris (Carié 1916; Janoo 1996). From this material, Hoffstetter described a number of reptiles (Hoffstetter 1946a, 1946b). However, recent work at the Mare aux Songes has shown that even Sauzier's and Carié's excavations failed to find significant amounts of the small (<30 mm) vertebrate material that in fact is

present (Hume 2005; Rijdsdijk et al. 2009). Newton (Newton and Gadow 1893, p. 282) had previously remarked that only a single bone (now lost) of a 'small finch' had been recovered. A number of small vertebrate elements have now been collected (Rijdsdijk et al. 2009), but the site is still physically biased toward large vertebrates.

Alfred's fascination with Dodos led him to one unfortunate misinterpretation of information. He published a paper supporting a second species of Dodo – from Réunion: the supposed white Dodo or solitaire (Newton 1869), based only on seventeenth century illustrations of white-plumaged Dodos of (then) unknown origin. It was not until the discovery of subfossil remains on Réunion during the 1980s that the true identity of the Réunion solitaire could be ascertained. It is now considered to be an ibis (*Threskiornis solitarius*; Mourer-Chauviré et al. 1995, 1999), belonging to a totally different family of birds, while the paintings were of an albinistic Mauritian Dodo (Hume and Cheke 2004). Although he continued to write on Dodos and other extinct Mascarene birds until his death in 1907, Newton must have suspected an error as he never referenced his paper again, and later called the identification of the paintings 'conjectural' (Newton and Gadow 1896, p. 217). After 3 years of bitter rivalry, the race between these two authorities to be first to scientifically describe the Dodo's anatomy resulted in improper diversion of specimens, academic blackmail and a bitterness that was never resolved between the two men. Both Richard Owen and Alfred Newton shared the spoils of anatomically describing the two giant, flightless ground pigeons, but Owen succeeded in associating his name with the more famous Dodo, and was prepared to achieve this aim by any means.

Richard Owen: career and motivations

By 1856 Richard Owen had risen to the rank of superintendent of the natural history departments in the British Museum, Bloomsbury, becoming one of the greatest comparative naturalists of his time. He fought hard for and was ultimately successful in getting new premises to store the ever increasing accumulation of natural history specimens, which opened in 1881 but was not complete until the end of 1883, after which Owen retired. This was despite receiving opposition from some distinguished scientists, including Charles Darwin, Thomas Huxley and Joseph Hooker – opposition that would appear surprising except that none of these wanted to see Owen's influence grow even more (Rupke 1988). The new building was first called the British Museum (Natural History), now simply the Natural History Museum (Gunther 1980; Rupke 1988).

One of his many landmark discoveries was his prediction from a single small scrap of bone, called

'Rule's bone', that a group of giant ostrich-sized birds once occurred in New Zealand (Owen 1839). He presented his theory to the Royal Society, potentially undermining his scientific credibility when doing so, but within three years was proved correct; the first complete skeleton of a giant moa, the tallest bird known, was received in London – a true landmark in palaeontological history.

Despite his abilities, Richard Owen, a Lancashire-born lad and not in the same social class as other noted academics, appears to have suffered an inferiority complex that could make him jealous of, and ruthless towards, any potential rival. Thus, after establishing the order Dinosauria mainly on the basis of work by Gideon Mantell, Owen refused to acknowledge him with any credit, claiming he had made the discovery himself (Rupke 1993, 1994; Dean 2008). Similarly, he was awarded the Royal Medal in 1846 for his work on Belemnites (Owen 1844), but failed to acknowledge Channing Pearce, an amateur biologist and the true discoverer, who had produced his own work on the subject 4 years earlier. As a result of this deceit, he was later accused of plagiarism and formally voted off the councils of the Royal Society in 1861 and the Zoological Society in 1862 (Rupke 1993, 1994; Cadbury 2000).

