

T & A D POYSER

Lost Land of the Dodo



ANTHONY CHEKE, JULIAN HUME

LOST LAND OF THE DODO

DEDICATION

We would like to dedicate this book to the memory of our friend the late France Staub (1920–2005¹), doughty Mauritian naturalist, artist, dentist and *bon viveur*, who did so much, in his eclectic way, to keep wildlife issues before the Mauritian public in the later 20th century.

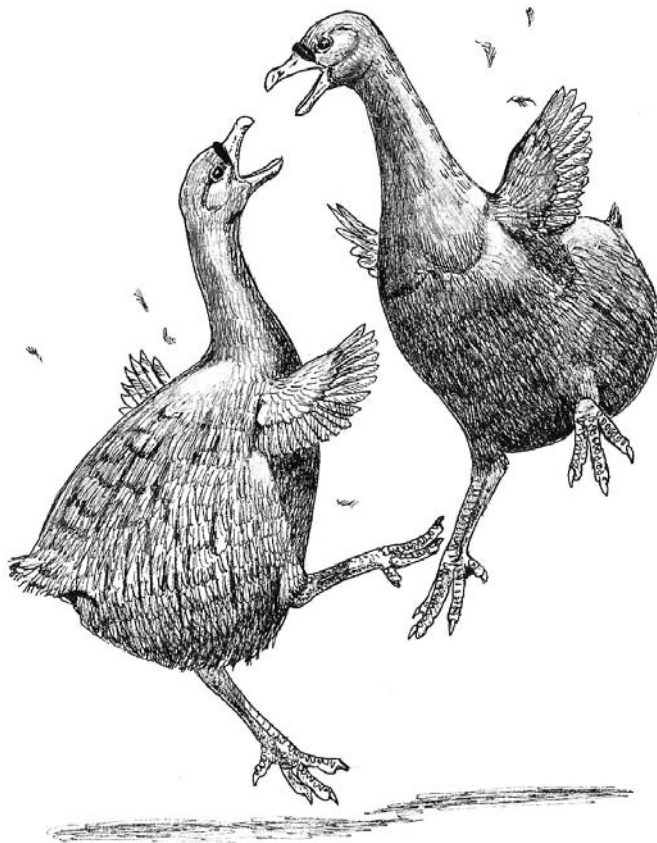
In addition we would like to recall some of the great characters in the natural history of the Mascarenes: Peter Mundy for suspecting evolution 200 years ahead of his time; François Leguat for the 17th century's best natural history travel book and pioneering observations on bird behaviour and territory; Sieur Dubois for his precise enumeration of wildlife in near-pristine Réunion; Joris Laerle for providing the inspirational and unique images of Mauritian birds drawn from life; Gui Pingré, Jean-François Charpentier de Cossigny and Jean-Baptiste de Lanux for sticking to facts in the 18th century; Philibert Commerson for initiating *in situ* illustration; Pierre Poivre for the foundations of conservation legislation;

Hugh Strickland for pioneering and perceptive bio-historical research; François Pollen and Edward Newton for the first properly documented collecting in the 19th century, and also the pioneers of old bones, Alfred and Edward Newton (again!), whose interest in Mascarene fossil history formed the basis for all subsequent palaeontological research; also Théodore Sauzier, George Clark and Etienne Thirioux, three 19th-century amateur fossil collectors and natural historians who have never been fully appreciated, and without whose efforts our knowledge of the Mascarene fauna would have been significantly diminished; in the 20th century Reginald Vaughan, Jean Vinson, and Harry Gruchet for conservationist thinking and action against the odds; and finally Alfred North-Coombes, champion of Leguat and historian of Rodrigues and the discovery of the islands, and Carl Jones, author of Chapter 10, who has done so much to establish in Mauritius one of the most successful hands-on conservationist organisations in the world.

LOST LAND OF THE DODO

AN ECOLOGICAL HISTORY OF
MAURITIUS, RÉUNION & RODRIGUES

ANTHONY CHEKE AND JULIAN HUME



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Front cover: Dodo watching as a Dutch ship arrives by Le Morne

Title page: Male Rodrigues Solitaires in territorial dispute

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PREFACE

So rapid and complete was their extinction, that the vague descriptions given of them by early travellers were long regarded as fabulous or exaggerated, and these birds, almost contemporaries of our great-grandfathers, became associated in the minds of many persons with the Griffin and the Phoenix of mythological antiquity.

Hugh Strickland, 1848, on the Dodo and the Rodrigues Solitaire¹

[The Dodo] has remained famous as the bird whose deadness so many people and things are in danger of emulating...

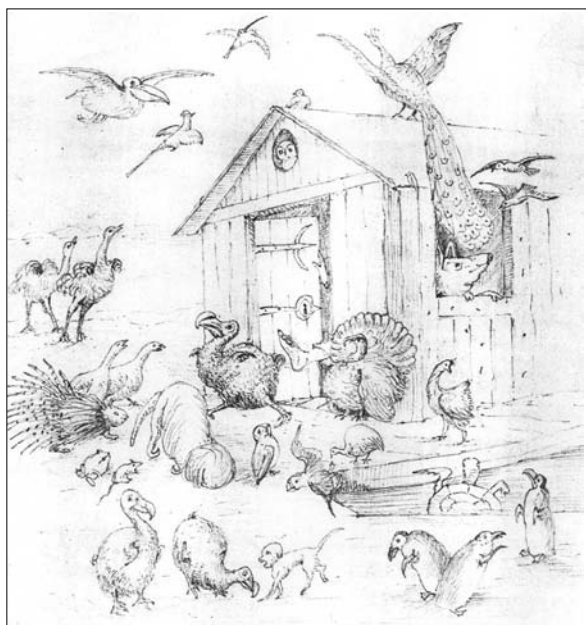
Australian travellers Leslie and Coralie Rees visiting its lost land in 1952²

Since its 'rediscovery'³ in the mid-19th century, the Dodo has been synonymous with extinction – indeed the catchphrase 'as dead as a dodo'⁴ has become so ingrained in the English language that we use it in almost any context. The bird itself has become a byword for stupidity – for being clumsy, flightless and allowing itself to be caught and eaten without running away⁵. What is less often realised is that until the question of the past existence of the Dodo was raised and resolved, the entire concept of 'extinction' did not exist. God had created all the plants and animals in, according to a famous calculation, 4004 BC, and there was no question of mere Man being capable of destroying what He had created. The fossils in the rocks, considered to be animals that had died in Noah's Flood (or alternatively put there by the deity to fool inquisitive humans), were the only creatures allowed to be extinct, and that because God himself made them so⁶. From this theological viewpoint, adhered to by society's leaders if not so fully by explorers and naturalists, extinction could not, and did not, happen. Hence when it was discovered in Europe that the Dodos reported by early Dutch visitors to Mauritius no longer existed on that island, and had never been found anywhere else, it became fashionable to believe they had never existed at all!⁷ The eventual understanding that they had existed (once remains were rediscovered in museums) was part of the jigsaw of ideas that prepared the ground for Darwin and Wallace's revolutionary (if not entirely novel) theory of evolution published in 1858. Both of these very different biologists got their ideas through studying islands – Wallace in the 'East Indies' (now Indonesia), Darwin (especially) in the Galapagos.

Darwin also visited Mauritius (in 1836), but was by then tired, ill and on his way home, and had little to say about his visit, though he did collect some marine life and a frog⁸.

So Mauritius became the island where extinction not only had occurred, but where it was, so to speak, discovered. Out of this discovery arose the concept of 'preservation' of species, the first step to current ideas of environmental conservation. When Edward Newton arrived in Mauritius from Britain to take up the post of Assistant Colonial Secretary in 1859, he rapidly noticed that some birds only recently still common had apparently vanished. With the first finding of Dodo bones in 1865, and then those of other extinct Mauritian species, the issue of preventing further extinctions took on a new urgency, and in 1878 Newton initiated the first laws anywhere specifically designed to protect indigenous land birds from persecution⁹ – until then the only animals that attracted any legal protection were either game, quarry or food, or deemed useful in some other way; pest controllers, perhaps, or providers of commodities such as feathers or fur.

There is a sense in which the old philosophy of the sanctity of creation has indirectly infused the modern concept of conservation – the idea that the earth and its wildlife are not 'ours' to wilfully damage, that we have a responsibility to look after what we also have the power to destroy. In a materialistic world where everything has its price, where the rule of the market is no longer seriously questioned by alternative political philosophies, it is hard to make a case for anything having an intrinsic value outside the confines of human economics. Witness the relentless destruction



'How the beasts got into the Ark – Noah kicked out the Dodo'. An illegibly signed unpublished cartoon bound with other material collected by Alfred Newton in a set titled 'Indian Ocean. Madagascar – Mascarene Islands (MSS)' held in the Newton Library, Cambridge University, Zoology Department.

their despoilers took good notes. We have a lot to learn from what they recorded.

Postscript

Much of our understanding of the Mauritian extinct fauna has been derived from subfossil bones collected in the Mare aux Songes swamp. After more than a century of neglect, excavations recommenced there in 2005, and were significantly expanded in 2006¹¹; further work is intended, with JPH intimately involved. This book went to press before the palaeontological results had been studied or published, but exciting new discoveries are expected (see Appendix 13).

A note on English names

Throughout this book, we have generally used the most widely accepted English names for all taxa, with the exception of some of the cagebirds that have been released onto the islands; in these cases, we decided that it was preferable to use the long-established avicultural names as used in the Mascarenes, which better reflect how these species reached the islands.

Two of the bird names are more problematic. The Réunion Solitaire (formerly thought to be a type of dodo) has been shown relatively recently to be an ibis, hence we refer to this species as Réunion Ibis. However, this bird was always called a 'solitaire' by the islanders, and most of the literature refers to it by that name, so we have followed this where appropriate. We have given both names in the tables and appendices, and in Box 8.

The native bulbuls of the islands have always been locally known as 'merles' (from the French for the superficially similar Blackbird), and this name persists to this day. By contrast, the introduced Red-whiskered Bulbul is frequently referred to on the islands as simply 'bulbul'. The native species belong to the genus *Hypsipetes* and are closely related to the Black Bulbul *H. leucocephalus* of mainland Asia. They should properly be called Mauritius Bulbul and Réunion Bulbul. However, they are frequently referred to as 'merles' in the literature and we have chosen to retain the name 'merle' in the main text. Where appropriate (such as in the tables and in Box 25) we have given both names.

of irreplaceable forests with their immensely complex and subtle ecology for the sake of a few million dollars worth of dead wood. Fortunately many humans retain an inherent appreciation of beauty, a curiosity about their world, a fascination with the grandeur and absurdity of nature that allows them to see that all this does have real, if intangible, value. The Dodo was both grand and absurd, but above all, like all lost species, a precious example of the process of evolution through aeons of time in its own little world of Mauritius.

We are used to seeing on our television screens fictional cultures that have evolved on other planets throughout the cosmos, and enjoy seeing the weird aliens that life has thrown up in far galaxies. Our own world is in fact remarkably like the fictional universe – think of islands and continents as planets where each has its own special circumstances and generates its own peculiar life-forms. There are huge ones and tiny ones, each with its irreplaceable specialities. They have all been invaded, but do we want them all to be subject to the uniform bleak conformity of the 'Empire' or the 'Dominion'¹⁰ – the local inhabitants exterminated by the rats, bulldozers, pesticides, concrete and blind incomprehension of a 'western culture' (and its imitators) out of control?

This book tells the story of three such 'planets' – islands far out in the Indian Ocean that escaped the heavy hand of man until fewer than 500 years ago. Their history is more complete than most because

ACKNOWLEDGEMENTS

AUTHORS' NOTE

The style we have chosen for this book, a clear text annotated with numbered endnotes, is more usual in historical or literary than in scientific works. However, we felt that text unencumbered by endless 'Harvard references' and explanatory byways was easier to read, while including all the source material in the notes still makes it possible for scholars and specialists to follow up any lines of particular interest. The endnotes also contain anecdotes, biographical details and other snippets that would distract from the flow of the main text, but are nevertheless part of the story. For details of abbreviations and acronyms used in the text and endnotes, see the preamble to the bibliography. ASC is responsible for the main text, JPH for the box features and Appendix 13. All translations from French are by ASC unless otherwise stated.

Acknowledgments for Mascarene work done in the 1970s and 1980s will be found in earlier publications¹². For this book I would like to thank Carl Jones and the Mauritian Wildlife Foundation who have provided accommodation and sometimes transport on visits to Mauritius in 1996, 1999 and 2003, and Auguste and Christel de Villèle who have kindly done the same in Réunion and helped with local literature research; Aleks Majlkovic played host in the MWF house on Rodrigues in 1999. I have had long and fruitful discussions with many people, notably (for Mauritius and Rodrigues) Carl Jones, the late France Staub, Vikash Tatayah, John Maureemootoo, Roger Safford, Nik Cole, Philip LaHausse, Alan Grihault, Owen Griffiths, Jean-Michel Vinson, Rachel Atkinson and Aleks Majlkovic, and (for Réunion) Jean-Michel Probst, Pierre Brial, Sonia Ribes, the de Villèles, Alain Vauthier, Bruno Navez, and Jacques Trouvilliez, plus much correspondence with Mathieu Le Corre, Marc Salamolard, Thomas Ghestemme, and Christophe Lavergne. Roger Safford and Dennis Hansen contributed helpful feedback on drafts – David Bullock and Steve North kindly commented on Chapter 9 and inspired much useful discussion, and Yousoof Mungroo of the Mauritian National Parks and Con-

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at A&C Black, and Julie Dando for producing the original maps in this volume. My son Oli kindly scanned most of the text illustrations. Finally I must thank my friend and co-author Julian Hume for collaborating so cheerfully through often difficult times, and

my wife Ruth for putting up with too-long absences from our business at the Inner Bookshop while the book project stretched from months into years to everyone's frustration, not least our patient publisher.

Anthony Cheke

So many people over the years have given their encouragement and support – it is almost impossible to put my gratitude into words. I will start by thanking Storrs Olson and Helen James, who launched my interest in palaeontology; I have never looked back. In the UK, I would particularly like to thank Robert Prys-Jones and Carl Jones, who have helped make Mascarene research so rewarding. My deep gratitude goes to Mike Barker, Dave Martill, Bob Loveridge, Darren Naish, Dave Hughes, Errol Fuller, Cyril Walker, the late Colin Harrison, Glyn Young, Nick Arnold, Graham Cowles, Paula Jenkins, Sandra Chapman, Andy Currant, Ann Datta, Ray Symonds, Mike Brooke, Andrew Kitchener, Michael Walters, Jo Cooper, Mark Adams, Martin Staniforth, Ralfe Whistler, Rungwe and Claude Kingdon, Owen Griffiths, Aurele Andre, Daniel Sleight, S. Abdhoolrahman, Alan Grihault, Clem Fisher, Justin Gerlach, and in particular Effie Warr, former librarian at Tring.

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I am forever in the debt of my wife Jenny and my children, Jade, Jasmin and Jeradine, and my parents, brothers and sister, whose patience and understanding have made this project possible.

Julian Hume



An 1874 engraving by Butterworth and Heath of a Dodo preening its foot, derived from Roelant Savery's painting 'Landscape with exotic birds' in the collection of the Zoological Society of London.



INTRODUCTION

These singular birds ... furnish the first clearly attested instances of the extinction of organic species through human agency

Strickland (1848) on the Dodo and Rodrigues Solitaire¹

To simplify a little, one could say that the ecosystem is like our homes. It's what allows us to live. Like all houses, it's made up of components which, like bricks, are assembled side by side to create the totality of the unit. If you take a brick out, the building doesn't fall down – but you risk having draughts, leaks, and if you keep on taking out bricks the system ends up unable to perform its function. It is the same with nature – there comes a point when it falls apart.

Vincent Florens, explaining ecosystem degradation to a journalist in 2005²

Imagine you are a Dutch sailor in 1598. You have been on a ship in bad weather for weeks since your last landfall at the Cape, eating dry biscuits and suffering from scurvy – and suddenly your prayers have been answered. Land has been sighted! Up ahead is one of the mythical islands on the dodgy Portuguese maps that the captain boasted of. Cloud-topped mountains and seductive forests promise fresh water and food – and as you land after negotiating the reefs, dinner walks up and asks to be eaten! Giant juicy tortoises ten times the size of anything seen in Europe, and weird fat flightless birds that don't know how to run away. Welcome to Mauritius, a land untouched by man, and about to be changed forever.

Oceanic islands, created by undersea volcanoes and isolated by hundreds or thousands of miles of open sea, are very special. They are natural experiments in evolution, each one unique depending on its age and size, on which land is nearest, on whether it is tropical or temperate, on the direction of prevailing winds and ocean currents, and on which animals and plants were the first to arrive. On islands several millions of years old far from sources of immigration, evolution can proceed so far that almost all the biota can be endemic, i.e. specific to that place. Less obvious are 'islands' in the middle of great continents – islands of habitat, equivalent to sea-girt islands in their history and evolution. They are typically isolated lakes or high mountains, separated by wide stretches of unsuitable terrain, where endemic species have similarly evolved³.

Many far-flung islands in the temperate zones were colonised by man in early or prehistoric times, but a number of tropical islands were not reached until much more recently. Island ecosystems do not mix well with humans – one of the common characteristics of isolated islands is that there are few (or no) predators, and only limited numbers of herbivores to influence the vegetation. Under these circumstances species evolve which have no defences against organisms from the large continents⁴. Humans not only kill directly, but introduce all kinds of animals, plants and diseases that can overwhelm these fragile ecosystems. Islands colonised by people a long time ago have always lost many, sometimes all, of the endemic species that evolved there, and their past history can only be reconstructed from material such as old bones and subfossil seeds and pollen, dug out of swamps and caves.

Easter Island⁵ is a small (166km²) and immensely isolated subtropical volcanic island in the south-east Pacific Ocean, 2,250km from the nearest land (the Pitcairn Islands) and 3,747km from the nearest point of South America. Today it is a treeless savanna with a mysterious vanished culture that carved massive monolithic statues. Pollen deposits show it was originally a forested island, but it was subsequently clear-felled by its Polynesian population. When first described by Western visitors in 1722, little trace remained of the original flora, and none of any fauna there might have been, and even the folklore gave only fragmentary glimpses of the former ecosystem – for palaeoecologists, everything has had to be reconstructed

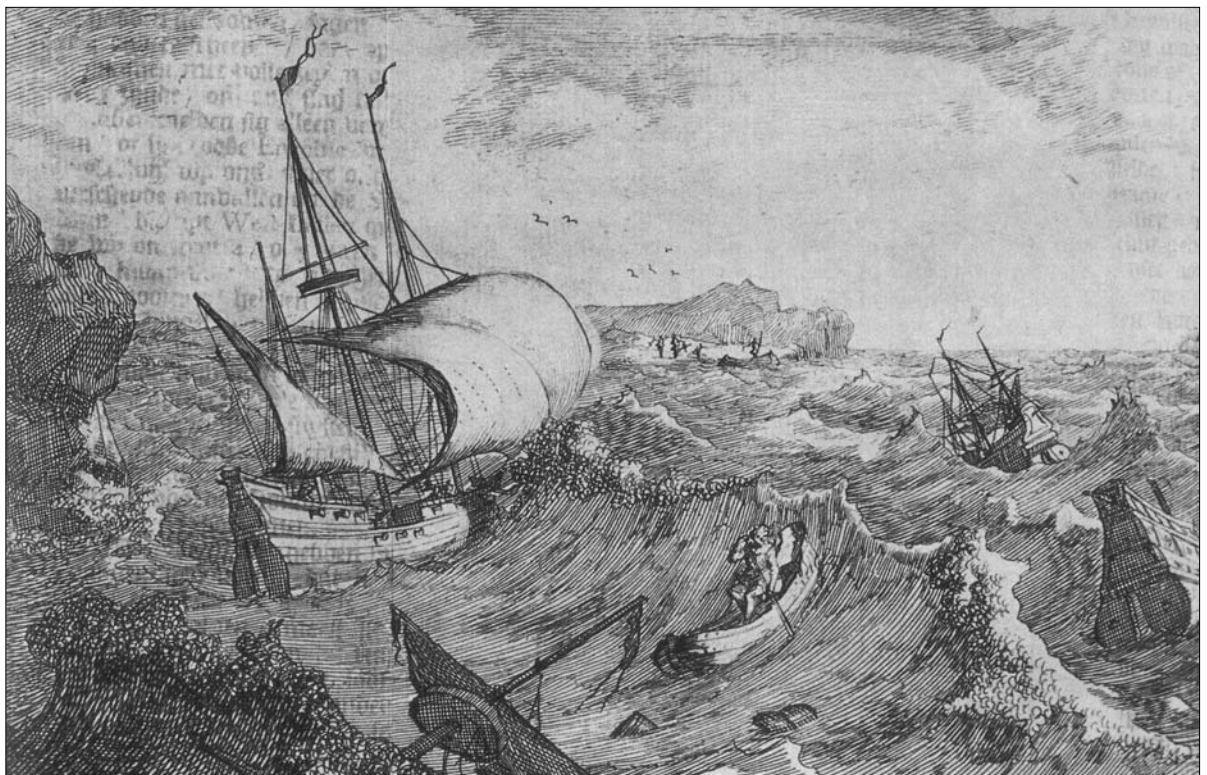
from subfossil material. Although often cited as a directly human-induced eco-catastrophe, it now appears that exploding numbers of Polynesian Rats arriving with the immigrants caused a forest decline through seed predation, before the people finished it off. A sobering fact is that the first people did not get there until about 1200; although deforestation was complete by about 1650, final cultural and economic collapse only followed after the introduction of Western diseases and removal of people as slaves after 1722.

Hawaii⁶, a volcanic archipelago, was colonised by Polynesians (around 300-400 AD); New Zealand⁷, an old continental island group, a little later (c. 900 AD). These are much larger islands, and by the time Europeans arrived (1700s AD) were only partly deforested and still had a great deal of their endemic fauna. Nonetheless, hundreds of years of occupation by colonists who habitually introduced rats, pigs and dogs wherever they went had taken their toll on the fauna. Some of the losses were hinted at in folklore, and in New Zealand it didn't take long for European settlers to find bones of enormous flightless birds (moas) that confirmed the stories. Again there were no written records, and it has taken a further two centuries to rediscover all the extraordinary lost birds

of the Hawaiian Islands⁸. Meanwhile European colonisation has proved almost as destructive as Polynesian, and a host more species, especially in Hawaii, have become extinct.

The history of the great continental island of Madagascar is even more tantalising. Although only 300km from the African coast and nearly 1,600km long, it remained almost completely free of human influence until colonised from across the Indian Ocean by settlers and traders as recently as c. 800 AD⁹. When Flacourt explored parts of it in 1648–52 he was told that flightless elephant birds and giant lemurs still existed in remote areas¹⁰, though he did not see them himself. These now-extinct creatures were part of normal life to the Malagasy – but they too had no written language, and no records of their discovery and settlement of the island. Being a continental island, with an ancestral fauna (some of which had walked onto it before its isolation by continental drift around 80–88 million years ago¹¹), there developed a range of herbivores and predators; much of the fauna, especially the mammals (lemurs, tenrecs etc.) and flying birds, has been able to withstand human impact better than on truly oceanic (and much smaller) islands.

The shipwreck of the Arnhem off Mauritius in 1662, from Stokram (1663), illustrating the dangers of tropical storms and reefs. The Arnhem was actually lost in the open sea about 192km (120 miles) east of Mauritius, but over the years many Dutch, French and English ships were wrecked on the reefs.



GENERAL COMMENTS ON THE BOX FEATURES ON SPECIES AND SPECIES GROUPS

All of the most important contemporary accounts are provided for extinct species, as this provides useful morphological and ecological information about these species that are often unrepresented by skin remains or detailed descriptions or illustrations. Examples of contemporary accounts describing species that are still extant are also included, as their present day distribution is often an artefact of human intervention.

Probst and Brial (2002) have collected all the old wildlife accounts for Réunion (in French), but there has been no such complete compilation for Mauritius and Rodrigues. Ours here (much of it translated into English for the first time) does not claim to be complete, but is a selection of the most informative descriptions from early visitors to all three islands.

Specimen collections

Specimen collections are biased toward extinct species represented by fossil material and museum skin specimens. Extant species are mentioned only if they are represented in the fossil record. For a full listing of museum skin material see Cheke and Jones (1987).

Abbreviations

The following abbreviations are used:

Institutions: BMNH, The Natural History Museum, London, England (formerly the British Museum (Natural History)); UMZC, University Museum of Zoology, Cambridge, England; UMO, University Museum, Oxford; RMS, Royal Museum of Scotland, Edinburgh; MHNH, Muséum National d'Histoire Naturelle, Paris, France; UCB, Université Claude Bernard-Lyon 1, France; NHMV, Natural History Museum of Vienna, Austria; RMNH, Rijksmuseum van Natuurlijke Historie, Leiden; MI, Mauritius Institute, Port Louis, Mauritius.

