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A new species of Woodcock (Aves: Scolopacidae: *Scolopax*) from Hispaniola, West Indies

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Abstract

Several hundred late Holocene fossils from Trouing Jean Paul, a cave in Massif de la Selle, Haiti, represent an extinct species of woodcock (*Scolopax brachycarpa*, new species). *Scolopax brachycarpa* is known from most major skeletal elements; although volant, its carpometacarpus was very short relative to its humerus. The only other species of *Scolopax* from the West Indies is the extinct and presumably closely related *S. anthonyi* of Puerto Rico, which also had a relatively short carpometacarpus compared to continental congeners. Both *Scolopax brachycarpa* and *S. anthonyi* share more osteological characters with the Eurasian *S. rusticola* than with the North American *S. minor*.

Key words: extinct species, fossils, Haiti, Holocene

Introduction

The Eurasian Woodcock (*Scolopax rusticola*) and American Woodcock (*S. minor*) are among the most familiar and distinctive species of birds within their ranges, whether to scientists or hunters (Sheldon 1967; de la Valdène 1990). Though closely related to the snipe (*Gallinago* s.l.; Gibson & Baker 2012), the woodcocks are distinctive among the Scolopacidae in their stout bodies, short wings, colorfully patterned plumage, courtship behavior, and osteology (Strauch 1978, Keppie & Whiting 1994; Van Gils & Wiersma 1996).

Seven species of *Scolopax* exist today, as follows: *S. rusticola*—Eurasia; *S. mira*—Ryukyu Islands, Japan; *S. saturata*—Sumatra and Java; *S. rosenbergii*—New Guinea; *S. bukidnonensis*—Philippines; *S. celebensis*—Sulawesi; and *S. rochussenii*—Northern Moluccas; and *S. minor*—North America (van Gils & Wiersma 1996:488-490; Dickinson & Remsen 2013:213-214). Thus, five of the seven extant species of woodcocks are endemic to one or more tropical or subtropical islands in the Asian or Papuan faunal regions. Very little is known about the life history of these Old World insular species.

No species of woodcocks live in the West Indies today. The only species of *Scolopax* previously known from any Caribbean island was the extinct *S. anthonyi* from Puerto Rico. First described as a snipe (*Capella* = *Gallinago*) by Wetmore (1920), the 10 fossils of *S. anthonyi* were collected in two Puerto Rican caves by H. E. Anthony in 1916. Olson (1976) re-examined these specimens, which represent six different skeletal elements, finding them referable to *Scolopax* rather than *Gallinago*, a conclusion with which we concur. The fossils of *S. anthonyi* are undated beyond being late Quaternary.

The only other described extinct species of woodcock is *Scolopax hutchensi* from the late Pliocene/early Pleistocene of Florida (Blancan and early Irvingtonian Land Mammal Ages; Emslie 1998). Compared to the living *S. minor* of North America, *S. hutchensi* had "larger, more robust wing bones relative to its leg elements" (Emslie 1998:59), a trend opposite that of the insular species that is the object of this paper.

Here we describe a second resident species of West Indian woodcock, based on fossils from Trouing Jean Paul, a late Holocene paleontological site on the island of Hispaniola. Steadman and Takano (2013) reported 4800+ non-

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passerine bird fossils from Trouing Jean Paul, a limestone cave at 1800 m elevation in the Massif de la Selle, Haiti (Fig. 1). The fourth most common species in this fossil assemblage was a woodcock (*Scolopax* new sp.), represented by 340 specimens that are the topic of this paper.

