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Mammals from Isla Cozumel, Mexico, With Description of a New Species of Harvest Mouse

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Isla Cozumel, or Cozumel Island, lies in the Gulf of Mexico approximately 16 kilometers off the east coast of the Yucatan Peninsula. Administratively, the island is attached to the Mexican Territory of Quintana Roo. The strait that separates Cozumel from the mainland reaches a depth of more than 300 meters, and the current in the strait is swift. The island itself is approximately 45 kilometers long (northeast-southwest) and averages about 14 kilometers wide. "It is composed of limestone and its greatest elevation is about 10 meters above the sea" (Paynter, 1955:8). Vegetationally, Cozumel supports mostly scrubby deciduous forest and mangrove swamps.

From August 7 to 11, 1962, a field party from the Museum of Natural History of The University of Kansas collected vertebrate animals in the vicinity of San Miguel on the west coast of Cozumel. The present report concerns the mammals obtained or observed by the party, among which are several species previously unreported from the island. One of these is a new harvest mouse of the genus *Reithrodontomys* that is named and described beyond. Mention is made also of species previously reported from Cozumel, especially by Hall and Kelson (1959), Koopman (1959), Merriam (1901), and Thomas (1888).

Field operations on Cozumel were supported by funds made available through a contract (DA-49-193-MD-2215) between the U. S. Army's Medical Research and Development Command and The University of Kansas.

Didelphis marsupialis cozumelae Merriam, 1901.—Ten specimens (91428-37), including six pouch young, were taken 3½ km. N San Miguel, where opossums were seen nightly at a garbage dump. The female that carried the six young was obtained on August 8; the young weighed an average of 18.4 (17.6-19.5) grams.

We tentatively retain the subspecific name *cozumelae* for the insular opossums. Comparison of our material with specimens of *D. m. yucatanensis* from the adjacent mainland fails to support Merriam's (1901:102) contention that the two differ in certain cranial features or that *cozumelae* is the larger in size of body. The tail does, however, average shorter in relation to length of

body than in specimens from the mainland, and the white tip on the tail is noticeably shorter (one-half to two-thirds as long).

Selected measurements of an adult male and the largest available female (the one with young) are, respectively: total length, 770, 633; length of tail, 319, 300; length of hind foot, 60, 53; length of ear, 54, 52; greatest length of skull, 115.1, 90.7; zygomatic breadth, 63.5, 45.2; palatal length, 65.7, 54.8; length of M1-M4, 19.5, 17.9.

Micronycteris megalotis mexicana Miller, 1898.—Our only specimen (91539), a female in juvenal pelage and with unfused phalangeal epiphyses, was taken in a mist net stretched between two palm trees adjacent to the cottage in which we stayed. Goldman (1951:443) earlier listed this species from Cozumel under the name *Macrotus pygmaeus*.

Artibeus jamaicensis yucatanicus J. A. Allen, 1904.—Judging from our experience, this species is the commonest of the bats occurring on Cozumel. Eighteen individuals were collected as follows: 4 km. N San Miguel, 6 (91724-29); 3½ km. N San Miguel, 12 (91730-40, 91781). All specimens taken were netted, either along small roads through the scrubby forest or among coconut palms adjacent to residences near the beach. Five of 11 females obtained were lactating; the testes of one male measured 10 mm. Several authors previously have reported this bat from the island.

Artibeus lituratus palmarum Allen and Chapman, 1897.—One specimen (91780), a male having testes measuring 6 mm., was netted along with several individuals of *A. jamaicensis* among coconut palms 3½ km. N San Miguel. This species has not been reported previously from Cozumel.

Artibeus phaeotis phaeotis (Miller, 1902).—A male and two females of this small fruit-eating bat were trapped in mist nets stretched across a narrow road in the forest 4 km. N (91790) and 3½ km. N (91791-92) San Miguel. Each of the females carried a single embryo (23 and 25 mm. crown-rump). Although this species long has been known from the Yucatan Peninsula, it was not formerly known from Cozumel.

