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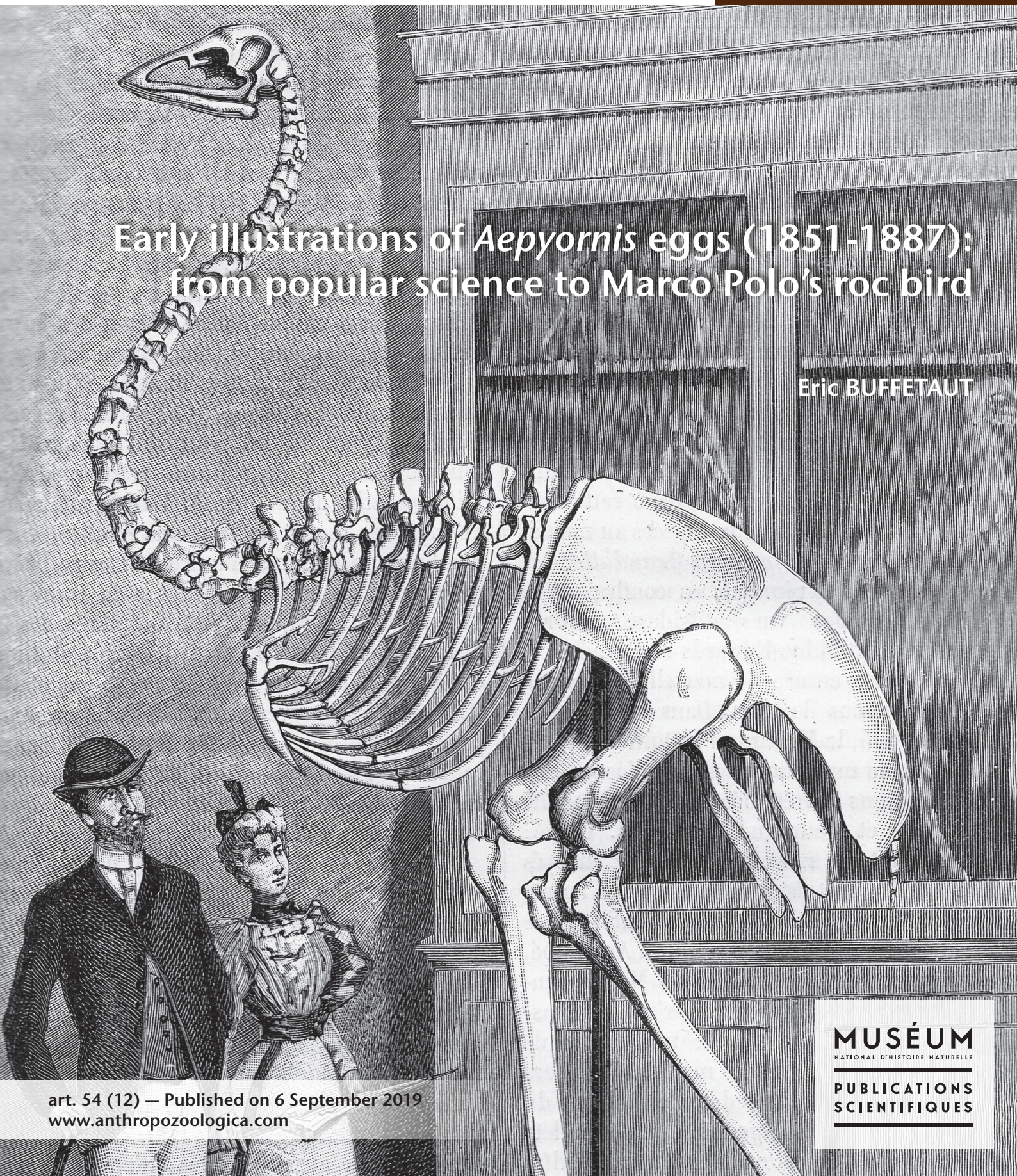
Eric BUFFETAUT



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Couverture/*Cover* :
Reconstitution et squelette monté du « grand *Aepyornis* » (*Aepyornis ingens* Milne-Edwards & Grandidier, 1894), par Oustalet (1894). Photo E. Buffetaut/*Reconstruction and mounted skeleton of the "great* Aepyornis*" (*Aepyornis ingens *Milne-Edwards & Grandidier, 1894), from Oustalet (1894). Photo E. Buffetaut.*

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Early illustrations of *Aepyornis* eggs (1851-1887): from popular science to Marco Polo's roc bird

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ABSTRACT
The huge eggs of the giant extinct bird *Aepyornis*, from Madagascar, attracted much attention when they were first described by Isidore Geoffroy Saint-Hilaire (1851). However, before 1900, only one illustration of such an egg was published in a scientific paper, by Rowley (1878). By contrast, illustrations of *Aepyornis* eggs appeared in various other types of publications, notably popular magazines, where they illustrated short items about the giant bird. The first one was published in 1851 in *Le Magasin pittoresque* (Anonymous 1851a), only a few months after Geoffroy Saint-Hilaire's original description. Similarly, in 1887 the popular science magazine *Scientific American* published a drawing of an *Aepyornis* egg (Anonymous 1887). An engraving of an *Aepyornis* egg was published by Ward (1866) in a catalogue advertising the casts of fossils he was selling. Yule (1871) used a lithograph of an *Aepyornis* egg as a frontispiece for his translation of Marco Polo's book of travels, in the belief that the eggs of this giant bird had been the source of the legend of the roc bird mentioned by Polo. In 1885, in a popular book on eggs in plants and animals, Guillaume Capus published an engraving of an *Aepyornis* egg to illustrate the size range of bird eggs (Capus 1885). These early illustrations are reproduced here. They testify to the appeal these huge eggs had for the general public, while scientists working on *Aepyornis* apparently did not find them sufficiently informative to warrant illustrations.

KEY WORDS
Aepyornis,
eggs,
illustrations,
popular science.