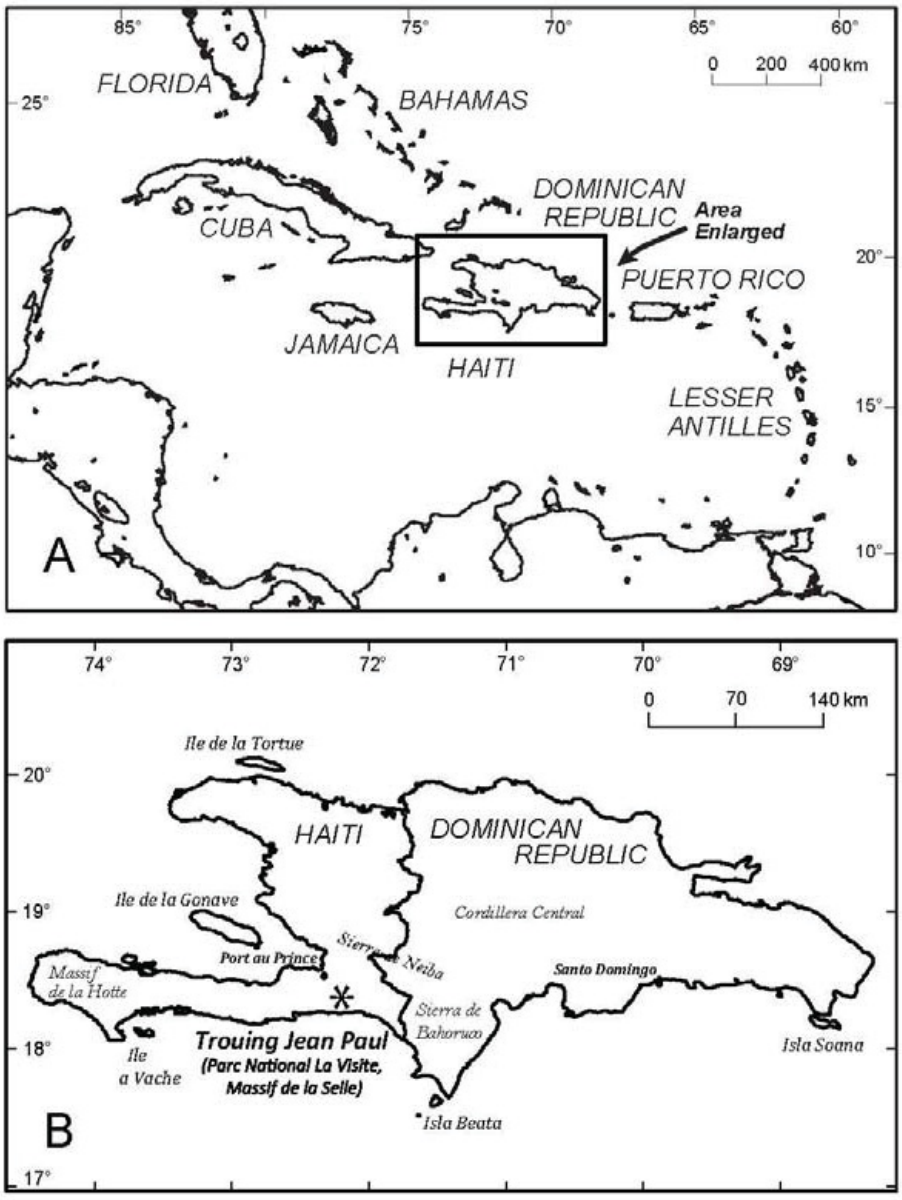

FIGURE 1. The West Indies (A), with an inset of Hispaniola (B) showing the location of Trouing Jean Paul, the type locality of *Scolopax brachycarpa*.

Materials and methods

The prehistoric bones of the new species of *Scolopax* are catalogued in the Vertebrate Paleontology Collection of the Florida Museum of Natural History, University of Florida (UF). The modern skeletons used in our osteological comparisons are from the UF Ornithology Collection, some of which formerly were in the Pierce Brodkorb Collection (PB). We examined these modern skeletons, with general collection localities in parentheses: *Scolopax minor* UF 11569, 11740, 11741, 12901, 12902, 14574, 14641-14645, 16936, 19060, 19123, 19148, 19574, 20359, 21333, 21373, 21979, 24700-24713, 38103, 39719, 41931, 45413, 46928, 47744 (Florida, Massachusetts,

Michigan, Vermont); *S. rusticola* UF 14640, 17078, 24714-24716 (France, Poland, Russia, Azerbaijan); *Gallinago gallinago* UF 41192, 46104, 46947, 47939 (Florida, Bahamas), *G. paraguaiae* UF 24684, 24685 (Surinam). Osteological nomenclature follows Baumel et al. (1993), supplemented as needed by Howard (1929). Measurements were taken with digital callipers with 0.01 mm increments.