Previous authors (Hershkovitz, 1949:449, Dalquest, 1953:64, and Davis, 1958:164, among others) have regarded *A. p. phaeotis* (type locality, Chichén-Itzá, Yucatán) as a subspecies of *Artibeus cinereus*. Apparently none of the authors who thus treated *phaeotis* examined the holotype, which actually is identical with the species later described by Andersen (1906:422) as *Artibeus turpis* (type locality, Teapa, Tabasco). Therefore, *A. p. phaeotis* replaces *A. t. turpis* as the correct name for the bat of the Caribbean lowlands of southern Mexico and adjacent areas that is characterized by its small size, relatively broad and naked uropatagium, and short, up-turned rostrum. The slightly smaller subspecies of Pacific coastal areas (see Davis, 1958:163) henceforth should bear the name *Artibeus phaeotis nanus*.

We are grateful to Dr. C. O. Handley, Jr., of the U. S. National Museum, who currently is revising the genus *Artibeus*, for allowing one of us (Jones) to examine the holotype of *phaeotis*. Our attention first was drawn to this matter when we discovered that all individuals of small *Artibeus* in our collection from the Yucatan Peninsula resembled *"turpis,"* which was not reported from there, rather than *"cinereus,"* which was said to occur there.

Measurements of the male and two females are, respectively: total length, 57, 54, 58; length of hind foot, 12, 10, 11; length of ear, 14, 16, 17; length of

forearm, 38.2, 38.3, 40.8; greatest length of skull, 19.6, 19.1, 19.3; zygomatic breadth, 11.5, 11.7, 11.7; length of maxillary tooth-row, 6.0, 5.8, 5.9.

Natalus stramineus saturatus Dalquest and Hall, 1949.—This species, previously unreported from the island, is represented in the U. S. National Museum by 32 specimens in alcohol from San Miguel.

Oryzomys palustris cozumelae Merriam, 1901.—Rice rats were abundant in tangled, second-growth brush and vines. Thirty-six specimens were collected from 3 km. N (92185-86) and 3½ km. N (92168-84, 92187-203) San Miguel. A female obtained on August 8 carried three embryos that measured 15 mm. (crown-rump) and our sample contains many two-thirds to three-fourths grown young.

Up to now, *O. p. cozumelae* has been regarded as a distinct species, although its close relationship with *O. palustris* of the adjacent mainland has been recognized (see Goldman, 1918:43). None of the specimens among our material are as large as the holotype of *cozumelae*, but a number fall within the range of variation cited for adults by Goldman (*loc. cit.*). When our specimens were compared with individuals of *O. p. couesi* from the Yucatan Peninsula, we found that *cozumelae* differed noticeably only in being larger externally; cranially, *couesi* and *cozumelae* differ only in minor details (for example, the skull of *cozumelae* averages slightly larger, is less arched over the orbits, and has heavier teeth and larger nasals), and the latter averages only slightly darker than mainland specimens. Furthermore, adults of *cozumelae* do not exceed in external size individuals from several of the named populations of *O. palustris*. For all these reasons, and because *cozumelae* long has been recognized as only an insular relative of *palustris*, we employ the name *Oryzomys palustris cozumelae* for it. We feel the relationships of the insular population are best reflected by such usage.

Reithrodontomys spectabilis new species

Holotype.—Adult male, skin and skull, no. 92294 Museum of Natural History, The University of Kansas, from 2½ km. N San Miguel, Isla Cozumel, Quintana Roo; obtained by Ticul Alvarez on August 8, 1962 (original no. 848).

Distribution.—Known only from Cozumel Island.

Diagnosis.—Size large both externally and cranially (see measurements); tail long in relation to head and body (134-148 per cent in adults), scantily haired; pelage short and relatively sparse; upper parts brownish ochraceous over-all, brighter ochraceous on sides; underparts grayish white, the individual hairs white terminally and plumbeous basally; pinkish buff pectoral spot sometimes present; tail dark brown above, only slightly paler below; braincase relatively flattened and uninflated; zygomatic arches broad and strong; rostrum relatively short and broad; mesopterygoid fossa broad; auditory bullae large but only moderately inflated; incisive foramina rarely reaching level of M1; teeth large; first and second molars typical of the subgenus *Aporodon* in having well developed mesolophs(ids) and mesostyles(ids); third lower molar essentially a smaller replica of first two; baculum long (9.5 and 10.9 mm. in two adult males), slender, curved dorsally at the distal end, broadly arrow-shaped basally (width of base 1.1 and 1.2 mm. in the two adult bacula studied), possibly largest among members of genus. The skull and teeth are illustrated in Figure 1.