The Mascarene islands of Mauritius, Réunion and Rodrigues, the subjects of this book, together with Christmas Island¹² and the Atlantic's answer to Easter Island, St. Helena¹³, are the most substantial tropical oceanic islands where the first visitors were Westerners, some of whom arrived complete with pens (or quills) at the ready. They described the islands as they found them, and also the consequences of their arrival. Brief early visits by the Portuguese excepted, we have a more or less continuous record, beginning with the early travellers' encounters with the unusual creatures they met, supported by a wealth of subfossil material

that corroborates the animals they described, such that the islands' ecological history is almost fully discoverable¹⁴. Having this much more precise handle on exactly what happened and what went wrong, we are in a position to learn the lessons more fully, and to use this information to work out how to reverse ecosystem damage where possible. Parallels can also be drawn with islands and ecosystems in other places where we have less complete histories. It is a sad but salutary story – with a bit of a happy ending (so far) for the animals and plants that have managed to survive the last four centuries.



Dodos, parrots and tortoises imagined in primeval Mauritius. From Ramdoyal (1981).



CHAPTER 1

GEOGRAPHY OF THE MASCARENES

AND HOW ANIMALS AND PLANTS COLONISE ISLANDS

Mauritius is an Ile scituate within the burning Zone close by the Tropick of Capricorne, but in what part of the World is questionable, participating as well in part with America, in respect of the immense South Ocean, as bending towards the Asiatique Seas from India and Iava. But most properly adioyning the great Ile Madagascar, from which it is distant two hundred leagues or sixe hundred English miles, whereby I judge it placed in the Afrique seas, and thereby imcorporated into Afrique. But how ever doubtfull of what part of the three it is, of this I nothing doubt, that for varietie of Gods temporall blessings, no part of the Universe obscures it

Thomas Herbert having trouble with his geography in 1634¹

Réunion, Mauritius and Rodrigues are three strikingly different islands united only by their relative proximity and volcanic origin, lying at the southern edge of tropics in the Indian Ocean east of Madagascar. Réunion, the largest and most southerly, is nearest to Madagascar, but is nonetheless 665km offshore at 21°S 55.5°E. Mauritius (20.25°S 57.5°E), next in size, is 164km east north-east of Réunion. The smallest, Rodrigues (19.75°S 63.5°E) is by far the most isolated, being 574km east of Mauritius and some 4,800km west of Australia, the next landfall².

Réunion has both the highest peak in the Indian Ocean, and its only active volcano outside the sub-antarctic. It sits just to the east of a volcanic hotspot that during the past 66 million years is believed to have given rise to the Deccan Traps lava fields in India, the Maldives, the Chagos, the Saya de Malha and Nazareth banks (large undersea plateaux), the St. Brandon (Cargados Carajos) atolls and Mauritius³. On our mobile planet these hotspots are relatively stable in position relative to the poles, but the tectonic plates slowly move over them, producing a series of islands, or lava fields if the plate is land rather than sea-floor⁴. As the great Mesozoic continent of Gondwanaland broke up, the final split around 84 million years ago (mya) saw a large section (now India) break off and drift north; around 64–66 mya it passed over the current site of Réunion, where the flood basalts erupted, and eventually crunched into Central Asia. The result of India's impact with Asia is the massive crumple zone of the Himalayas⁵. Another part, now

Madagascar, initially (c. 120mya) broke off with India, but got stuck off the African shore, while a small fragment, now the Seychelles, ended up stranded part-way between Madagascar and India. The rest of Gondwanaland is now split into South America, Africa, Australia, New Guinea, New Caledonia, New Zealand and Antarctica.

According to potassium–argon and stratigraphic dating, the hotspot began to generate Mauritius some 10 mya. The island remained volcanically active as it drifted off the main magma source, often with long periods of quiescence, until c. 25,000 years ago⁶. About 3 mya the first eruptions forming Réunion broke the surface, and the island has grown (and eroded) actively since then⁷. Off to the east, on a separate volcanic upwelling on a fracture zone that intersects the track of the plates over the hotspot, lies Rodrigues. According to a much-cited but very limited study of Rodriguan rocks, it is commonly supposed to be the youngest of the islands at around 1.5 my⁸, but the geomorphology and the degree of plant and animal endemism argue for a much older origin, confirmed by more recent geological work⁹. The hotspot island chain between Mauritius and India is considered further in Chapter 4.

RÉUNION

Réunion is the largest and most spectacular of the islands, 70km long by 50km wide, covering 2,512km². The great bulk of the central massif, centred on the Piton des Neiges (3,069m) and the Piton de la Fournaise

(or 'Le Volcan', 2,631m), creates a rain shadow. The east of the island, exposed to the prevailing easterly winds, is wet and cloudy every day of the year, an annual average of 6,000–7,000mm of rain falling in the wettest part of the coast, and 10,000–12,000mm a few miles inland (e.g. Hauts de St Rose, 860m)¹⁰. In the west the coastal fringe is very dry (540mm/yr at St-Gilles), though it is wetter and cloudier higher up. This cloud, with a base at around 1,500m often shades the coast in the afternoon, even though the sky directly overhead is clear. The centre of the island is dissected into huge 'cirques' and very deep gorges. Cirques are roughly circular caldera-like valleys caused by erosion under very high rainfall, but with very narrow outlets to the sea through dramatic gorges. In the south-east of the island, around the active volcano, the valleys are as deep (cliffs up to 1,000m), but narrower, apart from the fairly smooth slope of the *pays brûlé* (the 'burnt land') where regular lava flows reach the sea. All round the island the land slopes steeply upwards towards the centre, 61% of the land surface being above 1,000m¹¹. Frosts are regular above about 1,500m, and it occasionally snows on the summits¹².

Around Réunion the land shelves steeply into deep water, in places under massive sea cliffs. Apart from stretches of the sheltered west coast there is no fringing reef; even where some coral has developed it is close inshore enclosing only a very narrow lagoon. There are no natural harbours and only one area with a good anchorage (Saint-Paul Bay) – this was important in the human history of the island¹³.

MAURITIUS

Mauritius is smaller, roughly 60km long by 40km broad, covering 1,865km². It is also much lower and

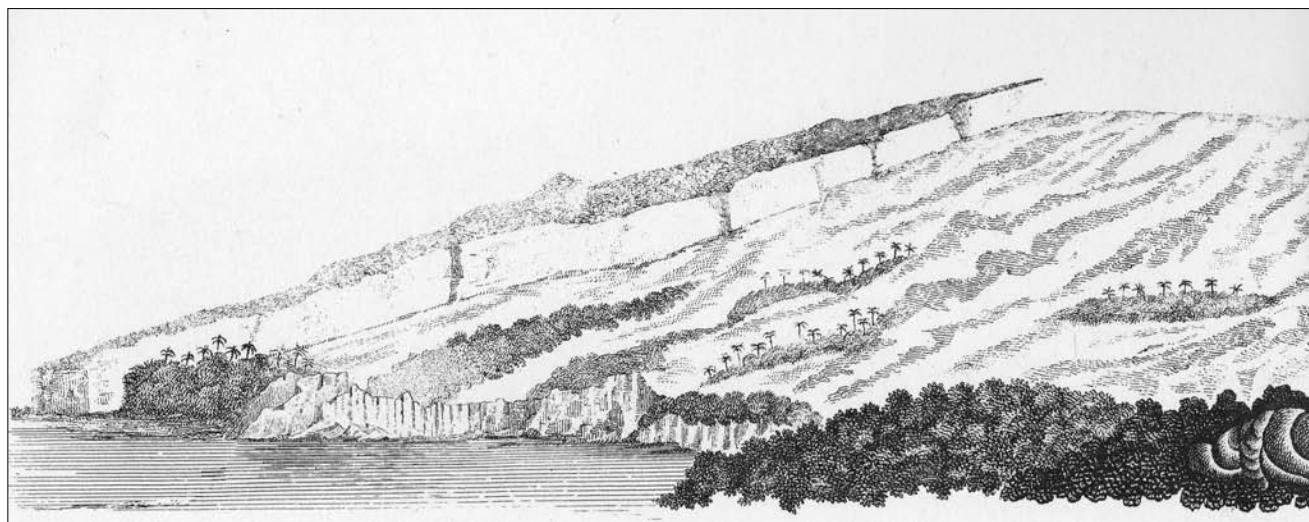
flatter, though even so it is markedly wetter in the windward east than the leeward west. In the north there is a broad undulating lava plain rising to around 150m above sea level, though in the middle of the island there are steep sharp mountains rising out of the plain, remains of a huge ancient volcano that was once much taller. The land rises in the south-central part to a plateau around 550–600m, dissected in the area of the oldest lavas in the south-east by one large and several smaller valleys, the principal one being the Black River Gorges. The highest point is Black River Peak at 828m, but several others reach up to 760m¹⁴. The gentle slopes of the late and intermediate lavas contain a large number of caves (lava tubes), up to 6m high and 9m wide, some of which extend for hundreds of metres underground, often just a few metres beneath the surface¹⁵. Annual rainfall ranges from 1,400–1,800mm in the coastal south-east to 3,600mm on the high plateau and down to as little as 800mm in a narrow dry western fringe¹⁶.

The coast is fringed by a broad reef-fringed lagoon mostly about half a mile (0.8km) wide, except for two short stretches of coast, in the west and the south, where the sea breaks directly onto low cliffs. There are numerous islets in the lagoon where it is particularly broad, mostly along the east coast where the lagoon is 5km wide in places. Off the north shore, on an under-sea platform 45–63m deep, there are four biologically significant islands: Round Island, Serpent Island, the Flat Island group, and Gunner's Quoin¹⁷.

RODRIGUES

Rodrigues is much the smallest of the islands (104km²), but is surrounded by a very wide submarine platform, part of which is occupied by an

Figure 1.1. The *enclos* (main lava flow zone) of the Volcan on Réunion, showing lava flows, coastal cliffs, islands of vegetation and the abundance of palm-trees. From Bory de St.Vincent's *Voyage* (1804).



extensive shallow reef-fringed lagoon about twice the area of the land surface. The island, 17.7km long by 8.45km wide, is in the form of a hog's back, with steep valleys extending off the central ridge; the highest point, Mont Limon, is only 398m. Like the other islands the main relief is composed of basaltic lavas, but Rodrigues also has an area of limestone plateau, Plaine Corail, consisting of consolidated coral sand (calcareenite) accumulated through wind action. Plaine Corail is studded with caves created by water dissolving and eroding the limestone¹⁸. The climate is relatively dry, with rainfall ranging from under 800mm on the southern edge of Plaine Corail to more than 1,600mm in the centre-west uplands. Most of the island gets 1,000–1,400mm annually, about the same as the northern plains of Mauritius. The lagoon is studded with islets to the south and west, mostly flat limestone (calcareenite) or sandbanks, though some have small basaltic hills.

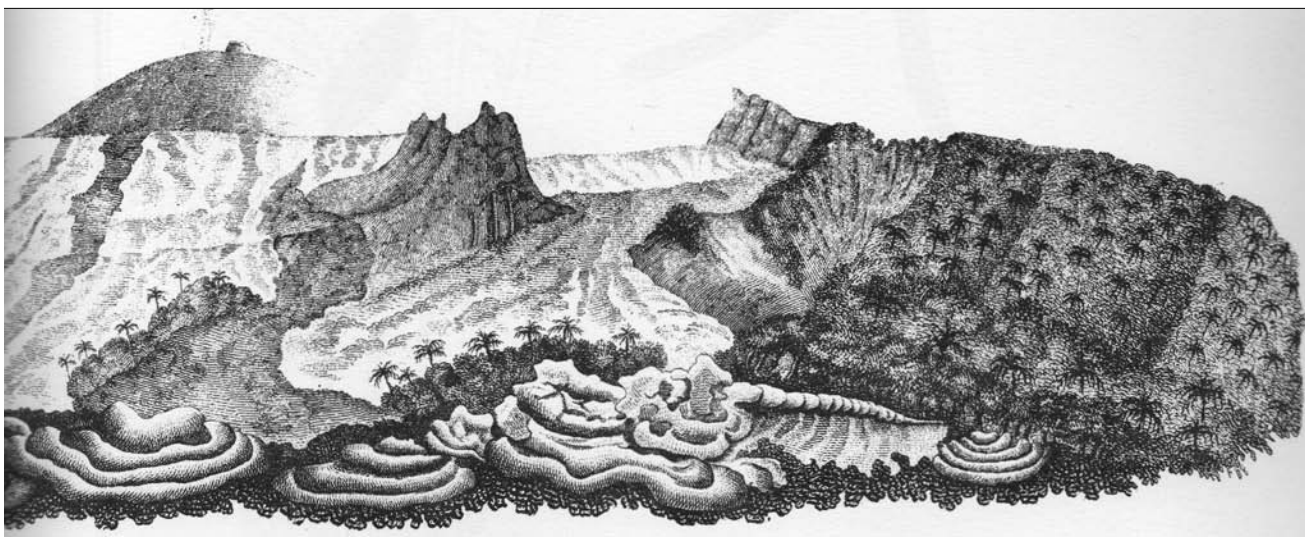
HOW REMOTE ISLANDS ARE COLONISED

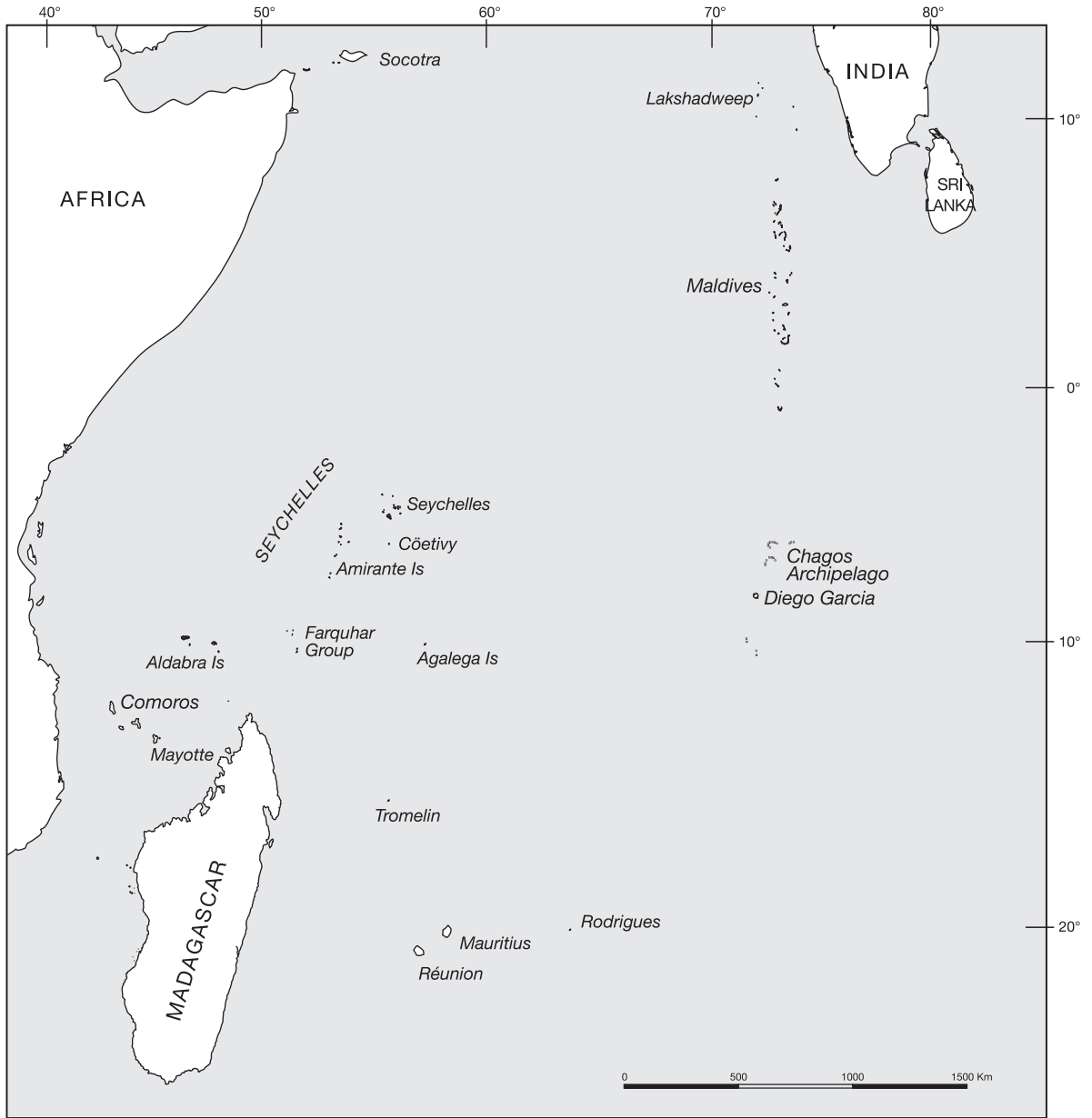
Plants and animals can only colonise a volcanic island once eruptions have ceased in enough of the island to allow life to establish. Even if we know the maximum age of the island from dated rocks, it is difficult to estimate how long the land has actually been habitable. Inferences can be drawn from the plant and animal species that have evolved – the more different they are from their nearest relatives, the longer they are likely to have been there. Thus an overgrown and flightless Dodo, only distantly related to other pigeons, has been there a long time, whereas a Common Moorhen differing little from those in Madagascar (or Europe for that matter) has probably arrived relatively recently. This is only a guide; actual rates of evolution are not known, and some groups evolve

quicker than others. The fact that a species is relatively unchanged does not prove it has not been on an island a long time, it only makes it less likely.

For this reason the relative age of island biotas is often studied using the sum of endemic species, genera and families – the higher the proportion of endemics, and the more there are in higher taxonomic categories, the longer the island has been there. Isolation is also an important factor; the further away from sources of immigration the island is, the fewer colonisers are likely to arrive. There will be less turnover, and a greater chance for those that do get there and survive to evolve into forms adapted to that particular island environment without being threatened by new competitive arrivals¹⁹.

Isolated islands of continental origin, such as New Zealand, Madagascar and the Seychelles 'microcontinent', started off with a pre-established fauna and flora which then evolved in isolation for 60–80 million years; any immigrants from outside would have to compete with the established biota. Volcanic islands are all younger, and often even more isolated, although there are also groups near continents (e.g. the Comoros between Madagascar and Africa), where the influence of their large neighbours is dominant. However, the age and distance of an individual island may be less significant than the history of the hotspot over which the island formed. The Hawaiian chain, the clearest demonstration of the hotspot phenomenon, consists of a long line of islands lying north-west from the large, high, recent and still volcanically active island of Hawaii, similar to Réunion (though much larger)²⁰. It extends through older and progressively more eroded high islands (Maui, Oahu, Kauai; like Mauritius), through low islands with broad lagoons and residual basaltic hills (Niihau, Necker; resembling Rodrigues),



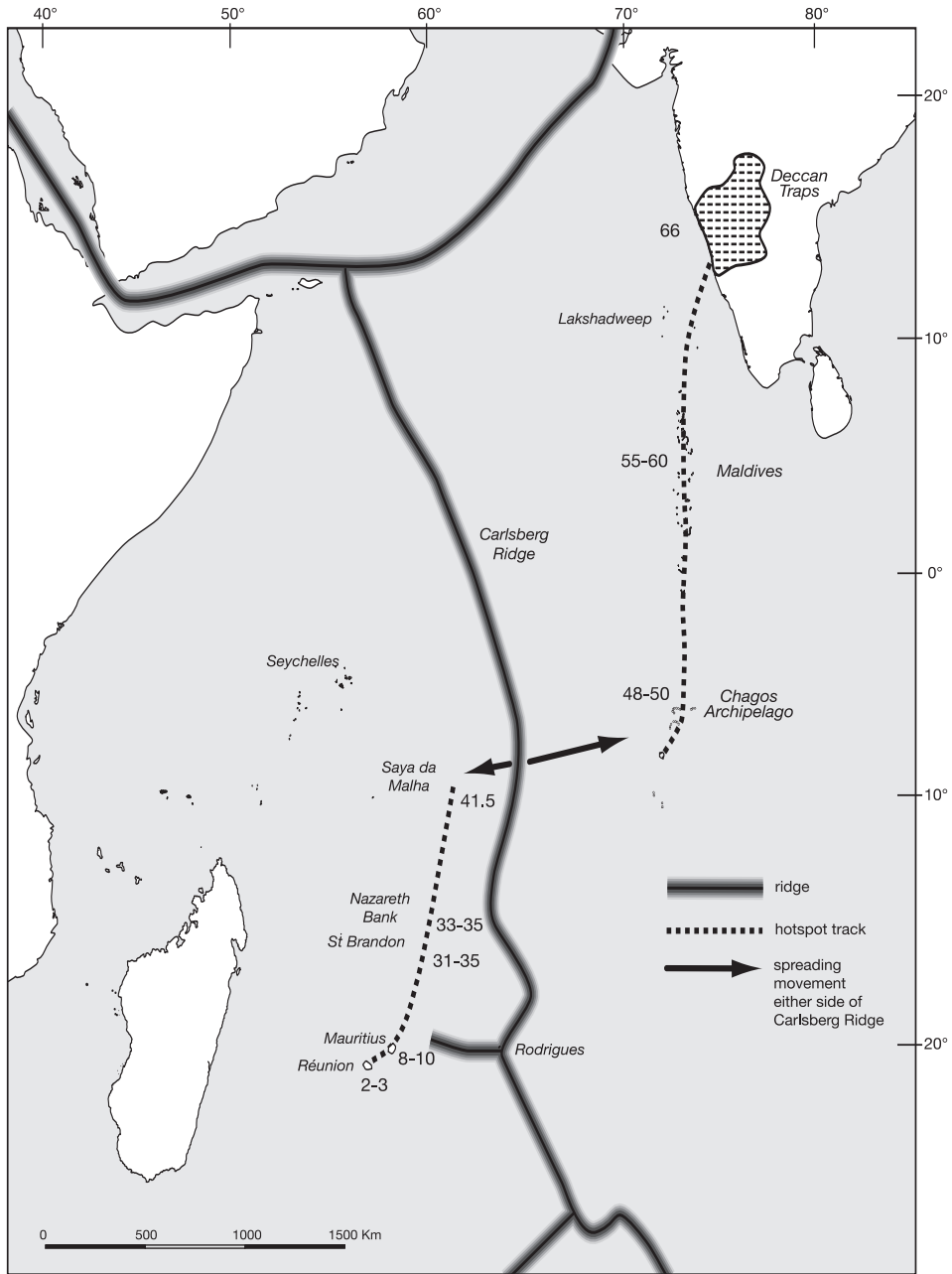


Map 1.1. The western Indian Ocean.

atolls with no volcanic material above sea-level (Laysan, Midway, like Aldabra) to submarine seamounts or guyots that no longer reach the surface. The age of the oldest Hawaiian atolls is around 28 my²¹. As new islands appear in a hotspot chain they can be colonised from their older neighbours.

Newly formed volcanic islands are, of course, entirely without life. Plants and animals will start arriving from the beginning, though which ones and

how many will depend on the island's isolation, size and topography, and the prevailing winds and currents²². Some plant seeds are salt-resistant and water-borne, and others, together with fern and moss spores and many small invertebrates, are carried widely by air currents – these are the first to colonise new islands. Wind-drifted birds and bats, and irruptive species (some rails), will arrive fairly early on, though if the islands are extremely remote (Easter Island,



Map 1.2. The volcanic origin of western Indian Ocean islands. The dates and current positions of the islands along the Deccan–Réunion hotspot track are shown, along with their relation to the Seychelles mini-continent. Adapted from Kearey & Vine (1996), Courtillot (1999) and O'Neill *et al.* (2004).

Hawaii) the number of founding species may be very small. These birds and bats will bring further plant seeds in their guts or stuck to feathers or fur. Larger animals cannot establish until there is vegetation for them to live in and on, and chance plays a much larger part in colonisation – for instance, if a single bird

arrives it will be unable to breed; bats might do better as most females carry their young with them while they are small. It is surprising what can travel across oceans, as there is an alternative to being able to fly or swim. If a tree, or better still a raft of vegetation, is swept out to sea by a storm, any animals on it, and

BOX 1

PETRELS AND SHEARWATERS (PROCELLARIIDAE)

It is now difficult to ascertain the former diversity and abundance of seabirds. Early observers report large breeding colonies of various species, particularly on the islets around Mauritius and Rodrigues, but today many species are locally extinct or comprise non-breeding migrants. Furthermore, some very distinct but enigmatic species are known from just a few sightings and even fewer specimens. The Réunion Black Petrel *Pseudobulweria aterrima* has only been seen on a few occasions, and it was not until the late 1990s that an exhausted but live specimen was photographed; their breeding site has only been located very recently. Another rare endemic, Barau's Petrel *Pterodroma baraui*, is a nocturnal species breeding on Réunion and occasionally Rodrigues in the past, and a rare vagrant to Mauritius. The northern islets off Mauritius and Round Island in particular have remained a sanctuary for petrels, though the 'Round Island' Petrel, currently considered (pending DNA studies) to be a population of Trindade Petrel *Pterodroma arminjoniana*, may be a recent colonist. Two widespread shearwaters nested on Mauritius and Réunion, Tropical Shearwater, now *Puffinus bailloni* (following recent DNA work), which is no longer resident in Mauritius, and the Wedge-tailed Shearwater *P. pacificus*, which is still common.

