= Rodrigues starling =

The Rodrigues starling (Necropsar rodericanus) is an extinct species of starling that was endemic to the Mascarene island of Rodrigues . Its closest relatives were the Mauritius starling and the hoopoe starling from nearby islands ; all three appear to be of Southeast Asian origin . The bird was only reported by French sailor Julien Tafforet , who was marooned on the island from 1725 to 1726 . Tafforet observed it on the offshore islet of Île Gombrani . Subfossil remains found on the mainland were described in 1879 , and were suggested to belong to the bird mentioned by Tafforet . There was much confusion about the bird and its taxonomic relations throughout the 20th century .

The Rodrigues starling was 25 ? 30 centimetres (10 ? 12 inches) long , and had a stout beak . It was described as having a white body , partially black wings and tail , and a yellow bill and legs . Little is known about its behaviour . Its diet included eggs and dead tortoises , which it processed with its strong bill . Predation by rats introduced to the area was probably responsible for the bird 's extinction some time in the 18th century . It first became extinct on mainland Rodrigues , then on Île Gombrani , its last refuge .

= = Taxonomy = =

In 1725 , the French sailor Julien Tafforet was marooned on the Mascarene island of Rodrigues for nine months , and his report of his time there was later published as Relation d 'île Rodrigue . In the report , he described encounters with various indigenous species , including a white and black bird which fed on eggs and dead tortoises . He stated that it was confined to the offshore islet of Île Gombrani , which was then called au Mât . François Leguat , a Frenchman who was also marooned on Rodrigues from 1691 to 1693 and had written about several species there (his account was published in 1708) , did not have a boat , and therefore could not explore the various islets as Tafforet did . No people who later traveled to the island mentioned the bird . In an article written in 1875 , the British ornithologist Alfred Newton attempted to identify the bird from Tafforet 's description , and hypothesised that it was related to the extinct hoopoe starling (Fregilupus varius) , which formerly inhabited nearby Réunion .

Subfossil bones of a starling @-@ like bird were first discovered on Rodrigues by the police magistrate George Jenner In 1866 and 1871 , and by the reverend Henry Horrocks Slater in 1874 . They were found in caves on the Plaine Coral , a limestone plain in south @-@ west Rodrigues . These bones included the cranium , mandible , sternum , coracoid , humerus , metacarpus , ulna , femur , tibia , and metatarsus of several birds ; the bones were deposited in the British Museum and the Cambridge Museum . In 1879 , the bones became the basis of a scientific description of the bird by ornithologists Albert Günther and Edward Newton (the brother of Alfred) . They named the bird Necropsar rodericanus ; Nekros and psar are Greek for " dead " and " starling " , while rodericanus refers to the island of Rodrigues . This binomial was originally proposed by Slater in an 1874 manuscript he sent to Günther and Newton . Slater had prepared the manuscript for an 1879 publication , which was never released , but Günther and Newton quoted Slater 's unpublished notes in their own 1879 article , and credited him for the name . BirdLife International credits Slater rather than Günther and Newton for the name . Günther and Newton determined that the Rodrigues starling was closely related to the hoopoe starling , and they only kept it in a separate genus due to what they termed " present ornithological practice " . Due to the strongly built bill , they considered the new species likely the same as the bird mentioned in Tafforet 's account .

In 1900 , the English scientist George Ernest Shelley used the spelling Necrospa in a book , thereby creating a junior synonym ; however , he attributed the name to zoologist Philip Sclater . In 1967 , the American ornithologist James Greenway suggested that the Rodrigues starling should belong in the same genus as the hoopoe starling , Fregilupus , due to the similarity of the species . More subfossils found in 1974 added support to the claim that the Rodrigues bird was a distinct genus of starling . The stouter bill is mainly what warrants generic separation from Fregilupus . In 2014 , the British palaeontologist Julian P. Hume described a new extinct species , the Mauritius starling (Cryptopsar ischyrhynchus) , based on subfossils from Mauritius . It was shown to be

closer to the Rodrigues starling than to the hoopoe starling , due to the features of its skull , sternum and humerus . Until then , the Rodrigues starling was the only Mascarene passerine bird named from fossil material .

In 1898 , the British naturalist Henry Ogg Forbes described a second species of Necropsar , N. leguati , based on a skin in the World Museum Liverpool , specimen D.1792 , which was labelled as coming from Madagascar . He suggested that this was actually the bird mentioned by Tafforet , instead of N. rodericanus from mainland Rodrigues . Walter Rothschild , however , believed the Liverpool specimen to be an albinistic specimen of a Necropsar species supposedly from Mauritius . In 1953 , Japanese writer Masauji Hachisuka suggested that N. leguati was distinct enough to warrant its own genus , Orphanopsar . In a 2005 DNA analysis , the specimen was eventually identified as an albinistic specimen of the grey trembler (Cinclocerthia gutturalis) from Martinique .