RÉSUMÉ
Premières illustrations d'œufs d'Aepyornis (1851-1887) : de la vulgarisation scientifique à l'oiseau roc de Marco Polo.
Les énormes œufs de l'oiseau géant éteint *Aepyornis*, provenant de Madagascar, attirèrent l'attention dès leur première description par Isidore Geoffroy Saint-Hilaire (1851). Cependant, avant 1900, une seule illustration d'un tel œuf fut publiée dans un article scientifique, par Rowley (1878). En revanche, des illustrations d'œufs d'*Aepyornis* parurent dans divers autres types de publications, notamment des magazines destinés au grand public, où elles accompagnaient de brefs articles sur cet oiseau géant. La première fut publiée en 1851 dans *Le Magasin pittoresque* (Anonymous 1851a), quelques mois seulement après la description initiale par Geoffroy Saint-Hilaire. De même, en 1887, le magazine de vulgarisation scientifique *Scientific American* publia un dessin d'un œuf d'*Aepyornis* (Anonymous 1887). Une gravure d'un œuf d'*Aepyornis* fut publiée par Ward (1866) dans un catalogue présentant les moulages de fossiles qu'il vendait. Yule (1871) utilisa une lithographie d'un œuf d'*Aepyornis* comme frontispice pour sa traduction des récits de voyage de Marco Polo, pensant que les œufs de cet oiseau géant étaient à l'origine de la légende de l'oiseau roc mentionné par Polo. En 1885, dans un ouvrage destiné au grand public sur les œufs des plantes et des animaux, Capus publia une gravure d'un œuf d'*Aepyornis* pour illustrer les variations de taille des œufs d'oiseaux (Capus 1885). Ces illustrations anciennes sont reproduites ici. Elles témoignent de l'intérêt que suscitaient ces énormes œufs parmi le grand public, alors même que les scientifiques qui étudiaient *Aepyornis* ne les considéraient apparemment pas comme assez informatifs pour mériter d'être figurés.

MOTS CLÉS
Aepyornis,
œufs,
illustrations,
vulgarisation scientifique.

INTRODUCTION

At the 27 January 1851 session of the Paris Academy of Sciences, the French zoologist Isidore Geoffroy Saint-Hilaire presented a paper on subfossil bones and eggs recently brought from Madagascar that indicated the existence of a giant bird which he named *Aepyornis maximus*. Although the bones, especially an incomplete tarsometatarsus, were important for ascertaining the avian nature of the material, it was mostly the eggs that attracted the attention of scientists and the general public alike, because of their huge size: as noted by Geoffroy Saint-Hilaire (1851), in terms of volume, an *Aepyornis* egg was the equivalent of six ostrich eggs or 148 hen's eggs (for a recent summary about *Aepyornis* eggs, see Angst & Buffetaut 2017). Geoffroy Saint-Hilaire's short note was not illustrated, the longer memoir about the specimens that is announced in it never appeared, and it took a long time before one of the original specimens of *Aepyornis maximus* Geoffroy Saint-Hilaire, 1851 was figured in a scientific paper. The above-mentioned tarsometatarsus (recently designated as the lectotype of *Aepyornis maximus* by Hansford & Turvey [2018]) was first illustrated by Bianconi (1865) on the basis of a cast (Buffetaut *et al.* 2019). Curiously enough in view of the attention they attracted, it took even longer for illustrations of the eggs to be published in scientific papers. Meyer & Heller (1900) were the first to publish photographs of *Aepyornis* eggs (two specimens in the collections of the Dresden Royal Zoological and Anthropological-Ethnographical Museum). In their paper, they noted that only one picture of a complete *Aepyornis* egg had hitherto been published, *viz.* the coloured lithograph in Rowley's article on extinct gigantic birds from Madagascar and New Zealand (Rowley 1878; Fig. 1). While Meyer and Heller may have been right as far as scientific papers were concerned, several illustrations of *Aepyornis* eggs had appeared in various other kinds of publications during the second half of the 19th century, the first one of which only a few months after Geoffroy Saint-Hilaire's original description. These early, largely forgotten, depictions are discussed below.

LE MAGASIN PITTORESQUE, 1851

The first illustration of an *Aepyornis* egg appeared only four months after Geoffroy Saint-Hilaire's presentation at the Paris Academy of Sciences, in issue 20 of volume 19 of *Le Magasin pittoresque*, published in May 1851. *Le Magasin pittoresque* was a magazine aimed at a wide readership, published and edited by Édouard Charton (1807-1890), a philanthropist, politician and editor (Lagarde-Fouquet & Lagarde 2006) who launched several highly successful popular magazines, including *L'Illustration* (starting in 1843) and *Le Tour du Monde* (starting in 1860). *Le Magasin pittoresque* was the first of them, its publication started in 1833 and continued until 1914. It was initially modelled after the British *Penny Magazine* and offered its readers a miscellany of short stories, poems, historical anecdotes, biographies, moral advices, travel and exploration reports and articles on the various branches of science, including natural history. Charton's aim was to provide educational, morally sound and easily understandable material for all classes of society, including workers, at a very accessible price (50 *centimes* per month – four issues – in 1851). *Le Magasin pittoresque* was profusely illustrated with wood engravings by many illustrators, including some well-known artists of the time, such as Tony Johannot, Karl Girardet, Jean-Jacques Grandville and Gustave Doré. Whereas the illustrations bore the names of their authors, the articles did not, to ensure editorial coherence, but tables published at regular intervals listed the names of the contributors and illustrators, showing that many well-known writers,

FIG. 1. – Egg of *Aepyornis maximus* Geoffroy Saint-Hilaire, 1851, from Rowley (1878). The original plate shows the egg (from Rowley's collection) at its actual size. This appears to be the first illustration of an *Aepyornis* egg in a scientific paper. Photo E. Buffetaut.

artists and scientists were among them (Lagarde-Fouquet & Lagarde 2006). *Le Magasin pittoresque* was initially weekly (it later became monthly, and then bimonthly) and enjoyed considerable success, selling up to 100 000 copies in the 1830s.

