

A NEW GENUS AND SPECIES OF EMBERIZINE FINCH FROM PLEISTOCENE CAVE DEPOSITS IN PUERTO RICO (AVES: PASSERIFORMES)

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ABSTRACT—*Pedinorhis stirpsarcana*, an enigmatic new genus and species of emberizine finch, is known from four cave deposits of probable Wisconsinan age in central Puerto Rico. The most distinctive feature of this bird is the broad, flat ridge of the rostrum. *Pedinorhis* represents a group unknown in the Antilles and, although of uncertain affinities, somewhat resembles the mainland genera *Atlapetes* and *Pipilo*. The disappearance of *Pedinorhis* may be related to the postglacial loss of arid, savanna-like habitats that caused the extinction, or contraction in range, of many xerophilous vertebrates in the West Indies.

INTRODUCTION

Until recently, the fossil vertebrate fauna of Puerto Rico was known mainly from collections made by H. E. Anthony (1918), who excavated cave deposits in the central part of the island in 1916. The birds from these sites were studied by Wetmore (1920, 1922) and a few species were subsequently re-examined or revised by Olson (1974, 1976a, 1976b). In 1976 and 1977, expeditions from the Smithsonian Institution located several very productive new fossil deposits in the vicinity of Anthony's principal sites. This material is augmented by fossils collected in the same area in 1957 by James Bee for the University of Kansas. The fossil herpetofaunas from these and other sites in Puerto Rico have been dealt with by Pregill (1981). Details concerning the fossil deposits excavated by the Smithsonian expeditions are supplied by Olson in that publication (pp. 7-17).

Although to date only some of the thousands of newly obtained avian fossils have been specifically identified, certain species not previously known from Puerto Rico have been recognized, including several new taxa (Olson, in press). One of these is an emberizine finch represented by a number of well preserved rostra and mandibles from four Pleistocene cave deposits. This species could not be placed in any of the genera now found in the West Indies, and further comparisons convinced us that it could not be assigned to any mainland genus either.

Acknowledgments—We are indebted to Noel Snyder, Frederick V. Grady, and other members of the Smithsonian fossil collecting expedition of 1976 (see Pregill, 1981) for their efforts in obtaining new fossil

material from Puerto Rico. Part of the field work was supported by a grant from the National Geographic Society. We also thank William B. Hilgartner for his preliminary work in sorting the fossil passerines. David W. Steadman assisted in many ways and suggested improvements in the manuscript, which was also criticized by Gregory K. Pregill. Fossil specimens in the collections of the Museum of Natural History, University of Kansas, were made available by Larry D. Martin. Jon Barlow kindly lent us a skeleton of *Melanospiza* from the collections of the Royal Ontario Museum. The photographs are by Victor E. Krantz.

SYSTEMATIC PALEONTOLOGY

Order PASSERIFORMES

Family FRINGILLIDAE

Subfamily EMBERIZINAE

The conical bill immediately suggests placement of the fossils with finch-like birds. The rostrum lacks an ossified nasal septum, unlike most Icteridae, and furthermore the morphology of the bill is quite unlike that of *Dolichonyx*, *Molothrus*, or *Spiza*, which are the only icterids in the West Indies with stout, conical bills. The fossils resemble the Emberizinae and differ from the Carduelinae in the characters of the nostril, premaxilla, and retroarticular process that Steadman (in press) has noted as differentiating these two subfamilies.

PEDINORHIS, new genus

Type Species—*Pedinorhis stirpsarcana* n. sp.

Diagnosis—Large Emberizinae with rostrum and mandible long and narrow, in lateral view relatively

straight, not markedly angled ventrally, similar to *Atlapetes*, *Pipilo*, and *Arremon*. Nares decidedly larger and less rounded than in *Arremon* or *Arremonops*. No ossified nasal septum. Differs from *Atlapetes*, *Pipilo*, and other genera examined in having the internarial bar of the rostrum broad, flat, and straight, recalling that in certain Icteridae. In dorsal or ventral view, the tomial edges are noticeably concave, rather than straight as in most Emberizinae. The premaxillary symphysis is proportionately longer and narrower than in similar genera. Ventral (palatal) surface of premaxillary symphysis flat, with a distinct, wide median groove having a narrow raised ridge down the midline.