Hachisuka believed the carnivorous habits described by Tafforet to be unlikely for a starling , and thought the lack of a crest suggested that it was not closely related to Fregilupus . He was reminded of corvids because of the black @-@ and @-@ white plumage , and assumed the bird seen by Tafforet was a sort of chough . In 1937 , he named it Testudophaga bicolor , and coined the common name " bi @-@ coloured chough " . Hachisuka 's assumptions are disregarded today , and modern ornithologists find Tafforet 's bird to be identical to the one described from subfossil remains .

In 1987 , the British ornithologist Graham S. Cowles prepared a manuscript that described a new species of Old World babbler , Rodriguites microcarina , based on an incomplete sternum found in a cave on Rodrigues . In 1989 , the name was mistakenly published before the description , making it a nomen nudum . Later examination of the sternum by Hume showed that Rodriguites microcarina was identical to the Rodrigues starling .

= = = Evolution = = =

In 1943 , the American ornithologist Dean Amadon suggested that Sturnus @-@ like species could have arrived in Africa , and given rise to the wattled starling (Creatophora cinerea) and the Mascarene starlings . According to Amadon , the Rodrigues and hoopoe starlings were related to Asiatic starlings , such as some species of Sturnus , rather than the glossy starlings (Lamprotornis) of Africa and the Madagascan starling (Saroglossa aurata) ; he concluded this based on the colouration of the birds . A 2008 study , which analysed the DNA of various starlings , confirmed that the hoopoe starling was a starling , but with no close relatives among the sampled species .

Extant East Asian starlings , such as the Bali myna (Leucopsar rothschildi) and the white @-@ headed starling (Sturnia erythropygia) , have similarities with these extinct species in colouration and other features . As the Rodrigues and Mauritius starlings seem to be more closely related to each other than to the hoopoe starling , which appears to be closer to Southeast Asian starlings , there may have been two separate colonisations of starlings in the Mascarenes from Asia , with the hoopoe starling being the latest arrival . Apart from Madagascar , the Mascarenes were the only islands in the south @-@ west Indian Ocean that contained native starlings . This is probably due to the isolation , varied topography and vegetation of these islands .

= = Description = =

The Rodrigues starling was large for a starling , being 25 ? 30 cm (10 ? 12 in) in length . Its body was white or greyish white , with blackish @-@ brown wings , and a yellow bill and legs . Tafforet 's complete description of the bird reads as follows :

A little bird is found which is not common , for it is not found on the mainland . One sees it on the islet au Mât [Ile Gombrani] , which is to the south of the main island , and I believe it keeps to that islet on account of the birds of prey which are on the mainland , as also to feed with more facility on the eggs of the fishing birds which feed there , for they feed on nothing else but eggs or turtles dead of hunger , which they well know how to tear out of their shells . These birds are a little larger than a blackbird [Réunion bulbul (Hypsipetes borbonicus)] , and have white plumage , part of the wings

and tail black , the beak yellow as well as the feet , and make a wonderful warbling . I say a warbling , since they have many and altogether different notes . We brought up some with cooked meat , cut up very small , which they eat in preference to seed .

Tafforet was familiar with the fauna of Réunion , where the related hoopoe starling lived . He made several comparisons between the faunas of different locations , so the fact that he did not mention a crest on the Rodrigues starling indicates that it was absent . His description of their colouration is similar .

Hume notes that the skull of the Rodrigues starling was about the same size as that of the hoopoe starling , but the skeleton was smaller . Though the Rodrigues starling was clearly able to fly , its sternum was smaller compared to that of other starlings ; however , it may not have required powerful flight , due to the small area and topography of Rodrigues . The two starlings differed mainly in details of the skull , jaws , and sternum . The maxilla of the Rodrigues starling was shorter , less curved , had a less slender tip , and had a stouter mandible . Not enough remains of the Rodrigues starling have been found to assess whether it was sexually dimorphic . Subfossils show a disparity in size between specimens , but this may be due to individual variation , as the differences are gradual , with no distinct size classes . There is a difference in bill length and shape between two Rodrigues starling specimens , which could indicate dimorphism .

Günther and Newton noted that the skull of the Rodrigues starling was shaped somewhat differently and longer than that of the hoopoe starling , being about 29 mm (1 @.@ 1 in) long from the occipital condyle ; it was also narrower , being 21 ? 22 mm (0 @.@ 83 ? 0 @.@ 87 in) wide . The eyes were set slightly lower , and the upper rims of the eye sockets were about 8 mm (0 @.@ 31 in) apart . The interorbital septum was more delicate , with a larger hole in its centre . The bill was about 36 ? 39 mm (1 @.@ 4 ? 1 @.@ 5 in) long , less curved and proportionally a little deeper than in the hoopoe starling . It also seems to have had larger nostrils , with the nostril openings in the bone being 12 ? 13 mm (0 @.@ 47 ? 0 @.@ 51 in) in length . The mandible was about 52 ? 60 mm (2 @.@ 0 ? 2 @.@ 4 in) long and 4 ? 5 mm (0 @.@ 16 ? 0 @.@ 20 in) deep proximally . The skull had an attachment scar above the temporal fossa . The supraoccipital ridge on the skull was quite strongly developed , and a biventer muscle attachment in the parietal region below it was conspicuous . This indicates that the starling had strong neck and jaw muscles .

