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A NEW SPECIES OF STARLING (STURNIDAE, *Aplonis*) FROM AN ARCHAEOLOGICAL SITE ON HUAHINE, SOCIETY ISLANDS

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ABSTRACT

A new species of extinct starling, *Aplonis diluvialis*, is described from the Fa'ahia Archaeological Site on Huahine, Society Islands, French Polynesia. *Aplonis diluvialis* was larger than any Indo-Pacific congeners except *A. atrifusca* of Samoa. The only other Eastern Polynesian islands where starlings have been recorded with certainty are Rarotonga (*A. cinerascens*) and Mauke (*A. mavornata*). In pre-human times, however, species of *Aplonis* may have occurred through much of Eastern Polynesia.

INTRODUCTION

Many extinct populations of non-passerine birds have been discovered recently by studying bones from archaeological sites in Eastern Polynesia. Especially prevalent among these extinct birds are rails, pigeons, and parrots (Steadman 1985, 1987, 1988, 1989; Steadman & Olson 1985; Steadman & Zariello 1987). Until now, the only extinct populations of passerine birds known from fossils in Eastern Polynesia is a monarchine flycatcher (*Myiagra* sp.) from Ua Huka, Marquesas (Steadman 1989). The main reason for this scarcity is that the small bones of passerines seldom are retained in the ¼ inch (6 mm) or ½ inch (13 mm) mesh screens that generally have been used to sieve archaeological sediments. This situation contrasts markedly with that in Hawaii, where thousands of bones of extinct passerines have been collected with the use of 1/16 inch (1.5 mm) mesh screens (James *et al.* 1987).

Four recently excavated bones from Fa'ahia Archaeological Site on Huahine, Society Islands (Fig. 1, 2) provide a glimpse of the passerines that lived during the early Polynesian occupation of the island. Two of these bones (a humerus and ulna) do not seem to agree with any currently available

