

PROCEEDINGS  
OF THE

## BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF *NESOTROCHIS* FROM  
HISPANIOLA, WITH NOTES ON OTHER FOSSIL RAILS  
FROM THE WEST INDIES (AVES: RALLIDAE)

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In the National Museum of Natural History (USNM) are extensive collections of vertebrate remains from cave and midden deposits in the Greater Antilles. Most of these were obtained in the 1920's under the auspices of Gerrit S. Miller. A few papers concerning some of these remains were published by Miller and Alexander Wetmore, after which the collections were set aside by Miller. Subsequently they have been largely neglected. I have recently attempted some rough sorting of the avian material in these collections which has resulted in several significant discoveries of fossil birds. Because much yet remains to be done, the present report is preliminary, the main purpose being to put on record a new species of the distinctive ralline genus *Nesotrochis*. There appear to be other undescribed rails and new birds in the collections, but analysis of these will have to await completion of the sorting of specimens and associating them with their often scanty and scattered data.

A REVIEW OF THE GENUS *NESOTROCHIS* WETMORE*Nesotrochis debooyi* WETMORE

This large flightless rail was first described by Wetmore (1918) from aboriginal kitchen middens in the Virgin Islands. It was later found in middens and cave deposits in Puerto Rico. The following list gives the locality, references and location of specimens for each of the known occurrences of the species (key to abbreviations in acknowledgments).



## Puerto Rico

Cueva Clara near Morovís	Wetmore, 1922a	AMNH
Cueva San Miguel near Morovís	Wetmore, 1922a	AMNH
Cueva Toraño near Utuado	Wetmore, 1922a	AMNH
Hacienda Jobo near Utuado	Wetmore, 1922a	AMNH
Midden at Barrio Canas, ca. 2.4 km E of Ponce	Wetmore, 1938	YPM, USNM
Río Piedras	Specimens examined by Olson	MCZ
Cave at Ciales	Specimens examined by Olson	MCZ
Shell heap at Aguirre	Specimens examined by Olson	MCZ

## Virgin Islands

St. Thomas; midden at Magen's Bay (type-locality)	Wetmore, 1918; Brodkorb, 1974	USNM and UF
St. Croix; midden at mouth of Salt River	Wetmore, 1918	USNM
St. Croix; midden ca. 2.4 km E of SW Cape	Wetmore, 1937	USNM
St. Croix; midden near Christiansted	Wetmore, 1927	USNM
St. John; midden at Francis Bay	Brodkorb, 1974	UF
?Virgin Gorda (based on hearsay)	Nichols, 1943	—

The skeletal elements known for this species include the femur, tibiotarsus, tarsometatarsus, humerus and fragments of pelvis. It has been suggested that the Puerto Rican birds may have been larger than those of the Virgin Islands (Wetmore, 1938; Brodkorb, 1974), but there is not sufficient material to confirm this, especially since there appears to be marked sexual dimorphism in size. The not unlikely possibility that West Indian aborigines may have transported this species from one island to another must also be entertained.

*N. debooyi* apparently was an important food item of the aborigines of Puerto Rico and the Virgin Islands, and it probably persisted there at least until late in the last century. Wetmore (1927) attributed to this species legends of a bird called the "carrao" which hunters in Puerto Rico prior to 1912 used to run down with dogs. The name "carrao" is now applied to the Limpkin (*Aramus guaruana*), a wary bird of strong flight that is unlikely to have been captured by dogs. To Wetmore's account may be added the report of Nichols (1943), who was told by the natives of Virgin Gorda that in the past "flightless waterhens" had been common and many had been killed with sticks.



TABLE 1. Measurements (mm) of limb bones of the three species of *Nesotrochis*. Those of *N. picapicensis* from Fischer and Stephan (1971).

