

Variation in Echo Parakeets (*Psittacula eques* (Boddaert, 1783) [Psittaculidae]) in relation to inter-island differences

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Variation in Echo Parakeets (*Psittacula eques* (Boddaert, 1783) [Psittaculidae]) in relation to inter-island differences

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KEY WORDS

Echo Parakeet,
Réunion,
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Scotland.

ABSTRACT

The supposed differences in the variation in *Psittacula eques* (Boddaert, 1783) in birds found on Mauritius in relation to the extinct Réunion population have been disputed for over 150 years. This article argues that individual variation found in adult males in Mauritius is large enough to encompass the meagre details known from the Réunion population, based on a single 18th century specimen, as well as the plumage of a skin in Edinburgh of uncertain provenance claimed by some as from Réunion. We conclude that the populations are not only conspecific, but also almost certainly monotypic.

RÉSUMÉ

Variation des perruches d’Echo (Psittacula eques (Boddaert, 1783) [Psittaculidae]) en relation avec les différences inter-îles.

Les supposées différences dans la variation de *Psittacula eques* (Boddaert, 1783) entre les oiseaux trouvés à l’île Maurice et la population éteinte de la Réunion sont discutées depuis plus de cent cinquante ans. Dans le présent article, nous considérons que la variation individuelle observée chez les mâles adultes de Maurice est suffisamment importante pour inclure les maigres détails connus de la population réunionnaise, basés sur un seul spécimen du XVIII^e siècle, ainsi que sur le plumage d’une peau conservée à Edimbourg, de provenance incertaine et considérée par certains comme originaire de la Réunion. Nous concluons que les populations sont non seulement conspécifiques mais aussi presque certainement monotypiques.

MOTS CLÉS

Perruches d’Echo,
île de la Réunion,
île Maurice,
National Museums
Scotland.

INTRODUCTION

The Echo Parakeet *Psittacula eques* (Boddaert, 1783) is a Mascarene Island endemic, surviving in Mauritius but extinct in Réunion (Cheke & Hume 2008). Populations on the two islands are often treated as separate subspecies, *P. e. echo* (Newton & Newton 1876) on Mauritius, and *P. e. eques* (Boddaert, 1783) on Réunion, the type locality. Newton & Newton (1876) elevated the Mauritian birds to species rank based on nothing more than an assumption that it must differ like most other Mascarene congeners. Nonetheless the distinction has been maintained since on the basis of minor claimed plumage differences between known Mauritian specimens and 18th century descriptions and images of a single specimen from Réunion together with a tiny DNA difference with an enigmatic skin in Edinburgh thought by some to come from Réunion (Jackson *et al.* 2015; Jones *et al.* 2018). While this view was questioned on historical and DNA grounds by Cheke & Jansen (2016), Jones *et al.* (2018) largely ignored the historical difficulties, but restated their belief that the Edinburgh bird represented a Réunion specimen based largely on the presence of a complete pink collar, said to never occur in Mauritian birds. This paper re-examines the plumage variation in male Mauritian specimens and photographs with a view to resolving this difference of opinion.

MATERIAL AND METHODS

For this study we examined only the nine adult males (aged as adult due to presence of full-coloured collars) from 29 specimens from Mauritius (no surviving specimens reliably from Réunion are known) held in the American Museum of Natural History, New York City, USA (AMNH) (6; 3 adult males), Natural History Museum, Tring, UK (NHMUK) (4; 2 adult males), Naturalis Biodiversity Center, Leiden, Netherlands (Naturalis) (8; 1 adult male), Muséum national d'Histoire naturelle, Paris, France (MNHN) (6; 1 adult male), National Museum of Scotland, Edinburgh, UK (NMS) (1 adult male) and Cambridge University Museum of Zoology, Cambridge, UK (UMZC) (4; 1 adult male) (see Table 1).

