

# Duchemin's 'Linnet': Was there a second species of native fody *Foudia* sp. in the Granitic Seychelles? – with additional evidence for the mid-19<sup>th</sup> century introduction of *F. madagascariensis*

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## Abstract

The identity of a red-headed passerine observed on Mahé in 1768 by members of the Marion-Dufresne expedition is discussed. Ruling out the presence of Cardinal or Madagascar Fody (*Foudia madagascariensis*) on historical grounds, we conclude that a second species of endemic fody may well have existed prior to the settlement of humans in Seychelles, and become extinct shortly after, probably due to predation by ship rats (*Rattus rattus*) that arrived with the human settlers.

**Key words:** 18<sup>th</sup>-century, Seychelles, *Foudia*, extinction, Marion-Dufresne

## Résumé détaillé

Cet article traite de l'identité d'un passereau à tête rouge observé à Mahé le 13 septembre 1768 par l'un des membres de l'expédition Marion-Dufresne et décrit comme suit : «*J'ay aussi trouvé un oiseau qui a le plumage du corps et les ailes comme le linot, couleur brun et café, la teste [=tête] et la gorge rouge cramoisy, le bec et les pattes noires*». Cette description rappelle les premières observations rapportées par les premiers explorateurs de l'île Maurice et de La Réunion décrivant un foudi endémique à dominante rouge (respectivement *F. rubra* et *F. delloni*) sur chacune de ces îles. Lionnet (1980, 1984a) conclut à une énigme, évoquant la ressemblance avec un Foudi de Madagascar (dont le mâle rouge vif est aussi appelé 'Cardinal'), espèce rapportée de façon formelle pour la première fois aux Seychelles par Newton (1867), mais reconnue comme d'introduction récente. L'hypothèse d'un migrateur égaré comme le Roselin cramoisi (*Carpodacus erythrinus*) ou le Pipit à gorge rousse (*Anthus cervinus*) nous paraît très improbable au vu des différences dans l'étendue ou l'intensité de la

coloration rouge, et l'absence de bec et de pattes noires chez ces espèces.

L'hypothèse que le Foudi de Madagascar (*F. madagascariensis*) ait déjà été présent aux Seychelles en 1768, évoquée par Gerlach & Gerlach (1994), puis reprise par Gerlach (1995) et Skerrett *et al.* (2001), est discutée à la lumière des documents et récits historiques existants. Nous pensons que la présence d'un tel ravageur de cultures céréalières, qui plus est aussi visible dans son plumage nuptial pour les mâles aurait du être abondamment notée pendant le restant du 18<sup>ème</sup> siècle s'il avait déjà été présent aux Seychelles à cette époque ; or seule la présence de 'bengalis' - très probablement le Foudi des Seychelles (*Foudia sechellarum*), consommateur de grains mais principalement insectivore et seul a avoir été dénommé 'mangeur de riz' par les Seychellois est notée par Malavois en 1789. Dans ce contexte, la présence de 'cardinaux' aux Seychelles mentionnée par Froberville (1848) nous paraît douteuse, s'agissant qu'un écrivain mauricien basé à Paris et n'ayant jamais visité les Seychelles, dont les descriptions fauniques de l'île Rodrigues dans la même publication contiennent de nombreuses inexactitudes (Cheke & Hume, 2008).

L'hypothèse selon laquelle le Foudi de Madagascar aurait pu coloniser les Seychelles par ses propres moyens est hautement improbable vu qu'elle n'est naturellement présente dans aucune des îles entre Madagascar et l'archipel des Seychelles (groupes d'Aldabra, Farquhar/Providence et des Amirantes). Par ailleurs, Nicoll (1908) se réfère au Foudi de Madagascar comme une espèce considérée comme introduite par les Seychellois. Nous concluons, comme Gaymer *et al.* (1969), que le Foudi de Madagascar (ou Foudi cardinal) fut probablement introduit vers 1860.

Compte tenu de ces différents éléments historiques, nous pensons qu'il est extrêmement improbable que le Foudi de Madagascar ait déjà été présent aux Seychelles en 1768. Nous en concluons qu'une deuxième espèce de Foudi endémique non décrite pourrait bien avoir existé avant l'arrivée des humains aux Seychelles, et avoir disparu peu après en raison de la prédation exercée par les rats noirs (*Rattus rattus*), arrivés avec les premiers colons.