Petrels have always been considered fair game for mariners, and their habit of nesting in burrows has made them extremely vulnerable to egg and chick predation by humans and introduced predators, particularly rats and cats.

Accounts (a selection)

Joinck (in Keuning 1938–51) on Wedge-tailed Shearwaters in 1598 (translation by Henk Beentje):

Also there are birds that shriek like humans, they are in holes under the earth and if one had not found them, one would have said that it was a rabble, as they shriek all night long especially in the morning, because there were sailors that went towards the shrieking and took the birds out of the holes, and they were good grey birds good to eat. I have been on a river at night with our sloop and there was such shrieking as if 50 people complaining at each other, but it was all birds.

Bory (1804) on Barau's Petrels in 1801, at the Caverne à Cotte, above the Rivière des Remparts:

All the cave's vicinity was strewn with seabirds' heads, of the petrel kind. The not inconsiderable heaps of bodiless debris having attracted my attention, I learnt that these were heads of fouquet. The fouquet appeared to me to be the same bird of which Labat had spoken so much, and which in his time in the Antilles were called diabolins. Not finding myself in the season when fouquets were taken, I shall confine myself to reporting what I was told. In spring, a brown coastal bird, strongly reminiscent of a gull ['goëland'], and called taille-vent, abandons the shoreline and comes to lay its eggs in these areas of cliffs, which nature appears to have wished to render inaccessible. It is at the time of the solstice that the nestling taille-vents have acquired a certain size and excessive fat deposits that make them sought after. Then the creoles go seeking them, and all those they find are preserved in salt that they carry with them. These birds, thus salted, keep for some time, and take on a taste more or less like old hareng-saurs [red herrings]. Their fat is unctuous, and smells somewhat of fish oil, as with all seabirds. The Morne de Langevin, the Volcan, the heights of the rivière de l'Est and the Salazes are the places where the fouquets are most often found.*

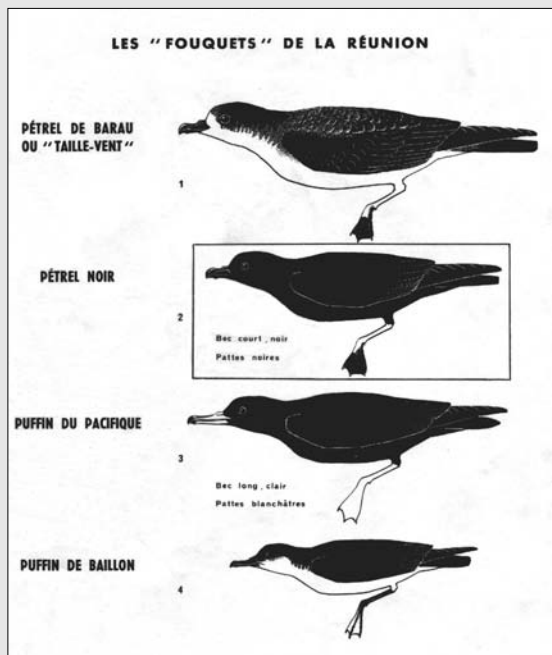
[Later, near the Piton Dolomieu of Le Volcan] *The wind carried the [volcanic] vapours to the opposite side from where we were. I saw some of those seabirds called in this country fouquets, and which retire for the night in the high mountains, passing to leeward of the crater without appearing inconvenienced. One of them crossed the crater itself without altering course and without appearing dazzled.*

Lesueur (1803, unpublished MSS in Le Havre), on the Tropical Shearwater in Mauritius in 1803:

We often saw tropic-birds in the mountains where these birds come to make their nests in rock cavities, and a bird known in the island by the name of coupe vent ['wind-cutter'] and which hunters regularly shoot by lying in wait of an evening towards Montagne Longue. It is a petrel which approaches [in appearance] the Petrel obscur (Lin.) [Little Shearwater, now Puffinus lherminieri] of northern seas, [but] I do not think it is the same species. It appears that its habits are to go out a considerable distance from the shore, as one does not see them, or at least I never saw one, flying about on the island's coasts. In the evening these petrels regain the coast and head for the mountains to spend the night there. It is in the moment they pass [over] that the hunters shoot them.

Tafforet (1726), in Rodrigues. Note that *fouquet* is a general name in the Mascarenes for shearwaters and petrels; the first bird described here is the Wedge-tailed Shearwater:

The fouquet is the colour of fols [noddies] but a little larger, and its beak is longer and hooked like a frigate-bird. They do not go far [out] to fish, and normally [do so] at night. There are those who say they cannot fly by day as the light is too bright for them, but I have however seen them flying about in daylight not sticking to a known route. They are [found] in holes under rocks, and cry like little children. At night when they go out to fish, I have made many fall to earth in this way: as they leave their holes and you hear them call, you need a dry latan leaf to set fire to suddenly. As soon as they see the light they fall to the ground. In contrast, if they do not see it, they continue on their way. . . . There are also mountain fouquets [probably gadfly-petrels Pterodroma spp.] but very few; I have only seen them in flight which is why I cannot speak [more] pertinently; they nest in holes in the ground high in the hills.



Petrels in Réunion. Publicity poster illustrated by Paul Barruel, c. 1970.

* Bory was spot on here; the *diablotin* is the very similar-looking Black-capped Petrel *Pterodroma hasitata*, now rare, but formerly widespread in the West Indies (Brooke 2004).

even some of the plants (or at least their seeds), may be able to survive for days or weeks drifting across the sea. This is how lizards, snakes and many invertebrates (e.g. snails) are believed to colonise islands, both as living adults and as eggs²³. Many reptiles (and/or their eggs) are resistant to sea-water, and can survive long journeys on floating logs or vegetation; some, notably tortoises, float very well by themselves²⁴. Some snails can seal themselves into their shells, which enables their otherwise vulnerable soft bodies to survive on floating vegetation. Other vertebrates, notably amphibians and mammals (other than bats) are normally unable to cross sea-water barriers. The presence of endemic rats on isolated islands such as Christmas and the Galápagos²⁵ is exceptional, and until recently it was thought that amphibians and freshwater fish never reach truly oceanic islands²⁶, but island age and DNA studies have shown that some frogs must have crossed the sea to Madagascar, Mayotte and the Seychelles²⁷.

Movement through the islands

While life starts arriving as soon as the first island becomes habitable, some of the biota can ‘hop’ to newer islands as they emerge over the hotspot²⁸ while the original point of colonisation erodes over millions of years. Thus the age of the chain may be more important than the age of individual islands, at least for those animals or plants that can still disperse. Only part of an island’s biota will be able to hop to a newer island; those that have become flightless, or have developed heavy short-lived seeds, become extinct as the island becomes an atoll or submerges altogether. In the Indian Ocean colonisation was also facilitated during the extended Pleistocene periods of lowered sea-level²⁹ by the presence of many more islands, some very large, providing ‘stepping stones’ for good fliers from southern India. Many of the more geologically recent arrivals amongst birds and flying-foxes, most of which have Asian affinities, probably reached the islands at this time (pp. 63–65)³⁰. Winds and ocean currents nowadays favour dispersal from Rodrigues to Mauritius and not the other way, though this may have been different in the past, and in any case the mass of the Nazareth and St Brandon banks creates current eddies that can back towards Rodrigues³¹.



Figure 1.2. “This lizard is hopeful of arrival on an island by means of the log raft on which it has inadvertently become a traveller”; illustration from Carlquist’s classic *Island Life* (1965).

There are good biological reasons to suppose that Réunion was colonised well after the other two Mascarene islands. It had no flightless birds, only one tortoise species, fewer endemic forms in relation to its area, and many species shared with Mauritius, the likeliest source. This is to be expected as it is clearly a geologically young island; steep, high, with an active volcano and little reef development. Although the island is believed to have emerged about 3 mya, and the oldest dated rocks are from 2.1 mya, there was a cataclysmic series of eruptions from the dying Piton des Neiges volcano over the period 223,000 to 188,000 years ago, during which much of the island would have been smothered in pyroclastic flows or subject to fires they initiated³², as happened at Krakatau off Java in 1883³³. Many species must have been lost in this holocaust, hence much of what was recorded by the first human visitors will have colonised since these eruptions. By contrast, Mauritius and Rodrigues shared similar flightless birds (rails and the oversized pigeons, the Dodo and Rodrigues Solitaire), large-headed parrots, big endemic day-geckos, two tortoise species each, and an extra fruitbat. Together with a much more eroded topography³⁴, these factors suggest a much longer timescale for species to evolve. Most of this is also mirrored in the flowering plants and snails³⁵, though not in very mobile groups like ferns, orchids or butterflies³⁶. Flightless birds cannot cross the sea, so the Dodo and Rodrigues Solitaire’s ancestors, and those of the flightless rails, must have flown to Mauritius and Rodrigues – their descendants becoming flightless on these islands before Réunion

emerged (and well before the pyroclastic eruptions), which explains why that island had no dodo equivalent. Other animals and plants did hop successfully from Mauritius to Réunion, only 164km away, its cloud bank (and rarely the mountains themselves) visible from high up on a clear day, which is why they share so many species (or sibling species) today (x-refs Chapters 3 and 4)³⁷. Only one bird, two fruitbats and a handful of snails (but no reptiles) were shared between Rodrigues and Mauritius, the bird and one bat being mobile enough to colonise Réunion also³⁸. Mauritius also suffered a devastating eruption well after its origin; the phase of 'intermediate lavas' in Mauritius ended with an explosive episode around 500,000 years ago³⁹, which must have been almost as destructive to the biota as the later events in Réunion, though we know that many species did in fact survive; as some reptiles (and no doubt plants) also did in Réunion⁴⁰.

The generally accepted dates, originating in the 1960s, suggest that Mauritius is the oldest island (8+ my) and Rodrigues the youngest at 1.5 my, but the composition of the flora and fauna is more consistent with these two islands being of similar age, and the potassium-argon dates for Rodrigues are based on just two rocks currently above sea-level⁴¹. Rodrigues would have been nearly ten times larger when the sea-

level was 100m or more lower during the Ice Ages⁴², but that only takes us back two million years or so. The key appears to lie in the age of the Rodrigues Fracture Zone which began its activity 8–10 mya⁴³. The lack of raised beaches indicates that Rodrigues is sinking⁴⁴ (as volcanic islands always do with time⁴⁵), so it is probable that 8–10mya Rodrigues emerged as a high island, a view supported by more recent work which has identified a series of older lavas⁴⁶. Either island could also have been seeded from an earlier island spawned by the hotspot – e.g. St Brandon, the nearest. This archipelago of atolls and banks⁴⁷ some 385km northwest of Mauritius may still have been a 'proper' island when Mauritius and Rodrigues first emerged; its submarine basalts are dated to 31 mya⁴⁸, similar in age to Midway atoll in the Hawaiian chain. There is a small guyot (Soudan Bank) much nearer, rising to within 13m of the surface only 175km northwest of Mauritius, and another at 46m depth that lies 147km east of Rodrigues, both of which may have at one time been high islands, as well as re-emerging during the Ice Ages⁴⁹. The discrepancy between the traditional dating of rocks in Rodrigues and the apparent age of the biota remains to be fully resolved⁵⁰. The origins of animals that reached the Mascarenes will be discussed further in Chapter 4.



CHAPTER 2

FIRST CONTACT

FINDING AND DESCRIBING THE MASCARENES

The five ships . . . being severed beyonde the Cape of buona speranza from the other three of their company, and having quite lost them, came all of them shortly after under an island called (as it is thought) by the Portugals Isola de Don Galopes: but they named it the island of Mauritius. Here they entered an haven, calling the same Warwicke, after the name of their vice-admirall, wherein they found very good harborow in twenty degrees of southerly latitude. This island . . . is a very high, goodly and pleasant land, full of green and fruitful vallies, and replenished with palmito-trees, from the which droppeth wholesome wine . . .

The first Dutch account of Mauritius (only the English version has survived)¹

The twentie seventh, latitude twentie one degrees, then we saw an Iland West South-west, and South-west by West some five leagues from us being very high land . . . The Ile is like a Forrest, and therefore I called it Englands Forrest; but others call it Pearle Iland, by the name of our ship [marginal note: A new iland discovered in 21. degrees]

J. Tatton, on ‘discovering’ Réunion, 27 March ‘1612’²

More than two thousand years ago, traders from the Mediterranean and Arabian regions were already making the sea crossing to India, and penetrating south along the African coast to Zanzibar. Mariners from the east, probably from trading posts in northern Sumatra, were independently exploring, and they reached Madagascar first, around 800 AD. They knew Aldabra and other islands north of Madagascar, and the Maldives nearer India, but appear to have largely ignored them. Well to the south of regular trade routes, the Mascarenes evaded early discovery. There is no evidence that the proto-Malagasy people (from Sumatra or Java) ever encountered them, and the Arabs apparently only did so around 1300 AD. Arab mariners apparently did little except note them on their charts, which were later acquired by the Portuguese³. To avoid their discoveries being leaked to rival European powers, the Portuguese in the 16th century wrote no reports on the lands they explored, so details of their itineraries are often obscure. Through careful study of surviving records of their voyages, Mauritian historian Alfred North-Coombes concluded that the islands were first seen by the Portuguese in 1510 (Réunion), 1516 (Mauritius) and 1528 (Rodrigues)⁴. They appear to have landed

only rarely – to reduce risk of detection they were under instruction to avoid intermediate landfalls and to hurry inconspicuously to and fro with their spices (and booty stolen from Arab traders). North-Coombes traced only one record of a Portuguese landing; in 1528 *Santa Apelonía* (Réunion) was said to have “plenty of fresh water, trees, birds and fish” – indicating a previous landing. When they thought an island could prove useful, the Portuguese planted bananas and left livestock to multiply and provide fresh meat on future visits; they left nothing on Mauritius or Rodrigues, but may have left goats on Réunion⁵.

The arrival of the Dutch

The first properly documented landing was in 1598, when Admiral van Warwyck from the newly independent Netherlands led a fleet into what is now Mahébourg Bay in Mauritius. Unlike the Portuguese, the Dutch recorded everything they found, including material from a shipwreck, though there was no indication of human survivors⁶. Rodrigues was visited briefly by the Dutch in 1601⁷, and frequently sighted thereafter. The lack of a natural harbour and the formidable defence of encircling reefs persuaded most

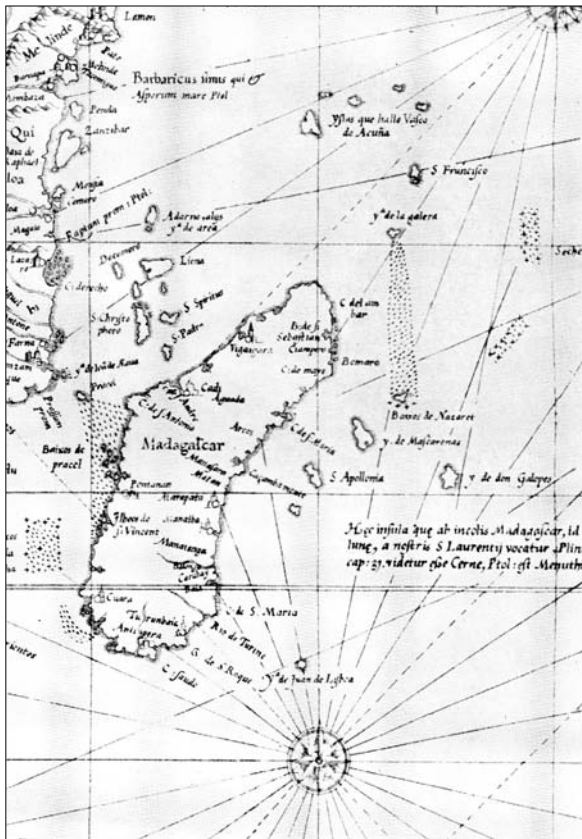


Figure 2.1. Mercator's map of Madagascar and islands nearby, 1569. From Vissdelou-Guibeau (1948).

passing ships to stay well clear, and no useful descriptions exist before Leguat's account of his two year exile there in 1691–3⁸. Réunion was the last to have its first descriptive visit, until recently thought to be by the English East-Indiaman the *Pearl* in 1613, under Captain Samuel Castleton. However, Bontekoe reported that in 1619 he had found a plaque recording an earlier Dutch visit by 'Commander Arieaen Maertsz Block' with 13 ships. Adriaan Martensz Blok had indeed left Holland in December 1611 with 13 ships and stopped at Réunion during 6–23 August 1612; his brief account has only recently been discovered⁹. However this does not explain how the chronicler of the remnant of Verhoeff's flotilla, sailing past without stopping in late December 1611, knew that the island abounded in tortoises, birds and fish – perhaps someone had good Portuguese contacts¹⁰.

To voyagers in those days it was a surprise and a wonder to find these lush islands uninhabited, 'desert' islands in the original sense of 'deserted'. It was not long before reports of shipwrecked sailors living for years on wits and wildlife (before being eventually rescued) led to romantic novels on the same theme. There were several such incidents in the Mas-

carenes¹¹, which was perhaps why Henry Neville included a Dodo-like bird in the first of these novels, *Island of Pines*, published in 1668¹². The proliferation of such novels in the early 1700s, typified by *Robinson Crusoe* in 1725, led to real accounts becoming suspect, with unfortunate results for the credibility of Rodrigues's first inhabitant, as we shall see.

Interpreting early descriptions

One of the problems confronting any historian is the use of names. If an object, plant or animal mentioned in an account is given a name but not actually described, how do we work out what it is? If a whole culture, fauna and flora is unfamiliar to an explorer, how does he (mariners of the 16th and 17th centuries were all men) name the novelties, and if he does describe them, is the description too entrenched in the writer's own background to be easily interpretable? These problems, particularly the second, are well illustrated in early accounts of the Mascarenes. There is a further complication; many of the travels were rapidly translated into other European languages by people who knew nothing of the islands being described, often compounding confusions inherent in the original.

Let us start with the famous engraving of the first Dutch camp on Mauritius, made to accompany the account of the voyages undertaken under Admirals Cornelisz van Neck and Wybrant van Warwijck, and published in 1601 (Figure 2.3)¹³. The wildlife in the picture consists of six birds, a bat, tortoises and fish, plus a number of trees including two palms. Three kinds of bird, the bat and the two palms are given explanatory text.

Three birds are named specifically: *walckvogel*, made up on the spot by the sailors, *rabos forcados*, a Portuguese name presumably borrowed from other mariners, and *Indische raven*, a term (together with its French equivalent *corbeau indien*) that came to mean 'hornbill' in the East Indies. Two of these birds are also described, so they can be identified directly with a high degree of confidence, although the pictures are rudimentary. The other biota, given names for their perceived equivalents in Europe, are not described and can only be identified inferentially from other evidence: 'tortoise', 'bat', 'turtle dove', 'parrot', 'palm-tree', 'date-palm'¹⁴. It is also instructive to compare our understanding today with what Hugh Strickland made of the picture in 1848, before any subfossil bones had been found.

The walckvogel

The *walckvogel* was completely new to everyone on the ships, so they described it fairly fully, and, though the picture is sketchy, it would have been enough to identify the bird once specimens had been brought to

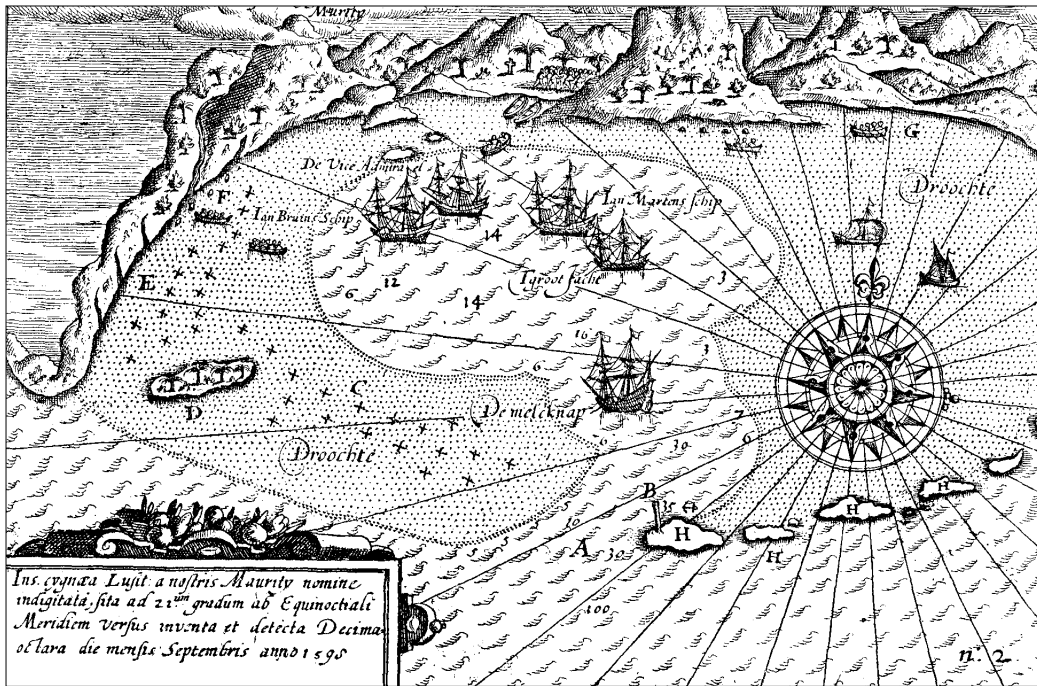


Figure 2.2. Van Warwijck's fleet in Grand Port harbour, Mauritius in 1598. The islet with palms to the left ('D') is Ile aux Aigrettes, the series on the right ('H') the group where Leguat was exiled a century later. From a facsimile in Bonaparte (1890).

Europe. One of the sailors on the same expedition used a quite different alternative, *doederssen*¹⁵. The next visitors (Harmensz's voyage) called the same birds *griff-eendt* or *kermisgans*, and *dronthe* (the *Gelderland* crew)¹⁶, though the captain of one ship in the fleet (the *Zeeland*) called them *dronten* or *dodersen*¹⁷. By 1602 we have *dod-aars*, *dronthe* and *walghvogel*, and in 1606 they have become (in German) *totersten* and (again) *walckvogel*¹⁸. Only in 1628 does 'dodo' first appear in English for the mystery flightless bird¹⁹; the alternative form 'dodar', current from 1638, survived well into the 18th century²⁰. The bird was so unique that only two of these appellations borrow from another bird-name; *dodaars* is used in Holland for the Little Grebe (*Tachybaptus ruficollis*), a small, round-bodied 'tail-less' bird, while *griff-eendt* and *kermisgans* were used almost as a joke; van Warwijck's fleet anchored in Grand Port Bay on 20 September 1598, the day before Amsterdam fair or *griff*, better known as a *kermis*²¹. *Griff-eendt* ('fair-duck') and *kermisgans* ('festival-geese') refer to fowl fattened for the fair. Dodos were as big and fat as 'kermis-geese', so acquired the nick-name, revived (and first recorded) when the *Gelderland*, van Warwijck's flagship, returned to Mauritius on almost the same date in 1601; there is no suggestion that anyone thought Dodos were related to real geese or grebes. In 1601, though not rediscovered till the 1860s, there was

an official artist on the *Gelderland*, who made accurate drawings of fish, a turtle and four species of bird, including a freshly killed Dodo. Although the bird in the drawing is not named, a map in the same folio indicates where the 'kermis-geese or *dronten*' were caught, thus clinching the identification²².

Rabos Forcados

The plumage and behaviour of the *rabos forcados* are described well enough to enable anyone familiar with tropical seabirds to recognise frigatebirds (*Fregata* spp.), as Strickland correctly noted. In the 1840s the taxonomy of this group had not been worked out, and the name Strickland used for the Mauritian bird, *F. aquila*, is now restricted to the Ascension Island Frigatebird in the Atlantic. Both the species likely to have occurred in Mauritius, the Lesser and Greater Frigatebirds (*F. ariel* and *F. minor*), have blackish females and young with white underparts, so the bird in the engraving must remain indeterminate²³.