Three photographs of adult males of *P. e. echo* in Mauritius (with a full dataset) were studied: those by Mark Chao (10 February 2018 Black River Gorge NP, stored at www.ebird.org), Patrick Baude (August 2018 Black River Gorge NP, paba249924, stored at <http://www.oiseaux.net>) and Anthony Cheke (14 October 2018, Macabé Forest) (Fig. 3). Descriptions and illustrations like those in Juniper & Parr (1998), Sinclair & Langrand (2003), Safford & Hawkins (2013) and del Hoyo & Collar (2014) do not reflect the variation in plumage shown by surviving Echo Parakeets (for example the dark lore is incorrectly placed in all illustrations). As an vulnerable species in recovery (<https://www.birdlife.org/worldwide/news/no-longer-endangered-echo-parakeet-100-year-recovery-plan> – dated 5 May 2021 and <https://www.iucnredlist.org/species/22685448/154065622>, accessed 5 May 2021), few Echo Parakeet specimens are in existence, so we supplemented specimen study with photographs of living birds.

TABLE 1. — Institution of examined specimens of Echo Parakeet *Psittacula eques* (Boddaert, 1783). The number of specimens is displayed, the adult males present in the collection, and their registration number. Abbreviations: see Material and Methods.

Institution	No. of specimens	Adult males	Register no. Adult males
AMNH	6	3	AMNH 448948, 621309, 621312
NHMUK	4	2	BMNH 1859.11.22.42, 1890.10.10.7
Naturalis	8	1	RMNH.AVES.210986
MNHN	6	1	MNHN-ZO-MO-1911-2114
NMS	1	1	NMS.Z 1929.186.2
UMZC	4	1	UMZC 18/Psi/67/k3

RESULTS

VARIATION IN ADULT MALES OF ECHO PARAKEET (N = 12)

The number of male specimens in museum collections is low (all but one known to have been collected at Mauritius), and therefore we used three supplementary photographs (from the same range as the museum specimens originate), to bring the number of studied adult males to 12. Instead of photographs (as they are not all photographed under standard conditions), we illustrated eight males in a standard manner, to show the individual variation (Figs 1; 2).

Colour of the cere

Although a bare part can easily discolour and shrink in skins, we find this part variable from white, pale grey to dark grey. However, the variable greyish colouration was also observed in checking photographs on the Internet.

Upper mandible coloration

All birds (skins and photographs) show a clear red upper mandible, all but one having a clear pale tip of the mandible. There is not much variation in this feature between photographs of live birds and museum specimens.

Lower mandible coloration

In most birds lower mandible is dark or blackish, some but skins show a hint of red in the dark lower mandible.

Black 'lore'

This line extends from the eye ring/lore (part closest to the bill) via the upper side of the cere to the other eye ring/lore. The thickness of the line varies from thin to broad, most are complete however some birds show an incomplete line.

Eye-ring coloration

The eye-ring shows an orange to pale orange coloration (hard to judge in dry skins).

Black throat patch and collar: extent and shape

The black triangle is narrow under the bill and broad below. It is present in all birds, tapering at the side-neck. However, the extent of black in the neck varies, from surrounding nearly (and possibly entirely) the whole head, to 50 or 75 % of the side-neck.