Il pourrait alors s'agir d'une espèce forestière de foudi à tête rouge (de type *F. omissa/rubra*) comme celles existant ou ayant existé sur les autres îles de l'océan Indien (Maurice, La Réunion, Comores, Aldabra, Madagascar), impliquant la présence de deux espèces de foudis endémiques résultant de colonisations anciennes différentes (de la même façon qu'il y eut deux espèces de Zostérops aux Seychelles dont l'une s'est éteinte au cours du 20<sup>ème</sup> siècle). L'existence d'une race à tête rouge du Foudi des Seychelles (dont les mâles ont le front et une bavette jaune en plumage nuptial) inféodée au groupe d'îles de Mahé nous paraît improbable, mais l'hypothèse d'un individu de cette espèce arborant un plumage aberrant ne peut toutefois être totalement écartée compte tenu des variations de colorations observée chez les foudis en général. La prédation exercée par le rat noir, déjà introduits à Mahé en 1773, est la cause avérée ou présumée de l'extinction de nombreuses espèces de passereaux insulaires à travers le monde ; et plusieurs espèces de foudis endémiques sont connues pour y être extrêmement vulnérables. Les Foudis des Seychelles n'ont naturellement survécu que dans des îles non colonisées par le rat noir ; le Foudi de Maurice et le Foudi d'Aldabra (*F. aldabrana*) ont un succès reproducteur et des densités considérablement limités par sa prédation ; et le Foudi de La Réunion ne fut jamais revu après l'invasion et l'expansion des rats sur cette île. La confirmation de la présence ancienne d'une deuxième espèce non décrite de Foudi des Seychelles demanderait cependant davantage d'éléments circonstanciels comme d'autres descriptions supplémentaires concordantes ou des dessins. Cependant, plusieurs espèces éteintes des Mascareignes n'avaient été rapportées qu'une seule fois ; mais alors que dans ce groupe d'îles la plupart des extinctions précoces ont pu être confirmées par des fossiles (ce qui n'a pas encore été le cas du Foudi de La Réunion), des gisements de fossiles d'oiseaux terrestres n'ont pas encore été découverts aux Seychelles.

**Mots clés** : 18<sup>ème</sup> siècle, Seychelles, *Foudia*, extinction, Marion-Dufresne

## Introduction

The first extensive account of the native fauna and flora of the granitic Seychelles is contained in the reports of an expedition from Mauritius that explored several of the islands in 1768; it is generally known as the 'Marion-Dufresne' expedition after its sponsor,

although he did not participate himself. Lionnet (1980, 1984b) analysed the natural history content of the unpublished manuscripts and listed and identified the plants and animals observed. However, some remain enigmatic.

Amongst the enigmas is a bird described by the unidentified 'commander of the second detachment' sent to explore Mahé by Jean Duchemin, captain of the flute *La Digue* (Lionnet, 1980, 1984b). He reported that on 13 September:

*"I also found a bird which has the plumage of the body and wings like a linnnet, brown and coffee coloured, the head and throat crimson red, the bill and the feet black"* (our translation)<sup>1</sup>.

This description evokes a red-plumaged fody *Foudia* sp., but the only known fody native to the Seychelles is the Seychelles Fody (*F. sechellarum*), which has no red in the plumage (and only a tinge of yellow on the forehead and throat). Hence, a red-plumaged bird on Mahé so early in the history of human visitation to the island is puzzling.

Lionnet (1980) left the issue open, stating that *"the bird resembling a linnnet is an enigma; it can hardly have been the Seychelles Fody Foudia sechellarum; one could identify it as the Madagascar Fody Foudia madagascariensis if one didn't know that this bird, so widespread in the Seychelles today, is of relatively recent introduction"* (our translation).