	<i>N. debooyi</i>			<i>N. picapicensis</i>		<i>N. steganinos</i>		
	n	range	mean	n	range	n	range	mean
Length								
tarsometatarsus	6	71.4–75.5	73.2	2	62.0–63.2	1	————	59.5
Length								
tibiotarsus	13	104.6–124.0	117.5	2	88.0–96.2		————	
Distal width								
tibiotarsus	11	11.4–13.2	12.3	6	9.3–10.0	3	8.4–9.7	9.2
Length femur	8	72.3–80.3	76.7	2	58.5–68.3		————	
Length humerus	3	58.3–63.7	61.2	4	49.0–50.0	4	43.2–49.2	46.9
Length ulna		————			————	1	————	33.8

*Nesotrochis picapicensis* (Fischer and Stephan)

Fischer and Stephan (1971) described three new species of birds, including two rails, in Pleistocene deposits from Pío Domingo cave, near Sumidero, Pinar del Río, Cuba. Their paper fails to compare or even discuss many of the Antillean taxa with possible affinity to their fossil species. Consequently, their generic assignments are incorrect.

The flightless rail that Fischer and Stephan named *Fulica picapicensis* was based on femora, tibiotarsi, tarsometatarsi, humeri, pelvis, a few vertebrae, a proximal end of an ulna<sup>1</sup> and a partial cranium. A humerus was designated as the holotype. I have had only their illustrations, description and tables for comparison, but these indicate clearly that *picapicensis* shows no more than a familial resemblance to the coots (*Fulica*). Furthermore, the broad distal end of the tarsometatarsus, with widely flared trochleae, particularly the inner one, is a feature peculiar among rails to *Nesotrochis* and indicates, along with the other skeletal elements illustrated, that *picapicensis* certainly belongs in *Nesotrochis* rather than in *Fulica*. *Nesotrochis picapicensis* differs from *N. debooyi* in its much smaller size (Table 1), more pointed intercotylar knob and in the heavier and straighter shaft of the humerus. No doubt more differences could be discerned upon comparison of actual specimens of *N. picapicensis*.

<sup>1</sup> This is not from a rail and is possibly columbid.



**Nesotrochis steganinos**, new species

Figures 1, 2

*Holotype*: Complete right tarsometatarsus USNM 205609 (Fig. 1). Collected in Pleistocene cave deposits (Cave I in Miller's notes) near St. Michel de L'Atalaye, Département de L'Artibonite, Haiti, Hispaniola, in 1925 by G. S. Miller.

*Measurements of holotype*: Overall length 59.5 mm, proximal width 9.9, proximal depth 10.1, least width of shaft 4.3, least depth of shaft 2.7, width through trochleae 10.3, depth through trochleae 6.7.

*Paratypes*: Incomplete left tarsometatarsus (USNM 205610), three left humeri (205676, 205687, 205691), two proximal ends of left humeri (205689, 205690), two distal ends of right humeri (205684, 205677), left ulna (205688), two distal ends of left tibiotarsi (205678, 205685), two distal ends of right tibiotarsi (205679, 205680), right femur lacking distal end (205681), incomplete left femur (205682), shaft of right femur of juvenile (205683). These came from the same group of caves as the holotype, details of which are discussed by Miller (1922, 1929). A left humerus (205686) of this species was found in a tray of specimens with no data. It is almost certainly from one of the Haitian collections. Matrix adhering to it is similar to that on specimens labelled "San Raphael"—a locality about ten miles north of St. Michel.

*Etymology*: Gr. *steganos*, through a covered passage or tube + *inos*, sinew—in reference to the closed hypotarsal canals.

*Diagnosis and description*: Clearly referable to the genus *Nesotrochis* on the basis of the expanded distal end of the tarsometatarsus with widely flaring trochleae and particularly the more anterior and distal placement of the inner trochlea. Much smaller than *N. debooyi* and averaging somewhat smaller than *N. picapicensis* (Table 1).