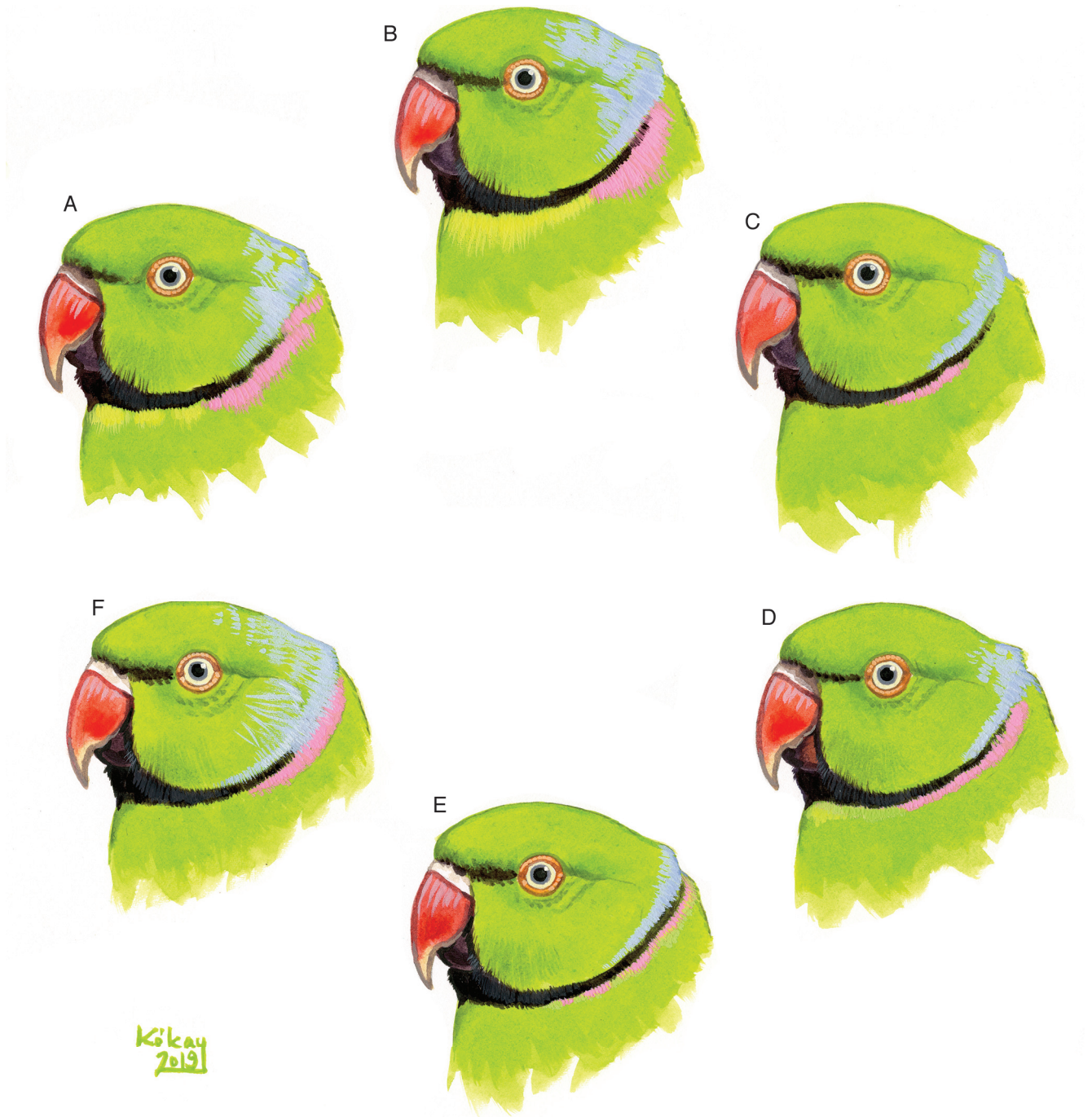


FIG. 1. — Illustrations showing the variation of six males of Echo Parakeet *Psittacula eques* (Boddaert, 1783) from Mauritius, using: **A**, AMNH 448.948 (no date); **B**, AMNH 621.312 (9 November 1907); **C**, AMNH 621.309 (no date); **D**, MNHN-ZO-MO-1897-1614 (no date); **E**, photo Patrick Baude (August 2018); **F**, photo Mark Chao (18 February 2018). Drawing: Szabolcz Kokay.

Length and shape of the blue

In most birds a blue wash (not a collar) is restricted to the hind-neck and the part of the side-neck close to the hind-neck, however its amount and intensity vary. The blueish wash in some birds runs almost to the lower crown/upper nape. Some birds show a slight partial neckband, but in all examples starting only from mid-side-neck to the hind-neck, absent from the first half of the side-neck, always on the part above the black line.

Length and shape of the pinkish collar

Highly variable, ranging from thin strips on the side neck, to a wide collar round the side and back of the neck; below the black ring.

Presence of yellow on upper breast

Some birds have this patch while in others it is lacking.



FIG. 2. — Comparative illustrations of *Psittacula eques* (Boddaert, 1783): **A**, male photographed by Anthony Cheke in Mauritius on 14 October 2018; **B**, NMS.Z.1929.186.2 (no date, thought by some to have been collected on Réunion). Drawing: Sazbolcz Kokay.