The Indian Raven

The 'Indian raven', of which only the colour is confusingly described, was pictured as a large bird with a substantial beak and a kind of projection on its forehead, perched up a tree. The birds were often referred to in subsequent reports, the Dutch always calling them *ind(ian)ischelindiaensche ravens*, translated

Figure 2.3. Dutch life on Mauritius in 1598. From a facsimile in Bonaparte (1890). Numbers have been overwritten with modern versions to improve clarity. We have used Strickland's translation into English (1848, Appendix A) from the French of an early version of the voyage; names in the original Dutch and French are italicised in brackets. Moree's (1998) English version, direct from the Dutch, is less faithful to the original (i.e. it contains more interpretation); for the original Dutch see Keuning (1938–51, vol. 3).



1. Are tortoises [*schildtpadden*] which frequent the [high] land, deprived of paddles for swimming, of such size that they load a man [and can still walk very upright]; [they also] catch crawfish [*escruiisses/ecrevisses*] a foot in length which they eat.
2. Is a bird called by us *walckvogel* [*oiseau de nausée*] the size of a swan. The rump is round, covered with two or three curled feathers; they have no wings, but in place of them three or four black feathers. We took a number of these birds, together with turtle doves [*turtelduyven*] and other birds, which were captured by our companions when they first visited the country, in quest of a deep and potable river where the ships could lie in safety. They returned in great joy, distributing their game to each ship, and we sailed the next day for this harbour, supplying each ship with a pilot from among those who had been there before. We cooked this bird, which was so tough that we could not boil it sufficiently, but eat it half raw. As soon as we reached the harbour, the Vice-Admiral sent several men ashore to seek for inhabitants but we found none, only turtle doves and other birds in great abundance, which we took and killed, for as there was no one to scare them, they had no fear of us, but kept their places and allowed us to kill them. In short, it is a country abounding in fish and birds, insomuch that it exceeded all the others visited during the voyage.
3. A date tree, the leaves of which are so large that a man may shelter himself from the rain under one of them, and when one bores a hole in them and puts in a pipe, there issues wine like [sack]; a mild and sweet flavour; but when one keeps it three or four days it becomes sour. It is called palm-wine.
4. Is a bird which we called *rabos forcados*, on account of their tails which are shaped like [tailors'] shears. They are very tame, and when their wings are stretched they are [easily] a fathom in length. The beak is long, and the birds are nearly black with white breasts. They catch and eat flying fish, also the intestines of fish and birds, as we proved with those we captured, for when we were dressing them, and threw away the entrails, they seized and devoured the entrails and bowels of their comrades. They were very tough when cooked.
5. Is a bird which we called Indian Crow [*Indische raven/corbeau indien*], [about the size of a] parroquet [*papagaien*; macaw implied], of two [and] three colours.
6. Is a wild tree, on which we placed (as a memorial in case ships should arrive) a tablet adorned with the arms of Holland, Zealand and Amsterdam, so that others arriving might see that the Dutch had been here.
7. This is a palm tree [*palmit*]. [A good] many of these trees were felled by our companions, and they cut out the bud marked A, a good cure for pains in the limbs. It is two or three feet long, white within and sweet; some ate as many as seven or eight of them.
8. Is a bat with a head like a meerkat*. They fly here in great numbers, and hang in flocks [on] the trees; they sometimes fight and bite each other.
9. Here the smith set up a forge, and wrought his iron; he also repaired some of the ironwork on the ships.
10. Are huts which we built of trees and leaves, for those who aided the smith and cooper [in smithing and coopering in order to depart] at the first opportunity.
11. Here our chaplain [Philips Pietersen of Delft], a sincere and plain-spoken man, preached a very severe sermon, without sparing anyone, twice during our stay on the island. [Half went on land to attend it in the morning, the other half in the afternoon]. Here was [a man named Laurens, born on the island of Madagascar] baptised, along with one or two of our own men [who had not been baptised].
12. Here we applied ourselves to fishing, and took an incredible quantity, to wit, two barrels and a half at one haul, [of all] different colours.

* 'meerkat' (literally 'lake-cat') must have been a colloquial term for a familiar Dutch animal, probably an otter; this was before the South African animal now known as Meerkat *Suricata suricatta* had been discovered. The French translation used 'marmelot', also unidentified, but translated by Strickland as marmot – but that alpine animal would have been unfamiliar to Dutch sailors.



Figure 2.4. Head and foot of a freshly killed Dodo, drawn by Joris Laerle in 1601. From Moree (2001).

into French as *corbeau indien*. Although also applied in France to macaws in the 1650s²⁴, the term was widely used in Dutch, French and English in the East Indies to denote hornbills²⁵. Confusion persisted for well over a century – in the 1770s Buffon was still mistakenly assuming that some sort of crow (as in the everyday use of ‘*corbeau*’) was being discussed²⁶. Strickland, reflecting the most widespread usage, and influenced by the projection over the bill of the bird in the engraving, assigned the ‘*Indische raven*’ rather definitively to ‘a species of *Buceros*’ i.e. a hornbill. Although quoting Thomas Herbert at length, Strickland uncharacteristically failed to notice that Herbert’s ‘*cacato*’ was curiously similar to the bird in the Dutch engraving (though mirror-reversed), and represented the same species. A ‘*cacato*’ (cockatoo) is likely to be a kind of parrot, and indeed Herbert described them succinctly as “birds like parrats, fierce and indomitable”. Nonetheless, later writers were confused by Dutch voyagers always referring quite separately to ‘*Indianische ravens*’ and ‘*papagaien*’ as

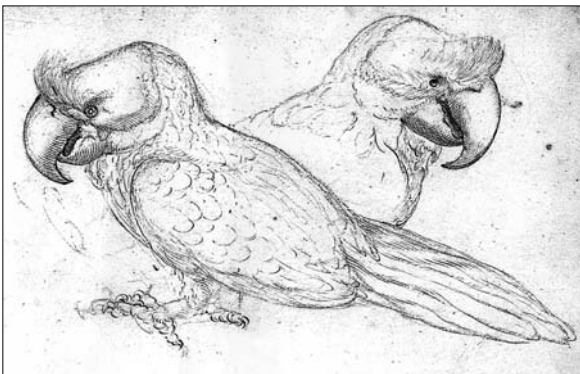


Figure 2.5. Two Raven Parrots, drawn by Joris Laerle in 1601. From Moree (2001).

two separate classes of birds, while failing to give useful descriptions, though Pastor Hoffman in 1675 did his best: “red crows with recurved beaks and blue heads, which fly with difficulty and have received from the Dutch the name of ‘*Indianische ravens*’”²⁷. Thus until subfossil material of a large parrot was found in the 1860s, the Indian Raven was misidentified or ignored; mentions of parrots, even from English visitors who never used the term ‘Indian Raven’, were taken as referring to something quite different. Even finding the bones did not immediately clinch the argument; Emile Oustalet was still arguing in 1897 that ‘*corbeaux indiens*’ were hornbills whose bones were yet to be found, formerly present in addition to the extinct parrots by then named *Lophopsittacus mauritianus* (and hereafter called Raven Parrots)²⁸. In 1983 Pierre Verin, compiling a book of old voyages to Mauritius, called the bird a hornbill, and in 1993 France Staub revived the idea again²⁹. No hornbill bones have been found. In fact, their presence would be most improbable on zoogeographical grounds; hornbills are poor at sea crossings and unknown on oceanic islands³⁰. The artist on the *Gelderland* also drew this bird – unequivocally a large crested parrot. An analogous saga is still being played out in relation to the supposed Réunion dodo (of which more later).

The Red Hen

The *Gelderland* artist also drew another flightless bird, with a slender, curved bill. The contemporary Dutch voyagers never described such a bird, but their lists included the ‘hen’ words *feldhüner* or *veldt-boenders*, used in Germany and the Netherlands for grouse and partridges. Thomas Herbert mentioned ‘hens’ in 1629, providing a sketchy drawing but no description, and Cauche referred to “red hens [*poules rouges*] with woodcocks’ beaks”³¹. Strickland, whose intuition failed on the big parrot, did better here. He assimilated these birds, a drawing from van den Broecke (visiting in 1617), together with birds Leguat later called ‘*gelinottes*’ (another ‘grouse’ name), as representing the same species, but was unable to identify it, not having access to the *Gelderland* journal or subfossil bones. Nearly 20 years later bones of a large flightless rail, a 17th-century picture of a flightless bird with chestnut plumage and a long decurved bill, and Peter Mundy’s manuscript with another description and sketch were discovered. The mystery was solved; these birds were all *Aphanapteryx bonasia*, the extinct Red Hen or Red Rail³² – which leads us on to an awkward case of mistaken identity.

In the 1620s and 1630s visitors to Mauritius expected to see Dodos, having read the popular Dutch accounts widely published in friendly European languages – French, English and German (the Dutch were at war with Spain and Portugal³³). However by

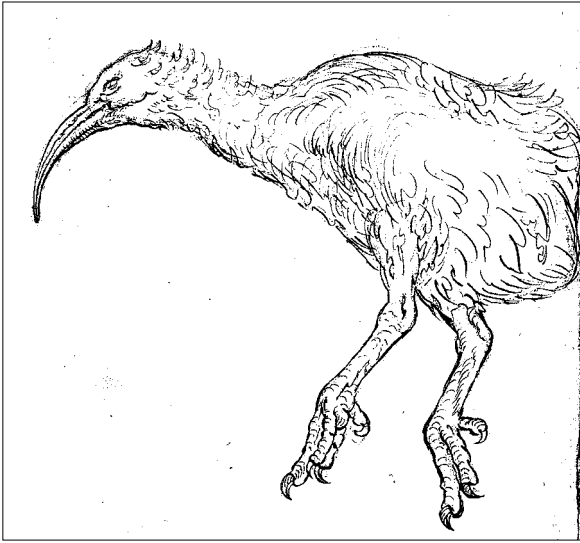


Figure 2.6. A freshly killed Red Hen, drawn by Joris Laerle in 1601. From Moree (2001).

the late 1630s visitors were failing to find them, Peter Mundy in 1638 having to be content with two captive ones seen a decade earlier at the Indian port of Surat, on his previous trip³⁴. After 1640 there was a period in which no-one saw or mentioned the birds³⁵, until in 1666 John Marshall saw “dodos or red hens which are larger a little than our English hens, have long beakes and their wings so little it is not able to support their bodies”³⁶. His ‘dodos’ were clearly not true *Dodos* *Raphus cucullatus*, but explicitly equated with Red Hens. In 1675 Pastor Hoffman, whose description of Indian Ravens we met earlier, reported a “particular sort of red bird known as *toddarschen* which is the size of an ordinary hen”³⁷. As Alfred Newton pointed out in 1868 when the Hoffman account first surfaced: “it would appear from this [usage] that in Hoffman’s time one common name of the Dodo had been transferred to another species of bird, in accordance with that odd process of substitution which has obtained in so many countries, where the rightful owner expiring bequeaths (as it were) its titles to a survivor”³⁸. All late references to ‘Dodos’ or ‘*Dodaersen*’ must therefore be examined very critically; they are as likely to be referring to Red Rails – the oft-cited last observation of the Dodo, by Benjamin Harry in 1681, is very much at issue here³⁹; we will return to it in Chapter 5.

Ben Van Wissen pointed out in his Dodo book that in the 17th century “copyright or author’s rights on works of art did not exist. People simply borrowed, pirated, or stuck in bits at will, with or without acknowledging their sources, just so long as the result was tasteful and saleable”⁴⁰. Such plagiarism was rampant, and often makes it difficult to assess whether a published account is genuinely that of the

voyager, or has been amplified or amended later by the author or an editor. Van Wissen illustrated this with an extreme example where a Dodo picture was ‘borrowed’ to illustrate a voyage through the Straits of Magellan, where the mariners were said to have caught and salted large numbers! In the Mauritian context the reverse occurred; penguins were used to illustrate Dutchmen catching Dodos in the published version of Harmensz’s voyage, and cassowaries do duty for Dodos in another engraving, from De Bry’s collection of voyages⁴¹. Thomas Herbert’s engravings of a ‘palmeto tree’ (*Latania*), and ‘a tropique bird’ (Frigatebird or *rabos-forcados*) are clearly copied from the classic 1598 Dutch engraving discussed earlier (Figure 2.3), and the earlier picture appears also to have influenced his Dodo and ‘cacato’, though unlike the Dutch illustration, his rather odd ‘batt’ is shown correctly hanging head down. Mauritian Dodos were twice borrowed by publishers to illustrate different versions of Bontekoe’s account of his visit to Réunion in 1619. A Dutch edition of 1646 used a Savery sketch, and Thevenot used van den Broecke’s drawing to illustrate a French edition in 1663 – contributing to the misidentification of the Réunion ‘Solitaire’ (see p. 30) that was not cleared up for over 300 years. Strickland spotted both the transposition and the identity problem, but died in 1853 before the real nonsense started. Bontekoe (or his Dutch editor) compounded the problem by claiming to have seen *dod-eersen* in Réunion, but as he was expecting to go to Mauritius (his ship having missed the target), he seems to have added in the iconic Mauritian bird as an afterthought from earlier descriptions of that island, as Strickland surmised in 1848⁴².

Due to this epidemic of copying, it is difficult to assess reports that closely mirror previous accounts – the authors (or editors) could be copying, or the accounts could be similar simply because the same animals and plants were seen. The faunal lists given by early Dutch visitors to Mauritius subsequent to 1598 are suspiciously similar and may not be independent, and this problem gets worse in the early 1700s when compilers, both French and Dutch, recycled old reports and presented them as up-to-date accounts of the islands⁴³. One fascinating story is that of the use of red cloths to catch Red Hens (see Box 11, p. 127). This tale developed as the 17th century wore on, but it is difficult to tell whether through copying or observation; Leguat independently said the same of the flightless rail in Rodrigues⁴⁴. In general, voyagers were most interested in wildlife they could kill and eat, so anything ridiculously easy to catch warranted a comment. This may partly explain the decline in Dodo and Red Hen reports as the 17th century progressed – even if the birds still existed in small numbers, there were too few to be worth hunting or writing about.

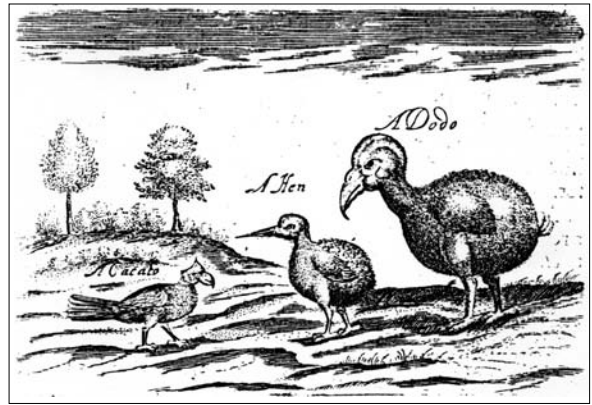
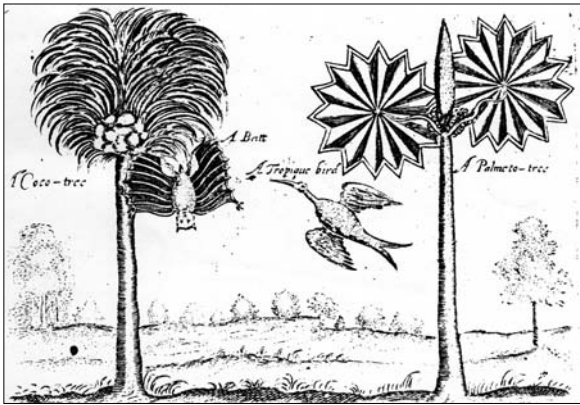


Figure 2.7. Animals and trees in Mauritius, from Thomas Herbert's travels (1634). Note how the 'Cacato' (Raven Parrot), the Dodo, the 'Tropique bird' (Frigatebird) and 'Palmeto-tree' are copied from Figure 2.3. The bat also features in Figure 2.3; only the 'Coco tree' (Coconut) and 'Hen' (Red Hen) are new.

Leguat's giant

Perhaps the most bizarre example of mistaken identity gone rampant is the story of Leguat's *géant*(t) or 'giant' bird (Figure 2.8). François Leguat, in his otherwise meticulous account of his time in Rodrigues and Mauritius in 1691–95, combined this name, a picture borrowed from Adriaan Collaert's century old *Avium vivae icones*, and a fairly detailed description to create an entity that has generated argument and a pile of literature ever since⁴⁵. Take away the distractions of the name and the picture, and it is easy enough to recognise the birds seen in Mauritius from Leguat's description:

*One sees many of those birds known as 'géants' because their head stands about six feet [high]. They are extremely high-mounted and have a very long neck. They are completely white, except for an area under the wing which is a bit red. They have a goose's beak, but a little more pointed, and the toes of the feet are separate and very long. They graze in marshy areas, and dogs often surprise them because it takes them a long time to get into the air ...*⁴⁶

As Buffon first noted in 1781⁴⁷, this description comes very close to a flamingo, particularly in the diagnostic red patch under the wing, though it fails on beak shape and the fact that flamingos have webbed feet. However Leguat got his name from Marquis Duquesne's prospectus for establishing an island paradise, for which Leguat and his companions were supposed to be the advance party⁴⁸. Duquesne was aiming for Réunion (not Rodrigues), and copied, almost word for word, his details from Dubois's voyages published in 1674⁴⁹. However he made one curious alteration in his bird list, substituting *géants* for Dubois's *flamants* (flamingos, supported by an adequate description)⁵⁰. Nonetheless Leguat's 'wrong' (unwebbed) feet and the illustration, albeit a hundred years old and of an unidentified '*Avis indica*', led

Henri Schlegel to combine them in 1858 to create *Leguatia gigantea*, allegedly a giant extinct rail six-feet tall⁵¹. This bird had immediate detractors, but other ornithologists, usually citing Leguat's legendary veracity in other respects, believed in its existence. This belief was in the face of a complete lack of any other eye-witness support for the *géant*(t)⁵², and an absence of subfossil material. Flamingos, on the other hand, were frequently mentioned by other early travellers and their bones have been found in the Mare aux Songes, the swamp near Mahébourg where Leguat probably actually saw the supposed *géants*⁵³. Despite everything the *géant* won't lie down⁵⁴; it is impossible to *disprove* its erstwhile existence, and one can only rely on the weight of evidence against it.

The *géant* was neither the first, nor by any means the last, Mascarene bird to be given a scientific existence based on traveller's tales alone. Buffon devoted five pages to a '*oiseau de Nazareth*' and its relationship to the Dodo and the Rodrigues Solitaire, this entity acquiring the latin name of *Didus nazarenum*⁵⁵. In fact the name was just a tag added by Cauche to his description of the Mauritian Dodo; he said "we called them '*oiseaux de Nazareth*' perhaps for having been found in the Island of Nazareth, which is above that of Prince Maurice, in 17 degrees of south latitude". Strickland recognised in 1848 that Cauche had probably simply modified '*oiseau de nausée*' (= *walckvogel*) into '*oiseau de Nazareth*'⁵⁶. Although Strickland was persuaded that it did not exist, Nazareth Bank remains the name of a barely submerged plateau north of St Brandon, although Cauche's Ile de Nazaret, which appears on old Portuguese maps, has been identified as Tromelin. Oudemans argued in 1917 that this island might conceal another dodo⁵⁷, but, as Renaud Paulian pointed out in 1961, ten minutes on Tromelin would put paid to that idea⁵⁸; it is a flat sandy islet of less than 1km², with neither forest or land birds⁵⁹.

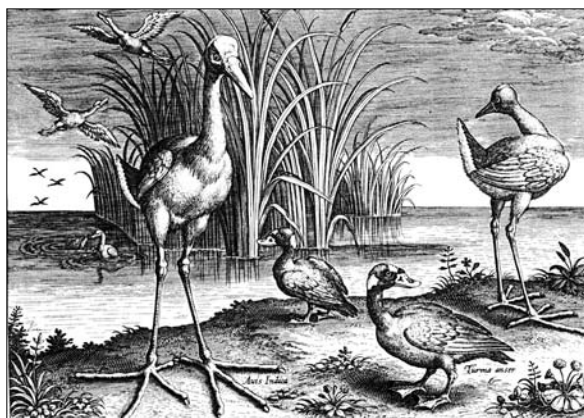
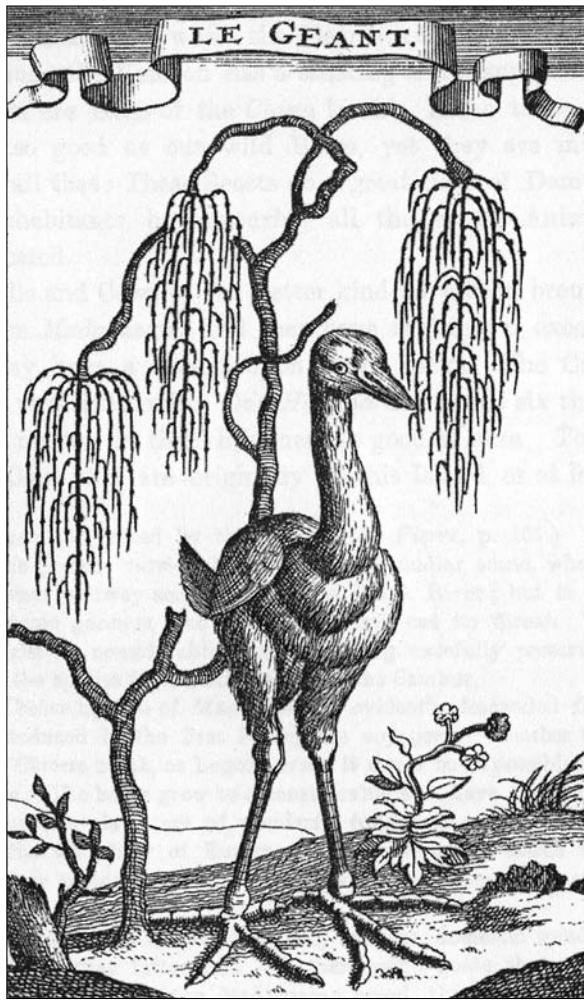


Figure 2.8. Leguat's 'géant' and its prototype, Collaert's 'auis indica'. From Leguat (1707) and Collaert (1580–1600).

Speculation on the identity of birds reported by early voyagers is a valid and necessary exercise in understanding the pre-human ecology of oceanic islands, but it can be overdone. Schlegel, Rothschild

and Hachisuka used nuances between different accounts and simple errors to erect no less than nine imaginary species⁶⁰. We have discussed Schlegel's giant rail (i.e. Leguat's *géant*), but he also accorded species status to Herbert's 'hen', a move Hachisuka endorsed on the grounds that it had (in Herbert's illustration) a straight bill; thus '*Pezocrex herberti*'⁶¹. Hachisuka invented a third Mauritian flightless rail by arguing that Peter Mundy's 'hen' was different again, because its colour was 'wheaten' rather than chestnut, hence '*Kuina mundyi*'. As we have seen, all these 'hens' behaved identically when presented with red cloths; also each observer saw only one kind – where were the other two hiding?⁶² Hachisuka also felt inspired to create a species for a pied bird seen in 1726 by Tafforet on an islet off Rodrigues, although everyone else had linked it to subfossil starling bones. As this bird ate dead tortoises, he argued that its "carnivorous habit" made it "impossible to place . . . among the starlings" – so it had to be a corvid, a sort of chough, '*Testuphaga bicolor*'. In fact most starlings are omnivores, and on a remote oceanic island without competition might well expand their niche to include carrion⁶³.