Systematic Paleontology

Order Charadriiformes Huxley, 1867

Family Scolopacidae Rafinesque, 1815

Genus *Scolopax* Linnaeus (1758)

The fossils are referred to *Scolopax* rather than *Gallinago* (the other genus of Scolopacidae likely to occur in a prehistoric West Indian upland setting) because of the presence of the following characters: mandibular articulation—postarticular process larger and more complex in shape; cotyla lateralis larger with flatter articulating surface; coracoid—corpus coracoidei straighter, stouter in dorsal or ventral aspect; processus coracoideus joins corpus coracoideus more smoothly; medial end of facies articularis sternalis more rounded in sternal aspect; humerus—corpus humeri stouter; fossa pneumotricipitalis less concave; distal end more expanded; processus supracondylaris less pointed; fossa musculus brachialis less concave; ulna—olecranon longer; condylus ventralis less pointed; carpometacarpus—external ligamental attachment more strongly developed; notch on caudal side of dorsal trochlea carpalis deeper; femur—anterior surface of proximal portion of corpus femoris (between head and trochanteric ridge) less concave; distal end more expanded relative to corpus femoris in anterior or posterior aspect; tibiotarsus—overall stouter; crista cnemialis lateralis longer than wide and joins corpus tibiotarsi more gradually; crista fibularis relatively longer and joins corpus tibiotarsi more gradually; condylus medialis wider and longer in anterior aspect; tarsometatarsus—stouter overall; cotyla medialis less concave in acrotarsial aspect; acrotarsial surface of corpus tarsometatarsi more concave; in distal aspect, medial and lateral trochleae rotated more plantad.

Scolopax brachycarpa, new species

Holotype. UF 276038, carpometacarpus (Figure 2L, Table 1), collected by C. A. Woods and his field party at Trouing Jean Paul, Morne La Visite region, Massif de la Selle, Haiti (18˚20’15” N, 72˚16’50” W), on 16 February 1984.

Paratypes. 19 carpometacarpi, UF 275883-275885, 275916, 275917, 275930, 275931, 275943, 275974-275976, 276036, 276037, 276043, 276089, 276131, 276137, 276326, 276335.

Referred material. 320 specimens representing all major postcranial skeletal elements (vertebrae, sterna, furcula, coracoids, scapulae, humeri, ulnae, radii, ulnare, manual phalanges, femora, tibiotarsi, tarsometatarsi, pedal phalanges) as well as the mandible, UF 275863-276037, 276039-276149, 276301-276346. All are from Trouing Jean Paul, Haiti.

Geological age. Late Holocene (details in **Discussion**).

Diagnosis. A small species of *Scolopax* that differs from *S. minor* and *S. rusticola* (and, in many cases, *S. anthonyi*) in these major features: mandibular articulation (Fig. 3; element not available in *S. anthonyi* or *S. hutchensi*)—postarticular process deeper; cotyla lateralis with well-developed medio-anterior extension; processus coronoideus larger; coracoid (Fig. 2)—impressio musculus sternocoracoidei more concave than in *S. minor*, *S. rusticola*, or *S. hutchensi*; in dorsal aspect, angulus medialis more pointed; corpus coracoidei stouter than in *S. minor* and *S. rusticola*, especially in medial or lateral aspect; ventral surface of facies ventralis with a longitudinal ridge (rounded in others); humerus (Fig. 2)—corpus humeri flatter (less convex), especially in proximal one-half; tuberculum dorsale more excavated; fossa musculus brachialis deeper, especially than in *S. minor*; condylus dorsalis with ridge extending toward condylus ventralis; condylus ventralis more rounded than in *S. minor* and *S. anthonyi*; tuberculum supracondylare ventralis smaller; ulna—tuberculum carpale less pointed than in *S. minor*; depression musculus brachialis deeper; proximal one-third of corpus ulna more antero-posteriorly compressed;

tuberculum ligamentum collateralis ventralis smaller; carpometacarpus (Fig. 2)—short relative to humerus or femur (Table 1); processus extensorius more prominent and oriented more perpendicular to long axis of the bone than in *S. anthonyi*; synostosis metacarpi proximalis and distalis shorter than in *S. rusticola* and especially *S. minor*; os metacarpale majus and minus stouter than in *S. minor*; processus intermetacarpalis located more proximad than in *S. rusticola* (absent in *S. minor* and *S. anthonyi*); femur (Fig. 4; element not available in *S. anthonyi*)—stouter overall; facies articularis acetabularis (head) relatively larger in all aspects; epicondylus medialis larger than in *S. minor*; tibiotarsus (Fig. 4)—overall more slender; in all aspects, proximal one-half of corpus tibiotarsi more angular (less rounded), with better developed intermuscular lines; distal end more expanded from corpus tibiotarsi; incisura intercondylaris wider than in *S. minor*, *S. rusticola*, or *S. anthonyi*; sulcus extensorius relatively deeper; tarsometatarsus (Fig. 5)—short relative to tibiotarsus (Table 1); overall slightly stouter; foramen vasculare distale larger than in *S. minor*, *S. rusticola*, or *S. anthonyi*; medio-proximo-acrotarsial margin of corpus tarsometatarsi sharper (less rounded); cristae plantares less well defined.