He made similar remarks in his later, fuller, paper (Lionnet, 1984b: 69-70, note 85). Although in fact the chronicle's writer only compared the bird's body and wings to a linnnet, we presume he chose that species because it has red on head and breast, though the colour was clearly more striking in the bird on Mahé. The description has echoes in other Indian Ocean islands: the Mauritius Fody (*F. rubra*) was called a "a little bird like a linnnet" by Peter Mundy in 1638 (Cheke & Hume, 2008), and in 1674 Dubois described the Réunion Fody (*F. delloni*) in similar terms to the expedition writer, apart from calling them *moineaux* ('sparrows'):

*"These sparrows have plumage like those in Europe<sup>2</sup>, except that the males, when breeding, have the throat, head and top of the wings the colour of fire"* (translation from Cheke & Hume, 2008).

## The identity of the “linnet”

Three separate explanations can be proposed for the identity of the “linnet”, which are enumerated below. Taxonomy and English names follow the handbook *Birds of the Malagasy region* by Safford & Hawkins (2013).

### A rare migrant?

It has been suggested to us that this bird may have been a rare migrant such as a Common Rosefinch (*Carpodacus erythrinus*) or a Red-throated Pipit (*Anthus cervinus*), both of which have been recorded as vagrants in October in Seychelles (Skerrett *et al.*, 2001) and could, at a stretch, fit the original description. However, the pipit is only dull red (face & throat only) even in breeding plumage, whereas a male rosefinch, whose breeding colours more or less match the description, would normally appear only rather weakly red (not striking) on autumn migration (Snow & Perrins, 1998; Skerrett *et al.*, 2001). Besides, neither have black bill and feet. Thus, we believe that this hypothesis is very unlikely.

### Could Duchemin’s ‘linnet’ have been a Madagascar Fody?

Gerlach & Gerlach (1994), revisited the question, and concluded, *contra* Lionnet, that the 1768 observation was evidence that the Madagascar (or Cardinal) Fody (*F. madagascariensis*) had colonised naturally before human settlement, thus much earlier than the previously assumed introduction date - the first formal record otherwise being in January 1867 (Newton, 1867)<sup>3</sup>. Gerlach (1995) followed this interpretation, though he has recently been more equivocal (Gerlach, 2007); Skerrett *et al.* (2001) also inclined towards accepting this hypothesis.

The Madagascar Fody, like many other small seed-eaters, is notorious for raiding grain crops. In Mauritius, introduced in the 1760s, it was reported damaging wheat crops as early as 1773 (Querhoënt, 1773; Cheke, 2009). Such a crop pest, had it been present, would have been mentioned by settlers during the rest of the 18<sup>th</sup> century, whereas the only such bird mentioned was the “*bengali*” reported by Malavois in 1789 (Fauvel, 1909; Gerlach & Gerlach, 1994), which was almost certainly the Seychelles Fody (*F. sechellarum*) (Cheke, 1982, *contra* Gerlach & Gerlach, 1994; Cheke & Rocamora, unpublished). Indeed, as Lionnet (1984a) pointed out, it is generally believed in the islands that the Madagascar Fody

“was introduced, during the time rice was cultivated, by a man jealous of his brother, also a rice planter, to harm him” (our translation). Nicoll (1908), visiting in 1906, gave this fuller version of the story:

“The Madagascar weaver bird *Foudia madagascariensis* has also, most unfortunately, been introduced. The history of this stupid act, as told me on good authority, is that two neighbours went to law concerning the ownership of a certain field which each claimed as his property. The loser, to be revenged on his adversary, brought from Madagascar a cage full of weaver birds, which he liberated on his neighbour’s land. In any case, whether this account of the origin of the birds be true or not, the effect of their introduction has been that it is now impossible to grow any rice or grain on Mahé, and at the present time these “weavers” are, next to the mynah, the commonest land-birds<sup>4</sup>.”

While the story itself is undated and may be apocryphal in detail (and was not reported by Newton, 1867), it does indicate that the Seychellois a century ago regarded the bird as introduced, whereas linguistic evidence in equally creolophone Mauritius and La Réunion shows clearly that introduced species are often assimilated as ‘native’ well within a century (Cheke, 1982). Indeed the Madagascar Fody itself was confused in Mauritius with the native *F. rubra* almost immediately after it was introduced, the name *cardinal* swapping to the more conspicuous anthropophilic incomer within a decade or two in the mid-late 18<sup>th</sup>-century (Cheke, 1982, 2009).