Tarsometatarsus with ossified ring below internal cotyla as typical of most rails. Distinctive in having a sheet of bone completely enclosing both of the tendinal canals on the internal side of the hypotarsus (Fig. 1c, e), whereas in all other known rails, except *Paraortygometra porzanoides* from the Miocene of France, the posterior canal is open. In medial view (Fig. 1c) the area anterior to the hypotarsus is more deeply excavated, with the result that the ridge descending along the shaft from the external cotyla is much narrower and more distinct than in *N. debooyi*. In proximal view (Fig. 1e) the internal cotyla is deeper and much more distinctly set off from the hypotarsus than in *N. debooyi*, and the intercotylar knob and the depression posterior to it are both better developed. In anterior view the tarsometatarsus differs from *N. debooyi* and *N. picapicensis* in that the internal cotyla and the proximomedial part of the shaft below it do not project as abruptly medially beyond the line of the shaft, and the distal foramen is relatively smaller.

The tendinal bridge of the tibiotarsus is not higher on the internal side in *N. steganinos* as it is in *N. debooyi*, and the opening distal to



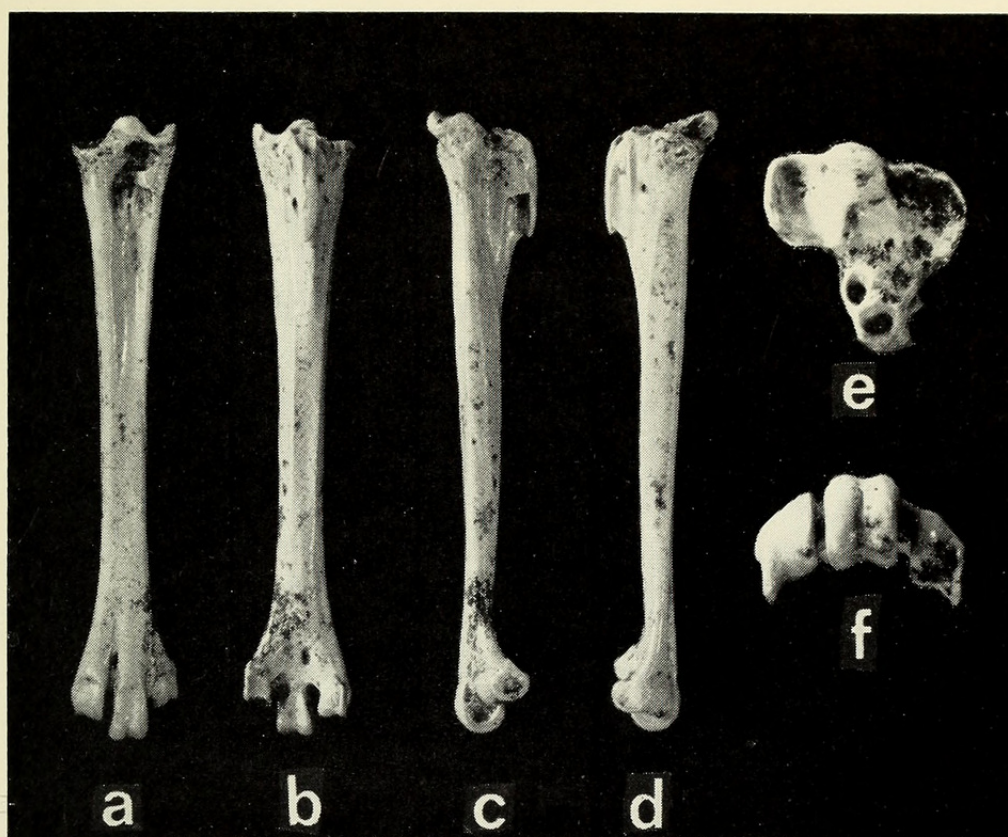


FIG. 1. *Nesotrochis steganinos*, new species, holotype tarsometatarsus, USNM 205609: a, anterior view; b, posterior view; c, medial view; d, lateral view; e, proximal view; f, distal view; a-d natural size; e and f, twice natural size.

the bridge is not slanted (Fig. 2d). Both of these species differ from *N. picapicensis* in having this opening smaller and more constricted. The few tibiotarsi of *N. steganinos* differ considerably in size.