Cauche – a cautionary tale

A few travellers were economical with the truth. François Cauche, who commented on Red Hens, and was the only person to describe the Dodo's nest, egg and call, probably never went to Mauritius at all⁶⁴. He was on a 22-gun French ship, the *Saint-Alexis*, under captain Alonse Gouverte. Cauche's account mentions only this one ship, claiming that in 1638 he went in it to Rodrigues, Mauritius, Réunion and Madagascar. However, Dutch records in Mauritius record two visits of a French ship, in 1638 and 1640⁶⁵ – an unnamed 14-gunner, captained by Salomon Gouverte. Cauche mentioned Salomon as Alonse's son, and said it was he who went ashore at Rodrigues. The Dutch also reported that the French said on their 1640 visit that they had left Dieppe with another ship, a 22-gunner (i.e. the *Saint-Alexis*), with which they expected to rendezvous at Mauritius. It appears that for some reason Cauche, in his published account, wanted to conceal the existence of the second smaller ship, possibly because it was illegally harvesting ebony in Mauritius (which the small Dutch outpost was powerless to stop). The smaller vessel spent five months in Mauritius in 1638, leaving in December for Dieppe but returning for a brief 11 days in 1640. The date Cauche said he arrived in 1638 coincides with that given by the Dutch for the 14-gunner's visit in that year (early July), but the shortness of the visit ('a fortnight') echoes the 1640 visit, as does Cauche's mention of an English ship, confirmed by the Dutch as the *William*⁶⁶. Furthermore, Cauche made much of

claiming the three Mascarene Islands for the French crown in 1638, whereas the Dutch confirmed that was the smaller ship's mission for Mauritius in 1640, but made no mention of such claims in 1638⁶⁷. Cauche and the *Saint-Alexis* perhaps only joined the smaller ship on its second journey, in 1640. Cauche's account of birds and other animals appears to draw heavily on previous works, which he acknowledges here and there by referring his readers to other named accounts. He commented on only six species for Mauritius: fruitbat, Dodo, frigatebird, Red Hen, Pigeon Hollandais and an alleged tiny parakeet the size of a lark; he claimed the rail and pigeon were also found in Madagascar. His description of the first three appears to be lifted straight from the van Warwijk accounts (and indeed he, or his editor, cited them for the frigate). Cauche's Red Hen was given a straight "woodcock's" bill like Herbert's 'hen', but no one had previously reported its colour, so his report appears valid. 'White red and black turtle doves' fits the colour scheme of the Pigeon Hollandais very well; the Dutch had not published descriptions of this pigeon, so again, this looks original, and there *are* blue pigeons, albeit less showy, in Madagascar. His '*paroquets*' "yet smaller [than a thrush] in Prince Maurice's island, with yellow necks and the rest green, no bigger than a lark" cannot be identified⁶⁸ and may relate only to Madagascar⁶⁹. Overall his story in relation to the Mascarenes seems fairly unreliable, though it may contain genuine material gained second-hand from the mariners on the smaller ship that spent so long ashore in Mauritius in 1638. His report of the Dodo's egg, nest and its call "like a goose" are unsubstantiated from any other source and are best treated with caution, although they are entirely plausible – his description of the nest and egg matches Leguat's for the Dodo's closest relative, the Rodrigues Solitaire (Box 17)⁷⁰. According to modern historians, Cauche had commercial and political reasons for pretending he was in Madagascar in 1638 rather than 1640⁷¹.

Leguat's Voyage et aventures

While many accounts conceal minor plagiarisms and exaggerations, and Cauche dissimulated to further his business, one famous book acquired the reputation among literary historians of being not the true story of experiences in the Mascarenes, but rather what the French call a *robinsonade* – a desert island novel⁷². The book is François Leguat's *Voyage et aventures*, in which he described two years spent stranded on Rodrigues before sailing to Mauritius in a home-made boat, only to be imprisoned by the Dutch on a tiny islet in Mahébourg Bay⁷³. Leguat's story had detractors from the start, apparently arising from petty disputes in the expatriate Huguenot community in The Netherlands and England⁷⁴. These antagonists

established a tradition in France that the book was a novel, that 'Leguat' had never existed and that the book was written entirely by others. In the islands no one doubted the essence of his story, as they were familiar with the environments Leguat discussed and recognised them. Abbe Gui Pingré, visiting Rodrigues in 1761, wrote that "this work is dismissed as a tissue of fables; I have found it a great deal less so than I expected". In France some naturalists were influenced by the literary critics; while Buffon praised Leguat's detailed observations on the Rodrigues Solitaire, Cuvier rejected everything he wrote as fiction. In the mid-19th century, subfossil bones were found that matched Leguat's account of animals in Rodrigues, and another early account of Rodrigues turned up which confirmed Leguat's observations⁷⁵. Even so, Pasfield Oliver, a Mascarene expert chosen by the Hakluyt Society to edit their edition of the *Voyage*, retained some doubts about the book's authenticity⁷⁶. In the 1920s an American literary historian, Geoffrey Atkinson, set out to 'prove' that Leguat's book was fiction, that it was written by François-Maximilien Misson and that it was part of a tradition of fabulous voyages. Atkinson argued that Leguat's genuine sources of background material were in actuality his *only* ones, the apparently original material being pure invention; some eminent biologists fell for it⁷⁷. During the 1920s and 1930s more documentary material came to light in Europe that confirmed Leguat's account, and in any case contemporary Dutch documents confirming Leguat's arrival at, imprisonment in and banishment from Mauritius to Java had been published in the 1890s in Cape Town and soon after in Mauritius⁷⁸. This did not prevent Percy Adams repeating Atkinson's 'proof' in his 1962 book *Travellers and travel liars*⁷⁹, leading Rodrigues's historian, retired Mauritian agriculturalist Alfred North-Coombes, to set about rehabilitating Leguat once and for all⁸⁰. Even after North-Coombes's detailed study was published in 1980, Adams (who ignored or had not seen it) was still claiming in 1983 that Misson had "published his amazing invention – not by any means out of whole cloth – the *Voyages et aventures de François Leguat*"⁸¹; doubts still persist in some quarters⁸². Leguat's champions recognise that Misson, always known to be Leguat's editor, added homiletic commentary designed to boost the story's value in promoting the Protestant cause, and to demonstrate God's actions in the everyday affairs of men⁸³. From a biologist's perspective, the remarkable thing is that almost everything that Leguat said about wildlife in Rodrigues *can* be confirmed, both by other accounts and by the wealth of subfossil material found in the caves on Plaine Corail⁸⁴. The name '*solitaire*' that Leguat used for the large flightless bird on Rodrigues was another borrowing from Duquesne/Dubois, but

the birds he described in such detail were unrelated to the Réunion 'Solitaire', and agree closely with the subfossil remains of the Dodo-relative *Pezophaps solitaria*. The prejudices of literary 'experts' apart, he has proved to have been a reliable witness to Rodrigues. Leguat's case is not unique in the Indian Ocean; recently another 'novel', Robert Drury's account of his long captivity in Madagascar soon after Leguat's adventures, has been shown to be a true story, not, as was generally supposed, a novel by Daniel Defoe⁸⁵.

The saga of Leguat's veracity is a warning to the unwary on the real problems surrounding the interpretation of voyagers' tales, and also a testimony to the various people who, over the years, have devoted meticulous attention to setting the matter straight (the contributions of travellers, subfossils and collectors to our knowledge of Mascarene vertebrates are summarised in Appendices 10–12). Chapter 3 discusses the current state of knowledge of the primeval fauna of the islands prior to human arrival, based on a massive literature of interpretation and identification, of which we have here cited only a few cases and pitfalls. However, errors and misinterpretations are not confined to those interpreting books – bones and even museum skins can mislead too. For the Mascarenes, the most notorious "banquet of codswallop" concerns a whitish passerine in Liverpool museum, labelled 'Madagascar', hyped as a second Rodrigues starling by H. O. Forbes in 1898, then transferred arbitrarily to Mauritius by Walter Rothschild. It was widely accepted as such, despite serious doubts, until being finally debunked over a century later as an albino specimen of the Martinique Trembler from the West Indies!⁸⁶ A number of species erected in the 19th century from bone material have been re-assessed and, in taxonomic jargon, 'sunk'. These include a grebe, a darter and a moorhen from Mauritius, and a second owl on both Rodrigues and Mauritius⁸⁷. In the other direction, subfossil bones originally assigned to the large Raven Parrot are now known to include two species⁸⁸. Finally, as recently as 1987, a bone found in Réunion in 1974 and originally identified as from a mysterious 'stork' turned received history upside-down; there never was a dodo there, and the Réunion 'Solitaire' was in fact an endemic semi-flightless ibis!⁸⁹

The Réunion dodo

Over the years this non-existent Réunion dodo has generated a huge literature, based on travellers' descriptions of the 'solitaire', the borrowed picture and description in Bontekoe's account, and a set of 17th-century paintings of white dodos. Whereas Mauritius Dodos had been sent alive to Europe and were in consequence well-illustrated, and Leguat had left a detailed description and passable drawing of the Rodrigues Solitaire, the accounts from Réunion were

fragmentary and somewhat contradictory, and the only published pictures were in editions of Bontekoe, borrowed from Mauritian originals. Bontekoe was also the only visitor to use a dodo name ('*dodaarsen*') for the Réunion bird; the French always called the bird a *solitaire*. Although the best account, from Dubois⁹⁰, did not evoke a Dodo, the size and turkey-like feet apparently overruled in the minds of European naturalists the slight problem that it had a long beak 'like a woodcock' and could fly (though it rarely did so). By the mid-18th century the French encyclopaedists accepted that Dodos inhabited Mauritius and Réunion⁹¹, tending to lump the islands together without much discrimination. As the birds had disappeared, no new information was forthcoming until 19th-century writers started looking into the history. First out was Auguste Billiard, who wrote in 1820 that in the time of Governor Labourdonnais (1735–46) the '*dronte*' (i.e. Dodo) or *solitaire* was still around, and that Labourdonnais had sent one as a curiosity to a director of the French East India Company⁹². Hugh Strickland re-published Dubois's account in 1844, and in 1848 compiled what was known of the Réunion bird, being careful to note that the accounts differed from those of the true Dodo, a point also made by Charles Coquerel in Réunion itself⁹³. Then in 1856 William Coker discovered the first 'white dodo' picture (Figure 2.9b), stimulating a rash of publications in which the identity of these birds with the Réunion Solitaire was promoted. This was cautiously endorsed by Alfred Newton, zoology professor at Cambridge, whose imprimatur, repeated in his *Dictionary of Birds* in 1896, confirmed in the minds of most ornithologists the existence of the 'white dodo of Réunion' – a belief enhanced by star billing in Walter Rothschild's stunning, if flawed, 1907 tome, *Extinct Birds*⁹⁴. By 1938 the 'white dodo' was so entrenched that Graham Renshaw not only assigned to it the manifestly *grey* Dodo painted by Jan Savery in Oxford's zoology museum, but even claimed for it the Prague skull, and "two skeletons at Cambridge"⁹⁵. Around the same time Masauji Hachisuka became interested and 'resolved' the various inconsistencies in the pictures and accounts by dividing the Réunion species in two: the 'white dodo' and a 'solitaire' like the one in Rodrigues, amplifying his interpretation in his Dodo book of 1953⁹⁶. Although Hachisuka's 'two species' scenario had few takers, the dodo was definitely 'fact'; the Réunion birds volume of the prestigious series *Faune de l'Empire Français* had one on its cover⁹⁷, and the local natural history magazine *Info-Nature* used a dodo standing on a tortoise as its logo until 1989. These castles in the air were sustained more by wishful thinking than by facts, and again it is the cautious and careful Strickland who comes out of it best. He presented the facts he had, and simply

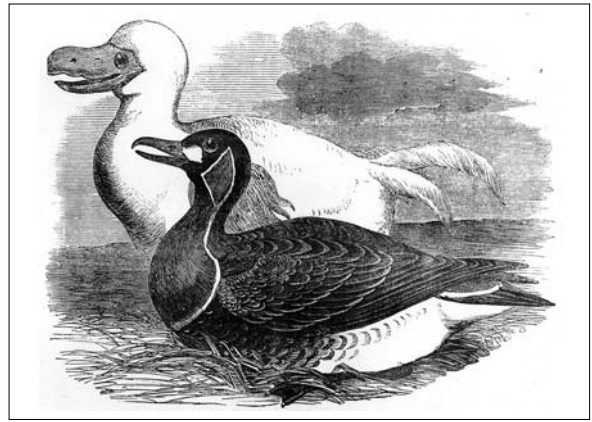
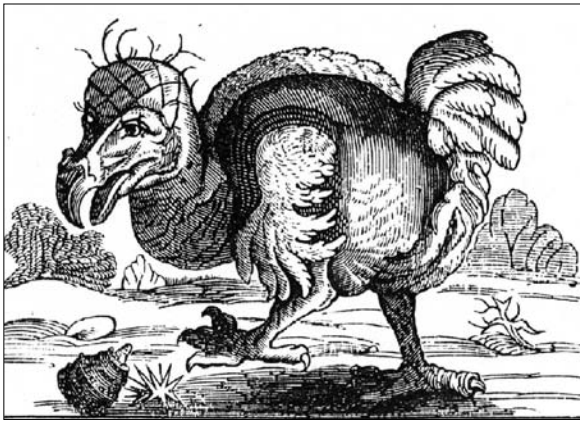


Figure 2.9. Salomon Savery's engraving of a Mauritian Dodo (a), used to illustrate Bontekoe's account of Réunion (from Strickland 1848), and the *Illustrated London News* of 20 September 1856, the first public presentation of a white dodo painting (b) (with a Red-breasted Goose *Branta ruficollis*); this was billed as 'Persian' by Coker, but later found to be by the Dutch artist Pieter Withoos. Note that the beak of the bird was cropped in the original publication.

pointed out that there had been a large, easily caught and possibly flightless bird in Réunion.

The case of the 'white dodo' slowly began to unravel in 1958, when James Greenway published an important book on extinct birds in which he expressed mild doubts as to the origin and authenticity of the 'white dodo' paintings, and emphatically rejected the 'two species' hypothesis. Some subsequent compilers then began to show caution in dealing with the Réunion species⁹⁸. In 1987, before the ibis was described, one of us showed that the bird Labourdonnais had supposedly sent to France was probably a *Rodrigues Solitaire*, and that the paintings

of 'white dodos' derived from an original series by Pieter Holsteyn in Holland. There was no evidence connecting the 'white dodo' to Réunion – and it was unlikely that a bird from there would have reached Holland in the mid-17th century. Hence the 'white dodo' paintings were probably derived from an albinistic Mauritian Dodo (Figure 2.9)⁹⁹, and so it has proved. In a previously undocumented painting by Roelant Savery, completed in Prague in 1611, a Dodo gleams white with yellow wings in the sun, facing left – exactly as depicted, only slightly modified, by Holsteyn and Withoos decades later. The model was a specimen from Mauritius in the Imperial collection in Prague, described in the contemporary manuscript catalogue as 'dirty white'¹⁰⁰. Until the late 1980s, whatever one may have thought of the paintings, the accounts of a 'solitaire' in Réunion could not easily be disentangled from the presumption that there was a dodo there. There was, however, one perceptive exception; Robert Storer correctly predicted in 1970 that "if and when remains of such birds are found on Réunion, they will prove to be unrelated either to the Dodo or the [Rodrigues] Solitaire, and I would not be surprised if they proved to be derived from rails or some group other than pigeons"¹⁰¹. Then the ibis was discovered . . .

Mythical birds are, however, quite hard to kill, and the 'Réunion Solitaire', masquerading as a Dodo, still appears in recent checklists and books¹⁰². Even a definitive book on pigeons published in 2001 still promoted it as fact, rejecting the ibis as irrelevant and accepting the 'white dodo' paintings as authentic pictures of Réunion birds¹⁰³. Perhaps in keeping with its imaginary nature, the Réunion dodo also survives as the logo and nickname of the local brand of lager beer, each bottle sporting its jaunty image (Figure 2.10).

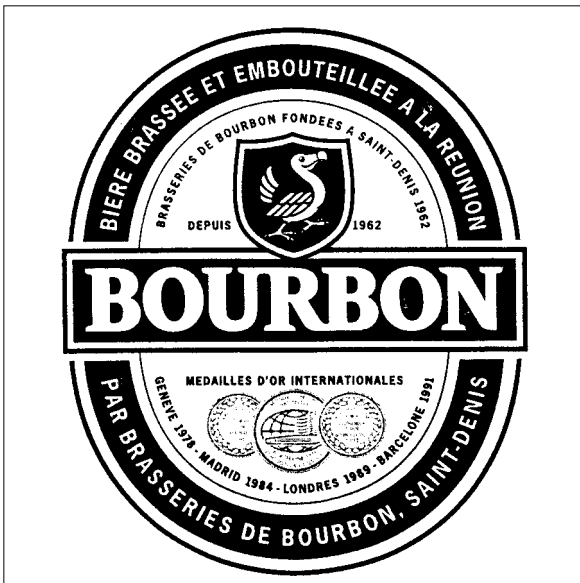
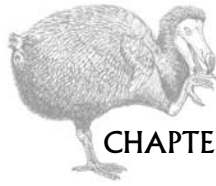


Figure 2.10. Label current in 2003 from Bourbon Beer, from Réunion.



CHAPTER 3

THE PRISTINE ISLANDS

The Mascarene biota at the time of discovery

We found all the view [before us] admirable. We never tired of looking at the little mountains of which it is almost entirely composed, so richly were they covered in great and beautiful trees. The streams that we could see flowing fell into valleys whose fertility we could not doubt . . .

François Leguat in 1691 on seeing Rodrigues for the first time, from just offshore¹

As the Ile is prodigall in her water and wood, so shee corresponds in what else a fruitfull mother labours to be excellent in, not only boasting in that varietie of feathered creatures, but in the rarenesse of that varietie . . .

Thomas Herbert, extolling Mauritius in 1634²

The hand of humanity, or at least the plants and animals imported by colonists, is all too evident almost everywhere in the Mascarenes today – only parts of upland Réunion remain largely untouched³. What remains is nonetheless recognised as one of the world centres of plant diversity⁴. While we have a good idea of the primeval fauna, it has proved quite difficult to reconstruct a clear idea of the original vegetation in the most devastated parts of the islands, the coastal and lowland areas. Early travellers were faced with hundreds of tree species they had never seen before, so they picked only a few to mention (ebony, palms etc.) and ignored the rest in their writings; they might discuss individual tree species, but rarely described their setting. Over time, after settlement, names were given to the different plants and their properties discovered⁵, but by then the lowland forest had been effectively destroyed, except in the high-rainfall danger zone where lava flows reach the sea in Réunion. Only in Rodrigues do we have a fairly adequate description of the appearance of lowland vegetation⁶.

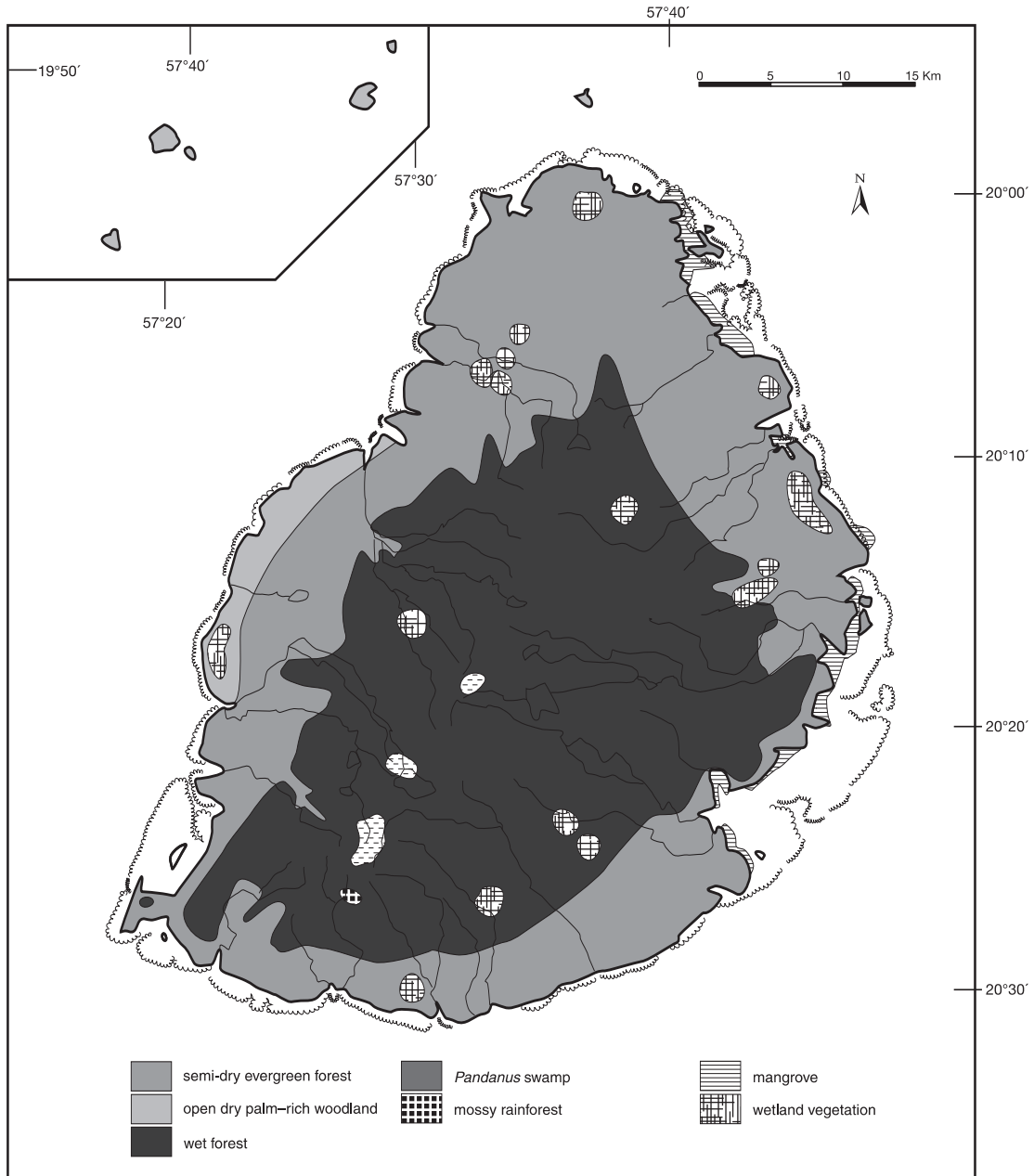
From early reports and ecological inference from what is left of the original vegetation, all three islands were completely forested when discovered, apart from the highest elevations in Réunion and on fresh lavas near its volcano⁷. As discussed in Chapter 1, the two larger islands have a wetter zone on the windward (eastern) side and a drier one in the lee (western). The coastal vegetation differed in the two zones; the tall,

dense, mixed rainforest reached the coast on the windward side, but on the dry side there is some dispute as to the composition of the vegetation.

The coastal dry zone of Réunion and Mauritius, vulnerable to fires and probably forming the habitat of several of the most spectacular endemic animals, has been characterised by botanists as being a ‘palm savanna’⁸. We do not believe any typical savanna vegetation existed in Mauritius, and consider it was much more restricted than supposed in Réunion⁹. While there is no doubt that this zone on all three islands was characterised by the endemic fan-palms, latans *Latania* spp. and an abundance of Hurricane Palms *Dictyosperma album* with their edible cabbage, there is nothing in the early Mauritian literature to suggest a ‘savanna’ – open grassland with occasional trees and shrubs¹⁰. The supposed extent of this ‘palm savanna’ was the area of less than 1,000mm rainfall in Mauritius and Réunion, but in fact on both islands early visitors described forest reaching to the shore almost everywhere. In Rodrigues (coastal rainfall 800–1,200mm) we have Leguat’s rather fuller account, describing fairly open mixed woodland rich in palms and screw-pines (*Pandanus*) in the lowlands; we believe the dry lowland forest in both Mauritius and Réunion was similar¹¹. The concept of the palm savanna arose by extrapolation from the surviving vegetation of Round Island, 21km off the north coast of Mauritius¹². On this steeply sloping islet with little soil, no water table, and rainfall of only c. 850mm,

there is a thicket heavily dominated by palms and screw-pine¹³. There is a short narrow strip on the west coast of Mauritius where the rainfall is under 800mm, and even the area within the 1,000mm isohyet is only a band about 24km long and up to 5km wide from Port Louis to Tamarin – all the northern plains being a bit wetter¹⁴, and always referred to by visitors as ‘wooded’. In Réunion parts of the north-west coast have only 500mm of rainfall each year, but

no trace of the original vegetation remains. Of all the numerous early visitors, only Guillaume Houssaye in 1689 actually gave a useful description of the vegetation in the dry zone – wooded throughout except for the stretch of coast from the Cap la Houssaye to Etang Salé, which was “burnt [i.e. parched] country of almost nothing but rocks where nothing grows except *benjoin* trees and *lataniers* on which the goats feed”. We think there was, in Réunion only, palm/



Map 3.1. The original vegetation of Mauritius, derived by extension and inference from Vaughan & Wiehe (1937), together with readings of the early accounts.

benjoin savanna along the west coast where the rainfall is under 750mm¹⁵, except in the region of the Pointe de Galets, where Houssaye specifically stated it was wooded¹⁶. Many early visitors to Réunion commented on the abundance of ‘aloes’ along the dry coast – the endemic *Lomatophyllum macrum*¹⁷. On all three islands the palm-rich woodland was closely associated with tortoises that fed on the fruits, dispersing the seeds of the latans and screw-pines¹⁸.

It is likely that on stable dunes and sandy upper beaches there would have been some open grassland, grazed by the numerous giant tortoises reported on each island. Only Heyndrick Jolinck in 1598 and Cornelisz Matelief in 1606 specifically mentioned grassy areas¹⁹, though no one described anything recognisable as the ultra-short ‘tortoise turf’ that occurs on Aldabra²⁰. Dunes exist in several coastal areas of Mauritius and along parts of the dry western coast of Réunion²¹. In Rodrigues, where the reported tortoise density was much higher than on the larger islands²², there are dunes only in the south near Gravier and Mourouk²³; the sandy spit at Port Mathurin dividing the sea from the tidal mudflat behind (now reclaimed) was free of trees but swept by the sea in heavy weather²⁴. Tafforet reported a shortage of grass everywhere, with the tortoises having to eat leaves and seeds fallen from the trees. Mauritius also had some mangrove forest, roots encrusted with oysters, extending in some places “100 fathoms” (600ft/185m) into the lagoon²⁵, though its original extent is not known.

