= Oryzomys gorgasi =

Oryzomys gorgasi , also known as Gorgas 's oryzomys or Gorgas 's rice rat , is a rodent in the genus Oryzomys of family Cricetidae . First collected as a living animal in 1967 , it is known from only a few localities , including a freshwater swamp in the lowlands of northwestern Colombia and a mangrove islet in northwestern Venezuela . It formerly occurred on the island of Curaçao off northwestern Venezuela ; this extinct population has been described as a separate species , Oryzomys curasoae , but does not differ morphologically from mainland populations .

Oryzomys gorgasi is a medium @-@ sized , brownish species with large , semiaquatically specialized feet . It differs from other Oryzomys species in several features of its skull . Its diet includes crustaceans , insects , and plant material , and parasitic nematodes infect it . The species is listed as " Endangered " by the International Union for Conservation of Nature due to destruction of its habitat and competition with the introduced black rat (Rattus rattus) .

= = Taxonomy = =

Oryzomys gorgasi was first found in Antioquia Department of northwestern Colombia in 1967 during an expedition by the U.S. Army Medical Department and the Gorgas Memorial Laboratory . In 1971 , Field Museum zoologist Philip Hershkovitz described a new species , Oryzomys gorgasi , on the basis of the single known specimen , an old male . He named the animal after physician William Crawford Gorgas , the namesake of the Gorgas Memorial Laboratory . Hershkovitz considered the new species most closely related to Oryzomys palustris , which at the time included North and Central American populations now divided into several species , including the marsh rice rat (O. palustris) and O. couesi . The species was not recorded again until 2001 , when Venezuelan zoologist J. Sánchez H. and coworkers reported on 11 specimens collected in coastal northwestern Venezuela in 1992 , 700 km (430 mi) from the Colombian locality . They confirmed that O. gorgasi is a distinct species related to the O. palustris group .

In 2001 , Donald McFarlane and Adolphe Debrot described a new Oryzomys species from the Dutch island of Curaçao off northwestern Venezuela . For their description , they used subfossil material from owl pellets , including two partial skulls and several hemimandibles . They referred the species to Oecomys , a group of arboreal (tree @-@ living) , mainly South American rodents related to Oryzomys . O. curasoae has also been known as the " Curaçao Rice Rat " and the " Curaçao Oryzomys " .

Marcelo Weksler and colleagues removed most of the species then placed in Oryzomys from the genus in 2006 , retaining only the marsh rice rat and related species , including O. gorgasi . They also kept O. curasoae in the genus and suggested that it may not be distinct from O. gorgasi . In a 2009 paper , R.S. Voss and Weksler examined the two and concluded that they represented the same species on the basis of direct comparisons and a phylogenetic analysis . The resultant tree placed O. curasoae and O. gorgasi sister to each other and closer to O. couesi than to the marsh rice rat . Accordingly , they placed O. curasoae as a junior synonym of the earlier described O. gorgasi .

Oryzomys gorgasi is the southeasternmost representative of the genus Oryzomys , which extends north into the eastern United States (marsh rice rat , O. palustris) . O. gorgasi is further part of the O. couesi section , which is centered on the widespread Central American O. couesi and also includes six other species with more limited and peripheral distributions . Many aspects of the systematics of the O. couesi section remain unclear and it is likely that the current classification underestimates the true diversity of the group . Oryzomys is classified in the tribe Oryzomyini , a diverse assemblage of American rodents of over a hundred species , and on higher taxonomic levels in the subfamily Sigmodontinae of family Cricetidae , along with hundreds of other species of mainly small rodents .

= = Description = =

Oryzomys gorgasi is a medium @-@ sized oryzomyine with small ears and large feet , and is similar to the marsh rice rat in general appearance . The long and coarse fur is brownish above and ochraceous below . At the base of the tail , the upper and lower sides differ in color and at the end is a short tuft of hairs . The scales on the tail are well @-@ developed . As in other Oryzomys , the hindfeet exhibit specializations for life in the water . The plantar (lower) surface of the metatarsus is naked . Two of the pads are very small . Ungual tufts , tufts of hair at the bases of the claws , are poorly developed . Interdigital webbing is present , but extends along less than half of the first phalanges .

In specimens from El Caimito , total length is 220 to 290 mm (8 @.@ 7 to 11 @.@ 4 in) , averaging 259 mm (10 @.@ 2 in) (measured in 6 specimens) ; tail length is 116 to 138 mm (4 @.@ 6 to 5 @.@ 4 in) , averaging 130 mm (5 @.@ 1 in) (measured in 8 specimens) ; hindfoot length is 30 to 32 mm (1 @.@ 2 to 1 @.@ 3 in) , averaging 31 mm (1 @.@ 2 in) (measured in 10 specimens) ; ear length is 15 to 17 mm (0 @.@ 59 to 0 @.@ 67 in) , averaging 16 mm (0 @.@ 63 in) (measured in 7 specimens) ; and condylo @-@ incisive length (a measure of total skull size) is 26 @.@ 9 to 31 @.@ 4 mm (1 @.@ 06 to 1 @.@ 24 in) , averaging 29 @.@ 6 mm (1 @.@ 17 in) (measured in 5 specimens) . In the holotype from Colombia , an old male , total length is 240 mm (9 @.@ 4 in) ; tail length is 125 mm (4 @.@ 9 in) ; ear length is 19 mm (0 @.@ 75 in) ; and condylo @-@ incisive length is 32 @.@ 1 mm (1 @.@ 26 in) . The collector recorded the holotype 's hindfoot as being 34 mm (1 @.@ 3 in) long , but Sánchez and colleagues remeasured it as 33 mm (1 @.@ 3 in) .