Etymology—Greek *pedinos*, flat or level, and *rhinos*, nose or beak. The name refers to the distinctive flattened ridge of the bill and is feminine in gender.

PEDINORHIS STIRPSARCANA, new species
(Fig. 1)

Holotype—Complete rostrum, collections of the Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, USNM 306879. Collected in May 1976 by Storrs L. Olson, Noel Snyder, and Frederick V. Grady.

Locality—"Blackbone Cave I" (Cueva del Infierno), 1.2 km S of Iglesia Ascencion, village of Barahona, 2 km NE of Ciales, north-central Puerto Rico (18° 20'55"N, 66° 26'57"W).

Horizon—Unconsolidated, unstratified cave sediments accumulated in a restricted area at the base of what must have been roosts of the extinct barn owl *Tyto cavatica* (see Pregill, 1981).

Chronology—Late Pleistocene. Radiometric dates (C^{14}) from three samples of shells of pulmonate snails taken from two different levels in this deposit gave ages ranging from 17,030 ± 160 B.P. to 21,400 ± 330 B.P. (Smithsonian Radiation Biology Laboratory; see Pregill, 1981:16). Although C^{14} dates from other nearby cave deposits appear to be unreliable, those from Blackbone I are consistent with one another and with the vertebrate fauna, which indicates earlier deposition than most Puerto Rican fossil sites, probably about the time of the Wisconsinan glaciation (Pregill, 1981). *Pedinorhis* also occurs in three other cave deposits, at least two of which are probably younger than Blackbone I.

Etymology—Latin *stirps*, stem or stock, and *arcanus*, secret, mysterious; so named for the uncertainty surrounding the relationships of the species.

Paratypes—Topotypes with the same data as the holotype: complete or nearly complete rostra USNM 306878, 306880–306883; partial rostra, USNM 306884, 307147; complete or nearly complete mandibles, USNM 306885–306886; mandibular symphyses, USNM 306887–306889, 306891, 306899, 306900; mandibular rami, USNM 306890, 306901–306903, 307146; tarsometatarsi, 306892–306896.

Cueva San Miguel: complete rostrum, USNM 306897.

Nesophontes Cave: rostrum, USNM 306898.

Cueva del Perro (specimens in the University of Kansas, Museum of Natural History, paleontology collections—KUPV): complete rostra, KUPV 37051–37055; mandible, KUPV 37056.

The last three sites are in the same valley system, less than 1 km from the type locality.

The tarsometatarsi included here are only tentatively referred to *Pedinorhis*. They correspond in size with that would be expected of a bird with a bill the size of that of *P. stirpsarcana*, whereas they differ in size from any extant taxa of nine-primaried oscines known from Puerto Rico. Recognition of other skeletal elements of *Pedinorhis* awaits more detailed sorting of the large amounts of unidentified passerine postcranial material obtained from the Puerto Rican deposits.

Measurements of Holotype—See Table 1.

Diagnosis—As for the genus.

Remarks—The functional significance of the broad, flattened rostrum in *Pedinorhis* is not readily apparent. Its structure is somewhat similar to that in certain icterids that are adapted for feeding by forcefully spreading the jaws apart, but the retroarticular processes of the mandible in *Pedinorhis* are not lengthened to provide increased attachment for *M. depressor mandibulae*, as in most such gaping birds.

The majority of emberizines endemic to the Antilles belong in the genera *Tiaris*, *Loxigilla*, *Melopyrrha*, *Loxipasser*, and *Melanospiza*. All of these have shorter, stouter bills, with more terete, curved internarial bars, and smaller, more rounded nostrils than in *Pedinorhis*. Most also have an ossified nasal septum. *Pedinorhis* definitely does not belong with this group of finches.