While travel in Réunion was generally impeded by the very rugged terrain, in Mauritius numerous early visitors complained that it was difficult to penetrate the forest because the trees grew so close together²⁶. This might sound like hyperbole, but in 1638 the commander of the first Dutch settlement, Cornelis Gooyer, reported that six men were unable to force a passage for a simple footpath through the forest from the northwest port to the southeast port (Port Louis–Grand Port) because it was too thick²⁷. In 1880, forester Richard Thompson was impressed by the dense upland wet forest:

*It is only in these forests that an idea can be gained of the grandeur and composition of what are essentially known as Evergreen Tropical Forests, and which at one point must have covered with the densest tree vegetation it is possible to imagine four fifths of the area of the island. The Tree-ferns rising to heights of 25 to 30 feet, the countless other Ferns, the Peppers, Creepers and Turners, the mass of tall clean stemmed under growth packed so closely together as not to give passage to a man through them, and above all the dense almost black shade of these forests, are something to see and admire.*²⁸

Reginald Vaughan and Octave Wiehé, pioneering the study of Mauritian vegetation in the 1930s, commented that tree density in the native Mauritian upland forest

was astonishingly high, 4–5 times that of comparable forests elsewhere²⁹ – and that was after three centuries of degradation by invasive animals and plants. Very high tree density appears to be an adaptation to withstand cyclones, and is now known to be matched on other islands subject to intense tropical storms³⁰.

The ease with which hunters were able to chase and catch feral cattle, goats and pigs in northern Mauritius during the 1600s indicates a more open forest in the drier areas, confirmed by Leguat in 1693³¹. A drawing of agricultural clearance by the Dutch near Poste de Flacq in 1670 shows thick but not impenetrable lowland forest, with latans and Hurricane Palms even in this fairly wet zone (Figure 3.1)³². This more open forest provided tall, straight trees for ship’s masts and for construction, and also the best ebony; judging by reports from visiting British ships, the tallest wood was in the lowland plain under Black River Peak³³.

Although the forest under 300m in Réunion appears not to have been as dense as that in central Mauritius at 125–150m, higher up it was just as impenetrable, and it remains so to this day³⁴. The lowland semi-dry forest above the savanna zone in the

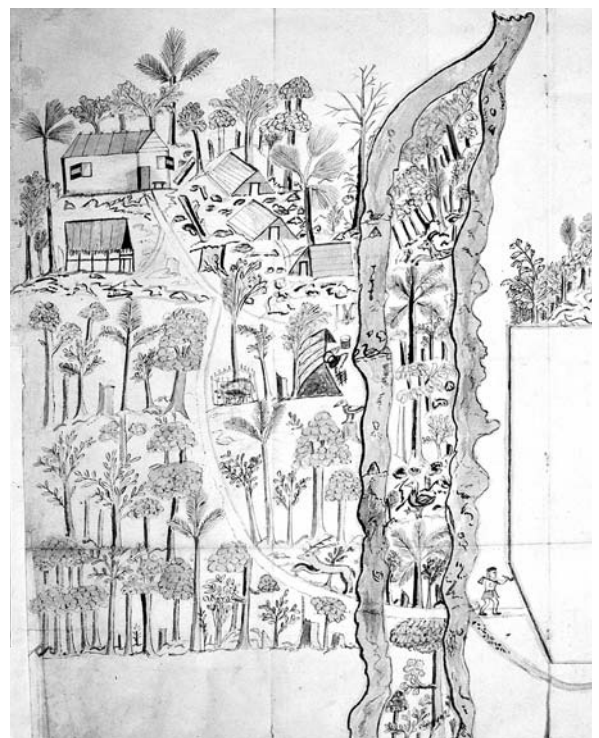


Figure 3.1. *The farm at Vuijle Bocht.* Part of a drawing from 1670 in the Dutch Rijksarchief (State Archives), showing settlement activity, forest clearance and wildlife at ‘Foul Bay’, now Post de Flacq, Mauritius. Hurricane Palms and latans are seen, with a variety of broad-leaved trees, plus wildfowl and an eel in the river, a probable sheldgoose on the land between the streams, a deer, a goat, some pigs in a pen, and an unidentified bird on a cut stump.

west was similar to that in Mauritius, fairly open with tall trees, but the wet forest higher up was very dense, thickly populated with emergent Upland Hurricane Palms, although these have now largely vanished from the otherwise fairly intact forests³⁵. In the mid-altitude mixed forest, and especially in the ultra-wet screw-pine thickets in the east, travel is virtually impossible where paths have not been cut, and even where paths exist progress is often prevented by deep ravines. Tree-ferns, three species of *Cyathea* reaching 10m in height, are also characteristic of the mixed forests and the screw-pine thicket. Above about 1,500m and occasionally up to nearly 2,400m there are tracts dominated by the ‘tamarin des hauts’ *Acacia heterophylla*, with a light canopy but huge girth. This forest, associated with the endemic bamboo *Nastus borbonicus*, is a fire climax, regenerating only if the tree cover is burnt off (or artificially cleared), so its past extent will have been variable, depending on the frequency and size of volcanic eruptions³⁶. Higher still, starting at around 1,850m but extending lower on exposed ridges, there is a dwarf forest dominated by giant heather *Philippia montana*, in cloud most of the day and heavily festooned with grey wispy *Usnea* lichen. At its most exuberant the heather reaches 6–7m tall, under which develops a deep layer of organic matter consisting of rotting trunks covered with a thick layer of moss and epiphytic ferns, and the large sedge *Machaerina iridifolia*. The vegetation becomes shorter with altitude, and several other shrubs become co-dominant, one of the more prominent being the endemic yellow-flowered St John’s Wort *Hypericum lanceolatum*, which provides nectar for the Réunion Olive White-eye *Zosterops olivaceus*. Over about 2,800m on the Piton des Neiges (and rather lower around the Volcano) above the daily cloud-banks, the heath gives way to sparse grass with occasional shrubs. August is the coldest month; frosts strike irregularly in winter above about 1,500m, burning the leaves of the upper reaches of the mixed forest, its frequency clearly defining the upper limit of true trees (*Acacia heterophylla*, *Sophora denudata*).

The forests of Rodrigues

As already discussed, the forest in Rodrigues was rather open – Leguat said it was easy to walk around everywhere as there was little or no undergrowth³⁷, possibly a result of the high densities of giant tortoises. Leguat and Tafforet found tortoises in all parts of the island, though the large aggregations of 2,000–3,000 together seem to have been coastal. Hurricane Palms and latans grew mostly in the valleys³⁸, and the tallest trees grew in the deeper soil where the valleys opened out toward the coast. Leguat clearly stated that these tall lowland forests had a closed canopy; he was particularly impressed with large spreading

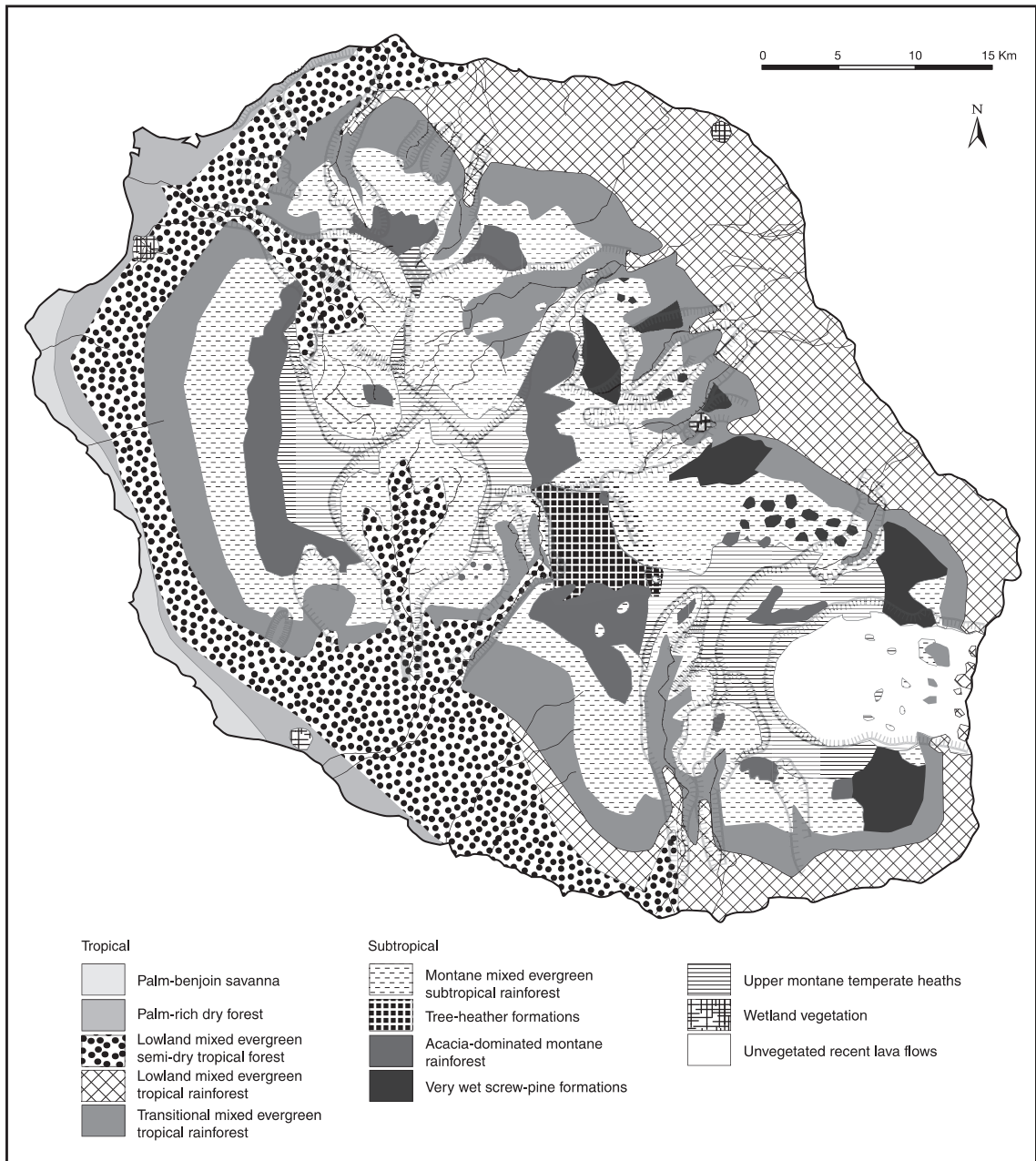
strangling figs, *Ficus reflexa* and *F. rubra*³⁹. The Huguenots had to fell trees near the shore to make space for their huts and gardens – i.e. there was no natural open ‘savanna’ by the coast. However, Pingré in the 1760s said that in some bays, especially at Port Mathurin, beach sand reached some 25–30 *toises* (48–58m⁴⁰) inland, on which grew nothing but “a few weeds”; the present Port Mathurin is on a sand spit which may have been open and grassy, while Leguat’s settlement was around the stream (Rivière Cascade Pigeon) to the east of the sand spit on basaltic soil. Large trees grew even where the soil depth was negligible, giving the impression from a distance, as Leguat put it, “of an island more advantageous than it merits, because one thinks it consists throughout of excellent soil”. Even before deforestation the streams were seasonal, shrinking to a trickle in the drier months⁴¹.

Surviving cyclones

All the islands are subject to violent tropical storms, or cyclones, during the summer, principally between December and April⁴². Although cyclonic depressions occur every year and contribute substantially to the annual rainfall, big storms strike the islands on average every 4–5 years, with a severe one every 15 years or so. The worst damage occurs if two or more violent cyclones strike in succession in a single season, as happened in Réunion in 1806–7, Mauritius in 1824 and 1960, and Rodrigues five times since 1850, most exceptionally in 1875–76 when four struck in two months⁴³. Cyclones have affected the evolution of the forest and may also have similarly influenced the animals. Severe storms partially defoliate the forest and destroy flowers and fruit, though the trees themselves are rarely uprooted unless isolated or ancient⁴⁴. The native forest, in good condition, is rarely over 20m high; it has a canopy of interlaced branches, very wide spreading roots and many trees have buttressed stems⁴⁵. In addition there is a very high trunk density. Although some species are stimulated to flower and fruit by cyclones⁴⁶, the immediate result of a storm is a sudden shortage of foliage, fruit, flowers and cover for the native fauna. Several of the animals, in the primeval state, had a marked fat-cycle⁴⁷, which may have evolved to enable them to survive these shortages, unpredictable and infrequent though they are. Unfortunately most animals with seasonal fattening are now extinct; those that survive (merles *Hypsipetes* spp. and flying-foxes) appear to have lost the habit, perhaps because their densities are now so low compared with pre-human times that the effect is no longer triggered or functional. A behavioural adaptation survives, though: Golden Bats readily forage on the ground. This extraordinary behaviour in a bat must be an adaptation to finding food when none

remains on trees⁴⁸. The fruitbats may even need to descend to the ground during cyclones to avoid being torn from their perches by the gales – they are surprisingly poor at negotiating even moderate winds⁴⁹, and once swept into the air and out to sea in a cyclone would almost certainly be doomed. Visiting the ground would have been perfectly safe in Rodrigues before cats and dogs were introduced, as there were no native predators large enough to catch them.

The early visitors were not ecologists, and we have little evidence of how these habitats were used by the original fauna. Inferences can be made from the flowering and fruiting habits of Mascarene plants, and from similar animals in other parts of the world, to partly reconstruct the ecosystem before it was disturbed. We know most of the parts but not really how the jigsaw fitted together. All known land vertebrates native to the islands are listed in Table 3.1 – to which



Map 3.2. The original vegetation of Réunion. From Cadet (1977) and Girard & Notter (2003), amended by re-interpretation of early accounts.

we have added turtles, seabirds and dugongs, whose fate was closely tied to that of the land fauna. A number of these species, known only from subfossil remains, apparently disappeared before the first humans who recorded wildlife arrived – probably victims of the rats that reached Mauritius and Rodrigues before any reports were made on the fauna⁵⁰. Although it is likely that small lizards and the blind-snake would have been overlooked, it was mostly the big reptiles that disappeared first⁵¹. In Mauritius the fortuitous failure of rats to reach Round and Serpent Islands enabled both boas and three lizard species (and a large tarantula) to survive after they vanished on the mainland, allowing their ecology (at least in its restricted residual habitat) to be studied; two further small lizards survive only on offshore islets (Chapter 9)⁵². Various birds and bats were never (or not clearly) mentioned by early travellers, mostly no doubt through oversight, though for Mauritius the harrier and the Reed Cormorant were both conspicuous species unlikely to be overlooked – their counterparts in Réunion were frequently mentioned⁵³. No one ever reported the Réunion Lizard-owl, nor the merle and ‘babbler’ in Rodrigues, and there are no unequivocal references to the night heron or Abbott’s Booby in Mauritius. Travellers and settlers also failed to record a third fruitbat in Mauritius, or more than one in Rodrigues, but as most did not notice there were two (of hugely different size) in Mauritius and Réunion, their failure to recognise a third (intermediate in size) is not surprising⁵⁴.

THE FAUNA OF PRISTINE MAURITIUS

In pristine Mauritius there were no terrestrial mammals, and the equivalent ground-dwelling niches were taken by reptiles, birds and land crabs⁵⁵. Judging by Round Island today and rat-free islands in the Seychelles and elsewhere, it is likely that ground-living lizards and land crabs were extremely abundant in Mauritius and Réunion⁵⁶. In Mauritius there were four species of forest skink ranging from the huge 680mm (27”) Didosaurus, through the large Telfair’s Skink, the medium sized Bojer’s to the small Macabé Skink; a fifth species, Bouton’s Skink, lives only on coastal rocks⁵⁷. Large skinks tend to be omnivorous, and this is certainly true of Telfair’s Skink on Round Island today – it is a predator of other reptiles and insects, eats fruit, and will scavenge anything edible. The smaller skinks are principally insectivorous⁵⁸. Didosaurus was big enough to take other lizards and also hatchling tortoises. Some trees have flowers and fruit that sprout from the trunk near the ground⁵⁹, suggesting pollination and perhaps dispersal by reptiles or ground-living birds. The surviving *Nactus* long-fingered night-geckos⁶⁰ are largely terrestrial on Round Island and Gunners Quoin, but unlike the skinks are nocturnal and wholly insectivorous.

The only terrestrial herbivores were two species of giant tortoise, one high-backed, allowing browsing up to 1m up, the other domed, presumably principally a grazer⁶¹. One of the characteristics of the Mascarene flora is the occurrence of heterophylly in many species of tree – saplings carry curious long thin foliage, sometimes bizarrely coloured, while adult trees have more familiar leaves. Heterophyllous species are mostly lowland dry-forest species, and they are particularly prominent in Rodrigues⁶². Aldabran tortoises kept on Ile aux Aigrettes largely ignore plants showing juvenile leaves, suggesting that heterophylly arose as a defence against browsing by tortoises, though authors of a study on the chemical defences of Mascarene heterophyllous plants preferred leaf-eating birds as the evolutionary agents⁶³. Another probable adaptation to tortoise browsing is the spiny trunk of some palms when young⁶⁴, though this does not explain why other species, notably latans and lowland Hurricane Palms *Dictyosperma album* are not spiny and clearly thrived in the presence of abundant tortoises; the *Hyophorbe* species (Bottle Palms) are toxic, at least to humans⁶⁵. While adult tortoises had no predators, the eggs and young would have been eaten, as on Aldabra today, by land crabs and rails⁶⁶, and no doubt also by the endemic night herons and Didosaurus.

The absence of large predators allowed birds to evolve flightlessness in safety – the Dodo was the size of a large goose, and the Red Hen equivalent to a domestic fowl. The large Raven Parrot *Lophopsittacus mauritianus* is often cited as flightless in the literature; this is an error⁶⁷, but its anatomy does suggest that both it, and Thirioux’s Parrot *Psittacula bensoni*, which we believe to be the ‘grey parrot’ of early accounts, were largely terrestrial in habits⁶⁸. The endemic *Dryolimnas* wood-rail also had reduced wings, as did the wood-rail in Réunion⁶⁹. The ecology of these birds has been open to a great deal of speculation, the Dodo in particular. Only one visitor mentioned its food – ‘raw fruit’ according to anonymous sailor writing in 1631, though he and others also described its powerful bite⁷⁰. France Staub believed Dodos mainly ate palm fruits, and attempted to relate their fat-cycle to the fruiting regime of these trees⁷¹. A whole scientific myth has grown up around Stanley Temple’s attractive but flawed hypothesis that the Dodo’s extinction caused regeneration failure in a large forest tree, the Tambalacoque *Sideroxylon grandiflorum*, with its seeds supposedly unable to germinate without passing through a Dodo’s gut (this is discussed fully in Chapter 7)⁷². Hachisuka speculated that Dodos would have eaten ‘crabs and shellfish’, pointing out that the large terrestrial crowned pigeons *Goura* from New Guinea wander about on river banks eating small crabs⁷³. Hachisuka was given

to flights of fancy, but in this case he may be right – *Goura* is quite closely allied to dodos and solitaires⁷⁴. Dodos swallowed a large stone which was held in the gizzard, and presumably had an important digestive and grinding function⁷⁵. Whatever Dodos ate in nature, they must have been able to cope with a wide range of food, as they were easy to transport on ships and keep in captivity, some apparently surviving for years⁷⁶.

Red Hens, large flightless rails with long decurved bills, look well-adapted to taking invertebrates or reptiles found in or on the soil⁷⁷, though we have no direct reports of their diet; like Dodos, they were reported to use their beaks aggressively in defence⁷⁸. The hen's bill closely resembled that of the endemic ibis (or Solitaire) in Réunion⁷⁹, which was said to feed on soil invertebrates⁸⁰, and the Limpkin *Aramus guarauna*, a North American snail specialist which also resembles the Red Hen in size and shape⁸¹. Mauritius was well supplied with large endemic land snails, many now extinct⁸², which could well have been the Red Hen's principal food, and many subfossil snail shells show damage consistent with attacks from a Red Hen's beak⁸³. There was also Sauzier's Wood-rail, a smaller ground feeder whose habitat on Mauritius is unclear, though bones are known from both swamp (Mare aux Songes) and dry rocky areas (Le Pouce range). The closely related White-throated Rail in Madagascar frequents marshes and watercourses, but in Aldabra, a very dry atoll, it occurs in all habitats from mangroves through scrub to open beaches⁸⁴. On Aldabra this rail has a relationship with giant tortoises, feeding on bloodsucking insects; tortoises respond to the birds by standing up 'on tiptoe', allowing the birds access to soft areas of skin⁸⁵. There is no report of such behaviour in the Mascarenes, but given the abundance of tortoises, similar associations may well have developed.

In South America *Anodorhynchus* macaws are palm-seed specialists that once depended on the now-extinct large-mammal 'megafauna' to eat the fruit, digest the flesh and excrete the seeds, which the parrots then ate. They have more recently latched on to domestic cattle to perform the same function⁸⁶. Carlos Yamashita, who discovered this, suggested to us that the Raven Parrot, with its macaw-like bill, may have specialised similarly in Mauritius, either feeding directly on the palm seeds, or waiting for them to be 'cleaned' by tortoises or Dodos⁸⁷. If true, this would help explain two things – the early disappearance of this parrot, and why none reached Europe. Palms were cut down in enormous numbers from the early days, and the large-seeded Latans had the most restricted, coastal, distribution. It had puzzled us why these large birds never reached Europe alive as did Dodos (and a Red Hen). Parrots were notoriously popular with mariners⁸⁸, so one would have expected

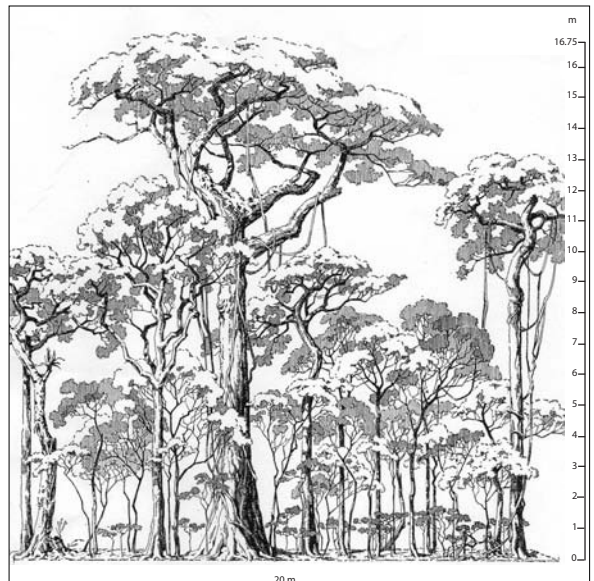


Figure 3.2. Profile of native upland forest in Mauritius, showing the structure of the best tract remaining in the 1930s; the large tree is a Makak *Mimusops maxima*, one of the dominant Sapotaceae. From Vaughan & Wiehe (1941), scales redrawn.

Raven Parrots to have been brought home to Holland or England – but if they refused to eat anything but the seeds of palms or large trees they would not have survived the journey. Raven Parrots were strongly sexually dimorphic in size, more than any other parrot⁸⁹, so the sexes possibly exploited different-sized foods.

Also putatively terrestrial was the enigmatic grey parrot of the early accounts, of which we know little except that it occurred in large numbers and was easy to catch⁹⁰. We assume that tarsi and bill elements Holyoak described as *Lophopsittacus bensoni* belong with parakeet breastbones also found in subfossil deposits, and that this was the grey parrot of the eyewitness accounts⁹¹. Given the abundance of these birds, they may have been exploiting the small fruit of Hurricane and Bottle Palms⁹². Like Raven Parrots, no grey parrots reached Europe; it may have been too unimpressive, or again it may have been too specialist a feeder. The still surviving Echo Parakeet was never successfully kept in captivity until modern dietary techniques made this possible in the 1990s⁹³.

The last of Mauritius's ground-living animals is the Malagasy Turtle Dove. It has usually been considered an introduction, but subfossil remains have been identified from all three islands, showing that it is a native species⁹⁴. This bird is largely a seed-eater, also taking small snails and feeding almost exclusively on the ground⁹⁵; it would have been the only granivore on the island. It is fairly scarce in deep forest, and may have originally been a bird of the more open low-land woodland.