The rostrum (front part of the skull) is short . The broad zygomatic plate develops a prominent notch , but not a spine , on its front end , and its back margin is in front of the first molars . The interorbital region , located between the eyes , is narrowest towards the front and is flanked by beadings along its margins . The interparietal bone is relatively long . The incisive foramina , perforations of the palate between the incisors and the molars , are narrow and long and taper towards the end . The palate itself is also long , extending beyond the molars , and includes prominent posterolateral palatal pits near the third molars , which are excavated into deep fossae . The roof of the mesopterygoid fossa , the opening behind the palate , is not perforated by sphenopalatine vacuities . O. gorgasi lacks an alisphenoid strut ; in some other oryzomyines , this extension of the alisphenoid bone separates two openings in the skull , the masticatory ? buccinator foramen and the foramen ovale accessorium . The squamosal bone lacks a suspensory process that contacts the tegmen tympani , the roof of the tympanic cavity , a defining character of oryzomyines . The subsquamosal fenestra , an opening at the back of the skull determined by the shape of the squamosal , is almost absent .

In the mandible (lower jaw) , the upper and lower masseteric ridges come close together below the first molars , but do not fuse . The back end of the lower incisor root is in a capsular process , a raising of the mandibular bone behind the molars . The upper incisors have yellowish enamel and are opisthodont , with the cutting edge inclined backwards . The molars are relatively small and are brachydont (low @-@ crowned) and bunodont (with the cusps higher than the connecting crests) . They are similar to those of the marsh rice rat in structural details . The upper and lower first molars have small accessory roots , as in many other oryzomyines , and the second and third lower molar each have two roots only .

Oryzomys gorgasi is distinguished from other Oryzomys species by its short rostrum , the form of its incisive foramina , the absence of sphenopalatine vacuities , and the near absence of a subsquamosal fenestra . Within the species , the Colombian specimen differs from the Venezuelan animals in being larger in some measurements , but having smaller teeth , and in having oddly shaped wear facets of the incisors . The Colombian animal was probably kept in captivity for some time after it was caught , which would explain its large size and odd wear facets . There are no substantial differences between mainland O. gorgasi and material from Curaçao .

= = Distribution and ecology = =

As far as known , Oryzomys gorgasi has a disjunct distribution in northwestern South America ,

including Colombia , Venezuela , and Curaçao . In a 2009 paper , Carleton and Arroyo @-@ Cabrales speculated that its distribution may extend into Central America . The Colombian population is known from the holotype only , caught at Loma Teguerre (7 ° 54'N , 77 ° W) in Antioquia Department , northwestern Colombia , near the Río Atrato , at about 1 m above sea level . The location is apparently a freshwater swamp , and Hershkovitz suggested that O. gorgasi probably occurred throughout the swamp forests in the Río Atrato basin . On Curaçao , it is known from cave faunas at Tafelberg Santa Barbara , Noordkant , Ser 'i Kura , and Hermanus . At Tafelberg Santa Barbara , it was found in association with introduced black rats (Rattus rattus) , indicating that the population persisted at least until the first European contact in 1499 .

In Venezuela , it was found on El Caimito , a small (57 ha , 140 acres) islet just east of the outlet of Lake Maracaibo in the state of Zulia , where the only other native non @-@ flying mammal is the opossum Marmosa robinsoni . El Caimito is separated from the mainland by a narrow , brackish channel and contains sand banks with xerophytic vegetation surrounded by marshy lagoons with Rhizospora mangle mangroves . Oryzomys gorgasi was caught in all habitats on the islet , but has not been found in other similar sites in northwestern Venezuela , where the introduced black rat is the only rodent collected . Analysis of stomach contents of El Caimito specimens indicates that the species is an omnivore , with a diet including crustaceans , insects , plant seeds , and other plant material . The crustaceans may include fiddler crabs (Uca) and a mangrove tree crab of the genus Aratus ; the insects include flies (Diptera) ; and the plants include grass seeds . Two parasitic nematodes , Litomosoides sigmodontis (family Onchocercidae) and an undetermined species of Pterygodermatites (family Rictulariidae) , are known to infect O. gorgasi . The 2009 IUCN Red List tersely indicates that the species has been found in second Venezuelan locality .

= = Conservation status = =

On the 2009 IUCN Red List , O. gorgasi is currently listed as " endangered " and O. curasoae as " data deficient " . The species may be threatened by competition with introduced black rats and destruction of its habitat , but does occur in at least one protected area . Displacement by the black rat has caused the species to become locally extinct in parts of its Venezuelan range . Suitable habitats for O. gorgasi exist in inland Venezuela , and further study is needed to determine whether it is present there . The extinction of the Curaçao population may also have been caused by competition with the black rat , which has been found together with Oryzomys in subfossil deposits .