The only other resident emberizines in the Antilles, apart from the very small species *Volatinia jacarina* and *Sporophila nigricollis* in the southernmost Lesser Antilles, are *Torreornis inexpectata* of Cuba, *Ammodramus savannarum* in the Greater Antilles (except Cuba), and *Zonotrichia capensis* of Hispaniola. These are smaller than *Pedinorhis stirpsarcana*, lack the distinctively flattened rostrum of the new genus, and differ in numerous other characters as well.

It is only with reluctance that we place this enigmatic Puerto Rican finch in a new genus, as much more of its history would probably be revealed if the species could be allied with some existing genus. Our comparisons indicate that *Pedinorhis* is most similar to the brushfinches and towhees of the genera *Atlapetes* and *Pipilo*, but none of the species of those genera shows a true approach to the bill morphology of *Pedinorhis*, even given the considerable diversity in bill shape within *Atlapetes*. The species of *Atlapetes* are for the most part birds of undergrowth in montane forest, ranging from Mexico to Argentina. Species of *Pipilo* inhabit mesic or arid lowland scrub in North and Middle America, south to Guatemala, but are also found in montane habitats in the western United States and Middle America.

Bones of *Pedinorhis* were most common in Blackbone Cave, followed by Cueva del Perro. The deposits in these two caves are believed to be older than most of