Owen's own copy of the *Memoir on the Dodo* (1866), a book limited to a run of 100, with 20 designated as presentation copies, includes a list of recipients on the inside front cover; neither Clark's nor the Newtons' names feature, although Bishop Ryan and Sir Henry Barkly are included. This suggests he was prepared to ingratiate himself with the influential (who had done little but write letters), but not with those who really did the work. Owen did eventually send an ordinary copy to Clark (GC > RO, acknowledging, 5.11.1867; not in paginated series).

Owen's background was very different from that of Alfred Newton, an upper-class Cambridge academic who was to become the first Professor of Zoology and Comparative Anatomy at the university, and one of the first disciples of Darwin's theory (Wollaston 1921). Charles Darwin's *Origin of Species by Means of Natural Selection* (Darwin 1859) was published 6 years before the Mare aux Songes discoveries. Alfred firmly believed in the evolution of species and corresponded with Darwin over issues of evolution amongst birds, totally absorbing the principle into his scientific thinking. Conversely, Owen, in a position of great responsibility at the British Museum, was in a more constrained situation, particularly as the Anglican tendencies of those holding the purse strings of the museum had to be considered. Although Owen was quietly sympathetic to some aspects of evolution, he publicly argued that every species was created as a predetermined archetype or ideal, a finished product fit to survive or condemned to die out without evolving in any way. In the eyes of many influential churchmen, Darwin's evolution by natural selection contravened God's own



Figure 11. Owen's pencil and watercolour of the Oxford Dodo head. From Hume et al. (2006).

work and thus Owen was hostile to the theory (Rupke 1994; Wissen 1995; Cadbury 2000; Dean 2008).

Despite ruthlessly overriding academic competitors, Owen appears also to have had a gentler, sympathetic side, particularly for those he considered gifted but unappreciated, and who were not 'the competition'. For example, Owen was generous with his time for certain artists and promoted their work whenever possible. The Dutchman, James Erxleben (1830–1890), whose exquisite plates depicting Dodo osteology have never been bettered, was used by Owen throughout the artist's career (Jackson 1999), despite Owen himself being an accomplished artist (Ingles and Sawyer 1979; Figure 11). Owen's last letters to Clark suggests he was not unhappy with the outcome of his Dodo heist, despite having been semi-tricked into spending so much of the museum's money. In June 1866, some months after the financial settlements, Owen (GC > RO 5.4.1866, p. 118) even intended nominating Clark as a corresponding member of the Zoological Society of London. According to Clark's response – none of Owen's letters to Clark have survived – Owen wrote sympathetically to him, and perhaps seeing Clark as a victim of circumstance (or manipulation by the Newtons) rather than a villain.

Clark's daughter Edith had a letter published in the *Westminster Gazette* of 16/1/1902 summarising her father's contribution to science, and it is interesting that in that she added extra detail on how Clark's labourers had worked in the marsh:

Owing to the depth of water and soft mud, which prevented the men from having any foothold, some rough rafts or 'catamarans' made of the trunks of banana trees, were floated. On these the natives [*sic*] stood and supported others with ropes passed und[er] their armpits, while they felt for the bones and picked them up with their toes (Clark 1902, transcribed from an MS copy by Thomas Parkin, inserted into Edward Newton's copy of Strickland and Melville (1848), now, courtesy of the late Dr Reginald

Vaughan, in the Alexander Library, Oxford University Zoology Department).

Regardless of this late press, by the end of the nineteenth century Clark had faded into obscurity. Rothschild (1907), Oudemans (1917) and later Hachisuka (1953), rekindled interest in the Dodo by publishing the first extensive accounts on the subject since Strickland and Melville (1848), yet none mentions Clark at all. However, since the mid-1990s half a dozen books and numerous papers on the subject have now been published, and Clark's contribution has now been duly recognised.

Despite Clark's financial intentions, his humble nature, love of natural history and true determination are worthy of merit. After 30 years of searching, Clark's persistence was rewarded with a unique opportunity and he took it: another marsh containing Dodo bones has still not been found.