Conformation of the humerus in *N. steganinos* shows clearly that the species was flightless. The humerus is shorter and heavier than in *N. debooyi* and more similar to that of *N. picapicensis*, but differs from both of these species in having the entepicondyle produced much farther distally and internally. There appear to be two distinct types of humeri in *N. steganinos*—larger ones with a shallow elongated brachial depression (Fig. 2a) and smaller ones with a very deep, rounded brachial depression (Fig. 2b). These at first seemed so disparate that I took them to be from entirely different species. However, they are alike in all but these two respects and one of the specimens (205691) is somewhat intermediate. It seems best, therefore, to refer all of these humeri to *N. steganinos*, since there is no other indication of the presence of two species of *Nesotrochis* in the deposits. The size differences are in accord with observed size differences in the hindlimb, while differences in the brachial depression are possibly indicative of a sexual dimorphism that involved more than size.



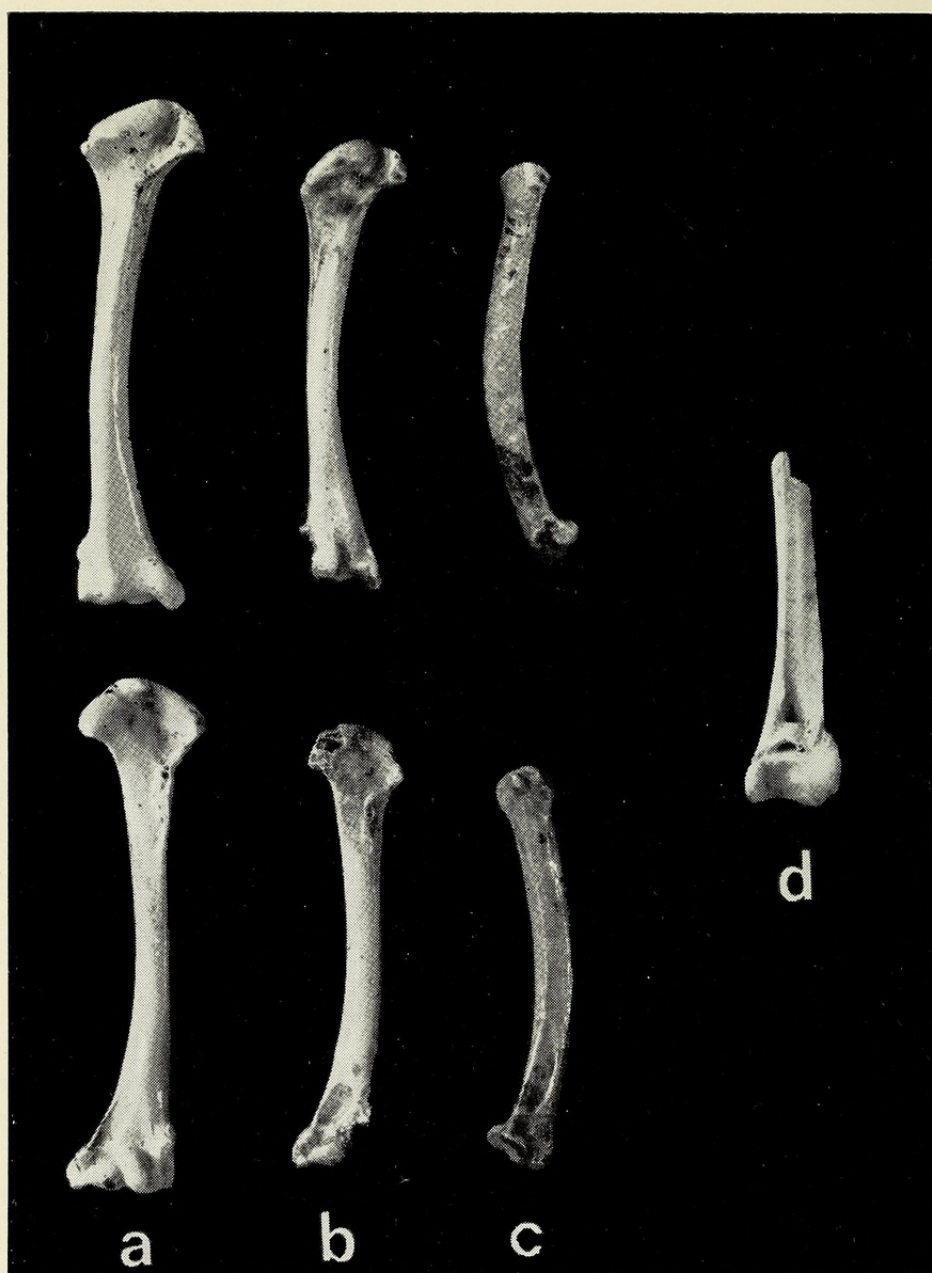


FIG. 2. *Nesotrochis steganinos*, new species, paratypes: a-c, wing elements (upper row, anconal view; lower row, palmar view); a, humerus, USNM 205676; b, humerus, USNM 205687; c, ulna, USNM 205688; d, distal end of tibiotarsus, USNM 205678. All figures natural size.

The ulna referred to *N. steganinos* (Fig. 2c) appears to be the only specimen of that element of *Nesotrochis* yet recognized. It is short and markedly curved, with a much reduced olecranon and a distinctly flattened internal surface of the shaft.

The remains of *N. steganinos* were found in deposits containing great quantities of bones of large extinct rodents and other mammals. These



accumulations of bones are attributed to predations of the gigantic extinct barn owl, *Tyto ostologa* Wetmore (1922b), bones of which occur in the same deposits. The owl must also have taken the flightless rails from time to time.