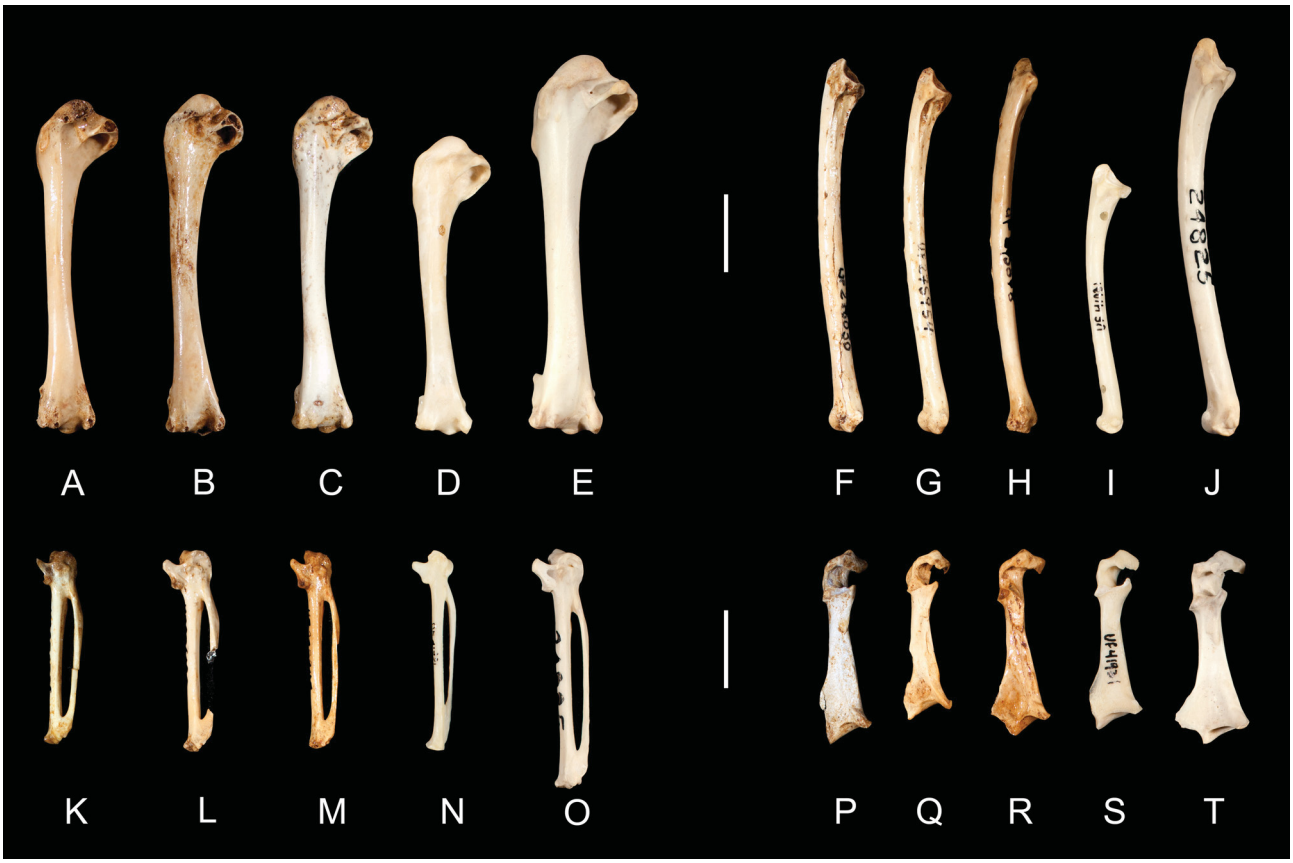

FIGURE 2. The humerus in anconal aspect (A–E), ulna in ventral aspect (F–J), carpometacarpus in ventral aspect (K–O), and coracoid in dorsal aspect (P–T) of *Scolopax*. *S. brachycarpa*, new species—A. UF 276311, B. UF 276018, C. UF 276022, F. UF 276030, G. UF 275954, H. UF 275878, K. UF 275885, L. UF 276038 (holotype), M. UF 275943, P. UF 275886, Q. UF 275940, R. UF 275938; *S. minor* ♂—D, I, N, S. UF 41931; *S. rusticola* ♂, E, J, O, T. UF 24715 (PB 24825). Scale bars = 10 mm.