DISCUSSION

VARIATION IN RELATION TO WHAT IS KNOWN OF THE RÉUNION POPULATION

The last time birds were definitively reported from Réunion was in 1704 (Feuillet 1705; Cheke 1987; Barré *et al.* 1996; Cheke & Hume 2008: 316, note 226), though in 1732 Charpentier de Cossigny (1732-1755; Cheke 1987; Barré *et al.* 1996; Hume 2007), writing from Réunion, mentioned green parrots but the context is unclear whether he was discussing Mauritius, Réunion or both. It is however likely that the specimen that Brisson (1760) described from the Cabinet Aubry arrived some years later, probably 1750-1755 (Cheke & Hume 2008: 393, note 21; Cheke 2013). This remains the only specimen ever unequivocally collected on Réunion (Cheke 2009; Cheke & Jansen 2016, *contra* Cheke 1987; Hume & Walters 2012) and Brisson's is the only detailed description. Brisson's introduction (1760, vol. 1) sets out his criteria for descriptions, indicating with a double asterisk (**) where the text was compiled directly from a specimen; the *Perruche à collier de l'isle de Bourbon* (Vol. 4: 328) has two asterisks. Buffon's (1770-1783) very skimpy description of the same bird is probably taken from his illustrator Martinet's *Planche Enluminée* No. 215 rather than directly from the specimen, as Levaillant

(1801, Cheke & Jansen 2016: online appendix) noted long ago. Martinet's plates, rather variably hand-coloured in different copies of Buffon (Jansen & Cheke 2020), appear, when compared to Brisson's description, to be an unreliable guide to plumage details. A further colour plate, by Barraband in Levaillant (1801), is labelled with Buffon's name 'perruche à double collier', thus nominally from Réunion, but Levaillant himself did not know where the two specimens he examined came from, and further historical research (Cheke & Jansen 2016) has not thrown any useful light on their provenance; furthermore Levaillant was very unclear on their provenance, and considered Buffon's and Brisson's birds to be different (Cheke & Jansen 2016). At the time the existence of Echo Parakeets in Mauritius was unknown in Europe (and thus to French encyclopaedists), hence birds conforming to Brisson and/or Buffon's names and descriptions were by default assigned to Réunion.

Brisson's (1760) description, taken from the Cabinet Aubry specimen, is very full, and nothing in it is outside the variation we have found in Mauritian birds:

"La tête, le col, le dos, le croupion, les couvertures du dessus de la queue, les plumes scapulaires & la poitrine sont d'un beau verd. Au dessous de l'occiput est une étroite bande de couleur de rose, qui s'étend de chaque côté autour du col,



FIG. 3. — *Psittacula eques* (Boddaert, 1783), 14 October 2018, Macabé Forest, Mauritius. Photo: Anthony Cheke.

devient plus large en approchant vers la gorge, & forme une espèce de collier, au-dessus duquel le verd est mêlé d'un peu de bleu. Sous la gorge est une bande transversale jaune, dont les deux bouts joignent ceux du collier couleur de rose. Au-dessus de ce collier, sur les côtés du col seulement, il y a une étroite bande noire, qui se recourbe de chaque côté de la gorge, & remonte jusqu'au demi-bec inférieur. Le ventre, les côtés, les jambes & les couvertures du dessous de la queue sont d'un verd tirant sur le jaune. Les petites couvertures du dessous des ailes sont d'un jaune-verd : les grandes sont d'un cendré clair. Les petites du dessus, aussi que les grandes les plus proches du corps, sont du même verd que le dos : les grandes les plus éloignées du corps sont d'un verd foncé. Les plumes de l'aile sont cendrées en-dessous ; mais en dessus elles sont du côté extérieur & à leur bout d'un verd plus foncé que celui du dos ; leur côté intérieur est d'un cendré-noirâtre, & leur tige est noire. La queue est composée de douze plumes d'un cendré-jaune en-dessous & vertes en-dessus : elles ont aussi leur tige noire. Les deux du milieu sont plus longues que les latérales qui vont tous en diminuant de longueur par degrés jusqu'à la plus extérieure de chaque côté, qui est plus courte de trois pouces neuf lignes que les deux du milieu. Le demi-bec supérieur est d'un rouge vif, excepté le bout de son crochet, qui est noirâtre : le demi-bec inférieur est d'un rouge obscur à la base, & noirâtre vers son bout. Les pieds sont d'un cendré tirant sur la couleur de plomb ; & les ongles noirâtres." (The