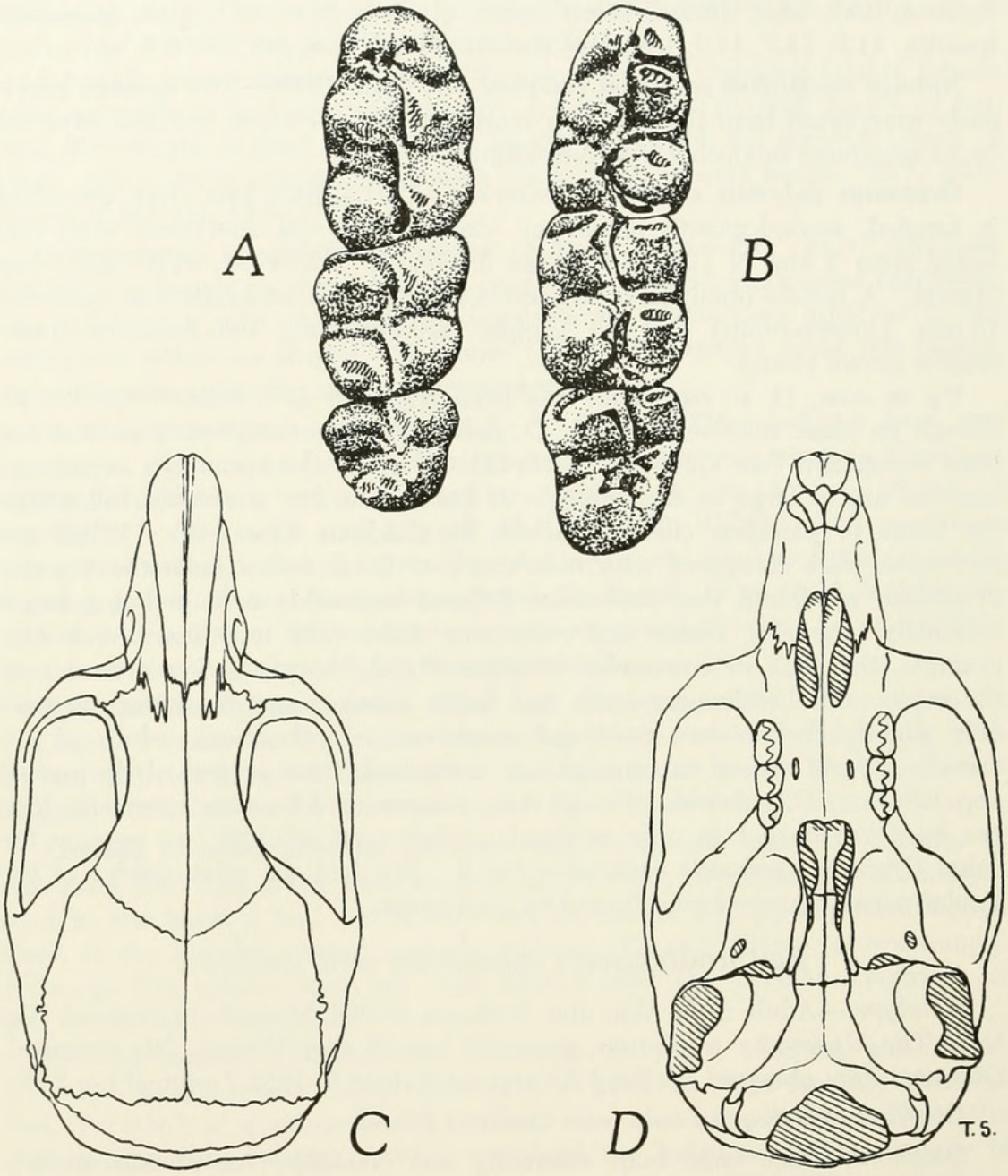

FIG. 1. Skull and teeth of *Reithrodontomys spectabilis*. Right upper (A) and left lower (B) molars of KU 92293 (× 15), and dorsal (C) and ventral (D) views of skull of holotype, KU 92294 (× 3). T. H. Swearingen made the drawings from photographs by J. F. Downhower.