On the basis of the elements so far known, particularly the tarsometatarsus, the genus *Nesotrochis* appears to be quite distinct from other genera of rails. Its affinities are uncertain. Wetmore (1922a) at first considered *Nesotrochis* to be an offshoot of the primitive South American wood-rails of the genus *Aramides*, but later he felt it to be closer to the gallinules (1937). I fully concur that *Nesotrochis* is not related to *Aramides*, while a gallinule-like ancestor is a possibility. The discovery of a complete skull of any of the species of *Nesotrochis* would probably shed much light on the affinities and adaptations of the genus.

#### OTHER FOSSIL RAILS FROM THE WEST INDIES

##### *Cyanolimnas cerverai* Barbour and Peters

The rail *Cyanolimnas cerverai* was first described from skins obtained in the Zapata Swamp of Cuba (Barbour and Peters, 1927) and all subsequent non-fossil specimens have come from this same vicinity. I have elsewhere discussed the relationships of the genus (Olson, 1973). The species has generally been regarded as flightless (e.g. Ridgway and Friedmann, 1941), although Bond (1942) reported that he saw one flutter about ten feet across a canal, and that another observer had also seen a bird fly for short distances. On morphological grounds *Cyanolimnas cerverai* would be classed as a flightless species, since the pectoral girdle and wing are as reduced as in other species of rails that are considered to be flightless (Fig. 3).

In addition to describing "*Fulica*" (= *Nesotrochis*) *picapicensis*, Fischer and Stephan (1971) named another, smaller rail represented in the fossil material from Pío Domingo cave in Pinar del Río as *Rallus sumiderensis*. They had a very large series of this species and the morphology of the wing and pectoral girdle indicated to them that it was flightless. If they were aware of the existence of *Cyanolimnas cerverai*, they gave no indication of it in their paper.

In the USNM is a collection of bones from a cave deposit in the Caballos Mountains on the Isle of Pines that contains a large series (at least 40 individuals) of a rather small rail