Etymology. Named from the Greek *brachys* (short) and the Latin *carpus* (masculine; wrist, carpal, metacarpal; Brown 1956: 394). The species name *brachycarpa* is feminine to agree in gender with the feminine genus *Scolopax*.

Remarks. We note that *Scolopax brachycarpa* differs from *S. minor* in 30 of 35 diagnostic osteological characters, from *S. rusticola* in 28 of the same 35 characters, from *S. anthonyi* in 18 of the 29 characters that were possible to evaluate, and from *S. hutchensi* in 10 of 14 characters that were possible to evaluate.

Females average larger than males in *Scolopax minor* in linear measurements, whether external or skeletal, but with considerable overlap (Ridgway 1919: 156; Table 1 herein). The woodcock fossils from Trouing Jean Paul are, of course, of unknown sex; nevertheless, where our measurements of a specific feature of the fossils has a sample size >10 (e.g., Table 1: humerus midshaft width, ulna midshaft oblique depth, femur midshaft width,

tarsometatarsus length, tarsometatarsus least width of shaft), the measurements have a small range, suggesting that *S. brachycarpa* was less sexually dimorphic in size than *S. minor*. The relatively small size range also supports our belief that these fossils represent a single species.

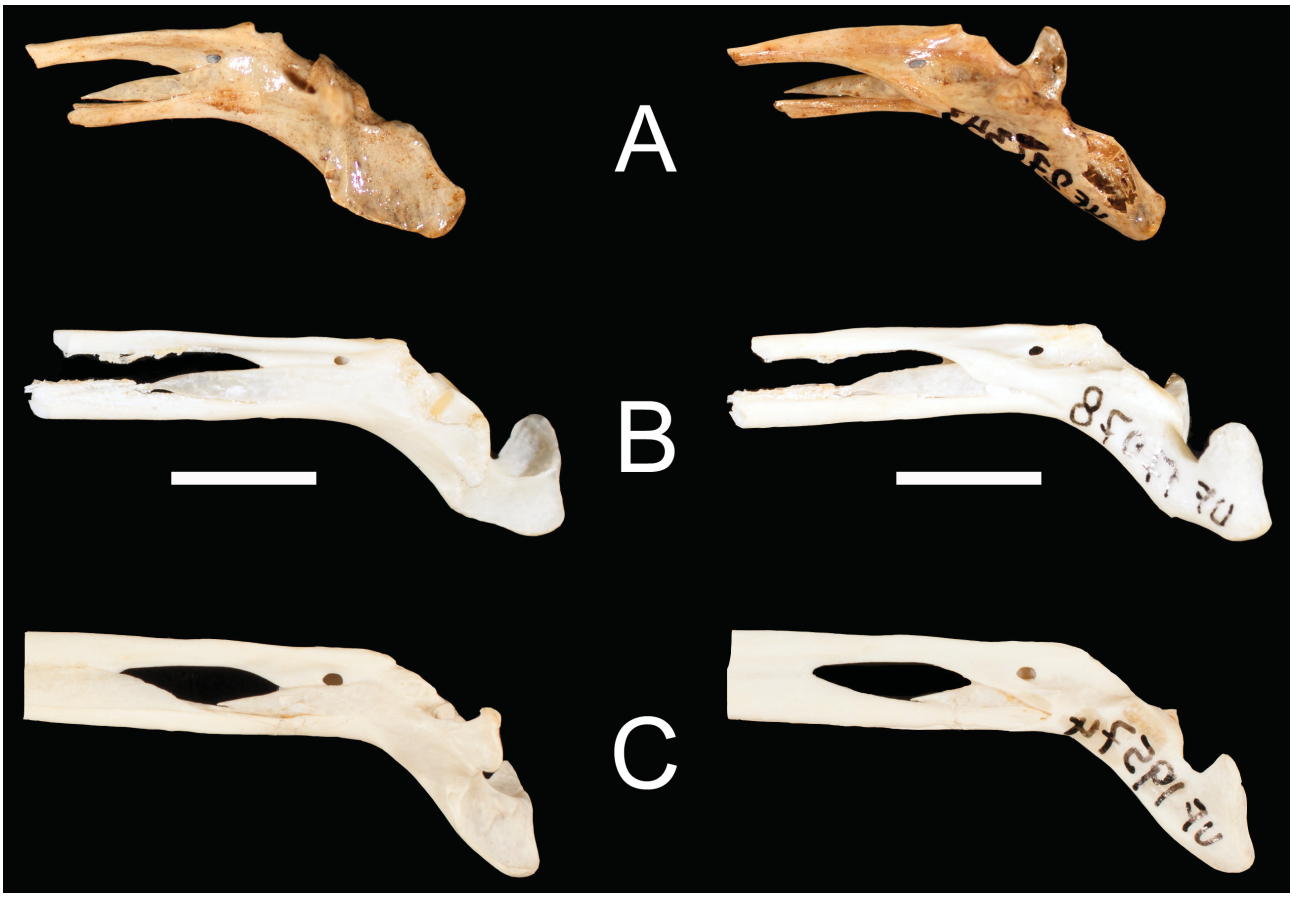

FIGURE 3. The mandible of *Scolopax* in medial (left) and lateral (right) aspects. A. *S. brachycarpa*, new species, UF 276343. B. *S. minor* sex unknown, UF 17078. C. *S. rusticola* ♀, UF 19574. Scale bars = 10 mm.

Discussion

Biogeography. Five of the seven extant species of woodcocks are island endemics in the Asian or Papuan faunal regions. With the discovery of *Scolopax anthonyi* from Puerto Rico and now *S. brachycarpa* from Hispaniola, we have growing evidence that an insular radiation of woodcocks once existed on Neotropical islands as well. We might expect to find fossils of related species of woodcocks on other West Indian islands, perhaps especially Cuba and Jamaica.