head, the neck, the back, the rump, the upper tail coverts, the scapulars and the chest are a fine green. Below the occiput is a narrow band coloured rose-pink, which extends on each side around the neck, becoming wider when approaching the throat, forming a sort of collar, above which the green is mixed with a little blue. Under the throat there is a horizontal yellow band, whose two ends meet those of the pink collar. Under this collar, solely on the sides of the neck, there is a narrow black band, which curves [up] on each side of the throat, rising up to the lower mandible. The belly, the flanks, the legs and the coverts on the underside of the tail are green tending to yellow. The lesser coverts on the underside of the wings are yellow-green, the greater are a clear ash-grey. The lesser [coverts] on the upper side, as well as the greater closest to the body, are the same green as the back; the greater [coverts] further from the body are dark green. The wing feathers [= flight feathers] are ashy below, but above they are, on the outer side [= vane] and at the tip a darker green than the back, their inner side ashy-black; their shaft is black. The tail is composed of twelve feathers, ashy-yellow underneath and green above; they also have black shafts. The central two are longer than those to the side which get shorter by degrees up to the outer ones on each side which are three inches nine lines shorter than the two in the middle. The upper mandible is a bright red, except for the tip of its hook which is blackish; the lower mandible is a dull

red at the base, and blackish towards the tip. The feet are ash-grey tending towards the colour of lead, and the claws blackish [Brisson 1760, vol 4: 328-30, body measurements omitted; ASC's translation]).

Buffon's description (in fact by Daubenton) lacks detail, overemphasizing the blue collar, omitting the black one, but mirroring the majority of versions of *Planche Enluminée* no. 215 (Jansen & Cheke 2020):

“Deux petits rubans, l'un d'un rose et l'autre bleu, entourent le cou en entier de cette perruche, qui est de la grosseur d'une tourterelle; du reste, tout son plumage est vert, plus foncé sur le dos, jaunissant sous le corps, et dans plusieurs de ses parties rembruni d'un trait sombre sur le milieu de chaque plume; sous la queue un frangé jaunâtre borde le gris-brun tracé dans chaque penne; la moitié supérieure du bec est d'un beau rouge; l'inférieure est brune.” (Two small ribbons, one pink and the other blue, encircle the entire neck of this parakeet which is the size of a Turtle Dove; for the rest, all the plumage is green, darker on the back, yellowing under the body, and in several places browned through a darker centre to each feather; under the tail a yellowish fringe borders the grey-brown trend of each feather; the upper half of the beak is a fine red; the lower [half] is brown). [Buffon 1770-1783, vol. 3: 13; ASC's translation]).

Since there is only the one confirmed specimen from Réunion, the degree of variation within that population is necessarily unknown.

THE PLUMAGE AND IDENTITY OF THE EDINBURGH SPECIMEN
Discussing differences in the blue tinge on the outer primaries and the width of the pink collar, in an earlier assessment of the Edinburgh specimen, Jones (1987) stated that “I have compared detailed photographs of the Edinburgh specimen with *echo* skins in the Mauritius Institute and do not think these difference are significant”. However recently, ignoring the differences in the 18th century descriptions, the unknown provenance of the Levaillant/Barraband specimens, and indeed Levaillant's evident confusion as to the identities of green ring-necked *Psittaculus*, as investigated by Cheke & Jansen (2016), Jones *et al.* (2018) concluded that:

“The plumage colours and patterns of the NMS specimen largely agree with those described by Brisson (1760), Buffon (1770-1783) and Levaillant (1801-1805), and with the illustrations in those publications by Martinet and Barraband. The collar patterns in the NMS specimen, while similar to those in the Ring-necked Parakeet, are unlike any we have seen in either museum, freshly dead or living specimens of Mauritius Parakeet. We note that in the descriptions of the Réunion Parakeet (Brisson 1760, Buffon 1770-1783, Levaillant 1801-1805), the authors emphasize the complete pink collar, which is not a feature of the Mauritius Parakeet. We are confident therefore that the provenance of the NMS specimen is Réunion, and that it represents the only known skin specimen of this now-extinct parakeet.”

So, according to Jones *et al.* (2018), the complete pink collar is the only plumage feature that distinguishes between

the populations from Mauritius and Réunion, a distinction we have shown (above) not to exist.