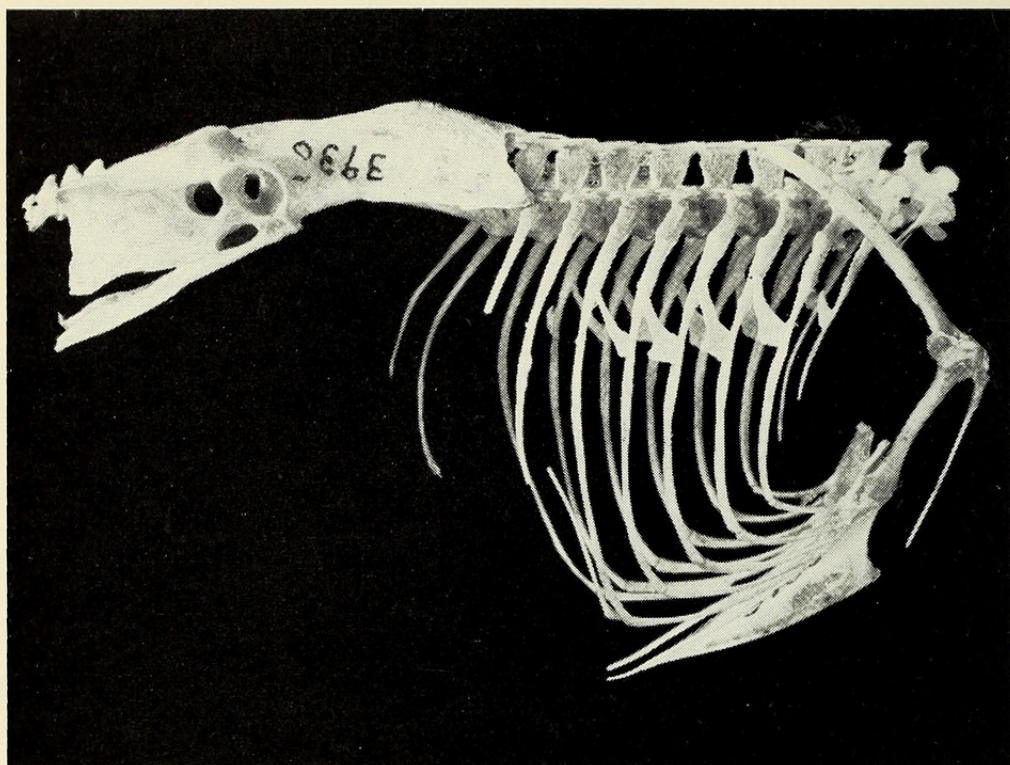


FIG. 3. Body skeleton of *Cyanolimnas cerverai*, AMNH 3930. Note the reduced pectoral girdle and carina, and the obtuse coraco-scapular angle typical of flightless rails.

with similarly reduced wings and pectoral girdle. The various elements agree well with illustrations of "*Rallus sumiderensis*" in Fischer and Stephan (1971). In Table 2 these specimens are compared with "*Rallus sumiderensis*" and with the scanty comparable material of *Cyanolimnas* from the Zapata Swamp (tarsal measurements from skins and a single body skeleton). There is close agreement between the three groups except in the tarsal measurements. Published measurements of tarsus length in "*Rallus sumiderensis*" do seem to be somewhat smaller than in the Zapata Swamp specimens but there is overlap with the Isle of Pines material.

The single available femur of *Cyanolimnas cerverai* from the Zapata Swamp is generally similar to specimens from the Isle of Pines but is somewhat more slender and curved, with a heavier, more rounded head that is not as markedly undercut on the anteroventral side. This is not a large enough sample to establish that there were differences between the pop-



TABLE 2. Lengths of limb bones (mm) of three samples of *Cyanolimnas cerverai*.

	Pinar del Rio*		Isle of Pines			Zapata Swamp		
	n	range	n	range	mean	n	range	mean
Tarsometatarsus	39	32.0–38.3	17	35.4–42.6	39.1	8	39.5–46.7	42.2 <sup>1</sup>
Femur	2	41.5–44.2	15	42.1–50.6	46.6	1	————	48.1 <sup>2</sup>
Coracoid	1	— 19.3	2	17.7–19.6	18.7	1	————	19.6 <sup>2</sup>
Humerus	26	32.4–36.7	18	32.7–38.1	35.2	————	————	————
Ulna	1	— 26.4	15	22.8–29.6	26.1	————	————	————
Carpometacarpus	1	— 17.5	2	18.0–18.2	18.1	————	————	————

\* "*Rallus sumiderensis*" from Fischer and Stephan (1971).

<sup>1</sup> Measured from skins.