Measurements.—External and cranial measurements of the holotype followed by average and (in parentheses) extreme measurements of eight specimens (four males and four females, including the type) are: total length, 216, 213.8 (205-221); length of tail, 124, 125.7 (121-132); length of hind foot, 22, 21.3 (20-22); weight (in grams), 20.6, 20.2 (18.1-21.4); greatest length of skull, 24.7, 25.2 (24.6-26.2); zygomatic breadth, 12.2, 12.3 (11.8-12.7); interorbital breadth, 3.7, 3.7 (3.5-3.9); breadth of braincase, 11.2, 11.2 (11.0-11.5); depth of skull, 8.5, 9.0 (8.5-9.4); length of rostrum, 8.8, 9.0 (8.7-9.8); breadth of rostrum, 4.1, 4.2 (3.9-4.5); length of incisive foramen, 4.4, 4.5 (4.4-4.8); breadth of mesopterygoid fossa, 1.7, 1.7 (1.5-1.8); length of palatal bridge, 3.9, 4.0 (3.8-4.3); alveolar length of maxillary tooth-row, 3.8, 3.8 (3.7-3.9); alveolar length of mandibular tooth-row, 3.4, 3.5 (3.4-3.7).

Comparisons.—The new species is a member of the subgenus *Aporodon* and is allied to *Reithrodontomys mexicanus* and *R. gracilis* of the *R. mexicanus* species group. It is the largest member of the *mexicanus* group as defined by Hooper (1952) and among the largest species of the genus *Reithrodontomys.*

Of the two kinds to which it appears most closely related, the new species resembles *R. gracilis* of the adjacent mainland of the Yucatan Peninsula to a somewhat greater degree than *R. mexicanus,* known nearest Cozumel Island from the highlands of Guatemala and Honduras. In comparison with *gracilis, R. spectabilis* is immediately recognized by its much larger size (total length averaging 213.8 in adult *spectabilis* but only 175.7 in six adult *R. g. gracilis* from the Yucatan Peninsula, length of hind foot 21.3 and 17.8, greatest length of skull 24.7 and 21.9, zygomatic breadth 12.2 and 10.8), generally darker coloration, and in having a massive skull with broader, heavier zygomatic arches. *R. spectabilis* resembles *R. gracilis* (in contrast to *R. mexicanus*) in that the dark tarsal stripe does not extend onto the hind foot and in having a flattened and relatively uninflated braincase, incisive foramina that rarely reach the level of M1, and in other general features of the cranium. The breadth and depth of the braincase are even less, relative to length of the skull, than in *gracilis*—the breadth averages 44.6 per cent of the greatest length of skull (47.5 in *gracilis* studied), and the depth of skull averages 35.9 in relation to length (36.9 in *gracilis*).

R. spectabilis resembles *R. mexicanus* more than *R. gracilis* in size (measurements of *mexicanus* studied—subspecies *howelli* and *orinus*—are intermediate between those of *spectabilis* and *gracilis*) and to some extent in general coloration. Cranially, aside from averaging smaller, *mexicanus* can be distinguished most easily from *spectabilis* by its proportionately broader and deeper braincase.

Because of its resemblance in many features to the smaller *R. gracilis,* we assume that the precursors of *R. spectabilis* reached Cozumel from the adjacent mainland of the Yucatan Peninsula. The magnitude of the differences between the two species suggests, to us at least, that they have been separated for a relatively long time, since at least late Pleistocene.

Remarks.—Some of the harvest mice from Cozumel Island were trapped in tangled, second-growth vines and brush adjacent to (beachward from) scrub forest; *Oryzomys palustris cozumelae* was abundant in this same habitat. Other individuals were taken in forest in traps set at the bases of trees and along a stone wall. One specimen was caught by hand at night as it climbed in the branches of a small tree, indicating that the Cozumel harvest mouse is at least partly arboreal in habits.

Our sample contains several juvenal and subadult specimens. One female, trapped on August 9, had been recently lactating, but no other females evidenced gross reproductive activity. The testes of two adult males measured 13 and 14 mm.

Specimens examined, 16, as follows: 2½ km. N San Miguel, 3 (92294-96); 3½ km. N San Miguel, 13 (92281-93).

Peromyscus leucopus cozumelae Merriam, 1901.—Six white-footed mice were trapped along trails in scrub forest or in places marginal between forest

and second-growth brush. Our specimens are from 3½ km. N (92417-21) and 2½ km. N (92422) San Miguel. A female obtained on August 11 was lactating.