Where these terrestrial animals were distributed in Mauritius is not known. It seems likely that Dodos, Raven Parrots, tortoises and Bojer's Skinks were mostly found in coastal or lowland areas⁹⁶, while the other skinks, Malagasy Turtle Dove, grey parrots, Red Hens, snakes and night-geckos were widespread, but there is no unequivocal information in the old accounts. In addition to fallen fruit, trees fruiting at ground level and the eggs and young of other creatures, there would have been some input into the diet of ground-feeders from seabirds, both from discarded food and their guano. These led to increases in invertebrate levels and thus densities of their predators, in this case including land crabs as well as lizards⁹⁷. There was at least one colony of Abbott's Booby (probably small), frigatebirds nested and roosted in the vicinity of the early Dutch settlements, and there were originally shearwater colonies too (Chapter 6).

Predators

Mauritius had several dedicated vertebrate predators, three birds (an owl, a harrier and a kestrel) and two snakes. Nothing was ever reported about the habits of the largish long-legged owl, known only from fossils, an 18th-century drawing and a good plumage description, but its anatomy suggests it specialised in terrestrial lizards⁹⁸. The harrier was never unequivocally reported by visitors, but its subfossil bones are indistinguishable from those of the Réunion Harrier⁹⁹, unusual in the genus *Circus* in having relatively short wings and being adapted to hunting in forest. In Réunion the harrier feeds nowadays on small mammals, and to a lesser extent on birds, introduced lizards and grasshoppers¹⁰⁰, but originally skinks, especially the large Telfair's, would no doubt have replaced the mammals. The Mauritius Kestrel also has short wings and behaves more like a sparrowhawk than a kestrel; it specialises on the endemic arboreal *Phelsuma* day-geckos, though some individuals also take small birds¹⁰¹. All three birds of prey are likely to have occurred in all forest types; the owl was last reported in forested areas, and the kestrel is known to have been common throughout the island¹⁰².

The Keel-scaled Boa, which reaches about 1.42m in length and is now confined to Round Island (Chapter 9), is known from subfossil deposits on the mainland. It is another specialised lizard-predator, feeding on geckos and skinks mostly at night, on the ground and in low vegetation. Females are much larger than males, and they may exploit different foods¹⁰³. The Burrowing Boa, also presumably once present on the mainland, became extinct on Round Island before its ecology was studied. It was a burrowing species with a typical blunt snout, but its principal prey is a mystery, as only Carié's Blind-snake lived underground. Perhaps it specialised in buried eggs (of skinks, tortoises or turtles)

or the chicks of burrowing seabirds, or, more probably, it used its fossorial morphology to sneak up on lizards hiding under leaf litter. It had the same curious lizard-trapping jaws as the Keel-scaled Boa¹⁰⁴.

Birds and lizards on Mauritius would also have been subject to predation from spiders: there were large tarantulas apparently similar to the lizard-eating species on Serpent Island (Chapter 9), and orb-web spiders with 3m webs that can catch small birds and arboreal geckos¹⁰⁵. Ground-nesting birds may also have suffered from eggs or young taken by land crabs, originally abundant in coastal areas.

Animals of the canopy

The forest canopy sheltered a varied selection of animals. The colourful *Phelsuma* day-geckos live mostly in the tree-tops throughout the island¹⁰⁶, but the large, dull brown Günther's Gecko probably favoured the lowland palm-rich forests¹⁰⁷. There was another parrot, the Echo Parakeet, and two pigeons, six woodland passerines, and three flying-foxes. The smaller day-geckos and three small birds, the Mauritius Fody and the White-eyes, while taking a lot of insects, also like flower nectar, and so act as pollinators. The Olive White-eye's long bill is particularly adapted for probing flowers, but the more generalist Grey White-eyes can also be active pollinators¹⁰⁸. Some Mauritian flowers have red nectar – particularly attractive to the day-geckos which pollinate them. At least one plant is not only pollinated but also dispersed by day-geckos, which (accidentally?) ingest the seeds¹⁰⁹. The parrots, pigeons, fruitbats, the Mauritius Merle, both white-eyes and the fody would all have taken fruits, mostly smaller than those that could be tackled by Dodos, Raven Parrots and tortoises, though the larger fruitbats can take quite large fruits¹¹⁰. There are no specific observations on what the bats ate in pristine Mauritius, but even now in Mauritius a high proportion of the Black-spined Flying-fox's diet is formed by the fruit of native trees, especially ebonies and the large sapotaceous canopy trees – even the Natte, which has a thick sticky latex like chewing gum. The Natte shows signs of coevolution with bats as dispersers, and there is some evidence of enhanced germination of seeds from fruit eaten by these bats; the bats' role in seed dispersal was clearly very important. Flying-foxes also visit flowers, damaging some by eating them whole, but probably pollinating others¹¹¹. When undisturbed the fruitbats fly by day as well as by night, though the smallest, the extinct Rougette *Pteropus subniger*, was said to be strictly nocturnal¹¹².

The Echo Parakeet survives; it takes unripe fruit, and both it and Pink Pigeons also eat foliage, particularly when fruit is out of season¹¹³. Pink Pigeons are also partial to flowers, particularly of a common forest

tree *Nuxia verticillata*. Merles can take the smaller palm fruits¹¹⁴, but both Merles and Pink Pigeons generally concentrate on smaller items. The diet of the extinct Pigeon Hollandais can be inferred from surviving blue pigeons in Madagascar and the Seychelles, but there is one record of stomach contents. Charpentier de Cossigny dissected one in 1755 and reported four 'nuts' in its gut, which he was told were those of either *takamaka* or the *natte à petites feuilles*, both rainforest trees with seeds up to an inch long and two-thirds as broad (*c.* 25 × *c.* 15mm)¹¹⁵ – this bird clearly took much larger fruit than the Pink Pigeon does. In 1801 the Pigeon Hollandais was reported to live on fruit and freshwater snails¹¹⁶.

Mauritius Cuckoo-shrikes feed in the canopy on large insects and geckos (and their tails!), while Mascarene Flycatchers feed on small insects in the understory. Grey White-eyes and Mauritius Fodies are generalist feeders, taking insects, nectar and small fruit; the white-eye feeds by gleaning, while the fody spends more time probing rotten wood and moss for grubs. The fody's adaptability was shown in the 1670s, when Governor Hubert Hugo reported 'sparrows' had become an agricultural pest when provided with a new and abundant food supply of cultivated grains¹¹⁷. The Mauritius Merle, primarily a frugivore, also regularly takes insects and geckos, and rarely also flowers; Mauritius Cuckoo-shrikes and Merles have been observed feeding geckos to their young¹¹⁸.

All these birds of the canopy probably originally occurred throughout the island, though to judge by Réunion today, the flycatcher may have been more common in the lowlands.

A cave-nesting swiftlet and a swallow by day, and two microbats by night were the only aerial insect-feeders on pristine Mauritius; all four are shared with Réunion, one of the bats not differing from those found in Madagascar and Africa, the other apparently endemic to the Mascarenes¹¹⁹. The Mascarene Swiftlet and the smaller microbat, the Mascarene Free-tailed Bat¹²⁰ use the same lava tunnels, the swiftlets returning at dusk as the bats emerge – both are now much reduced from population levels in the 19th century when the first detailed reports were made, so one must presume they were originally abundant, although they went unmentioned by the first visitors and settlers. The bat roosts in thousands packed tightly together on the cave roofs, while the swiftlet, related to species exploited in Asia for birds'-nest soup, glues its little nest-cups of lichen and saliva to vertical fractures in the highest parts of the caves. The Mascarene Swallow, a cliff-nester, may never have been very common. The larger bat, although called the Grey Tomb Bat, roosts by day in cliffs and palm trees. It is largely confined to the drier side of the island where it is still found today¹²¹.

Aquatic communities

The numerous ponds and rivers on Mauritius were home to a small waterbird community, but there were no amphibians, aquatic reptiles or true freshwater fish. There were three endemic waterbirds – the Mascarene Teal and the Mascarene Coot shared with Réunion, and a sheld-goose related to counterparts in Réunion and Madagascar; these shared the waters with two widespread species, the Reed Cormorant and the Greater Flamingo¹²². Little suitable nesting habitat for flamingos exists (or existed) on any of the Mascarenes, but nevertheless the condition of subfossil bones from Réunion indicates birds in breeding condition, so it appears that some nesting took place, although it is likely that the majority were non-breeding visitors from Madagascar¹²³. The teal, related to Bernier's Teal of Madagascar and the Indo-Australasian 'grey teals' (Chapter 4), may, like them, have nested in tree-holes¹²⁴. Two herons common when the island was discovered, the endemic Mauritius Night Heron and the widespread Dimorphic Egret, seem to have been coastal rather marshland birds, but details are sparse. Judging by its wing structure, the night heron had poor powers of flight¹²⁵, and may, like its counterpart in Rodrigues, have fed largely on lizards and invertebrates on land rather than in wetlands or on the shore, as some night herons do in Cuba today¹²⁶; it probably also enjoyed hatchling tortoises. Two other waterbirds now present, Common Moorhen and Striated Heron, lack early records or subfossil bones, so are possibly recent colonists¹²⁷; they were not introduced by human agency.

Few visitors commented on shorebirds, which no doubt reached Mauritius then as they do now. 'Curlews' were noticed as good game-birds; the common visitors are Eurasian Whimbrels, but Common Curlews occur also. Around 25 species of migrant shorebird, mostly wintering Palaearctic breeders, have been recorded in the Mascarenes¹²⁸. These birds apparently find the islands with ease, whereas equally far-travelled passerine migrants, which turn up regularly in the Seychelles, are virtually unknown in the Mascarenes¹²⁹.

Seabirds

The abundance of seabirds caught the imagination of early visitors to many remote islands, but not in Mauritius. Abundant landbirds for the pot, and a lack of conspicuous seabird colonies on the mainland, seem to have caused visiting mariners, alert (at sea) for seabirds as a welcome sign of nearby land¹³⁰, to largely ignore them once on shore. One account from 1598 discussed what appear to have been Wedge-tailed Shearwaters, found near their anchorage at Grand Port¹³¹. Apart from this the early Dutch accounts emphasised only one seabird, the *rabos forcados*

(frigatebirds) that apparently attended their camps to steal fish-guts and other refuse¹³². The only evidence that they bred is a passing reference on how easily they could be caught, as “feeling safe on their nests”, they allowed themselves to be taken by hand¹³³. There may also have been non-breeders using the island as a temporary base, as happens commonly elsewhere; the next nearest known colony was on islets off Rodrigues. The only other breeding seabird reported early on was John Marshall’s account in 1668 of a pair of goose-sized whitish birds by a nest in a “very high tree” – probably Abbott’s Booby¹³⁴. Although the Dutch visited the islands in Mahébourg Bay, nothing was said about the seabirds until Governor Deodati incarcerated Leguat on Ile aux Vacoas in 1694 – he reported abundant nesting terns and shearwaters on neighbouring Ile aux Fouquets¹³⁵. However, the Dutch name for Serpent island, still home to innumerable seabirds (Chapter 9) was Meeuwe Klip¹³⁶ – ‘Gull Rock’, even if the birds there were actually Sooty Terns, Brown and Lesser Noddies and Masked Boobies¹³⁷. Wedge-tailed Shearwaters presumably bred then as now in large numbers on Round Island, where both Red- and White-tailed Tropicbirds also nest. The most interesting seabird found there today, the ‘Round Island Petrel’ (currently considered to be Trindade Petrel *Pterodroma arminjoniana*) was not reliably recorded before 1932; although probably present in the mid-1800s, it may be a relatively recent colonist (Chapter 9). Gunners Quoin and Flat Island (with its satellites) also had colonies of both tropicbirds and the shearwater, possibly with boobies and terns also. On the mainland, only three seabirds besides Abbott’s Boobies are known to have nested: White-tailed Tropicbirds in cliffs and tree-holes in the interior (where they are still found), Wedge-tailed Shearwaters and Tropical Shearwaters¹³⁸. One Dutch report in 1598 reported tropicbirds, frigatebirds and probable boobies offshore with what were apparently pelicans – perhaps Pink-backed Pelicans, which formerly bred in the Amirantes atolls north of Madagascar¹³⁹. There are no other records, so the birds were probably just visitors.

Marine life

The lagoon and beaches around Mauritius were home to Dugongs *Dugong dugon*¹⁴⁰ and turtles. Most visitors merely mentioned Dugongs as good eating, but Hoffman in 1673–75 considered them “more abundant in the vicinity of Mauritius than anywhere else”; he described them well, and noted that they grazed on sea-grass in shallow water. Wreeden, then Dutch governor, found them “in large quantity” at Flat Island in 1672¹⁴¹. Ships calling at Mauritius in the 17th century regularly sent out parties to ‘turn turtle’ – i.e. to catch turtles hauling out to lay eggs and turn them over to

prevent them escaping. The favourite place soon earned the name of Turtle Bay, which it has kept to this day¹⁴². No indication of numbers was ever given, but as they were found commonly throughout the year, the breeding population must originally have run into thousands. The majority were no doubt Green Turtles *Chelonia mydas*, but Hoffman remarked on combs etc being worked from carapaces of (presumably) Hawksbills *Eretmochelys imbricata*, and the Gelderland artist drew Loggerhead Turtles *Caretta caretta* caught at Mauritius in 1601¹⁴³.

THE FAUNA OF PRISTINE RÉUNION

The original fauna of Réunion was similar to that of Mauritius, but much poorer in reptile species, lacking snakes, the largest skinks and geckos, and also flightless birds¹⁴⁴, reflecting the more recent emergence of the island. Many species are or were shared with Mauritius, or closely allied to Mauritian forms, indicating that much of the vertebrate fauna colonised Réunion from the neighbouring island, by far the nearest land. The reptile fauna is more impoverished than the birds, illustrating reptiles’ poorer dispersal abilities (Chapter 11). Two of the three Mascarene fruitbats occurred in Réunion – one of these, the Black-spined Flying-fox, was, with the Malagasy Turtle Dove, the only native land vertebrate shared by all three islands. It suggests their propensity for inter-island flight exceeds all but the highly migratory visiting shorebirds.

The ecology of Réunion’s fauna would have differed little from that of their relatives in Mauritius, although the greater altitude was reflected in a seasonal vertical migration of many birds, noted by earlier visitors. It is difficult to assess the effect of the absence of Dodos and Raven Parrots, though the ibis (or ‘solitaire’) seems to have more or less taken the niche the Red Hen occupied in Mauritius. One might have expected the lack of snakes to have resulted in higher lizard numbers, or for other lizard predators, such as the owl, with less competition, to have been more common, but there is no evidence from early visitors to suggest either; reports of lizards are even fewer than for Mauritius and no one ever saw the owl! The Réunion Forest Day-gecko would have originally been widespread throughout the island, spread through niches occupied by three species in Mauritius. The only other day-gecko on Réunion, the Manapany Day-gecko, is known only from the dry west coast, both now and in the past¹⁴⁵.

The extinct Hoopoe Starling, found only on Réunion, may have taken lizards in its diet, but was basically a generalist (as are most starlings) – Desjardins said captive ones would ‘eat anything’, and Levaillant was told that flocks of them damaged the berries in coffee plantations¹⁴⁶. The starling probably nested in

BOX 2

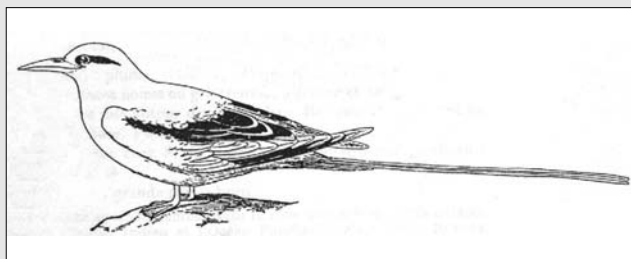
TROPICBIRDS (PHAETHONTIDAE)

Two species are known from the Mascarenes, the Red-tailed Tropicbird *Phaethon rubricauda* and the White-tailed Tropicbird *P. lepturus*, locally called *Paille-en-queue*. They remain fairly common on the islands but suitable nesting habitat has been reduced. Red-tailed Tropicbirds are abundant on Round Island off Mauritius, and although once rare, White-tailed Tropicbirds are beginning to return in numbers to Rodrigues and have begun to nest in the cave and gorge areas of the Plaine Corail.

Accounts

Leguat (1707) in 1691–3:

There's another sort of bird as big as a pigeon all over white, its beak is short and strong, it has a feather in its tail a foot and a half long, from whence it takes its name, being call'd straw-tail. These birds made a pleasant war upon us, or rather upon our bonnets; they often came behind us, and caught 'em off our heads before we were aware of it: This they did so frequently, that we were forc'd to carry sticks in our hands to defend ourselves. We prevented them sometimes, when we discover'd them by their shadow before us; we then struck them in the moment they were about to strike us: We cou'd never find out what use the bonnets were to them, nor what they did with those they took from us.



Tafforet (1726) in Rodrigues in 1726:

There are many Boatswain-birds (Paille-en-queue) which are all white, and others of white red. The Boatswain-birds nest ordinarily in the holes of the cliff or in the hollow trees which abound, especially the Benjoin.

White-tailed Tropicbird *Phaethon lepturus* from Berlioz (1946).

tree-holes, as would have all the parrots and possibly the Mascarene Teal. In other respects, with the exceptions noted below, Réunion shared its terrestrial vertebrate fauna with Mauritius, having the same sibling or replacement species of flying-fox (Black-spined and Rougette), tomb bat, free-tailed bat, harrier, kestrel, wood-rail, owl, parakeets (Echo and Thirion's), pink pigeon, blue pigeon, swiftlet, swallow, cuckoo-shrike, merle, paradise flycatcher, grey white-eye, olive white-eye, fody, day-geckos, night-gecko, Slit-eared Skink, large skink (like Telfair's), and Bouton's Skink. While birds mostly matched one-to-one, there were fewer than half as many lizard species. The few wetlands also had a similar fauna: cormorant, egret, night heron, teal, sheldgoose, flamingo, and coot. Dubois's Kestrel and the Réunion Night Heron were apparently not derived from their Mauritian counterparts, but from separate colonisations from beyond the Mascarenes, as neither was as specialised as the forms on Mauritius¹⁴⁷.

Forest birds

In addition to the Hoopoe Starling, Réunion had two forest parrots not shared with Mauritius – the Mascarin Parrot and Dubois's Parrot, of whose ecology nothing was recorded. The former, a middle-sized bird, was not a specialist feeder, as several were kept alive in Paris in the late 1700s¹⁴⁸. Dubois's Parrot, about the size of an Echo Parakeet but with red head, wings and tail, was reported only by Dubois himself, who said nothing of its habits¹⁴⁹.

Occurring in forest glades and in open areas is the insectivorous Réunion Stonechat, the only avian insectivore on the islands that feeds largely on the ground. In more open areas Réunion also has Madagascar Buttonquails, which did not occur naturally on Mauritius. Although no bones have been found to confirm they are native, the 'small grey partridges the size of quails' described by Dubois fit this species, as does Père Vachet's description of the repeated very short flights made when pursued¹⁵⁰.

Both islands had a fody, the Réunion bird resembling the Mauritian species closely. Dubois described the male as red on the head and breast, but its habits, however, appeared to be quite unlike anything reported in Mauritius, until Hugo's similar account was published in 2002 (Box 31, p. 228). The Réunion Fody occurred in considerable flocks, was a pest of grain in the fields and even a nuisance in people's kitchens – behaviour reminiscent of the typically granivorous Madagascar Fody, and unlike the habits seen in the predominantly insectivorous island fodies today. However in the mid-19th century, before Cardinal Fodies were introduced to Rodrigues, Rodrigues Fodies also formed flocks in open grassland, probably feeding on seeds¹⁵¹. As it has never been formally named, we propose to call the Réunion Fody:

Foudia delloni sp. nov. Size as other fodies (roughly that of a House Sparrow *Passer domesticus*); breeding male bright red on head, neck, throat, and upperparts of wings, brown on back, paler on belly; tail brown. Female and eclipse male brown on head, neck and wings where

male red, paler brown on throat, otherwise similar to male. Differed from *F. rubra* in having the wing coverts red not grey-brown (male in full plumage), and from *F. madagascariensis* in the restricted area of red in the male. Known only from Réunion Island, Indian Ocean, where extinct soon after 1672. It is named after Gabriel Dellon, the first traveller to describe it; the description is based on two contemporary accounts, Dellon's in 1668 and Dubois's in 1671–72¹⁵².

Above the tree-line

Réunion is unique in the Mascarenes in having large areas above the tree-line, ranging from giant heather forest around 1,700–1,800m through to scant grass at the highest levels. Only four birds are known to have exploited this zone, the stonechat, the two white-eyes and the '*oiseau bleu*' – a large ground-dwelling bird, reluctant to fly. The Réunion Olive White-eye, like its Mauritian counterpart a nectar specialist and important pollinator, is particularly attracted to the seasonally abundant yellow flowers of an arborescent St John's Wort and a small laburnum-like tree in the heath zone, and still makes altitudinal migrations to exploit these food sources, also used by the Mascarene Grey White-eye¹⁵³.

The *oiseau bleu* lived, at least latterly, in the open woodland with temporary marshy pools of the Plaine des Cafres at around 1,600–1,800m¹⁵⁴. Now that the mystery of the '*solitaire*' has been solved (see p. 30), the *oiseau bleu* is the most enigmatic bird from the old accounts. It was a quasi-flightless bird the size of a 'large capon', blue with red bill and legs¹⁵⁵. The description could fit the Purple Swamphen *Porphyrio porphyrio*, but the *oiseau bleu* lived, not in lowland swamps as befits the gallinule, but in subalpine 'forest-steppe'. Furthermore the birds escaped hunters by running, neither flying (though they could) nor hiding, which is the Purple Swamphen's tendency¹⁵⁶. Although many writers have considered that these birds were Purple Swamphens¹⁵⁷, a species common in Madagascar, it seems more probable that the *oiseau bleu* was an endemic derivative of this bird, rather than identical to it. Purple Swamphens would surely also have occupied typical habitat such as the Étang de Saint-Paul, where *oiseaux bleus* were never reported. Dubois classed them as terrestrial birds (i.e. not waterbirds like ducks), and everyone else said they only lived on the Plaine des Cafres. This situation seems analogous to the '*solitaire*', which in Réunion did not inhabit typical ibis habitat (wetlands again), but lived in the forest, and was also classed by Dubois as a land-bird. A possible explanation is that these two colonised Réunion before any wetlands developed, and by the time geomorphological processes had created swamps they had become irretrievably adapted to other types of habitat. It is rather surprising

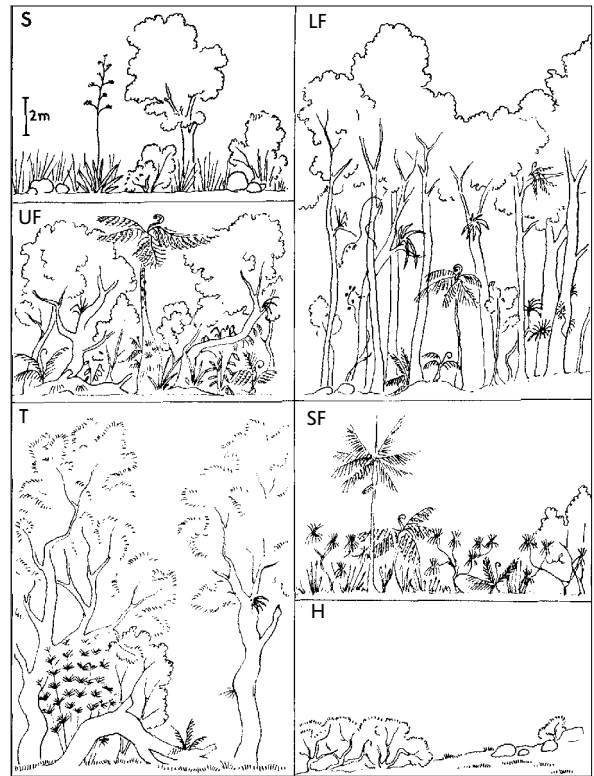


Figure 3.3. Impressions of the different habitats in Réunion, drawn by Nicolas Barré for his paper on bird ecology (Barré 1983). The letters code for: S: dry savannah (now entirely of introduced species), LF: lowland mixed wet forest, UF: upland mixed wet forest, T: tamarin forest, SF: very wet screw-pine forest, H: high-altitude heath. The tree heights are to scale.

that neither colonised Mauritius, but perhaps the pre-existence of Red Hens prevented their establishment. Wild-breeding Purple Swamphens were established in Mauritius from the mid-1800s until the 1960s (Chapter 7), and possibly in Réunion in the 1800s, but the evidence suggests they were introduced¹⁵⁸, though additional vagrants from Madagascar cannot be excluded. No subfossil material of the *oiseau bleu* has yet been found; the bird's diet and habits are unknown.

