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Morphology of the bony stapes in New and Old World suboscines: New evidence for common ancestry.—Owing to the tremendous degree of morphological uniformity within the class Aves, presumably because of the restrictive physical demands of flight, the relationships of the higher taxa of birds are perhaps the most poorly understood of all the vertebrate groups. Particularly enigmatic have been the relationships of the major groups of the massive order Passeriformes.

The order Passeriformes has been subdivided classically on the basis of syrinx morphology into two major groups, the "oscine" passerines (suborder Passeres), which possess a complex syrinx with more than three pairs of intrinsic syringeal muscles, and a heterogeneous group known as the "suboscines," which have been thought to be the more primitive because they have an anatomically simpler syrinx than that found within the oscines (Ames 1970, Peabody Mus. Nat. Hist. Bull. 37). The "suboscines" comprise several groups, presently given subordinal rank by most authors

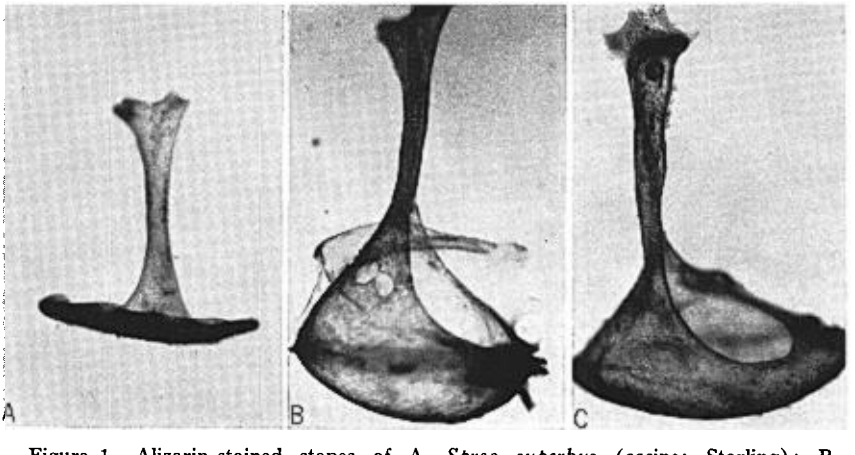

Figure 1. Alizarin-stained stapes of A, *Spreo superbus* (oscine: Starling); B, *Xiphocolaptes promeropirhynchus* (New World suboscine: Woodhewer); and C, *Pitta angolensis* (Old World suboscine: Pitta). All approximately ×40. Stapes may be prepared after extraction from the ear either by coating them with a conductive substance such as gold for scanning electron microscopy, or by staining with Alizarin Red S, and placing them in vials containing glycerine. Alizarin-stained specimens are more easily studied with conventional light microscopy, and are easily photographed under any normal scope; all specimens in Figure 1 were prepared in this manner.

(see Wetmore 1960, Smithsonian Misc. Coll. 139 (11); Storer 1971, Classification of birds. Pp. 1–18 *in* Avian biology, vol. 1 (D. S. Farner and J. R. King, Eds.), New York, Academic Press), which occur in both the New and Old World regions, primarily in tropical and subtropical zones. The question of the relationship of New to Old World groups has been a subject of great controversy for more than a century, and at present there is little agreement because the possession of a simple syrinx in these zoogeographically isolated groups may represent the retention of a primitive character state rather than an indication of evolutionary affinity.

The form of the small avian bony stapes was examined in several groups at the turn of the century (Krause 1901, Die Columella der Vögel, Berlin, R. Friedländer and Sohn), but no comprehensive study has ever been achieved. I have examined the morphology of the bony stapes in more than 1,000 species. I have discovered that (1) the vast majority of birds (most of the nonpasserine orders, and the entire "oscine" passerine assemblage) possess a bony stapes resembling the primitive reptilian condition, with a flat footplate, and a straight bony shaft (Figure 1A). The widespread occurrence of this type of stapes probably represents the retention of the primitive condition. The major groups of the "suboscines" (Table 1) share a derived morphology of the stapes, characterized by a large bulbous footplate area perforated usually by one large (often one large and one small) fenestra (Figure 1B, 1C, and Figure 2). In this condition the shaft is similar to the primitive condition, but is necessarily shortened by the expansion of the footplate. The similarity of the stapes in the Old World Eurylaimidae and Pittidae, and the New World Furnariidae, Dendrocolaptidae, Formicariidae, Conopophagidae, Rhinocryptidae, Cotingidae, Pipridae, Tyrannidae, and Phytotomidae is strong evidence for a common origin of these New and Old World groups.

A study of the morphology of the stapes in all birds is currently being prepared for publication in monograph form.