Furthermore, the description from Duchemin’s commander does not match the typical plumage colouration of a male Madagascar Fody, whose bright red colouration extends over the whole body in breeding plumage. Although some males retain red feathers in various parts of their body when moulting into eclipse, these are not normally tidily restricted to head and throat, though some individuals can temporarily show this pattern. In addition, they never have black legs and feet, a character unknown in other species of fody. Although leg colour does not vary in known *Foudia* or in sister genera *Quelea* and *Euplectes*, there is wide variation in the large related genus *Ploceus* (Zimmermann *et al.*, 1996; see Warren *et al.*, 2012 for relationships), so there is no *a priori* reason to doubt this observation.

Given the argument that Duchemin’s bird was a Madagascar Fody (above), the introduction date of this bird needs to be critically re-assessed, and

we believe that we can demonstrate on historical grounds that the presence of this species in 1768 was highly improbable.

As Gerlach & Gerlach (1994), echoed by Skerrett *et al.* (2001), argued that the Madagascar Fody could have colonised naturally, contrary to local belief, it should also be noted that there are no cases of this species reaching new territory unaided by man (Safford & Hawkins, 2013). Although the initial spread of proto-*Foudia* in the Pleistocene spanned the western Indian Ocean (Warren *et al.*, 2012), the extant species all appear extremely sedentary, and the Madagascar Fody does not occur naturally on any of the islands between Madagascar and the Seychelles (Aldabra, Farquhar/Providence and Almirante groups), where one might expect it if it had dispersed across the sea unaided. It has since been introduced to all these groups (Safford & Hawkins, 2013), and the furthest recorded over-water self-dispersal has been the 27 km from Assumption to Aldabra in (discovered in 2012), from which eradication is in progress (Bunbury *et al.*, 2013).

The scarcity of the bird at the time of Edward Newton's visit, that it was seen only on Mahé and there in just one locality, and the fact that locals he quizzed were unfamiliar with the species (Newton, 1867), argues for an introduction in the early stages of establishment. By 1877 (Lantz's collections; Oustalet, 1878) it was clearly frequent, but still confined to Mahé. On Praslin it was absent in 1878 (Blackburn, 1883), but had arrived by 1883 (North, 1892), probably deliberately introduced (Cheke, 2013). Had it really been around since the 1760s or earlier, it can be presumed this very successful coloniser would by 1867 have been both widespread and abundant across the archipelago, as indeed it had become by 1906 (Nicoll, 1908), and remains to this day (Lionnet, 1984a; Skerrett *et al.*, 2001; Gerlach, 2007). Furthermore, as Nicoll (1908, quoted earlier) and Gardiner (1907<sup>5</sup>) pointed out, echoed by Dupont (1935) who also told the story of introduction for revenge<sup>6</sup>, rice growing was totally compromised by the presence of the Madagascar Fody. Had it arrived before the 1860s, the cultivation of rice, routine in the 1840s and 1850s (Sauer, 1967; Scarr, 2000), and still practised in 1867 (Wright, 1968) and 1871 (Pike, 1872) on Mahé and other islands, would have already become very difficult because of the Madagascar Fody's granivorous habits, and the problem would have been commented on. The very fact that it was the endemic Seychelles Fody that was known locally as *mangeur de riz* (Newton,

1867; 'rice eater'), when the Madagascar Fody is far more injurious, is further evidence against the earlier presence of the latter. We conclude, as did Gaymer *et al.* (1969) over 40 years ago, that the Madagascar Fody was introduced around 1860<sup>7</sup>.