<sup>2</sup> From body skeleton AMNH 3930.

ulations of the Zapata Swamp and the Isle of Pines. While recognizing that further study may disclose temporal or geographic variation within the species, I feel that it is best to consider the Isle of Pines specimens and "*Rallus sumiderensis*" as belonging to *Cyanolimnas cerverai*, until better material becomes available.

Barbour (1928) was of the opinion that *Cyanolimnas cerverai* originated in the Zapata Swamp. It is now evident that this was not the case. Two other distinctive birds, the finch *Torreornis inexpectata* and the wren *Ferminia cerverai*, were also originally described from the Zapata Swamp. Later, a well-marked new race of *Torreornis* was discovered on the arid coast of extreme southeastern Cuba (Spence and Smith, 1961). It thus seems fairly certain that all three of these species were formerly more widely distributed in Cuba and that the present populations are relicts.

### *Fulica podagrica* Brodkorb

The species described by Brodkorb (1965) as *Fulica podagrica* from the Pleistocene of Barbados requires further study; after a perfunctory examination of the type material, I believe that it is probably a composite. The holotype humerus is clearly that of a coot and seems to differ from available specimens of *Fulica americana* and *F. caribaea* only in its slightly heavier shaft and the slightly more proximal position



of the ectepicondyle. Historical specimens of coots taken on Barbados were mentioned by Brodkorb (1965) as possibly belonging to *F. podagrica*, but he was unable to locate them. They were later discovered by Phillips (1967) who identified them as *Fulica caribaea*, thus establishing that this species once occurred on the island.

Most, if not all, of the leg elements assigned to *F. podagrica*, upon which most of the diagnosis of that species was based, appear to be from a wholly different rail that was larger and heavier than indicated by the type humerus of *F. podagrica*. The distal part of a tarsometatarsus (UF 7468), for example, has a wider shaft, narrower trochleae, smaller and more proximally located distal foramen, and a longer and deeper scar for the hallux than does *Fulica*, and it evidently does not pertain to that genus.

Through an unfortunate mixup, the specimen Brodkorb (1965) gives as "*Fulica leucoptera*" is actually *Gallinula chloropus garmani*. Since much of the original characterization of *F. podagrica* rested on comparisons with this specimen, there is further cause to reappraise *F. podagrica*.

#### ACKNOWLEDGMENTS

This paper is dedicated to Alexander Wetmore, the father of Antillean paleornithology, who called to my attention much of the type material of *Nesotrochis steganinos*. For loan of specimens and for information concerning them I am indebted to Pierce Brodkorb and S. David Webb, University of Florida (UF); Malcolm C. McKenna and Dean Amadon, American Museum of Natural History (AMNH); Raymond A. Paynter, Jr., Museum of Comparative Zoology (MCZ); and Fred C. Sibley, Yale Peabody Museum (YPM). I thank William B. Robertson for directing me to the Nichols reference. The manuscript was criticized by Pierce Brodkorb, Robert J. Emry, John Farrand, Jr., Clayton E. Ray, and Alexander Wetmore. The photographs are by Victor E. Krantz.

#### RESUMEN

Se hacen breves consideraciones acerca de la especie extinta de rávido no volador *Nesotrochis debooyi*, de Puerto Rico y



las Islas Vírgenes, y se añaden nuevas localidades a su distribución. *Fulica picapicensis* Fischer y Stephan, hallada en cuevas pleistocénicas del oeste de Cuba, se asigna al género *Nesotrochis*. Se describe una nueva especie, *Nesotrochis steganinos*, encontrada en depósitos cavernícolas de la Española. La especie fósil *Rallus sumiderensis* Fischer y Stephan, descrita en base de restos procedentes de cuevas del oeste de Cuba, es la especie viviente *Cyanolimnas cerverai*, y otros fósiles hallados en la Isla de Pinos, Cuba, se asignan también a esta misma especie que hasta ahora se conocía sólo de la Ciénaga de Zapata, Cuba. El material tipo de *Fulica podagrica* Brodkorb, del Pleistoceno de Barbados, parece que incluye dos especies y, por tanto, debe estudiarse con más detalle.

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