According to Günther and Newton , the ulna of the Rodrigues starling was somewhat shorter than that of the hoopoe starling , measuring 37 ? 40 mm (1 @.@ 5 ? 1 @.@ 6 in) ; the humerus measured 32 ? 35 mm (1 @.@ 3 ? 1 @.@ 4 in) , and the keel on its sternum was a bit lower . It had strong quill knobs on the ulna , indicating that the secondary remiges were well developed . One coracoid measured 27 @.@ 5 mm (1 @.@ 08 in) in length , and one carpometacarpus was 22 @.@ 5 mm (0 @.@ 89 in) long . The leg and feet had the same proportions . The femur measured around 33 mm (1 @.@ 3 in) , the tibiotarsus 52 ? 59 mm (2 @.@ 0 ? 2 @.@ 3 in) , and the tarsometatarsus 36 ? 41 mm (1 @.@ 4 ? 1 @.@ 6 in) .

= = Behaviour and ecology = =

Little is known about the behaviour of the Rodrigues starling , apart from Tafforet 's description , from which various inferences can be made . The robustness of its limbs and the strong jaws with the ability to gape indicates that it foraged on the ground . Its diet may have consisted of the various snails and invertebrates of Rodrigues , as well as scavenged items . Rodrigues had large colonies of seabirds and now @-@ extinct Cylindraspis land tortoises , as well as marine turtles , which would have provided a large amount of food for the starling , particularly during the breeding seasons . Tafforet reported that the pigeons and parrots on the offshore southern islets only came to the mainland to drink water , and Leguat noted that the pigeons only bred on the islets due to persecution from rats on the mainland ; the starling may have also done this . Originally , the Rodrigues starling may have been widely distributed on Rodrigues , with seasonal visits to the islets . Tafforet 's description also indicates that it had a complex song .

The stouter build and more bent shape of the mandible shows that the Rodrigues starling used greater force than the hoopoe starling when searching and perhaps digging for food . It probably

also had the ability to remove objects and forcefully open entrances when searching for food ; it did this by inserting its wedge @-@ shaped bill and opening its mandibles , as other starlings and crows do . This ability supports Tafforet 's claim that the bird fed on eggs and dead tortoises . It could have torn dead , presumably juvenile , turtles and tortoises out of their shells . Tafforet did not see any Rodrigues starlings on the mainland , but he stated that they could easily be reared by feeding them meat , which indicates that he brought young birds from a breeding population on Île Gombrani . Tafforet was marooned on Rodrigues during the summer and was apparently able to procure juvenile individuals ; some other Rodrigues birds are known to breed at this time , so it is likely that the starling did the same .

Many other species endemic to Rodrigues became extinct after humans arrived , and the island 's ecosystem is heavily damaged . Before humans arrived , forests completely covered the island , but very little remains today . The Rodrigues starling lived alongside other recently extinct birds , such as the Rodrigues solitaire , the Rodrigues parrot , Newton 's parakeet , the Rodrigues rail , the Rodrigues owl , the Rodrigues night heron , and the Rodrigues pigeon . Extinct reptiles include the domed Rodrigues giant tortoise , the saddle @-@ backed Rodrigues giant tortoise , and the Rodrigues day gecko .

= = Extinction = =

Leguat mentioned that pigeons only bred on islets off Rodrigues , due to predation from rats on the mainland . This may be the reason why Tafforet only observed the Rodrigues starling on an islet . By Tafforet 's visit in 1726 , the bird must have either been absent or very rare on mainland Rodrigues . Rats could have arrived in 1601 , when a Dutch fleet surveyed Rodrigues . The islets would have been the last refuge for the bird , until the rats colonised them , too . The Rodrigues starling was extinct by the time French scientist Alexandre Guy Pingré visited Rodrigues during the French 1761 Transit of Venus expedition .

The large populations of tortoises and marine turtles on Rodrigues resulted in the export of thousands of animals , and cats were introduced to control the rats , but the cats attacked the native birds and tortoises as well . The Rodrigues starling was already extinct on the mainland by this time . Rats are adept at crossing water , and inhabit almost all islets off Rodrigues today . At least five species of Aplonis starlings have become extinct in islands of the Pacific Ocean , and rats also contributed to their demise .