The Edinburgh specimen was acquired from Louis Dufresne in Paris, with many other birds, in 1819 (Sweet 1970), including a number from the Mascarene islands that included only one bird, a white-eye *Zosterops olivaceus* (Linnaeus, 1766), from Réunion (Cheke & Jansen 2016). A number, perhaps all, from Mauritius had been collected between 1803 and 1810 by Mathieu, an officer in the French army (Milne Edwards & Oustalet 1893; Cheke & Hume 2008; Cheke & Jansen 2016), but no full list of his specimens has survived, Dufresne's own MS sale catalogue (1818) not listing collectors (JJFJJ pers. obs.). Milbert (1812) mentioned two Mauritian pigeon species given to Dufresne by Mathieu which are now in Edinburgh (Cheke & Hume 2008: 313, notes 143, 144). The Dufresne specimens have no collection data or original labels, so there is no unequivocal provenance for the Echo Parakeet, though the implication, based on the rest of the collection, is that it came from Mauritius. The existence of a small DNA difference (0.2%) from Echo specimens collected since the 19th century scarcity bottleneck in Mauritius, is not sufficient to claim different origin, and is much less than the difference between introduced populations of a related species (Ring-necked Parakeet *P. krameri*) in Mauritius and the Seychelles, though this may reflect origin in different Indian races (Jackson *et al.* 2015; Cheke & Jansen 2016).

On the evidence at hand, it is not possible to assign the Edinburgh specimen to a specific island of origin nor a specific collector, as no paper trail can be found dating before mention of this specimen for the first time by Dufresne (1818).

CONCLUSION

The variation we have shown to occur in Echo Parakeets from Mauritius encompasses both the single clear description of the only confirmed Réunion specimen (Brisson 1760), and also the plumage of the disputed Edinburgh skin. The only logical conclusion from this is that not only were the populations conspecific, as most authorities now accept, but also almost certainly monotypic, as *Psittacula eques*. Thus, in the present state of knowledge, *Palaeornis echo* (Newton & Newton, 1876) should be placed in synonymy with *Psittacus eques* (Boddaert, 1783).