P. l. cozumelae differs from the subspecies of the mainland of the Yucatan Peninsula (*P. l. castaneus*) in being larger, both externally and cranially, and in having heavier teeth. The two kinds closely resemble each other in color.

Dasyprocta punctata yucatanica Goldman, 1913.—According to Merriam (1901:100), *D. punctata* was introduced on Cozumel "shortly before" the visit of Nelson and Goldman to the island in 1901. Goldman actually observed an individual in the forest near San Miguel. Natives reported to us that agoutis still occur on the island.

Agouti paca subsp.—On the morning of August 11, William E. Duellman observed a paca along a trail through the forest approximately 4 km. N San Miguel. We queried local residents concerning the status of this large rodent on the island and, while aware of its presence, they had no knowledge of whether or not it had been introduced.

Urocyon cinereoargenteus subsp.—We did not obtain specimens of the gray fox, but local residents reported its occurrence to us. Earlier, Merriam (1901:99) wrote of this species on Cozumel as follows: "The only mammal heard of [by Nelson and Goldman] which was not secured is a small Gray Fox (*Urocyon*) reported by natives as rather rare, but more common on the eastern and southern parts of the island. From the accounts it agrees with the Raccoon, Nasua, and Peccary in being much smaller than the mainland species."

Procyon pygmaeus Merriam, 1901.—A subadult male raccoon (92565) was shot on August 8 from a coconut palm situated along the beach 3½ km. N San Miguel. Two other individuals were seen in the same tree and the three may have been from the same family group. Our specimen differs in cranial features from raccoons of the Yucatan Peninsula (*P. lotor shufeldti*) in ways described by Goldman (1950:76-77), and we follow Goldman in preserving specific recognition for *pygmaeus*. It is perhaps worthy of note that our specimen has a distinct "interparietal" bone approximately 13 mm. long by 8 mm. wide, at the juncture of the parietal and frontal bones.

Nasua nelsoni Merriam, 1901.—According to local residents, coatis are common in the vicinity of San Miguel. Several were seen at night and in early morning by our party. One (92570), an adult female with well-developed teats (probably recently lactating), was obtained 3½ km. N San Miguel.

We retain *N. nelsoni* as a full species because it differs so strikingly in size from the coati (*Nasua narica yucatanica*) of the adjacent mainland. Measurements of our specimen, followed in parentheses by measurements of an adult female of *yucatanica* from 7 km. N and 51 km. E Escárcega, Campeche, are as follows: total length, 741 (990); length of tail, 332 (485); length of hind foot, 76 (99); length of ear, 35 (40); greatest length of skull, 103.4 (118.6); zygomatic breadth, 50.3 (58.3); interorbital constriction, 20.4 (24.5); palatal length, 62.7 (72.9); breadth of braincase, 38.3 (42.0); alveolar length M1-M3, 16.6 (19.9). Aside from its over-all smaller size, the skull of *nelsoni* is notable for its more delicate construction and distinctly smaller bullae when compared with *N. n. yucatanica*.

Trichechus manatus manatus Linnaeus, 1758.—Local residents reported that manatees were observed occasionally along the west coast of the island and that they were common in the bays and lagoons on the adjacent coast of Quintana Roo.

Tayassu tajacu nanus Merriam, 1901.—The collared peccary of Cozumel was described as a subspecies distinct from that on the adjacent mainland of Yucatan (*T. t. angulatus*) on the basis of smaller size and blacker nose and chin. Subsequently, Hershkovitz (1951:567) noted that the species had been introduced on the island from the adjacent mainland (see also de Vos *et al.*, 1956:176) and suggested that the small size claimed for *nanus* resulted from heavy hunting pressure, which did not allow animals to attain adult size. Additional specimens are needed before Hershkovitz's interesting hypothesis can be tested. Natives on Cozumel reported the collared peccary as common and intensively hunted.

Mammals Reportedly Collected on Cozumel by G. F. Gaumer

George F. Gaumer, well-known naturalist who lived for many years on the Yucatan Peninsula, reported himself, or sent to others, a number of mammals alleged to have come from the island of Cozumel. Some of these probably originated from the island but others seemingly did not, as discussed below.