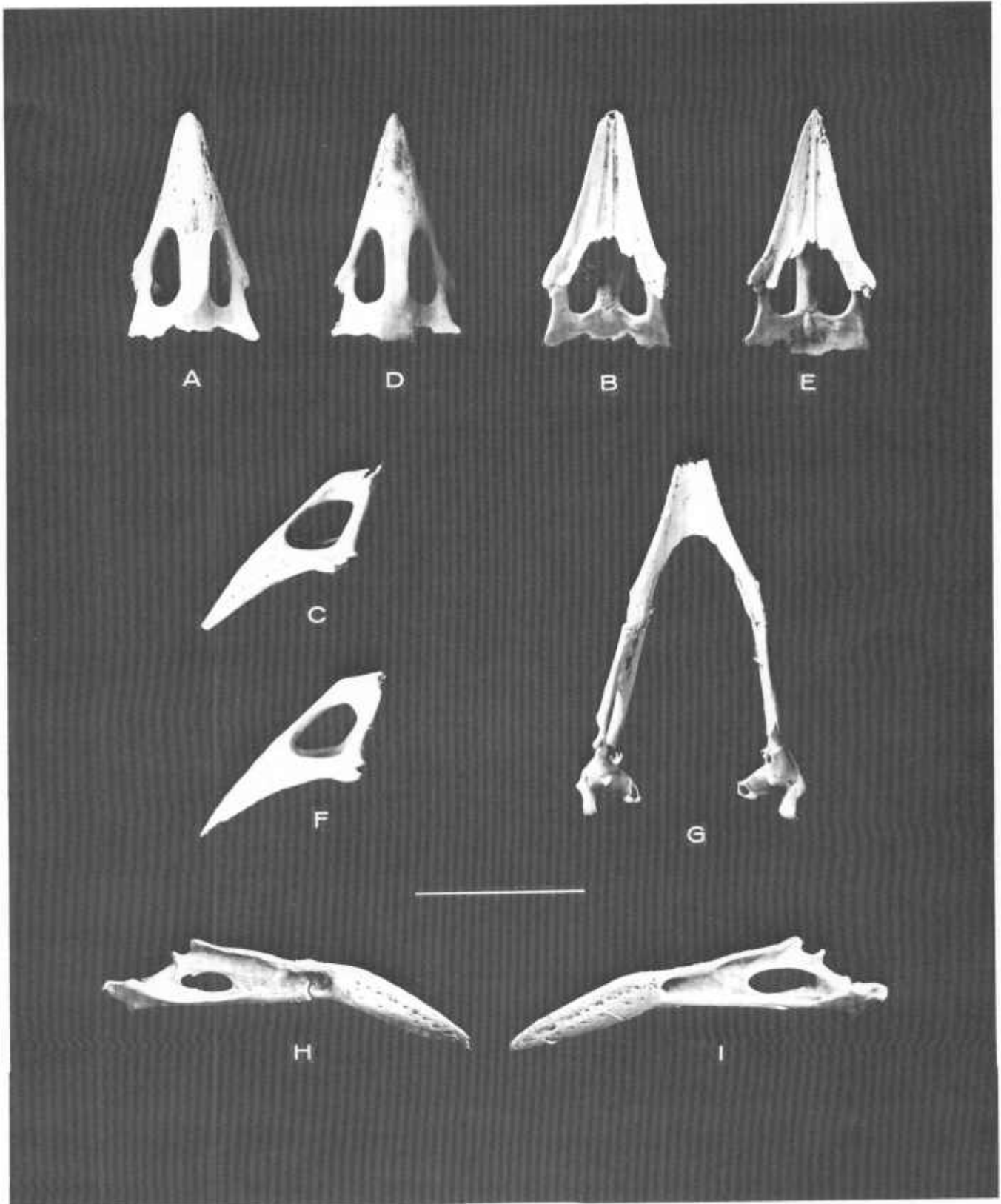


FIGURE 1. Rostra (A–F) and mandibles (G–I) of *Pedinorhis stirpsarcana*, new genus and species: A, B, C, dorsal, ventral, and lateral views of the holotype, USNM 306879; D, E, F, same views of paratype, KUVF 37054, G, H, dorsal and right lateral views of paratype, USNM 306885; I, left lateral view of paratype, USNM 306885. Specimens whitened with ammonium chloride. Scale equals 1 cm for all views.

TABLE 1. Measurements (in mm) of *Pedinorhis stirpsarcana*, new genus and species. The four columns on the left include the measurements of the holotype, which are also given individually for descriptive purposes. SD, standard deviation.

	n	Range	Mean	SD	Holotype
ROSTRUM					
Length from naso-frontal hinge to tip	13	13.15–14.45	13.90	.49	13.95
Length of symphysis along midline of ventral surface	14	7.45– 8.70	8.10	.41	8.50
Length from anterior border of naris to tip	13	8.10– 8.60	8.20	.32	8.50
Maximum length of naris	9	4.05– 4.65	4.47	.17	4.55
Maximum width of ventral surface	8	6.90– 7.15	6.96	.25	7.15
MANDIBLE					
Maximum depth of ramus	7	3.85– 4.30	4.06	—	
Length of symphysis	7	5.05– 6.40	5.77	—	
Length of dentary	6	10.25–11.10	10.66	—	
TARSOMETATARSUS					
Maximum length	4	27.70–29.70	29.03	—	

those found in Puerto Rico. The extinct lizard *Leiocephalus etheridgei* is known only from these two caves (Pregill, 1981), as is an extinct form of burrowing owl, *Athene* (*Speotyto* auct.). Both of these taxa are characteristic of open, arid environments. A new species of palm swift (*Tachornis*, Apodidae) is known so far only from Blackbone Cave (Olson, in press). *Tachornis* nests and roosts in groves of palms in open savannas. These, and other Antillean vertebrate assemblages, indicate that during the last glacial advance the West Indies were more arid than at present, with a predominance of open habitats (Pregill, 1981; Pregill and Olson, 1981; Olson, in press; Olson and Hilgartner, in press). The subsequent postglacial change to more mesic conditions was accompanied by numerous extinctions of xerophilous vertebrates. This evidence could be interpreted as suggesting that the extinction of *Pedinorhis* was caused by the same factors responsible for the extinction of other xerophilous and savanna-adapted vertebrates in the West Indies. We have identified only two specimens of *Pedinorhis* from other, presumably younger, Puerto Rican cave deposits (Cueva San Miguel, Nesophontes Cave), which may mean that the species was not quite as susceptible to habitat change as some taxa.