Acknowledgements

J.P.H. would like to thank Ann Datta, Susan Snell and Effie Warr from the Natural History Museum, London, for access to the Owen/Clark correspondence, Ray Symonds and Mike Brooke, for access to Strickland's 'The Dodo Book' held at the University Museum of Zoology, Cambridge, Clem Fisher and John Millard from the World Museum, Liverpool, and David Craven at the Bolton Museum, discussions with Kenneth Rijdsdijk and Perry de Louw of the Dodo Research Programme, and Errol Fuller and Lorna Steel for use of images during the preparation of this paper. Research funding was provided by the Percy Sladen Centenary Fund, Special Fund, NHM and The Gen Foundation. A. S. C. gratefully thanks Dr Peter Meadows and the staff of the Manuscript Department, Cambridge University Library, for access to Edward Newton's letter books and Alfred Newton's correspondence, Rosemay Ng for permission to consult the archives of the Royal Society of Arts and Sciences in Mauritius in 2008, Linda Birch, then at the Alexander Library in Oxford, for letting him examine Edward Newton's copy of Strickland and Melville (1848), Malgosia Nowak-Kemp for sight of the Gulliver–Rolleston correspondence in the University Museum of Zoology, Oxford, and the librarians at the Newton Library, Cambridge University Zoology Department, for access to bound volumes of Mascarene material assembled by Alfred Newton. Robert Prys-Jones found us some useful information in old British Museum annual reports and minutes, and with Dave Williams made many helpful suggestions on a draft of this paper.

References

Anon. 1860. Minutes of meetings, with reference to A. Newton mentioning Dr Ayres's discovery of Dodo bones. *Proc. Zool. Soc. Lond.* 1860:443.

Anon. 1866. A catalogue of the valuable and interesting series of Dodo Bones lately received from Mauritius. . . auction and sale catalogue. Sale No. 2604. London (UK): J.C. Stevens.

Anon. 1869. Séance du Jeudi, 28 Juin 1866. *Trans. Roy. Soc. Arts Sci., Mauritius.* NS 3:12.

Baker RA, Bayliss RA. 2002. Alexander Gordon Melville (1819–1901): the Dodo *Raphus cucullatus* (L., 1758) and the genesis of a book. *Arch. Nat. Hist.* 29:109–118.

Barnwell PJ. 1967. Boyle, Charles John (1806–1885). *Dictionary of Mauritian Biography.* 30:876.

Barnwell PJ, Béchet O. 1843. *Dictionary of Mauritian Biography.* 10:311–312.

Boyle CJ. 1867. *Far away, or, sketches of scenery and society Mauritius.* London (UK): Chapman and Hall.

Burgh-Edwards SB, Pierrot M. 1946. Thiéry, George Thomy (1823–1902). *Dictionary of Mauritian Biography.* 19:597–598.

Cadbury D. 2000. *Terrible lizard: the first dinosaur hunters and the birth of a new science.* New York (NY): Henry Holt.

Carié P. 1916. L'acclimatation à l'île Maurice. *Bull. Soc. Natl Acclim., Paris.* 63: 10–18, 37–46, 72–79, 107–10, 152–59, 191–98, 245–50, 355–63 and 401–4 [also reprinted by the society with new pagination].

Cheke AS, Hume JP. 2008. *Lost land of the Dodo.* London (UK): A and C Black.

Clark G. 1865. On the discovery of bones of the Dodo of Mauritius. *Mauritius Commercial Gazette.*

Clark G. 1866. Account of the late discovery of Dodos' remains in the island of Mauritius. *Ibis.* 2(2):141–146. Port Louis 15/11.1865.

Clark G. 1869. The Dodo [revised version of Clark 1865]. *Mauritius Almanac and Colonial Register.* 1869:37–40 [written in the third person, but almost certainly by Clark; the reprint is stated as revised by him].

Clark E. 1902. The Dodo [letter to the editor in]. *Westminster Gazette.* 16/1/1902 [handwritten copy pasted into Edward Newton's/Thomas Parkin's copy of Strickland and Melville, 1848].