This logic renders very doubtful the inclusion of "*cardinaux*" (i.e. Madagascar Fody) in a list of Seychelles birds included in de Froberville's (1848) account of the islands. De Froberville was a Paris-based Mauritian compiler without personal experience of the Seychelles, and his equivalent account of Rodriguez in the same publication can be shown by archival information to be both outdated and inaccurate (Cheke & Hume, 2008). His Seychelles bird list shows clear signs of being assembled from a mixture of reliable and unreliable sources. On the plus side he is the first to mention in print Seychelles Scops Owls (*Otus insularis*) ("*chevêche*") and Seychelles Swiftlets (*Aerodramus elaphrus*) ("*hirondelles ... which ... build the nests so esteemed by the Chinese*"), against which he appears to conflate Fairy Terns (*Gygis alba*) with Seychelles Kestrels (*Falco araea*) as "*white éperviers the size of larks ... [that] chase swifts right onto the roofs of houses*" (the kestrel's diet is 92% lizards, occasional birds but not swifts; Skerrett *et al.*, 2001), and includes in the list "*doyoles*", a completely untraceable term<sup>8</sup> (our translations).

Although on plumage description grounds the Madagascar Fody cannot be completely ruled out, we believe that for historical reasons outlined above it is vanishingly unlikely that the Madagascar Fody would have already arrived or been introduced in the Seychelles by 1768. There is an alternative possibility, which we believe is more likely: that there was a native red-plumaged fody on Mahé that rapidly went extinct after human settlement.

### An undescribed species of red-headed Fody?

There are two candidates for what species these fodies may have been. The most obvious would be a typical red-headed fody of the type found in Mauritius, La Réunion (extinct), Aldabra, Comoros (Comoro Fody [*F. eminentissima*]) and Madagascar (Forest Fody [*F. omissa*]). In the granitic islands, the Seychelles Fody has been historically reported on various islands of the Praslin group (Cousin, Cousine, Marianne, possibly Aride and La Digue; Skerrett *et al.*, 2001) as well as Frégate. Although this species probably also originally occurred on Mahé (Cheke & Rocamora, unpublished), it is possible

that there was a second species of fody, resulting from an independent colonisation, and now extinct. This pattern of sympatric congeners is matched by another Seychelles genus: the two species of white-eye *Zosterops*. One of these, the Seychelles Grey White-eye (*Z. modestus*), was historically confined to the Mahé group (Rocamora & Skerrett, 2001; Skerrett *et al.*, 2001). The other, the Seychelles Chestnut-flanked White-eye (*Z. semiflavus*), resulting from a more ancient colonisation (Warren *et al.*, 2006) and now extinct, appears to have occurred on Mahé as well as in the Praslin group (Lionnet, 1980, 1984b; reported as “canaries”).

The other possibility is that the Seychelles Fody may have had two forms (corresponding to two races), each exhibiting different colouring in the two groups of islands - as for example with the sunbirds in the Aldabra group, where three variants of belly coloration exist on different islands, generally considered as races of the Souimanga Sunbird *Nectarinia* (= *Cinnyris*) *sovimanga* (Cheke *et al.*, 2001; Safford & Hawkins, 2013). While normally brown with a little yellow on the face in the male, some males of the introduced Seychelles Fody population on D'Arros show “dramatic coloration changes, with shining yellow, red or orange on their heads ... covering sometimes almost the entire head (crown, cheeks, lores and the area between the eyes and nape) and there is a broad black band through the eye” (Rocamora, 2003a, 2003b). However, this red coloration appears to be due to hybridization with Cardinal Fodies also present (Richardson & Rocamora, 2004), whereas there is no evidence of red colour sports in pure-bred Seychelles Fodies (which have no red in the plumage). Hence we regard this option as very unlikely, although the presence of one Seychelles Fody male with an abnormal plumage cannot be completely discarded. Assuming the Madagascar Fody can be ruled out, the sighting of a ‘linnet’ with a red head and chest is in our view a very strong indication of the presence of an *omissa/rubra* type fody.

### Scarcity and rapid extinction

Contrary to most birds reported during the Marion-Dufresne expedition, this ‘linnet’ was observed with certainty only once, which suggests that it may have been rare. However, if the visit of the expedition in December was outside the breeding season, as the Seychelles Fody breeds mainly May-September (Crook, 1961; Skerrett *et al.*, 2001), most males would have been in dull eclipse plumage, and only

full-plumaged males would have been ‘rare’; hence, explaining the single observation. Females and eclipse males are more likely to have been seen as some sort of ‘sparrow’. It is possible that Duchemin’s ‘linnet’ was already restricted to Mahé in 1768 and may have become extinct not long after of being reported, which explains the apparent absence of later reports.