The carpus of *Scolopax*. The very narrow (emarginated) outer three primaries (p8–10) of *Scolopax minor* males produce a whistling sound during its vertical courtship flights (Sheldon 1967: 54; Keppie & Whiting 1994: Figure 5). Given the short, stout carpometacarpus of *S. brachycarpa*, we doubt that this extinct species had such modified outer primaries or a whistling aerial courtship flight. A distinctively narrow carpometacarpus occurs in both males and females of *S. minor*; examining numerous skins and spread wings of *S. minor* in the UF Ornithology Collection, we note that p8–10 are highly emarginated in both sexes, with males having, on average, slightly narrower distal portions of p8-10 than females. The carpometacarpus of *S. rusticola* is much broader than in *S. minor*; examination of four UF skins of *S. rusticola* (2♂, 1♀, 1U) revealed no emarginated primaries.

Chronology and ecology of extinction. Six bones of *Scolopax brachycarpa* from Trouing Jean Paul, each representing a different individual animal, yielded six late Holocene ^{14}C dates, with an overall range from ca. 1600 to 600 years old (Steadman and Takano 2013). The first human (Amerindian) presence on Hispaniola is dated very approximately at 6000 to 5500 years ago (Veloz Maggliolo & Vega 1982; Keegan 1994; Higuera-Gundy et al.

1999). Therefore, the Hispaniolan woodcock survived for ca. 5 millennia after humans first arrived on Hispaniola (Steadman et al. 2005); *S. brachycarpa* may have survived even into the past five centuries of European and African influence on the island. Scientific knowledge of Hispaniolan birds did not commence with any rigor until the 1800s, at which point non-native rats (*Rattus* spp.) and cats (*Felis catus*) already had been on the island for several centuries. Thus it is feasible that *Scolopax brachycarpa* could have lived without detection into the 16th, 17th, or 18th centuries.