The two *Aepyornis* eggs on page 157 of issue 20 of volume 19 are part of a composition by M. Werner (Jean-Charles Werner [1798-1856], a well-known artist who, in addition to providing various natural history engravings for *Le Magasin pittoresque*, illustrated many major zoological works and had close links with the Paris Natural History Museum [Cardot 2019]), entitled "comparative dimensions of various eggs" (Fig. 2). The eggs are displayed on a kind of narrow bank between a body of water in the forefront and a rocky background. One of the *Aepyornis* eggs is in the background, the other one figures very prominently in the right half of the picture. Other eggs in the drawing are those of an ostrich, a cassowary (in fact probably an emu egg, to judge from its dark colour – at that time the emu was often referred to as the "New Holland cassowary" in French publications), a swan, a hen, a pigeon, a hummingbird, an eagle, a vulture, an auk (possibly the Great Auk), a crocodile (with the head of the baby crocodile emerging from the egg), a python, a freshwater turtle, a Saint Lucia boa, an acnoid (?) turtle, a snake from the Paris Museum galleries, and, shown in a body of water at the bottom of the picture, a shark and a skate. The *Aepyornis* eggs show few details, being remarkable mainly for their huge size, even as compared with the large egg of the ostrich. This engraving illustrates an anonymous article entitled "Ce que c'est qu'un œuf" ("What is an egg"), consisting of general considerations on eggs and reproduction in oviparous animals, in which *Aepyornis* is not mentioned (Anonymous 1851a). However, this article is followed on page 159 by a short piece on the "Epyornis" (a spelling frequently used by various authors, including Geoffroy Saint-Hilaire himself, in the 19th century), a "new gigantic fossil bird from the island of Madagascar" (Anonymous 1851b). This brief item summarises Geoffroy Saint-Hilaire's note at the Academy of Sciences, with due mention of the huge size of the eggs and of legends about giant birds told by Malagasy natives, and refers to the Dodo of Mauritius (*Raphus cucullatus* (Linnaeus, 1758)), that had been described in a previous issue of the magazine. It rightly concludes that *Aepyornis* was a flightless herbivorous bird, unlike the large carnivorous volant bird mentioned in some Malagasy tales. This short item may have been written by Isidore Geoffroy Saint-Hilaire himself, since he was listed among the contributors of *Le Magasin pittoresque* (Charton 1864; Lagarde-Fouquet & Lagarde 2006). His father Étienne had been among the supporters of the magazine when it was

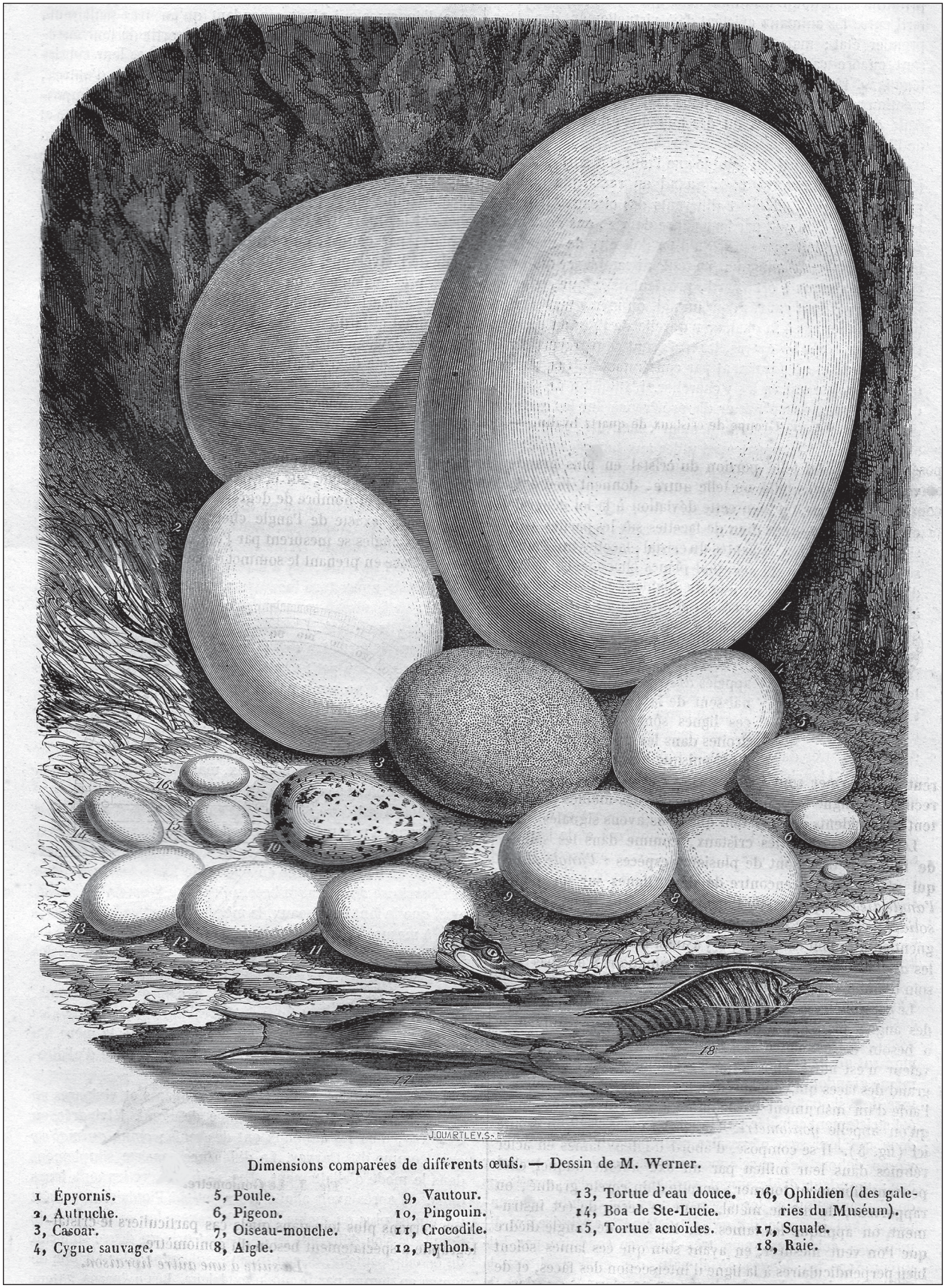

Fig. 2. — Comparative dimensions of various eggs. Drawing by M. Werner, from *Le Magasin pittoresque* (Anonymous 1851a). See text for identification of the eggs. The *Aepyornis* eggs, at the back, stand out because of their huge size. Photo E. Buffetaut.

launched in 1833 (Lagarde-Fouquet & Lagarde 2006). The engraving on page 157 thus served as an illustration for both the general article about eggs and the short item on *Aepyornis*.