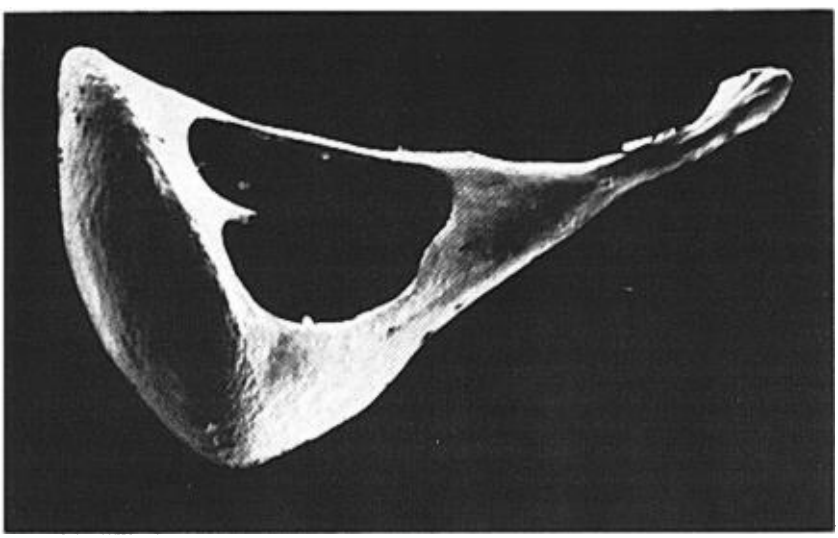

Figure 2. SEM photo of the stapes of the Ovenbird, *Furnarius rufus,* a New World suboscine bird, approximately ×50.

TABLE 1
SPECIMENS OF SUBOSCINE BIRDS EXAMINED[1]

	Number examined[2]			Number examined[2]	
	Genera	Species		Genera	Species
Eurylaimidae	2	2	Cotingidae	21	30
Furnariidae	30	53	Pipridae	9	18
Dendrocolaptidae	10	23	Tyrannidae	70	124
Formicariidae	27	39	Phytotomidae	2	2
Conopophagidae	2	2	Pittidae	1	9
Rhinocryptidae	2	2			

[1] Material from the rare Oxyruncidae, Acanthisittidae, Philepittidae, Menuridae, and Atrichornithidae is still incomplete.
[2] All but four of the families of the oscine passerine birds were examined.

This work was supported by a grant from the University of North Carolina Research Council. R. W. Storer (University of Michigan), and R. L. Zusi (National Museum of Natural History) permitted me to use collections under their care. I wish to thank W. H. Zucker for instruction and help with the SEM work (Figure 2) that was done in the laboratory of R. Mason, Jr. (Pathology, University of North Carolina), and H. C. Mueller and R. H. Wiley for comments on the manuscript.—ALAN FEDUCCIA, *Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514.* Accepted 21 Nov. 73. (This paper was subsidized by the University of North Carolina Research Council.)

More new birds for Rio Grande do Sul, Brazil.—The distributional study of Rio Grande do Sul birds now in progress (Belton 1973, Auk 90: 94) has revealed 24 more species not previously recorded for the state. They are listed below with information on the closest previously known area of occurrence taken, if not otherwise attributed, from R. Meyer de Schauensee (1966, Species of birds of South America, Philadelphia, Acad. Nat. Sci.). Numbers in parentheses after sexual designation identify birds in my personal collection.

Small-billed Tinamou, *Crypturellus parvirostris*. After hearing this bird call in a small wooded patch near cultivated fields, I saw it cross a road about 5 km southeast of Pirapó at 28° 04′ S, 55° 13′ W on 25 January 1973. This confirms the previous report of this species in the state (Belton 1973) based on Helmut Sick's recognition of the voice.

Greater Shearwater, *Puffinus gravis*. Sex unknown (701) found freshly dead on the ocean beach 20 km southwest of Cassino at 32° 20′ S, 52° 18′ W on 1 March 1972. Another was found dead on the beach between Torres and Tramandaí at 29° 51′ S, 50° 03′ W on 14 December 1971. Previously recorded from Uruguay and Argentina, but apparently not on the Brazilian mainland.

Bay-winged Hawk, *Parabuteo unicinctus*. Sick and I watched this bird on 11 October 1971 as it perched on and later flew over the low spiny leguminous trees characteristic of the area around 30° 12′ S, 57° 30′ W near Barra do Quaraí. Previously recorded in Santa Catarina, adjacent Argentina, and Uruguay.

Arctic Tern, *Sterna paradisaea*. Male (817) collected 20 December 1972 on the ocean beach just north of Tramandaí at 29° 58′ S, 50° 06′ W. Although the bird was seen flying and had a fish in its throat when collected, a deep, partially healed wound in the left wing may have interfered with its normal movements and could account for its unusual presence in the area. Previously recorded rarely off the coast of Brazil and Argentina.