Although *Pedinorhis* represents a group of finches that by now has totally vanished from the West Indies, it is not unlikely that birds of this genus were more widely distributed in the past and will be found as fossils elsewhere in the Antilles. The extinction of *Pedinorhis* is paralleled by that of other West Indian finches. The Zapata Sparrow, *Torreornis inexpectata*, is known only

from three very small and extremely disjunct populations in remote parts of Cuba. Fossils indicate that it had a wider distribution in the past, and its present habitat requirements indicate that this species, too, has suffered from postglacial reduction of arid habitats (Pregill and Olson, 1981). Remains of an as yet undescribed species related to the Cuban Bullfinch, *Melopyrra nigra*, are known from apparent Pleistocene deposits on Cayman Brac (Morgan, 1977). As its name implies, the Hispaniolan Siskin, *Carduelis dominicensis*, is now known only from Hispaniola, but remains of this species were found in Blackbone Cave in Puerto Rico, along with those of *Pedinorhis* (Olson, pers. obs.), indicating that its range has contracted. It would thus appear that the end of the Pleistocene was not a happy time for finch-like birds in the West Indies and that the extinction of *Pedinorhis* was part of a recurring pattern, rather than an exceptional circumstance.

Comparative Material Examined—Fossils were compared with skeletons of the following species of nine-primaried oscine passerines. Except for one skeleton from the Royal Ontario Museum (ROM), all specimens are from the collections of the National Museum of Natural History, Smithsonian Institution. Familial and subfamilial limits in this paper follow the classification of Raikow (1978).

Parulidae: *Icteria virens* 321003. Thraupidae: *Nesospingus speculiferus* 501883; *Spindalis zena* 502892. Icteridae: *Molothrus bonariensis* 289101; *M. aeneus* 288959; *Dolichonyx oryzivora* 499562; *Spiza americana* 491181. Fringillidae: *Pheucticus ludovi-*

cianus 553164; *Saltator albicollis* 488026; *Calcarius pictus* 489748; *Plectrophenax nivalis* 489549; *Calamospiza melanocorys* 17718; *Zonotrichia iliaca* 502444; *Z. melodia* 499784; *Z. capensis* 428883; *Z. leucophrys* 554116; *Junco vulcani* 488512; *J. hyemalis* 502325; *Ammodramus sandwichensis* 500803; *A. maritimus* 502168; *A. savannarum* 227832; *Spizella passerina* 499605; *Poocetes gramineus* 501485; *Chondestes grammacus* 499768; *Amphispiza belli* 492504; *Aimophila ruficauda* 361663; *A. aestivalis* 498551; *A. strigiceps* 227796; *Torreornis inexpectata* 554336, 554337; *Phrygilus fruticeti* 227537; *Melanodera xanthogramma* 491023; *Lophospingus pusillus* 345641, 345642; *Diuca diuca* 227792; *Pospiza nigrorufa* 499056; *Sicalis flaveola* 347236; *Emberizoides herbicola* 428724; *Embernagra platensis* 227429; *Volatinia jacarina* 347235; *Sporophila nigricollis* 500464; *Melopyrrha nigra* 322174; *Tiaris bicolor* 501899; *Melanospiza richardsoni* ROM 111657, *Loxipasser anoxanthus* 502865; *Loxigilla portoricensis* 501843, 501844, 501875, 501879, 501880; *L. violacea* 553351; *L. noctilis* 487967, 487995, 488033; *Pipilo chlorurus* 499755; *P. ocai* 500615; *P. erythrophthalmus* 553156; *Melozona kieneri* 343500; *Arremon taciturnus* 345633; *A. flavirostris* 227415; *A. aurantiirostris* 553600; *A. schlegeli* 347233; *Arremonops chloronotus* 289030; *A. conirostris* 347332; *Atlappetes pallidinucha* 428887; *A. albofrenatus* 347232; *A. schistaceus* 428067; *Pezopetes capitalis* 429814.

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