Darwin C. 1859. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life.* 1st ed. London (UK): John Murray.

Dean RD. 2008. *Gideon Mantell and the discovery of dinosaurs.* Cambridge (UK): Cambridge University Press.

Duncan JS. 1828. A summary review of the authorities on which naturalists are justified in believing that the Dodo, *Didus ineptus* Linn., was a bird existing in the Isle of France, or the neighbouring islands until a recent period. *Zool. J.* 3:554–567.

Fuller E. 2000. *Extinct birds.* Oxford (UK): Oxford University Press 398 pp.

Fuller E. 2002. *Dodo – from extinction to icon.* Oxford (UK): Harper Collins.

Gervais P, Coquerel C. 1866. Sur le Dronte, à propos d'os de cet oiseau récemment découvertes à l'île Maurice. *C.R. Séances Acad. Sci. Paris.* 62:924–928.

Gray JE. 1867. Accounts of the income and expenditure of the British Museum for the financial year ended the 31st day of March 1867 [tortoise bones mentioned p.49]. Department of Zoology.

Grihault A. 2005. Dodo – the bird behind the legend. Mauritius: IPC Ltd.

Gunther AE. 1980. The founders of bird science at the British Museum, 1753–1900: a contribution to the centenary of the opening of the British Museum (natural history) on 18th April 1981. London (UK): Halesworth.

Günther ACLG. 1873. Preliminary notice of some extinct tortoises from the islands of Rodriguez and Mauritius. *Ann. Mag. Nat. Hist.* 4(11):397.

Günther ACLG. 1877. Notice of two large extinct lizards, formerly inhabiting the Mascarene islands. *J. Linn. Soc. Zool.* 13:322–327.

Hachisuka M. 1953. *The Dodo and kindred birds, or the extinct birds of the Mascarene Islands.* London (UK): H.F. and G. Witherby.

Hengst J. 2003. The Dodo – the bird that drew the short straw. The Netherlands: Art Revisited, Marum.

Higginson HP. 1859–1872. *Reminiscences of Life and Travel 1859–1872* by Harry Pasley Higginson M Inst. C.E (dated 1891, Wellington, New Zealand). [Unpublished MS Travelogue copy-typed by his granddaughter, Elaine White (c.1950–60). Copy and original in her care. Tavistock, Devon].

Hoffstetter R. 1946a. Remarques sur la classification des ophiidiens et particulièrement des Boidae des Mascareignes (Bolyerinae subfam. nov.). *Bull. Mus. Natl Hist. Nat., Paris.* 18(2):132–135.

Hoffstetter R. 1946b. Les Typhlopidae fossiles. *Bull. Mus. Natl Hist. Nat., Paris.* 18(2):309–315.

Hume JP. 2005. Contrasting taphofacies in ocean island settings: the fossil record of Mascarene vertebrates. *Mono. Soc. Hist. Nat., Bal.* 12:129–144.

Hume JP. 2006. The history of the Dodo *Raphus cucullatus* and the penguin of Mauritius. *Hist. Biol.* 18(2):65–89.