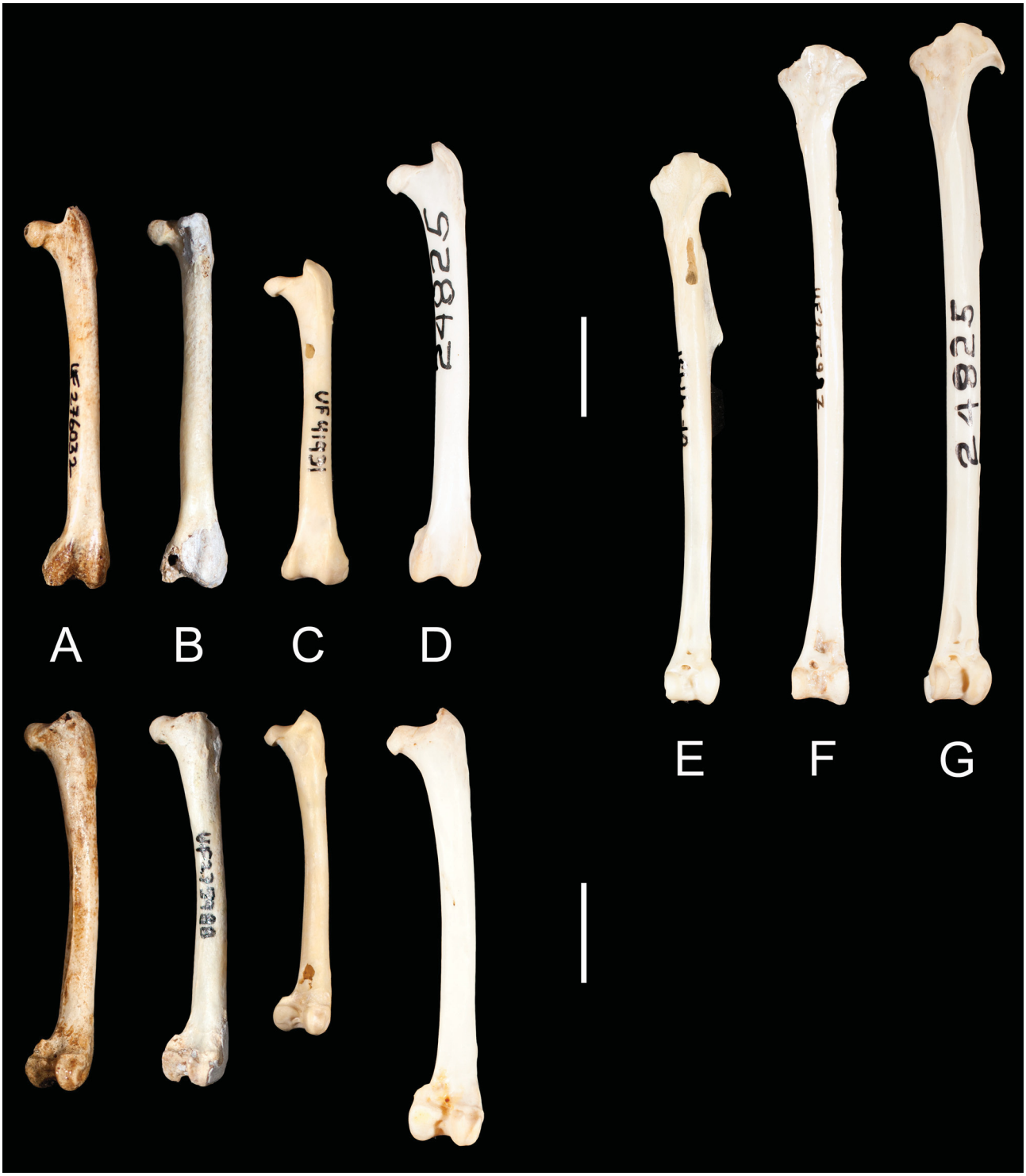

FIGURE 4. The femur (A–D) in anterior (upper) and posterior (lower) aspects and the tibiotarsus in anterior aspect (E–G) of *Scolopax*. A, B. *S. brachycarpa*, new species, UF 276032, 275988. C. *S. minor* ♂, UF 41931. D. *S. rusticola*, UF 24715 (PB 24825). E. *S. brachycarpa*, new species, UF 276032. F. *S. minor* ♂, UF 41931. G. *S. rusticola* ♂, UF 24715 (PB 24825). Scale bars = 10 mm.

FIGURE 5. The tarsometatarsus of *Scolopax* in plantar (upper) and acrotarsial (lower) aspects. A–F. *S. brachycarpa*, new species, UF 275482, 276036, 275872, 276025, 275958, 276304. G. *S. minor* ♂, UF 41931. H. *S. rusticola* ♂, UF 24715 (PB 24825). Scale bars = 10 mm.

Acknowledgments

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TABLE 1. Measurements (in mm) of adult skeletal elements in extinct (†) and living species of *Scolopax*, with mean, range, and sample size.