The fact that two *Aepyornis* eggs are depicted in the illustration by Werner suggests that they were drawn "from nature" at the Paris Natural History Museum, since two complete eggs (plus a broken one) were kept there, as reported by Geoffroy Saint-Hilaire (moreover, the caption mentions that at least one of the snake eggs in the picture was from the Natural History Museum collections). What is remarkable is the short time (four months) that elapsed between the description by Geoffroy Saint-Hilaire and the publication of the engraving; it shows how reactive Édouard Charton, the editor of *Le Magasin pittoresque*, was to scientific novelties and how well he understood the potential interest of spectacular palaeontological discoveries for the general public. The fact that Geoffroy Saint-Hilaire was a regular contributor to the magazine may also have played a part. What is puzzling, however, is that the impressive engraving by Werner was not reproduced in other popular science publications of the time. In the mid-nineteenth century, the authors of books and articles on geology and palaeontology tended to reproduce the same illustrations of fossils almost *ad infinitum*, but it does not seem that Werner's eggs were so used. This did not prevent the huge size of *Aepyornis* eggs from making them popular, as exemplified, for instance, by the cardboard model produced about 1858 by the French physician and manufacturer of anatomical models Louis Auzoux, which was marketed as an *Aepyornis* egg and could be opened to exhibit four stages of the development of the avian egg – it was in fact a hen's egg enlarged to the size of an *Aepyornis* egg (Buffetaut 2017, 2018).

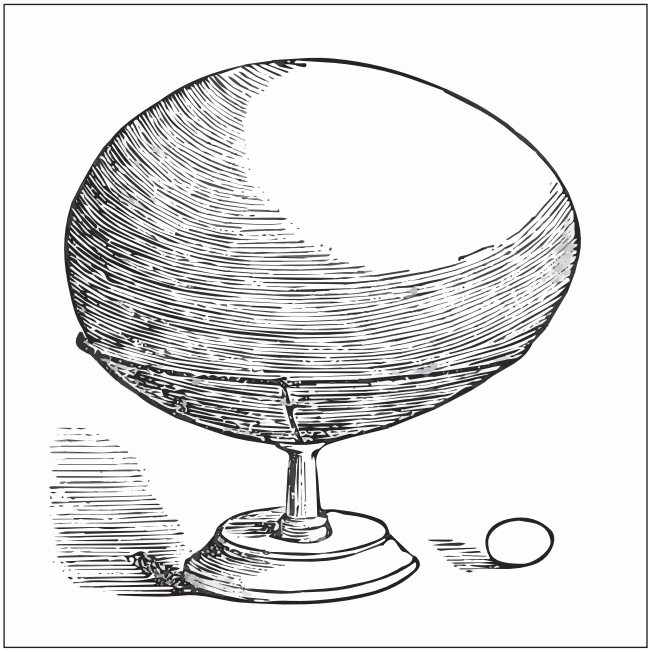

Fig. 3. — Egg of *Aepiornis* [sic] *maximus*, compared with a hen's egg. From Ward (1866). Photo E. Buffetaut.

HENRY A. WARD'S *CATALOGUE OF CASTS OF FOSSILS* (1866)

Henry Augustus Ward (1834-1906) was an American naturalist who, after travelling extensively in Europe in the 1850s, became appointed professor of natural history at the university of Rochester in 1860 (Kohlstedt 1980). There he established a geological museum displaying the vast collection of specimens and casts he had acquired during his stay in Europe, complemented by American specimens. After a second visit to Europe in 1863, during which he acquired more casts, he started a commercial venture that became known as Ward's Natural Science Establishment, selling casts of fossils to universities and museums (Kohlstedt 1980; Davidson 2005). In his *Catalogue of casts of fossils, from the principal museums of Europe and America, with short descriptions and illustrations* (Ward 1866: 49), he advertised casts of the original specimens of *Aepyornis* [spelled *Aepiornis*] *maximus* described by Geoffroy Saint-Hilaire in 1851. The short description mentioned two metatarsals (in fact tarsometatarsi) and two eggs and briefly summarised Geoffroy Saint-Hilaire's paper, including the fact that the volume of an *Aepyornis* egg was the equivalent of that of 148 hen's eggs. It mentioned that the originals were kept at the "Garden of Plants" in Paris (the *Jardin des Plantes*, the former name of the National Museum of Natural History in Paris, still used today for the park around the museum buildings). Casts of the tarsometatarsi and one egg sold for $ 4.50; for casts of two metatarsi and two eggs, the price was $ 5.00 (with mountings). The description was accompanied by a small engraving showing an *Aepyornis* egg on a stand next to a hen's egg (Fig. 3). Ward spent a long time in France between 1854 and 1860 and his catalogue shows that he obtained many casts from the museums in Paris and Lyon. Getting a set of casts of the original specimens of *Aepyornis maximus* must have been easy, since the Paris Natural History Museum sent sets of them to many institutions in France and abroad in the 1850s (Buffetaut *et al.* 2019).

A second, revised edition of Ward's catalogue was published under a different title in 1870. The accompanying descriptive text for *Aepyornis* casts (Ward 1870: 20) basically remained the same, but fewer details were given about what was offered for sale and prices were no longer mentioned, because what Ward offered in this catalogue were complete series of casts or "geological cabinets", the "Academy series" consisting of 170 specimens, selling for $ 300, while the "College Series", consisting of 330 specimens, cost $ 1000. The *Aepyornis* casts were offered in both series and the engraving already published in the 1866 catalogue was reproduced in the new one.

Ward's catalogues testify to the interest elicited by the giant bird *Aepyornis* during the nineteenth century, when museums and universities were eager to acquire casts of significant specimens. To judge from the illustrations chosen by Ward, the eggs were considered more spectacular and attractive than the scanty skeletal remains then available, which were not illustrated.