Oldfield Thomas (1888), in the first technical paper dealing with mammals from Cozumel, reported five species that were collected by Gaumer and communicated to Thomas by Salvin and Godman. These five were *Didelphis marsupialis, Pteronotus parnellii, Artibeus jamaicensis, Tadarida laticaudata,* and *"Nasua nasica."* The opossum, Jamaican fruit-eating bat, and coati (in the form of the small *Nasua nelsoni*) subsequently have been found to be common on the island. No other records of the two remaining bats, *Pteronotus* and *Tadarida,* have been forthcoming, but each is widespread on the adjacent Yucatan Peninsula and we do not doubt that each occurs on Cozumel.

In his "Monografía de los mamíferos de Yucatán," Gaumer (1917:117) reported the presence of the Yucatan deer mouse, *Peromyscus yucatanicus,* on the island. He did not, however, record *Peromyscus leucopus* from Cozumel and Koopman (1959:237) concluded that Gaumer confused the two species. We are inclined to agree with Koopman, because insofar as we know *P. yucatanicus* does not occur on the island. Gaumer (*op. cit.*:63) also recorded the white-lipped peccary (as *"Dicotyles labiatus"*) from Cozumel but this, too, seems to be in error.

By far the most perplexing collection of mammals relating to Cozumel is a lot of specimens acquired from Gaumer by the Museum of Natural History in the early 1900's. Many of these specimens were cited by Hall and Kelson (1959) and all species represented were listed by Koopman (1959). The holotype and paratypes of *Mimon cozumelae* Goldman (1914) were among the specimens in this collection. Aside from *M. cozumelae,* species represented (and their catalogue numbers) are: *Micronycteris megalotis mexicana* (1659-60); *Glossophaga soricina leachii* (1655-58); *Artibeus jamaicensis yucatanicus* (1641-42); *Centurio senex* (1669-70); *Lasiurus borealis teliotis* (1655); *Plecotus* (possibly *mexicanus*) (1658); *Molossus ater nigricans* (1663-64); *Ateles geoffroyi yucatanensis* (885); *Tamandua tetradactyla mexicana* (869-872, 880); *Heterogeomys hispidus yucatanensis* (1370); *Nasua narica yucatanica* (876-77, 1599-1600); *Galictis allamandi canaster* (873); and *Tayassu* sp. (875—said to be *T. t. nanus,* probably solely on supposed geographic grounds, but specimen not now to be found).

Most of the labels that now accompany the above-listed specimens are not the original labels of Gaumer, and, in any event, bear no additional information that could support or refute the contention that the specimens actually

came from Cozumel. Many other specimens received at the same time are labeled simply as from "Yucatan." Some of the specimens said to be from Cozumel obviously did not come from there as shown below and there is a strong possibility that others did not. Perhaps few or none of the specimens actually originated on the island.

Of the eight bats, only two (*A. jamaicensis* and *M. megalotis*) have been obtained on Cozumel by other collectors. One, *Plecotus*, seems likely not to occur there (see also Koopman, 1959:237). The remaining five (*Mimon, Glossophaga, Centurio, Lasiurus*, and *Molossus*) are widespread in Middle America and each is known from the adjacent mainland. We took *G. soricina* on the much smaller Isla Mujeres that lies to the north of Cozumel. There is a strong possibility that all five species actually occur on Cozumel and that additional collecting will establish their presence on the island. We are especially hopeful of this development with reference to *Mimon cozumelae*.

With reference to the six strictly terrestrial kinds, we doubt that any save *Tayassu* occurs on the island. The major habitat, scrub forest, doubtfully would support tamanduas or monkeys (although the latter might have been introduced) and neither was reported to us by local residents (nor was the grison mentioned). We especially questioned natives about the occurrence of pocket gophers but they assured us that "tuzas" were not present. All four coatis, formerly labeled "*Nasua nelsoni*," are unquestionably the much larger *N. narica yucatanica* that occurs only on the adjacent mainland.

Zoogeography

As Koopman (1959) pointed out, the zoogeographic relationships of Cozumel, at least with respect to mammals, are undoubtedly with the adjacent mainland, not with the Antilles. Even though the strait that separates Cozumel from the mainland of Quintana Roo is deep, and the current in it strong, we suppose that most of the mammals that occur on the island reached it by "rafting" across the strait or possibly from the mainland to the south of Cozumel. At a time of maximal glaciation, because of a lowering of the sea level, the strait would have been reduced to approximately half its present width, theoretically making "rafting" much easier than now, especially if favorable winds prevailed. At least three of the mammals that currently inhabit the island are known or suspected to have been introduced by man.

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