- Hume JP, Cheke AS. 2004. The white Dodo of Réunion Island: unravelling a scientific and historical myth. *Arch. Nat. Hist.* 31(1):57–79.
- Hume JP, Prys-Jones RP. 2005. New discoveries from old sources, with reference to the original bird and mammal fauna of the Mascarene Islands, Indian Ocean. *Zool. Med. Leid.* 79(3):85–95.
- Hume JP, Datta A, Martill DM. 2006. Unpublished drawings of the Dodo *Raphus cucullatus* and a note on Dodo skin relics. *Bull. Brit. Orn. Club.* 126A:49–54.
- Ingles JM, Sawyer FC. 1979. A catalogue of the Richard Owen collection of palaeontological and zoological drawings in the British Museum (natural history). *Bull. Brit. Mus. Hist. Ser.* 6(5):109–197.
- Jackson C. 1999. Dictionary of bird artists of the world. Woodbridge, Suffolk, (UK): Antique Collectors Club.
- Janoo A. 1996. On a hitherto undescribed Dodo cranium, *Raphus cucullatus* L. (Aves, Columbiformes), with a brief taxonomical overview of this extinct flightless Mascarene Island bird. *Bull. Mus. Natl Hist. Nat. C.* 18(1):55–77.
- Lesson RP. 1831. *Traité d'Ornithologie*. 2 vols. Paris (France): Levrault.
- Lionnet [JF] G. 1972. The seychelles. Newton Abbot, (UK)/Pennsylvania (PA): David and Charles and Harrisburg/Stackpole Books.
- Milne-Edwards A. 1866. Remarques sur des ossements de Dronte (*Didus ineptus*). *Ann. Sci. Nat., Paris.* 1866:355–379.
- Mosse JR. 1869. The Mauritius Railways – midland line. *Inst. Civ. Eng.* 1:202.
- Mourer-Chauviré C, Bour R, Ribes S. 1995. Was the solitaire of Réunion an ibis? *Nature.* 373:568.
- Mourer-Chauviré C, Bour R, Ribes S, Moutou F. 1999. The avifauna of Réunion Island (Mascarene Islands) at the time of the arrival of the first Europeans. *Smithsonian Contrib. Paleobiol.* 89:1–38.
- Newton A. 1865. Letter of Mr Clark about bones in Mauritius. *Proc. Zool. Soc. Lond.* 1865:732 [meeting of 12/12/1865].
- Newton E. 1865. Notes of a visit to the island of Rodriguez. *Ibis.* (2)1: 146–153.
- Newton A. 1866. Letters, announcements, etc. *Ibis.* 2(2):128.
- Newton A. 1869. On a picture supposed to represent the Didine bird of the Island of Bourbon (Réunion). *Trans. Zool. Soc. Lond.* 6:373–376.
- Newton E, Gadow H. 1893. On additional bones of the Dodo and other extinct birds of Mauritius obtained by Mr Theodore Sauzier. *Trans. Zool. Soc. Lond.* 13(282):302.
- Newton A, Gadow H. 1896. A dictionary of birds. London (UK): A. and C. Black.
- Newton A, Newton E. 1869. On the osteology of the solitaire or Didine bird of the island of Rodriguez, *Pezophaps solitaria* (Gmel.). *Phil. Trans. Roy. Soc.* 159(327):362.
- Oudemans AC. 1917. Dodo-Studien, naar aanleiding van de vondst van een gevelsteen met Dodo-beeld van 1561 to vere. *Verh. K. Akad. Wet. Amsterdam.* (2)19(4). Pp.vii + 140 + plates.
- Owen R. 1839. Exhibited bone of an unknown struthious bird from New Zealand. *Proc. Zool. Soc. Lond.* 7:169–171.
- Owen R. 1844. A description of certain belemnites, preserved, with a great proportion of their soft parts, in the Oxford Clay, at Christian–Malford, Wilts. *Phil. Trans. Roy. Soc., Lond.* 134:65–85.
- Owen R. 1845. Descriptive and illustrated catalogue of the fossil organic remains of Mammalia and Aves contained in the Museum of the Royal College of Surgeons. London (UK): Royal College of Surgeons.
- Owen R. 1846. Observations on the Dodo. *Proc. Zool. Soc. Lond.* 1846:51–53.
- Owen R. 1866a. Evidence of a species, perhaps extinct, of a large parrot (*Psittacus mauritianus*, Owen), contemporary with the Dodo in the island of Mauritius. *Ibis.* 2(2):168–171.