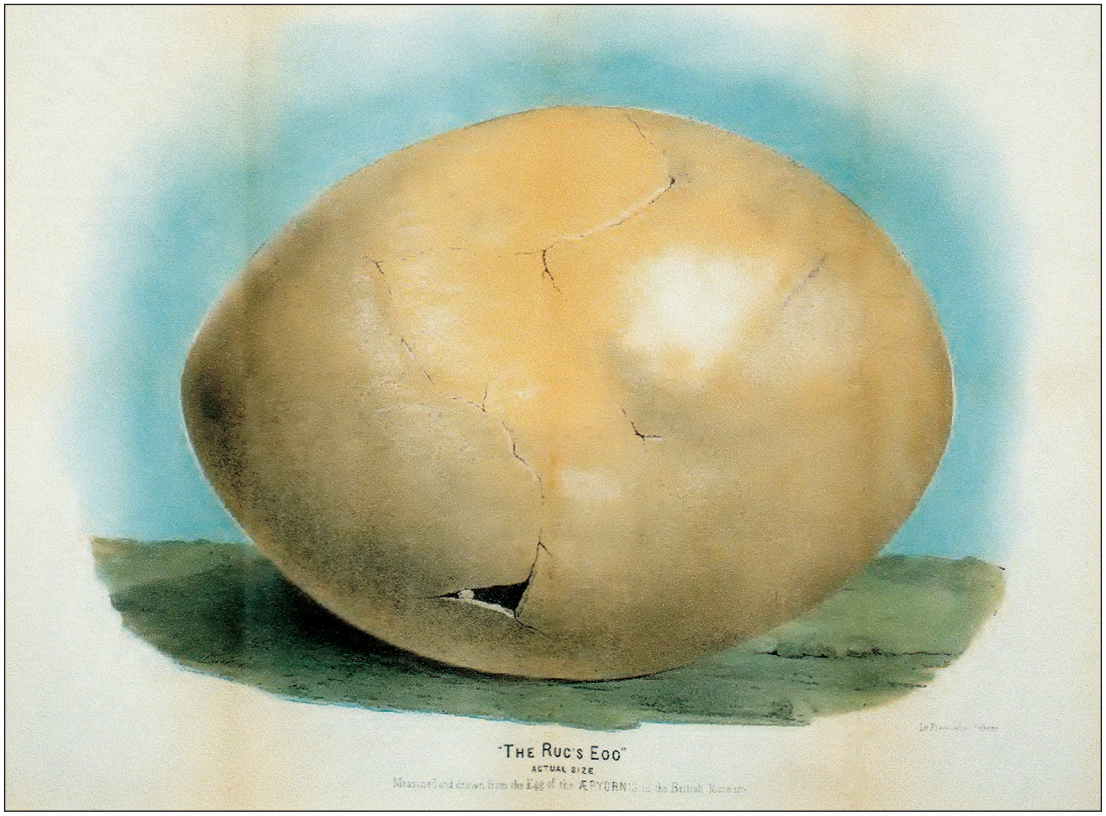

FIG. 4. — "The Ruc's egg". Colour lithograph, frontispiece of *The Book of Ser Marco Polo, the Venetian, Concerning the Kingdoms and Marvels of the East. Volume 2* (Yule 1871). Photo E. Buffetaut.

HENRY YULE'S "RUC'S EGG" (1871)

Curiously enough, the first colour illustration of an *Aepyornis* egg was published in 1871 in a translation of Marco Polo's book of travels by Colonel (later Sir) Henry Yule (1820-1889), a Scottish orientalist who travelled extensively in Asia (Yule 1903). The *Aepyornis* egg appears as the frontispiece of volume 2 of *The book of Ser Marco Polo, the Venetian, concerning the kingdoms and marvels of the East* (Yule 1871), with the following caption: *"The Ruc's egg". Actual size. Measured and drawn from the Egg of the AEPYORNIS in the British Museum* (Fig. 4). The egg in question is cracked in many places and has a small triangular hole. It is probably the largest of the two eggs in the British Museum mentioned by Lydekker (1891) as having been purchased in 1870. The illustration apparently was the work of Yule himself, since the explanatory list of illustrations mentions that the "ruc's egg" was "measured and drawn by the editor from the Egg of *Aepyornis maximus* in the British Museum" (Yule 1871: xvi). In a long footnote about the fable of the Rukh bird appended to Polo's chapter about Madagascar, where that fabulous creature is mentioned, Yule (1871: 351) writes: "We give, in the frontispiece of this volume, a drawing of the great *Aepyornis* egg in the British Museum of its true size, as the nearest approach we can make to an illustration of the *Rukh* from nature". The idea, taken up by Yule, that tales about the gigantic rukh (or roc) bird were somehow linked to the huge eggs of the *Aepyornis* was widely accepted in the 19th century. In a whole series of papers (e.g. Bianconi 1861), the Italian naturalist Giuseppe Bianconi (1809-1878) tried to demonstrate that Marco Polo's giant bird was indeed the *Aepyornis* (Buffetaut 2013), which he considered as a kind of giant vulture, although Geoffroy Saint-Hilaire (1851) had from the beginning realised that it was a flightless bird related to the ostrich, an opinion shared by Richard Owen (1852). Yule was aware of the divergent opinions about the systematic position and life habits of *Aepyornis*, but chose to accept that there was indeed a link between the fabulous Rukh and the huge eggs from Madagascar.

Perhaps not surprisingly considering where it was published, Yule's illustration of an *Aepyornis* egg was overlooked by most subsequent authors writing about the topic, with the exception of Lambrecht, who listed it in his comprehensive bibliography about Aepyornithidae in his remarkable *Handbuch der Palaeornithologie* (Lambrecht 1933: 187).

GUILLAUME CAPUS, *BIBLIOTHÈQUE DES MERVEILLES*, 1885

An engraving showing an *Aepyornis* egg appeared in 1885 in Guillaume Capus's book *L'œuf chez les plantes et les animaux* ("The egg in plants and animals"), a volume in a collection entitled *La Bibliothèque des Merveilles* ("The library of marvels"; Capus 1885). Like *Le Magasin pittoresque*, this highly successful book series was edited by Édouard Charton and published by the

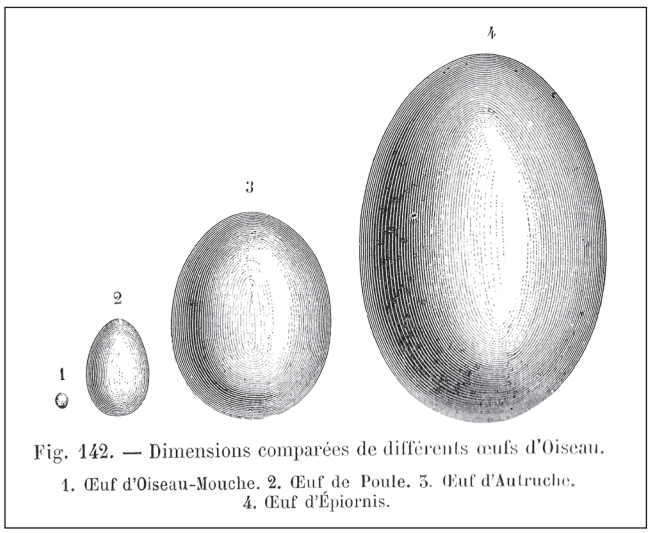

Fig. 142. — Dimensions comparées de différents œufs d'Oiseau.
1. Œuf d'Oiseau-Mouche. 2. Œuf de Poule. 3. Œuf d'Autruche.
4. Œuf d'Épiornis.