The most likely reason for the extinction of an undescribed endemic passerine is rat predation. Ship rats (*Rattus rattus*) were reported as established on Mahé as early as 1773 (Malavois in Fauvel, 1909; Cheke, 2010), and it is well-known that several endemic island fodies are extremely vulnerable to this rat. In the granitic Seychelles, the Seychelles Fody survived naturally - and still does today - only on islands without ship rats (Diamond & Feare, 1980; Safford & Hawkins, 2013<sup>9</sup>), ship rats keep the reproductive output of both the Mauritius Fody and the Aldabra Fody (*F. aldabrana*) far below the carrying capacity of the habitat (Frith, 1976; Cheke, 1987; Nichols *et al.*, 2002; Cheke & Hume, 2008), and the Réunion Fody was not seen again after ship rats invaded that island (Cheke & Hume, 2008).

Confirmation of the early presence of an undescribed extinct species of fody in Seychelles would require more evidence such as concordant additional descriptions or drawings. However, the fact that this ‘linnet’ was only reported once should not be considered as invalidating the record. Several species in the Mascarenes were only reported once or twice before going extinct. Like the ‘linnet’, the Réunion Fody’s plumage was described only once, though its behaviour was also noted by another observer (Cheke & Hume, 2008). While in the Mascarenes most early extinctions have subsequently been confirmed by subfossils, Réunion Fody bones have yet to be found, and deposits yielding landbirds still await discovery in the Seychelles.

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<sup>1</sup> « J'ay aussi trouvé un oiseau qui a le plumage du corps et les ailes comme le linot, couleur brun et café, la teste [=tête] et la gorge rouge cramoisy, le bec et les pattes noires ». 'Caffé' was transcribed 'carré' ('square') by Lionnet (1980), which does not make sense, hence his later correction (1984b) to 'café' - but it was always spelt with two 'f's elsewhere in the MS. The linnet is a small Eurasian finch, *Carduelis cannabina*, common in France, and familiar as a cage-bird.

<sup>2</sup> House Sparrow *Passer domesticus*

<sup>3</sup> Edward Newton's visit to the Seychelles was in early 1867 (diary in the University Library, Cambridge, copy in ASC's library) not 1866 as Gerlach & Gerlach (1994) and Skerrett *et al.* (2001) stated.

<sup>4</sup> Skerrett *et al.* (2001) cited Henri Dauban as attributing a similar story to the Common Waxbill *Estrilda astrild*.

<sup>5</sup> "The chief food of the people is rice, which used to be grown very extensively in the marshes, previous to the introduction of the beautiful though graminivorous cardinal bird".

<sup>6</sup> Dupont located the event on La Digue, which may link to Henri Dauban's version pertaining to Common Waxbills (Skerrett *et al.*, 2001), which certainly did appear first on La Digue.

<sup>7</sup> Loustau-Lalanne (1962) wrongly claimed it was introduced to Mahé in 1879 and to Praslin in 1904.

<sup>8</sup> Adrian Skerrett (*in litt.*) argues this term could derive from the north Indian "dayal" (& variants) for magpie robins *Copsychus* spp. (see Anonymous, 1998), of which there is an endemic species, *C. sechellarum*, in Seychelles. *Dyal/dayal* is a current French term for magpie robins, but we have been unable to trace this usage back to the 19<sup>th</sup> century. By 1848 the Seychelles species had long had a local French name (*pie*; Cheke, 1982; Skerrett *et al.*, 2001), but as Froberville used other metropolitan names in his list (*chevêche*, *épervier*) which were never used in the islands, the significance of 'doyole' must rest unclear.

<sup>9</sup> On D'Arros, the introduced Seychelles Fody thrived in the presence of rats and cats (Skerrett *et al.*, 2001) prior to their eradication (Rocamora & Matyot, 2002), probably because the rat species there was the much less arboreal Norway rat (*Rattus norvegicus*). Norway rats were first reported in the central Seychelles only in the 1970s (Cheke, 2010).