- Owen R. 1866b. Memoir on the Dodo (*Didus ineptus*, Linn.) with an historical introduction by the late William John Broderip, F.R.S. London (UK): Taylor and Francis.
- Owen R. 1867. Departments of Natural History. Accounts of the income and expenditure of the British Museum for the financial year ended the 31st day of March 1867 [Dodo discussed p.46].
- Owen R. 1869. On the osteology of the Dodo. *Trans. Zool. Soc. Lond.* 6:49–86.
- Owen R. 1872. On the Dodo (part II)-notes on the articulated skeleton of the Dodo (*Didus ineptus* Linn.) in the British Museum. *Trans. Zool. Soc. Lond.* VII:513–525.
- Pike N. 1873. Subtropical rambles in the land of Aphanapteryx. Personal experiences, adventures and wanderings in and around the island of Mauritius. London (UK)/New York (NY): Sampson Low, Marston, Low and Searle/Harper and Brothers.
- Pitot A. 1914. *Mauritius Illustrated*. London: W.H. and L. Collingridge. Extinct birds of the Mascarene Islands:82–93.
- Reinhardt JT. 1842. In: Kroyer H, editor. *Noiere Oplysning om det I Kiøbenhavn fundne Drontehoved*. Vol. 4. København (Denmark): Naturhistorisk Tidsskrift. p. 71.
- Rijsdijk KF, Hume JP, Bunnik Fde Florens V, Baider C, Shapiro B, Plicht Jvd JA, Griffiths O, Hoek Ostende LWvd, Cremer H, Vernimmen T et al. 2009. Mid-holocene vertebrate bone concentration-lagerstätte on oceanic island Mauritius provides a window into the ecosystem of the Dodo (*Raphus cucullatus*). *Quatern. Sci. Rev.* 28:14–24.
- Rothschild W. 1907. *Extinct birds*. London (UK): Hutchinson.
- Rupke NA. 1988. The road to albertopolis: Richard Owen (1804–1892) and the founding of the British Museum of natural history. In: Rupke NA, editor. *Science, Politics and the Public Good*. London (UK): Macmillan. p. 63–89.
- Rupke NA. 1993. Richard Owen's vertebrate archetype. *Isis.* 84(231):51.
- Rupke NA. 1994. Richard Owen: victorian naturalist. New Haven (CT): Yale University Press.
- Sclater PL. 1866. [Typed and handwritten agenda announcing the reading of Professor Owen's paper: on the osteology of the Dodo dated 9.1.1866.]. General Library, Natural History Museum, London. 1p.
- Small J, Power WHT. 1868. Report on the Malarial epidemic fever of Mauritius of 1866–67. *Army Med. Dept.* VIII:442–475.
- Strickland HE. 1840–1850. *The Dodo Book*. [1 volume of scientific papers, correspondence (mostly addressed to Strickland), articles, drawings etc., relating to the production and publication of *The Dodo* and its kindred (Strickland, H.E., and Melville, A.G., 1848), with correspondence dates from 1840s and 1850s]. Volume given to Alfred Newton in 1900. Cambridge (UK): University Museum of Zoology.
- Strickland HE, Melville AG. 1848. *The Dodo and its kindred*. London (UK): Reeve, Benham and Reeve.
- Teelock V. 2001. *Mauritian history. From its beginnings to modern times*. Moka (Mauritius): Mahatma Gandhi Institute.
- Toussaint A. 1945. Mylius, Charles Augustus Etienne (c.1795-c.1860). *Dictionary of Mauritian Biography* 17:524, and Addenda and Mutanda 3 (undated).
- Turvey ST, Cheke AS. 2008. Dead as a Dodo: the fortuitous rise to fame of an extinction icon. *Hist. Biol.* 20:149–163.
- Vinson J. 1968. Le centenaire de la decouverte a l'île Maurice des ossements du dronte ou Dodo, *Raphus cucullatus* Linné. *Proc. Roy. Soc. Arts. Sci. Mauritius.* 3(1):1–5.
- Wissen Bv. 1995. *Dodo Raphus cucullatus [Didus ineptus]*. Amsterdam (The Netherlands): ISP/Zoologisch Museum-Universiteit van Amsterdam.
- Wollaston AFR. 1921. *Life of Alfred Newton*. London (UK): John Murray.