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REFERENCES

- BARRÉ N., BARAU [C.] A. & JOUANIN C. 1996. — *Oiseaux de la Réunion*. 2nd ed., revised. Éditions du Pacifique, Paris, 207 p.
- BRISSON M. J. 1760. — *Ornithologie, ou méthode contenant la division des oiseaux en ordres, sections, genres, espèces et leurs variétés à laquelle on a joint une description exacte de chaque espèce*. 6 vols. J.-B. Bauche, Paris. <https://doi.org/10.5962/bhl.title.51902>
- BUFFON G. L. LECLERC, COMTE DE. 1770-1783. — *Histoire naturelle des oiseaux*. Imprimerie Royale, Paris. [3 original editions with variable numbers of volumes, published over more or less the same dates; one, in 10 vols., includes the Planches Enluminées by Martinet. Numerous later reprints; see Genet-Varcin E. & Roger J. 1954. Bibliographie de Buffon. Presses Universitaires de France, Paris & Mayaud N. 1939. *Alauda* 9: 18-32] <https://doi.org/10.5962/bhl.title.124865>
- CHARPENTIER DE COSSIGNY J. F. 1732-1755. — [Treize lettres de Cossigny à Réaumur, ed. A. LaCroix]. *Recueil trimestriel de documents et travaux inédits pour servir à l'histoire des Mascareignes françaises* 4: 168-96, 205-82, 305-16 (1939-40).
- CHEKE A. S. 1987. — An ecological history of the Mascarene Islands, with particular reference to extinctions and introductions of land vertebrates in A. W. DIAMOND (ed.), *Studies of Mascarene Island birds*. Cambridge University Press, Cambridge: 5-89.
- CHEKE A. S. 2009. — Data sources for 18th century French encyclopaedists – what they used and omitted: evidence of data lost and ignored from the Mascarene Islands, Indian Ocean. *Journal of the National Museum (Prague), Natural History Series* 177: 91-117.
- CHEKE A. S. 2013. — Extinct birds of the Mascarenes and Seychelles – a review of the causes of extinction in the light of an important new publication on extinct birds. *Phelsuma* 21: 4-19.
- CHEKE A. S. & HUME J. P. 2008. — *Lost land of the Dodo: an ecological history of Mauritius, Réunion and Rodrigues*. A&C Black & New Haven, London & Yale University Press, Connecticut.
- CHEKE A. S. & JANSEN J. J. F. J. 2016. — An enigmatic parakeet – the disputed provenance of an Indian Ocean Psittacula. *Ibis* 158: 439-443. <https://doi.org/10.1111/ibi.12347>
- DEL HOYO J. & COLLAR N. J. 2014. — *HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1: Non-passerines*. Lynx Edicions, Barcelona.
- DUFRESNE L. 1818. — *Catalogue des collections d'histoire naturelle formant le cabinet de Mr L. Dufresne, chef du Laboratoire de Zoologie et naturaliste au Jardin du Roi*. MS preserved in the National Museums Scotland, Edinburgh.
- FEUILLEY J. 1705. — Mission à l'île Bourbon du Sieur Feuilley en 1704 [ed. A. Loughnon] in *Recueil trimestriel de documents et travaux inédits pour servir à l'Histoire des Mascareignes Françaises, tome IV, avril/sept. 1939*. Tananarive, Imprimerie de l'Imérina: 3-56, 101-167 (1939).
- HUME J. P. 2007. — Reappraisal of the parrots (Aves: Psittacidae) from the Mascarene Islands, with comments on their ecology, morphology and affinities. *Zootaxa* 1513: 1-76. <https://doi.org/10.11646/zootaxa.1513.1.1>
- HUME J. P. & WALTERS M. 2012. — *Extinct birds*. Bloomsbury Publishing (T & AD Poyser), London, 608 p.
- JACKSON H., JONES C. G., AGAPOW P.-M., TATAYAH V. & GROOMBRIDGE J. J. 2015. — Micro-evolutionary diversification among Indian Ocean parrots: temporal and spatial changes in phylogenetic diversity as a consequence of extinction and invasion. *Ibis* 157: 496-510. <https://doi.org/10.1111/ibi.12275>
- JANSEN J. J. F. J. & CHEKE A. S. 2020. — Martinet's engravings in Buffon (1770-83): variation in their hand-colouring and its implications for defining Echo Parakeet *Psittacula eques* (Boddaert, 1783). *Bulletin of the British Ornithologists' Club* 140 (3): 299-308 <https://doi.org/10.25226/bboc.v140i3.2020.a3>
- JONES C. G. 1987. — *The larger landbirds of Mauritius in* DIAMOND A. W. (ed.), *Studies of Mascarene Island birds*. Cambridge University Press, Cambridge: 208-300.
- JONES C. G., JACKSON H.A., MCGOWAN R. Y., HUME J. P., FORSHAW J.M., TATAYAH V., WINTERS R. & GROOMBRIDGE J. J. 2018. — A parakeet specimen held at National Museums Scotland is a unique skin of the extinct Réunion Parakeet *Psittacula eques*: a reply to Cheke and Jansen. *Ibis* 161: 230-238. <https://doi.org/10.1111/ibi.12673>
- JUNIPER T. & PARR M. 1998. — *Parrots. A Guide to the Parrots of the World*. Pica Press, Mountfield, 584 p.
- LEVAILLANT F. 1801. — *Histoire naturelle des perroquets*. Vol. 1.: Levrault, Schoell & Cie., Paris, <https://doi.org/10.5962/bhl.title.60852>
- MILBERT J. G. 1812. — *Voyage pittoresque à l'île de France, au Cap de Bonne Esperance et à l'île de Ténériffe*. A. Nepveu, Paris. 2 vols.+ atlas. <https://gallica.bnf.fr/ark:/12148/bpt6k105333n>
- MILNE-EDWARDS A. & OUSTALET E. 1893. — Notice sur quelques espèces d'oiseaux actuellement éteintes qui se trouvent représentées dans les collections du Muséum d'Histoire Naturelle in *Centenaire de la fondation du Muséum d'Histoire Naturelle*: Muséum d'Histoire Naturelle, Paris: 190-252. <https://doi.org/10.5962/bhl.title.66840>
- NEWTON A. & NEWTON E. 1876. — On the Psittaci of the Mascarene Islands. *Ibis* (3) 6: 281-289. <https://doi.org/10.1111/j.1474-919X.1876.tb06925.x>
- SAFFORD R. & HAWKINS F. 2013. — *The birds of Africa. Vol. VIII. The Malagasy Region*. A&C Black / Christopher Helm, London, 960 p.
- SINCLAIR I. & LANGRAND O. 2003. — *Birds of the Indian Ocean Island. Madagascar, Mauritius, Réunion, Rodriguez, Seychelles and the Comoros*. Struik, Cape Town, 268 p.
- SWEET J. M. 1970. — The collection of Louis Dufresne (1752–1832). *Annals of Science* 26: 32-71. <https://doi.org/10.1080/00033797000203397>

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