Fig. 5. — Comparative dimensions of various bird eggs. From Capus (1885). *Aepyornis* egg (4) compared with eggs of an ostrich (3), a hen (2) and a hummingbird (1). Photo E. Buffetaut.

well-known publishing house Hachette (Lagarde-Fouquet & Lagarde 2006). Volumes in the collection treated of all kinds of topics, from art and history to science and technology. The collection, which eventually comprised more than 175 volumes, was remarkably long-lived, the first volume appearing in 1865, the last one in 1956! In line with Édouard Charton's aim of educating the general public in an attractive way, the books were written in a simple, easy to understand style and profusely illustrated with engravings. The authors were experts in their field, apparently chosen for their talent as popularisers. Guillaume Capus (1857-1931), a native of Luxemburg, had studied natural history and defended a thesis in botany at the university of Paris in 1875 (Chevalier 1931). He became a French citizen in 1882 and travelled extensively in Russia, Central Asia and Bosnia-Herzegovina in the 1880s, publishing several books about his explorations. After taking part in the foundation of an astronomical observatory on Mont Blanc, he eventually became Director of Agriculture, Forestry and Commerce for French Indochina in 1897, a position he held until 1907. His book on eggs was written at an early stage of his career, when he was a teacher in Paris. In it, he discusses eggs and more generally development and embryology in plants, fungi and animals, from an evolutionary point of view (he mentions approvingly Lamarck's and Darwin's ideas in the introductory section). The *Aepyornis* egg, in the chapter on bird eggs, is part of a figure illustrating size differences in avian eggs by showing side by side the eggs of *Aepyornis*, an ostrich, a hen and a hummingbird. The engraving (Fig. 5), for which no author is mentioned, is much less elaborate than that by Werner in *Le Magasin pittoresque*: the eggs are rather schematic and without any background or details. The intention clearly is to show the huge size differences among avian eggs, without any attempt at artistic elaboration. Like the item in *Le Magasin pittoresque*, the short section about *Aepyornis* eggs in the book is largely derived from Geoffroy Saint-Hilaire's 1851 paper.

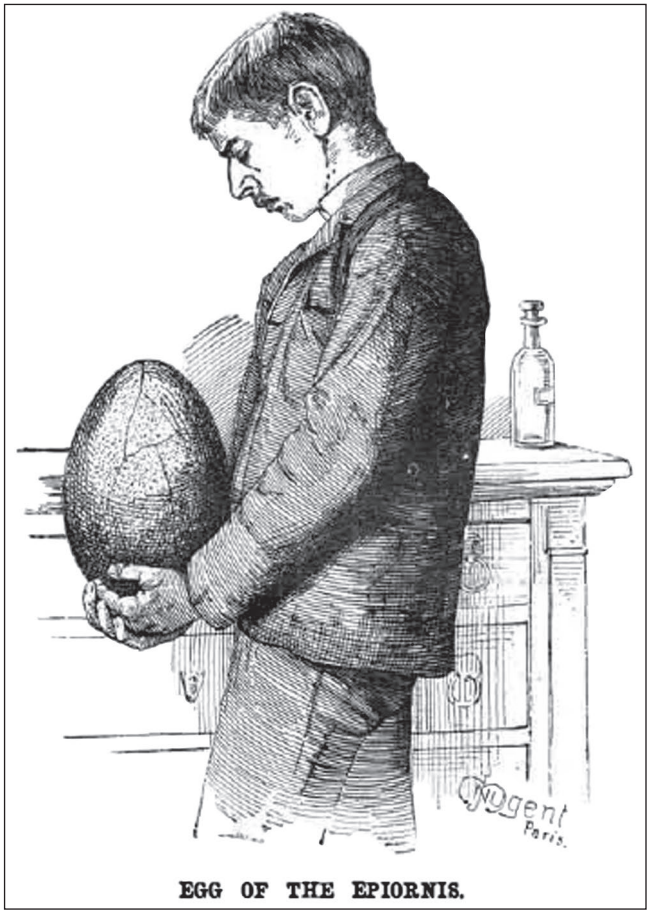

Fig. 6. — "Egg of the Epiornis" [sic]. From *Scientific American*, March 12, 1887. Photo E. Buffetaut.

SCIENTIFIC AMERICAN, 1887

In its issue of 12 March 1887, the well-known popular science magazine *Scientific American* published a short piece about "The Epiornis" [sic] (Anonymous 1887). In it, the anonymous author provides basic information about *Aepyornis* and its discovery and mentions possible associations with the roc bird, as well as the rather bizarre conceptions of the French historian Jules Michelet in his book *L'Oiseau* (Michelet 1856), about that giant bird fighting plesiosaurs in primeval times. He rejects the idea that it may have been carnivorous and notes that several species have been distinguished and placed in the same family as the ostrich. He also speculates that living specimens may still be discovered – an idea that had been discarded by the explorer Grandidier as early as 1867 (Grandidier 1867). Interestingly, the author mentions that one of the earliest references to *Aepyornis* may be found in *Le Magasin pittoresque* for 1851. The article also includes a discussion of the etymology and spelling of *Aepyornis*/*Epiornis*, claiming that Geoffroy Saint-Hilaire derived the name from the Greek words ἐπί, meaning "above", and ὄρνις, "bird" (this, however, is incorrect: he clearly mentioned [Geoffroy Saint-Hilaire 1851: 104] that the name was derived from αἰπύς, meaning "tall", "big" – *Aepyornis* is therefore the correct spelling). The paper is illustrated with an engraving (Fig. 6) showing a rather tired-looking man holding

FIG. 7. — Georg Krause displaying two *Aepyornis* eggs, an ostrich egg and a hen's egg. From Schoenichen (1912). Photo E. Buffetaut.

an apparently cracked *Aepyornis* egg in his hands. The drawing is signed "J. M. Nugent" in the lower right corner. The mention of Paris below the signature suggests that the drawing may show one of the *Aepyornis* eggs kept at the Natural History Museum of that city, but it may equally depict a specimen offered for sale by one of the several dealers in natural history specimens who were active in Paris at that time.