The Réunion Tortoise

Unlike the other two islands, Réunion had only one species of tortoise, found most abundantly on the dry west coast, but also high up in the interior¹⁵⁹. It has been claimed that these animals were absent from the wetter windward side, but the discovery of Melet's manuscript confirms Tatton's observation in 1613 that they were also numerous in the northeast, at least around Saint-Denis¹⁶⁰. Remains of Réunion Tortoises, notably bigger than those in Rodrigues and especially Mauritius, vary from domed to high-backed, but DNA analysis shows they were all from a single population.

This variability is similar to that found in the Galápagos, whereas on the other Mascarenes the pairs of species present were distinguished by being either high-backed or domed¹⁶¹. Only one visitor mentioned the tortoises' food – leaves fallen from trees¹⁶² – but we assume they also grazed, browsed and ate fallen fruit. In the dry west tortoises may have had to make seasonal migrations to higher and wetter country to find sufficient food, as they do in the Galápagos¹⁶³, returning to the coast to nest on the sandy beaches; others appear to have lived and bred in the mountains (p. 88).

Native mammals

It is from Réunion that we have good early accounts of the habits of the Black-spined Flying-fox and Rougette. Administrator and keen naturalist Jean-Baptiste de Lanux, disturbed that Buffon had followed tradition in including fruitbats amongst the carnivores in his classification, wrote him a long and informative letter in 1772 that Buffon printed in 1776¹⁶⁴. He emphasized first and foremost that these bats ate nothing but fruit and flowers, not specifying the fruit (apart from cultivated ones) but reporting that in January and February (mid-summer) the flowers of the '*bois puant*' *Foetidia mauritiana* attracted them to coastal areas in huge numbers to feast on the nectar, scattering the stamens beneath the trees. For the Black-spined Flying-fox he noted feeding by day as well as by night, but said only odd ones flew around in the daytime unless disturbed. Mating generally took place in May (early winter), with young born in late October, becoming free-flying by the following mid-winter solstice, i.e. mid-June¹⁶⁵. The Black-spined bats roosted as expected on tree branches, but the smaller Rougette, which was strictly nocturnal, roosted in groups of up to 400 inside hollow trees – he was told (but could not verify) that these groups were of females accompanied by a single male¹⁶⁶. Both species were said to be at times very fat, but Lanux only specified the dates for the Black-spined Flying-fox: summer and early autumn. He noted that Black-spined Flying-foxes sometimes flew very high, and suggested they might easily make the crossing to and from Mauritius.

Bory de St Vincent reported seeing in 1801 a tiny all-white bat roosting in latan palms in Réunion, this remains unidentified and cannot be associated with any known species. Close associations of bats with specific trees are known elsewhere; there is a small all-white bat in central America that roosts only in *Heliconia* leaves, while the Malagasy endemic *Myzopoda* species apparently require Travellers' Palms *Ravenala* to roost in¹⁶⁷. Réunion had three other microbats, two (Grey Tomb and Mascarene Free-tailed) the same as in Mauritius, but there were also Pale House Bats

Scotophilus borbonicus, now vanished, said to have been prevalent at higher altitudes¹⁶⁸. Mascarene Swallows and Mascarene Swiftlets still occupy the daytime aerial niche, as in Mauritius.

Seabirds

The highest parts of Réunion are home to two endemic seabirds, Barau's Petrel and the Réunion Black Petrel. So difficult is the terrain on the highest crumbling cliffs of the Piton des Neiges that Barau's Petrel nests were not actually found until 1995, although the population can be counted in the thousands (Chapter 8)¹⁶⁹. The Réunion Black Petrel is known from only a few specimens spanning the last 150 years, and may always have been rare, as it was only once reported before the 19th century¹⁷⁰, while Barau's Petrel was abundant enough to have been systematically trapped using flares, as reported by Bory in 1801 (Chapter 6). The birds are attracted to lights at night, crash-land, and are easily caught (Chapter 8)¹⁷¹. Large numbers of Tropical Shearwaters and some Wedge-tailed Shearwaters also nest on cliffs and steep slopes on the coast and inland. As Réunion has only one small offshore stack (Petite Ile), and no shallow marine shelf, there are only limited opportunities for other seabirds. A few Brown Noddies and Wedge-tailed Shearwaters nest on Petite Ile, and the noddies also possibly breed on mainland cliffs at Cap Méchant, though in the 19th century there was a huge noddy roost on the cliffs near Saint-Denis. The only other seabird is the ubiquitous White-tailed Tropicbird, which, as on the other two islands, nests scattered on cliffs throughout the island¹⁷².

The rapid drop into deep water around the island and the very small area of reef lagoon made Réunion unsuitable habitat for Dugongs, whose absence was noted by travellers. Green Turtles nested commonly on the beaches, especially at Saint-Paul; Hawksbills were only mentioned by one early visitor, Bellanger in 1691, but probably bred in small numbers¹⁷³.

THE FAUNA OF PRISTINE RODRIGUES

Apart from the absence of snakes, skinks and hawks, the reptile and large-bird fauna of Rodrigues closely matched that of Mauritius, while small birds were poorly represented. The aerial feeders, swifts and swallows were apparently absent¹⁷⁴, and there were only four known species of arboreal passerines, two of which became extinct before being recorded in life. While the palm fruits supported Solitaires, two species of parrot, and a large, frugivorous day-gecko, the same abundant geckos plus snails fed the endemic night heron, owl and Leguat's Rail; the rail also ate tortoise eggs, dug up from the ground¹⁷⁵. The large, nocturnal and carnivorous Liénard's Giant Gecko probably preyed on smaller lizards and on birds and

their nests, and is known to have raided seabird eggs and young on islets¹⁷⁶. The two species of giant tortoise, a high-backed browser and a domed grazer (as in Mauritius), were extraordinarily abundant, keeping the understorey open and penetrable, and competing with Solitaires for fallen latan palm fruit. The seabird colonies on the offshore islets supported an endemic pied starling that was apparently an egg specialist and opportunist scavenger of carrion¹⁷⁷. A further four geckos are known as subfossils but were not seen by visitors.

The Solitaire

Leguat was so impressed by the Solitaire that he wrote a three-page essay on its habits; this is one of the first coherent observational accounts of animal behaviour in the wild ever published¹⁷⁸. He described the differences in the sexes, growing a little nostalgic about claimed breast-like tufts of feathers on the hens' thorax; males were greyish and brown, weighing up to 20kg (45lb), females were paler brown or 'blond', and much given to preening¹⁷⁹. They had black eyes, and a band above the tan-coloured bill like a 'widow's headband', clearly shown in Leguat's rather crude woodcut (Box 17). They were monogamous, made nests 30–45cm high out of fallen palm leaves, and laid a single egg, larger than a goose's, which took seven weeks to hatch, during which time both sexes incubated in turn¹⁸⁰. They then looked after their offspring for several months before it joined a flock of other young, the adults then returning to their territories. The males displayed vigorously, twirling on the spot and making a rattling sound with their wings that was audible for 200 paces. They defended their territories, especially when they had small nestlings, fighting off intruders (including humans) using the round, musket ball-like mass on their wings and their sharp beaks as weapons. According to Leguat only males would chase off males, and females chased females. They were fat from March through September, and every bird had a large stone in its gizzard (which Leguat and his friends used to sharpen their knives!). They could run swiftly, outrunning men in dense forest though not in more open areas¹⁸¹. Dodos likewise swallowed single gizzard stones, which may imply similarities between these two related birds' diets – though the Solitaire had a much smaller, more 'normal' bill. Leguat was amazed to find that even 'nestling' Solitaires had gizzard stones; he assumed they hatched with them *in situ*, but presumably the adults in fact fed them the stones early on to help them digest their food. Despite nesting on the ground, Solitaires were clearly nidicolous as are their pigeon relatives, though Leguat says nothing about how the young were fed; other pigeons provide hatchlings with pre-digested 'pigeon milk'¹⁸².

Other endemic land birds

Leguat's Rail, related to the larger Red Hen of Mauritius, was a flightless grey bird with a red bill and legs, and a red wattle around the eye¹⁸³. Leguat bemoaned his inability to find their well-hidden nests, so was unable to sample their eggs. He described their reaction to the colour red in similar terms as travellers to Mauritius did for the Red Hen (Box 11, p. 127), though Tafforet did not remark on it. They had decurved bills of very variable length, the longer ones more decurved than the shorter. Leguat stated that the bill was 2" (5cm) long and straight, whereas Tafforet called it "more or less like a curlew but a bit thicker and not quite as long". This disparity is reflected in the bones, but it is odd that each observer 'saw' only the one sort. Although Leguat said the sexes were similar, the variation in subfossil bones led Günther and Newton to suggest possible dimorphism in bill size¹⁸⁴, which may also have been reflected in their diet. Both Leguat and Tafforet said they were very fat, Tafforet saying that at times it prevented them from running, which they were usually good at. Since they fed on rich chelonian eggs, a good deal of fat is to be expected; this may have been seasonal.

Rather less was said about the Rodrigues Night Heron, but that is still more than we know about the Mauritian or Réunion species. Leguat noted that they were particularly fond of lizards (Box 6, p. 83; Box 33, p. 243), and Tafforet commented that they rarely flew, but were able to run very well when chased. Neither traveller described their plumage.

Leguat enjoyed the company of the then-abundant slate-coloured pigeons – they flocked around his table eating melon seeds he rejected, though he said nothing of their natural food. He noted, as did Tafforet, that they only nested on offshore islands. Leguat perceptively assumed this was to avoid rats, which had not then reached the lagoon islets. Subfossil bones indicate there were originally two pigeon species present, the Malagasy Turtle Dove and another smaller but related species, the Rodrigues Dove. Whether both species survived (and were not distinguished) or one was already extinct when Leguat arrived we may never know¹⁸⁵. Tafforet, the last to see them, did not describe his *tourterelles*.

There were at least two species of parrot on Rodrigues, though Tafforet described three (Box 20, p. 181). As only two kinds have been found as subfossils, we provisionally accept, despite a size discrepancy, the interpretation of Tafforet's bird with red wing patches as a colour morph (or simply a full adult male) of the Rodrigues Parakeet, which is known to have been turquoise¹⁸⁶. We have no other source for the red-winged parrot, as Leguat gave a rather unclear description of "blue and green parrots

... especially of mediocre and equal size”, while Pingré in 1761 mentioned *perroquets* but only described entirely green *perruches*¹⁸⁷. Leguat’s Parrot was a heavy-headed bird somewhat resembling the Raven Parrot, but smaller and less of a specialist; Leguat kept several captive without difficulty, even training them to talk. Tafforet reported that they ate the seeds of an (unidentified) lemon-scented shrub on the southern islets, as well as the berries of *bois de buis* (*Fernelia buxifolia*) on the main island, while Leguat noted that they liked the nut of a common tree with “a fruit like enough to an olive” (*Cassine* [= *Elaeodendron*] *orientale*). Neither observer mentioned palm fruit in connection with parrots, though they probably took at least the smaller ones on the tree before fruit-fall, the resident fruitbats likewise. The Rodrigues Parakeet, the size of a Ring-necked Parakeet *Psittacula krameri*, may have fed extensively on leaves as does the Echo Parakeet in Mauritius; it outlived Leguat’s Parrot, surviving well after the forests had been devastated, implying a less vulnerable ecology¹⁸⁸.

The lizard-owl was said by Tafforet to live in trees and to eat small lizards and small birds; it is mentioned only in passing by Leguat, as his only ally against rats. Tafforet reported that it sang only on fine nights, but not in bad weather.

The absence of rival small passerines can be seen in the adaptations of the noisy and conspicuous Rodrigues Fody¹⁸⁹, which, in addition to occupying niches similar to the Mauritius Fody on that island, has developed an elaborate brush-tongue to exploit nectar as efficiently as the olive white-eyes on Mauritius and Réunion¹⁹⁰. By contrast, the secretive insectivorous Rodrigues Warbler, the only member of its subfamily in the Mascarenes, is little differentiated from its close relative in the Seychelles and indeed other members of the genus *Acrocephalus*¹⁹¹. Apart from the Rodrigues Starling mentioned above, the only other passerines were a black bulbul (or merle) and an unidentified form, both known only from subfossil bones and apparently extinct before the first reports¹⁹²; the merle’s ecology was no doubt similar to those of its congeners on the other islands.

The first visitors to land on Rodrigues reported ‘geese’ as well as doves, parrots, ‘dodos’ (i.e. Solitaires) and ‘other birds’¹⁹³. However, given that the report was second-hand, ‘geese’ was probably a term sailors had used for some other large bird, most likely boobies, which are goose-sized with webbed feet. No bones of any duck or goose have been found in Rodrigues, and there was no suitable wetland habitat¹⁹⁴.

Bats

Although no visitor noticed more than one species of fruitbat, subfossil evidence shows that both Golden Bats and Black-spined Flying-foxes were present at

one time¹⁹⁵. We cannot be sure whether the now vanished Black-spined Flying-fox, better known from Mauritius and Réunion, was still around in 17th century Rodrigues and overlooked, or had already disappeared. At its present size Rodrigues is very small for supporting two species of flying-fox, so they must have colonised when the island was larger during a period of lower sea level. However, undisturbed, and perhaps with somewhat divergent habits (they are different in size), both might have persisted until human interference disturbed the balance. Only Abbé Pingré, in 1761, gave a description of the bats’ coloration¹⁹⁶ – his account rules out the Black-spined Flying-fox, and is consistent with the Golden Bat. However Leguat said he saw bats whose wings were (each) two feet long (French measure: 64cm = span of 128cm), whereas Pingré said his were 1’-1’6” (32–48cm, spans of 64–96cm)¹⁹⁷. These perceived differences may refer to the different species, the actual wing-spans being 90–102cm for the Black-spined Flying-fox, 66–76cm for the Golden Bat¹⁹⁸. Pingré’s size estimate, like his pelage description, matches the Golden Bat, while Leguat’s is too large for either, but does rather imply he saw Black-spined Flying-foxes. Leguat, the only early visitor to comment on diet, reported that the bats were very fond of wild figs¹⁹⁹. Another native tree is known locally as *bois chauve-souris*: “bats feed greatly on its fruits”²⁰⁰. Contrary to the accepted modern view of flying-fox reproduction, Leguat reported that the bats had two young at a time, an observation also supported for Golden Bats by a 20th-century visitor – in fact twins have recently been recorded both in the wild and in captive populations, so it is possible that under the right conditions this may be regular²⁰¹.

Land reptiles

Large nocturnal lizards as long as a man’s arm (Leguat) and as thick as a man’s wrist (Tafforet) must have been the giant gecko collected by Captain Descreux on Frégate Island in 1842, now known to have been not just the largest *Phelsuma* day-gecko, but one of the largest geckos of any kind²⁰². The smaller, brighter diurnal lizards about a foot long confused early reporters by seeming to be all sorts of colours and possibly species, but in 1761 Abbé Pingré finally discovered the truth – they could change colour with startling speed²⁰³. The bright-to-black lizards were Newton’s Day-gecko, which Leguat said normally ate palm fruit (and the melons at his table). Day-geckos are normally insectivorous with a strong interest in nectar²⁰⁴, but Newton’s Day-gecko’s teeth suggest frugivory, consistent with Leguat’s report, though Marragon reported it eating a lot of insects²⁰⁵. Was there a shortage of insects when the ancestor of these geckos first colonised Rodrigues?

BOX 3

BOOBIES (SULIDAE)

Boobies breed on many island archipelagos in the Indian and Pacific Oceans; at least three species once inhabited the Mascarenes. The largest species, the tree-nesting Abbott's Booby *Papasula abbotti*, once occurred on Mauritius and Rodrigues; old accounts have been confirmed by rare fossil remains. This species now breeds only on Christmas Island. The Masked Booby, *Sula dactylatra*, still breeds on Serpent Island in the North. The islets off Rodrigues, particularly Ile Frégate, once harboured large colonies of boobies; at least two species, Abbott's Booby and Red-footed Boobies *Sula sula* bred there. As boobies were hunted for meat and eggs, this may have been the reason why they were quickly eliminated from mainland Rodrigues and most of the offshore islands. Abbott's Booby probably died out in the 1830s, but Red-footed Boobies survived until at least the mid-1870s.

Accounts

John Marshall (Khan 1927, Cheke 1987a), in Mauritius in 1668:

I see upon the Island 2 birds by a nest upon a very high tree. They were much bigger than geese as seemed to mee, had long beakes and nests [necks?] and were of a whitish colour. [probably Abbott's Boobies]

Tafforet (1726) in Rodrigues in 1726:

The Boeufs [Abbott's Boobies] are the size of a good capon; their plumage is all white with the exception of the wing and tail feathers which are black; its beak is about 5 inches long, coming to a point at the tip, and inside it is like a saw; it is called boeuf because it calls like an ox; it often makes a noise with its wings when flying, that one might think was a gust of wind if it continued after the bird had passed; they normally lay on the branches of trees where they make their nests, and the male and female take turns to incubate the egg, for they lay only one, while one or the other goes fishing. The tratra [Red-footed Booby] is so called because it always calls like that; it is a bird which is not as big as a boeuf, has a beak approaching that of the boeuf, and is grey, a bit white on the belly; they perch and make their nests in trees and incubate by turns, but are in larger numbers than the boeufs. When they are little they are all white and the beak all black, and when they are big they are grey with the beak greenish; the frigates dare not approach them when they are landed on the trees, or in the water where they defend themselves, and once left alone they fly off to go to where they have their nests, and never make a mistake although it is often nearly dark when they arrive; one sees them coming in prodigious quantities from 4 in the afternoon until nightfall.

Pingré (1763) in Rodrigues in 1761:

I can find no traveller who has spoken of the boeuf, at least by this name. It is a bird bigger than a [domestic] duck, which it resembles in the general form of the body; its beak is very strong, about as long as a duck's, pyramidal in shape, or rather conical, ashy coloured, with a hint of red; the point, which is a bit hooked, is black; the eyes, which are precisely where the beak ends, are fine, large and black; the neck and all the body is covered with dazzlingly white down; the feathers of the wings and tail are black; the colour of the feet is blackish grey; the toes are joined by a membrane or web. The animal does not stand tall, its cry is very raucous, somewhat resembling the lowing of an ox. The flesh is almost black; its taste, approaching that of our [= French] seabirds, is not unacceptable. we found the flesh tough, it is true, but that is because we did not give it time to tenderise . . . Tratras are so called because of their cry. I only saw very young ones; they were covered with down, extremely white. I would not be sure that this whiteness was unchangeable."



Specimen collections

Fossil evidence, albeit scarce, confirms that boobies were once resident on the Mascarenes. Only two fossil wing bones of Abbott's Booby exist, which are kept in the Mascarene fossil collections at UMZC (collected from the Mare aux Songes) and UCB (collected on Rodrigues). Fossil material of *Sula* sp. are housed at BMNH and UMZC.

Abbott's Booby *Papasula abbotti* displaying. From Nelson (1971).

The early accounts did not report the Giant Gecko's diet, but Liénard was told that on Ile Frégate (by then its only location) it ate both figs and seabird's eggs, and even sucked the blood of the nestlings.

Four more species of lizard have been identified amongst the subfossil bones from the caves on Plaine Corail. Two are night-geckos in the genus *Nactus*, both larger than any of the others in the genus²⁰⁶, and the other two remain undescribed, though one appears to be a very unusual form²⁰⁷. There is no unequivocal mention of night-geckos in the early accounts, but they may have been the lizards mentioned by Tafforet

as owl food, as a collection of their bones, possibly from owl pellets, has been found in a niche in a cave on Plaine Corail²⁰⁸.

Both Leguat and Tafforet stated that there were three species of tortoise, but failed to describe their differences, Tafforet confining himself to saying that the largest he saw measured 3' to 3'8" in carapace length (French measure: = 0.97–1.19m), while Leguat estimated maximum size by weight: "around 100 [French] lbs" (48.5kg)²⁰⁹. Pingré recorded two sorts, large ones, relatively scarce, called *carosses*, and smaller, unnamed ones²¹⁰. Subfossil remains and

surviving museum specimens indicate only two species, a large high-backed one weighing up to 60kg, and a smaller domed sort of around 12kg²¹⁰. Tafforet said they ate fallen leaves and tree seeds, Leguat and Pingré naming specifically the fallen fruit of *latan* palms. Tafforet observed that they were not very fat, attributing this to their huge numbers²¹¹ and shortage of grass, and related the higher density in valleys to a shortage of water in the dry season.

Seabirds

Unlike Mauritius, where seabirds were largely ignored both by settlers and visiting ships, we are very well informed about the rich variety inhabiting the many islets in the Rodrigues lagoon. Leguat and his companions had no boat, but Tafforet did, and he used it to explore and describe each islet in turn. Rodrigues boasted more seabirds, both in species and numbers, than either Mauritius or Réunion: two boobies, frigatebirds (possibly two species), at least three petrels, the two tropicbirds and five species of tern. Of these the tropicbirds and two gadfly-petrels nested on the main island, while the others nested on islets. Ile Frégate, rocky with tree cover, was where both Abbott's and Red-footed Boobies nested, together with large numbers of frigatebirds and Wedge-tailed Shearwaters, while Sooty Terns and the two noddies favoured the large flat calcarenite islands in the south, Gombrani and Pierrot (= Chat), where there were also a few Fairy Terns. Noddies and shearwaters also nested on several of the smaller islets²¹². Pingré's description of the *boeuf* (Box 3) is so precise that it confirmed the former presence of Abbott's Booby, now confined to Christmas Island off Java, and from Tafforet and Leguat we know that the commoner Red-footed Boobies were largely of the white-tailed brown morph²¹³. The only frigatebird collected in Rodrigues is a Lesser Frigatebird *Fregata ariel*²¹⁴, but it is likely that Great Frigatebirds *F. minor* were also originally present²¹⁵. Frigatebirds and boobies are generally held to have nested only on Ile Frégate, but Pingré reported both on Ile Coco in 1761, and in March 1846 large numbers of boobies were roosting on Ile Crabe²¹⁶. Tafforet recognised both tropicbirds, nesting in trees and cliffs on the main island, as they still do²¹⁷. According to Tafforet, Sooty terns, his *equerets*, nested only on Pierrot, though Pingré reported large numbers on Gombrani and also a colony on Coco – no doubt they moved sites at times. Tafforet included as a 'seabird' the *sentinelle* which "fished on the banks of streams or pools", were "blackish mixed with greyish white" and "flew up calling incessantly" when disturbed. The Striated Heron, still common, best fits this description; it appears not to have colonised the other islands at this date²¹⁸.

Marine animals

The wide expanse of lagoon around Rodrigues was originally a haven for large numbers of Dugongs, and the beaches provided ample space for both Green and Hawksbill turtles to lay their eggs. Leguat reported Dugongs up to 20 (French) feet long (6.5m), and herds of three or four hundred "grazing like sheep" in 3–4 feet (1–1.3m) of water. Tafforet's figures were more modest: herds of 30–40, the largest individuals being 15–18 feet (5–6m) long²¹⁹. Dugongs graze on marine grasses, and the seagrass beds are still there, albeit now degraded, in the Rodrigues lagoon²²⁰. Both Leguat and Tafforet described Dugongs suckling a single young, Leguat being very scathing about a standard encyclopaedia of his time that asserted they had twins²²¹. Leguat's picture of the Dugong correctly indicated the bilobed horizontal tail fluke and the presence of tusks²²².

Green Turtles were also abundant, these large reptiles laying up to 200 eggs at a time on sandy beaches, always at night. Leguat asserted they laid 1,000–1,200 eggs each year from several landings, the eggs taking six weeks to hatch in the warm sand; these figures are in line with current knowledge²²³. The heavy toll taken by "frigate-birds, boobies and other seabirds" was estimated at 90% by Leguat, while Tafforet added that few escaped sharks and other fish. Pingré was told that the main laying season was in October and November; neither Leguat nor Tafforet, while mentioning seasonality, gave dates. Pingré was the only early naturalist to mention '*carrets*'²²⁴, the standard local name for Hawksbills, the source of commercial tortoiseshell. Hawksbills must surely have been frequent nesters on Rodriguan shores, as they still turn up in reasonable numbers even today²²⁵.

Crabs

Although outside the main scope of this book, we should mention land crabs, crustaceans that were of major concern to Leguat, and clearly enormously important in the lowland ecology of pristine Rodrigues²²⁶. Apart from rats, crabs were the principal seedling predators in the Huguenots' vegetable gardens. Their numbers were prodigious, living in extensive underground galleries that Pingré said made walking dangerous in areas near the shore, though they were absent on higher land. At the July and August full moons they flocked in their thousands to the sea to lay their eggs. Leguat said his group could kill three thousand in a night and see no diminution; 70 years later Pingré reported thousands killed by every ship's crew that arrived, again without any visible reduction. This crab-dominated ground fauna can still be seen today on Aldabra and Christmas Island, where the crabs are the most important scavengers and detritus feeders, recycling everything organic that falls on the