	†*S. brachycarpa* U	†*S. anthonyi* U	*S. minor* F	*S. minor* M	*S. rusticola* M + U
Coracoid length	24.33	25.6	25.77	24.61	28.75
	22.65–27.07	25.6	24.57–26.71	23.20–27.10	28.69–28.80
	8	1	20	14	2
Coracoid least width of shaft	2.55	--	2.83	2.60	3.20
	2.39–2.74		2.47–3.09	2.29–3.13	2.94–3.45
	10		20	14	2
Humerus length	44.33	43.8	43.73	41.26	53.86
	43.37–45.09	42.8–44.3	41.53–44.88	39.46–45.95	53.41–54.30
	5	3	21	15	2
Humerus midshaft width	3.19	3.4	3.50	3.27	4.42
	2.95–3.43	3.2–3.6	3.13–3.80	3.02–3.71	4.29–4.52
	22	3	21	15	3
Humerus proximal width	10.67	10.9	10.94	10.28	13.48
	10.25–11.26	10.4–11.1	10.25–11.55	9.53–11.61	13.04–13.92
	7	3	21	15	2
Humerus distal width	7.83	7.6	7.91	7.30	9.79
	7.51–8.26	7.1–8.2	7.42–8.50	6.91–8.24	9.26–10.26
	4	2	21	15	3
Ulna length	49.35	--	48.94	46.05	60.32
	49.01–49.80		46.04–50.53	44.65–50.35	59.52–61.12
	3		19	14	2
Ulna midshaft oblique depth	2.28	--	2.54	2.35	3.26
	2.19–2.46		2.22–2.91	2.15–2.81	3.19–3.37
	17		19	14	3
Ulna proximal width	5.82	--	6.57	6.04	8.49
	5.60–6.39		6.19–7.09	5.44–6.81	8.15–8.91
	5		20	14	3
Ulna distal depth	4.15	--	3.87	3.68	5.56
	4.02–4.26		3.52–4.19	3.45–4.09	5.41–5.76
	6		20	14	3
Radius length	44.91	--	45.17	42.52	56.99
	43.30–46.52		42.62–46.49	41.20–46.05	54.30–60.55
	2		20	15	3
Radius distal width	3.31	--	3.32	3.05	4.46
	3.30–3.33		3.05–3.69	2.77–3.56	4.29–4.56
	2		20	15	3
Carpometacarpus length	26.42	27.6	36.13	34.28	38.29
	25.66–26.90	27.6	34.26–37.01	33.56–35.32	36.63–39.95
	6	1	20	13	3
Carpometacarpus proximal depth	6.55	--	6.76	6.34	8.83
	6.25–7.01		6.37–7.17	5.97–6.57	8.69–8.94
	6		20	13	3

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TABLE 1. (Continued)

	†*S. brachycarpa* U	†*S. anthonyi* U	*S. minor* F	*S. minor* M	*S. rusticola* M + U
Femur length	40.53	--	38.09	35.46	44.08
	40.42–40.65		35.32–40.57	34.26–39.55	43.87–44.28
	3		20	15	2
Femur midshaft width	2.92	--	2.91	2.65	3.60
	2.64–3.18		2.66–3.15	2.39–2.86	3.46–3.74
	50		20	15	2
Femur distal width	7.03	--	6.49	6.02	8.00
	6.87–7.25		6.12–7.02	5.61–6.79	7.61–8.39
	3		20	15	2
Tibiotarsus length without cnemial crest	59.67	--	54.23	50.72	61.02
	58.35–60.89		50.88–56.37	48.77–54.01	60.56–61.48
	6		19	13	2
Tibiotarsus length from distal end of fibular crest	42.10	40.0	33.82	33.17	43.36
	40.66–43.00	39.5–40.5	28.22–38.60	26.04–37.82	41.99–45.51
	10	2	18	13	3
Tibiotarsus midshaft width	2.55	2.5	2.95	2.70	3.69
	2.17–2.80	2.5–2.6	2.66–3.16	2.47–3.03	3.38–3.98
	22	2	19	14	3
Tibiotarsus distal width	5.52	--	5.25	4.87	6.49
	5.23–5.82		4.82–5.73	4.42–5.25	6.08–6.73
	8		20	15	3
Tarsometatarsus length	34.33	35.3	34.01	31.27	38.04
	32.44–36.26	34.6–35.7	31.19–35.76	29.67–33.58	36.03–41.04
	16	3	20	14	3
Tarsometatarsus least width of shaft	2.53	2.6	2.33	2.02	2.87
	2.33–2.69	2.6–2.7	1.99–2.56	1.79–2.26	2.56–3.32
	23	3	20	14	3
Tarsometatarsus proximal width	6.16	6.9	5.65	5.25	7.02
	5.77–6.39	6.7–7.2	5.23–6.02	4.74–5.99	6.59–7.30
	10	2	20	15	3
Length: ulna/humerus	1.11	--	1.12	1.12	1.12
Length: carpometacarpus/ humerus	0.60	0.63	0.83	0.83	0.71
Length: carpometacarpus/femur	0.65	--	0.95	0.97	0.87
Length: tarsometatarsus/ tibiotarsus	0.82	0.88	1.00	0.94	0.88

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