Why the editors of *Scientific American* chose to publish this item about *Aepyornis* at that particular time is unclear. The paper does not mention any particular new discovery and mainly refers to Geoffroy Saint-Hilaire's paper and the short item in *Le Magasin pittoresque* that had been published in 1851, more than 35 years before. The only hint at more recent advances in the knowledge of *Aepyornis* is the mention that three and possibly four species of the genus had by that time been identified. In addition to the type species, *A. maximus*, this probably refers to *A. medius* and *A. modestus*, described by Milne-Edwards & Grandidier (1869) on the basis of bones smaller than those of *A. maximus*, and to *A. grandidieri*, described on the basis of relatively small eggshell fragments by Rowley (1867). Apart from *A. maximus* none of these taxa is currently considered valid (Hansford & Turvey 2018).

DISCUSSION

Despite the scientific importance of the huge eggs of the giant bird *Aepyornis* and the attention they attracted, scientists who studied them during the second half of the nineteenth century usually did not publish illustrations of them. Even Capellini, who wrote two fairly long papers on individual *Aepyornis* eggs, one kept in Bologna (Capellini 1889) and the other one in Lyon (Capellini 1900), did not think it useful to figure them. As noted by Meyer & Heller (1900), the only illustration of an *Aepyornis* egg to have appeared in a scientific paper before 1900 seems to be the coloured lithograph published by Rowley (1878). The reasons for this paucity of illustrations are unclear. They can hardly have been technical: photographs began to be used to illustrate palaeontological papers in the 1850s (Davidson 2008), and Rowley's example shows that lithographs could be used as well. By contrast, lithographs of aepyornithid bones appeared in scientific papers as early as the 1860s (Bianconi 1865; Milne-Edwards & Grandidier 1869). It could be argued that the eggs, despite their extraordinary dimensions, were less informative than bones, especially to investigate the systematic position of *Aepyornis* (a point already made by Geoffroy Saint-Hilaire [1851]), and that illustrating them was therefore less important. However, as early as 1867, Rowley attempted to use eggshell thickness to define a new species of *Aepyornis*, *A. grandidieri*, and in 1871 Nathusius used the microstructure of *Aepyornis* eggs to support the placement of the giant bird from Madagascar among ratites (Nathusius 1871). However, it was not until 1900 that Krause provided drawings of several complete *Aepyornis* eggs in an attempt to link size and shape differences with the different species that had been described on the basis of skeletal remains (Krause 1900). Interestingly, the large eggs of the moas from New Zealand, discovered at roughly the same time, were illustrated in scientific papers earlier than *Aepyornis* eggs (e.g. Owen 1879).

Nineteenth-century illustrations of *Aepyornis* eggs vary greatly in the amount of detail they show. Some (Yule [1871], Rowley [1878], *Scientific American* [Anonymous 1887]) are realistic in that they show cracks and/or details of surface texture. Others (Werner [Anonymous 1851a], Ward [1866, 1870], Capus [1885]) are much more schematic, showing mainly the outline of the egg – their purpose was mainly comparative, the aim being to show how large the *Aepyornis* eggs were in comparison with those of other birds. Whereas Rowley and Yule showed the eggs resting on their side in a horizontal position, other illustrators showed them in an upright position, with the "small" end at the top, which is the usual way of depicting bird eggs. The choice of position may have been dictated partly by layout considerations and page size.

The paucity of figures of *Aepyornis* eggs in scientific papers contrasts with their presence in other types of publications aimed at a different readership (the list given here may not be complete). The engraving by Werner in *Le Magasin pittoresque* (Anonymous 1851a, b) is especially noteworthy because it was published only a few months after Geoffroy Saint-Hilaire's presentation at the Academy of Sciences.

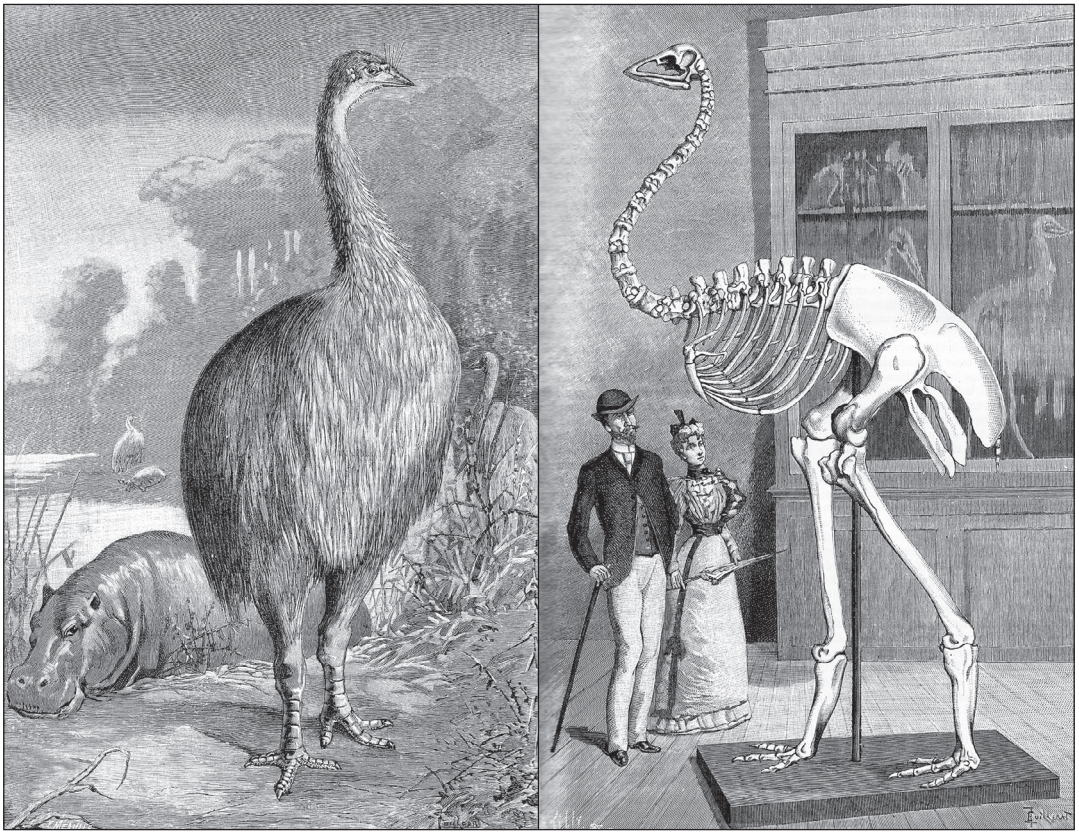

FIG. 8. — Reconstruction and mounted skeleton of the "great Aepyornis" (*Aepyornis ingens* Milne-Edwards & Grandidier, 1894), from Oustalet (1894). Photo E. Buffetaut.

It also started a kind of tradition by displaying the *Aepyornis* eggs together with those of other birds in order to enhance their huge size. The illustration in Capus's book followed the same pattern, which was subsequently re-used in many books and articles (see, for instance, Lucas 1902; Bloch 1915; Cauderay 1931). The figure in the 1887 *Scientific American* paper used a different approach to the same purpose, *viz.* showing an *Aepyornis* egg held by a person. Schoenichen (1912) combined both approaches by publishing a photograph of the ornithologist Georg Krause holding in his arms two *Aepyornis* eggs, an ostrich egg and a hen's egg (Fig. 7). On the whole, comparisons with eggs of other birds seem to have been favoured in the 19th century, and the use of the human figure to give an idea of the size of the eggs became more widespread in the 20th century. Both *Le Magasin pittoresque* and *Scientific American* were magazines aimed at the general public (although *Le Magasin pittoresque* was more generalist in outlook), and the giant *Aepyornis* eggs were likely to attract the attention of their readers. Ever since the beginnings of palaeontology, popular books and articles on the topic have consistently emphasized the huge size of many extinct creatures, and *Aepyornis* eggs clearly fitted that pattern. The engraving in *Le Magasin pittoresque* closely followed in time Geoffroy Saint-Hilaire's initial description of *Aepyornis*, which probably reflects the fact that these enormous eggs were really hot news at the time. This does not apply to the brief paper in *Scientific American*, published many years later at a time when no especially spectacular new discoveries of *Aepyornis* remains had recently been reported, and why it appeared at that particular time is unclear.

In addition it should be noted that until the 1890s, when various naturalists started to collect large numbers of aepyornithid bones at several sites on Madagascar, the scanty skeletal remains that were available made it difficult to provide reliable reconstructions of the giant birds, so that illustrations of the large eggs were the best way to convey an idea of their huge size to the general public. Once the skeleton of these birds became better known, illustrations of mounted skeletons and reconstructions began to appear in popular science magazines, while eggs were no longer necessarily illustrated, although they were mentioned (e.g. Oustalet 1894; Fig. 8).

The illustration in Capus's book on eggs echoes that in *Le Magasin pittoresque* more than 30 years earlier by using an *Aepyornis* egg to illustrate the vast range of sizes in bird eggs, although it does so in a much less artistically accomplished way than Werner's engraving. In a book aimed at a wide readership discussing the great diversity of eggs in both plants and animals, an illustration of the largest known egg was definitely not out of place.

The small figure published by Ward (1866, 1870) in his catalogues shows a cast rather than a real egg. Ward's catalogues, which offered only a few fossil bird casts, contained large numbers of engravings illustrating especially important or spectacular specimens, and clearly the eggs were among

them. The *Aepyornis* egg may have sold well, to judge from the number of such casts in museums in many countries, although it is difficult, without a search through museum archives, to ascertain whether they were purchased from Ward or obtained through other sources (as noted above the Paris Museum sent casts of *Aepyornis* to many local museums in France and abroad [Buffetaut *et al.* 2019]).

Finally, Yule's lithograph of the "ruc's egg", beyond the fact that it enhanced the attractiveness of the volume it illustrated, was part of an attempt by the translator and editor of Marco Polo's book to explain in rational terms some of the seemingly fabulous stories recorded by the Venetian traveller. Yule was clearly influenced by Bianconi's ideas about the identity between the rûkh bird and the *Aepyornis*, despite the fact that various experts, including Geoffroy Saint-Hilaire and Milne-Edwards, had already shown conclusively that the giant bird from Madagascar had been flightless and related to the ostrich. Whether the huge eggs from Madagascar played a part in the genesis of the myth of the rûkh bird remains a disputed question, but the idea was undoubtedly popular in the late 19th century, as shown by the fact that in Newton's influential *Dictionary of birds* there is no entry about *Aepyornis* and information about the giant birds from Madagascar is to be found in the entry about the "Roc" (Newton 1896).

CONCLUSION

During the half-century following Geoffroy Saint-Hilaire's original description of *Aepyornis maximus* in 1851, scientists working on the giant birds from Madagascar generally did not feel impelled to publish illustrations of their huge eggs, although measurements and comparisons with eggs of other birds were often provided. The reason for that may be that there was nothing especially remarkable about the eggs beyond their dimensions (and to some extent their microstructure), which were the main source of scientific information to be derived from them, so that illustrations of whole eggs could be dispensed with. As realised by Geoffroy Saint-Hilaire as early as 1851, skeletal remains were a different matter because they were important for a systematic placement of aepyornithids and for speculations about their biology. The main attempt to use *Aepyornis* eggs for systematic purposes was the paper by Nathusius (1871), illustrated with drawings of thin- and polished sections, in which he used eggshell microstructure to support the placement of *Aepyornis* among the ratites and to refute Bianconi's hypothesis that the giant bird was related to vultures.

As shown above, during the same period, pictures of complete *Aepyornis* eggs were used to illustrate various other types of publications, including popular science articles, catalogues of casts and even a translation of Marco Polo's book. In all instances, the main reason for these illustrations was the huge size of the eggs, which made them highly spectacular objects likely to excite the curiosity of the general public. The fascination exerted by *Aepyornis* eggs has not abated today, to judge by the very high prices they fetch at auctions.

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