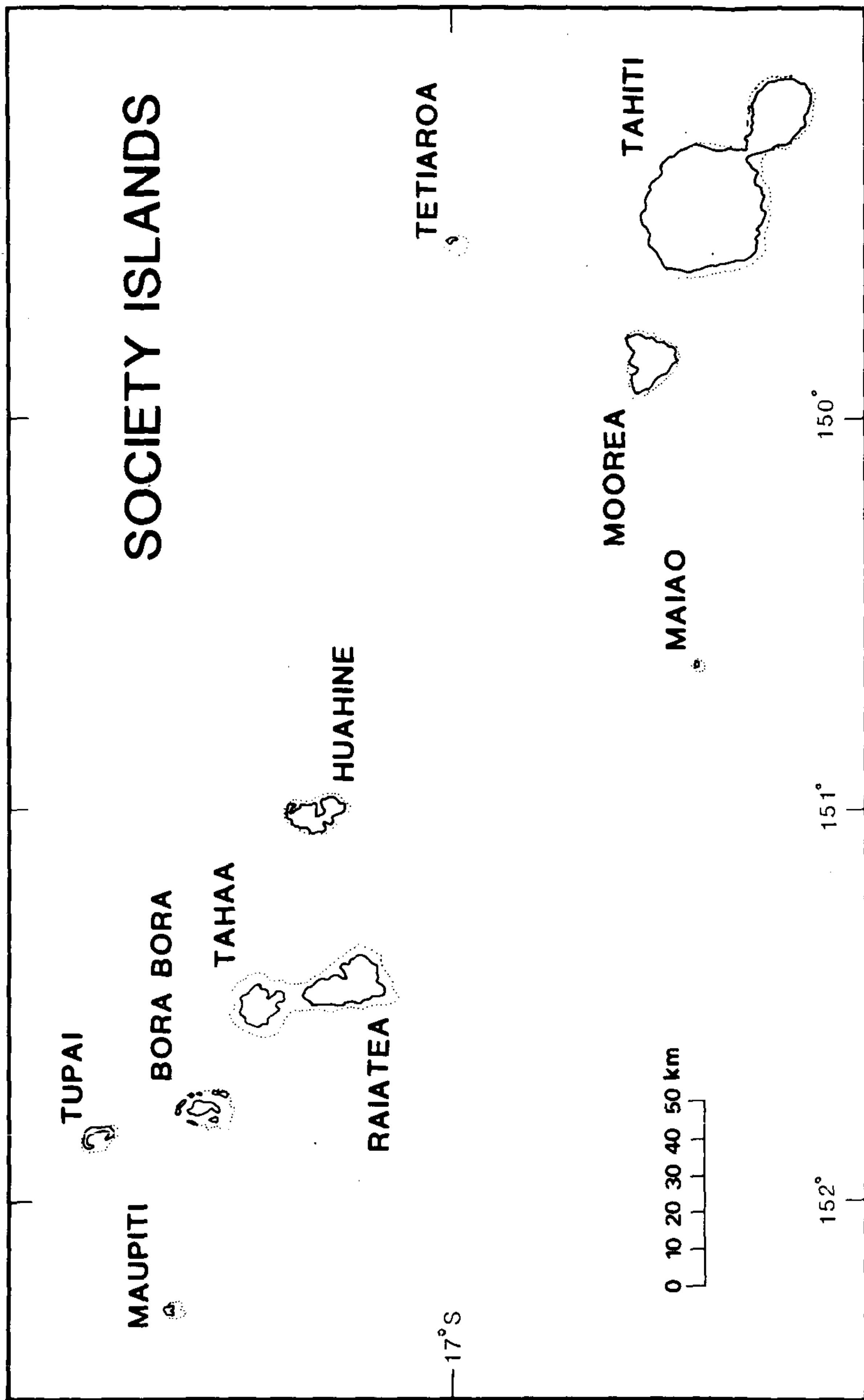


FIGURE 1 — The Society Islands

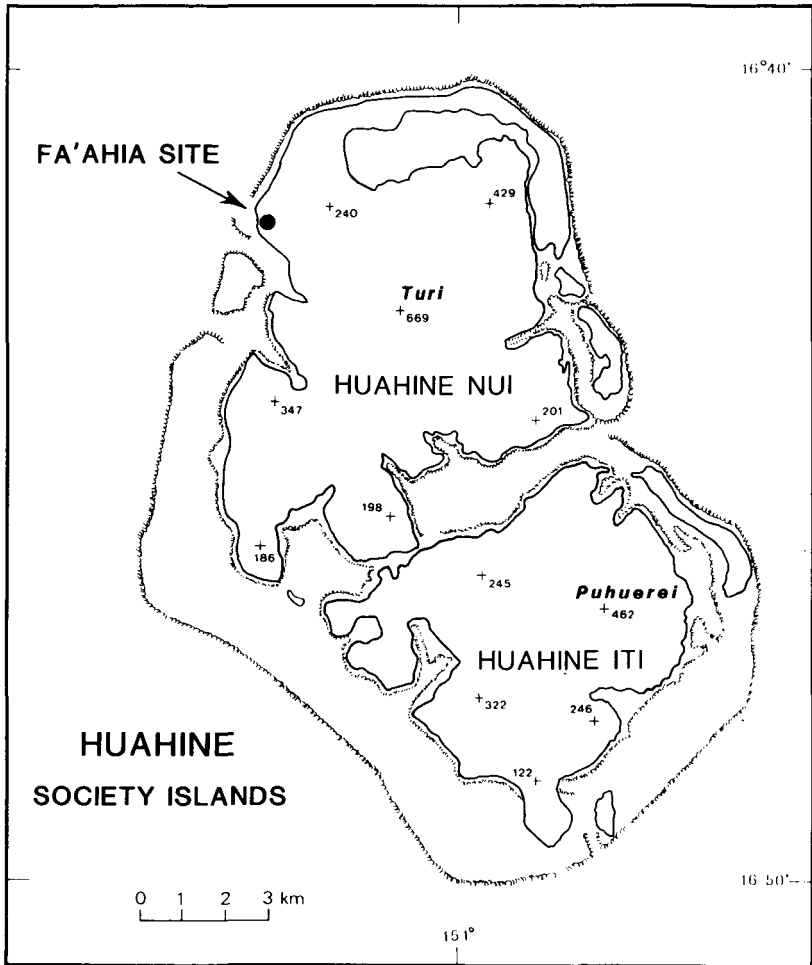


FIGURE 2 — Huahine, showing the location of the Fa'ahia Archaeological Site

skeletons of Eastern Polynesian passerines; they will be the topic of a future study. The third passerine bone from Huahine is a synsacrum that might pertain to *Acrocephalus caffer*, which has been extirpated on Huahine (Holyoak & Thibault 1978). (No modern skeletons of *A. caffer* are available; comparisons were made with skeletons of congeners.) The fourth passerine bone from Huahine is from an extinct species of starling, described herein.

The archaeology, stratigraphy, and chronology of excavations at the Fa'ahia Site have been reported by Sinoto & McCoy (1975), Bellwood (1979), Emory (1979), Sinoto (1979, 1983), Pigeot (1985, 1986), and Kirch (1986).

Radiocarbon dates from Fa'ahia range from c. 1250 to 750 years BP. The cultural sediments are at the edge of a coastal lagoon, below the modern water table. Certain organic materials, such as wood and bone, have been exceptionally well preserved because of rapid burial under anoxic sedimentary conditions.

Among the cultural materials at the Fa'ahia Site are wooden adze handles, wooden boards from voyaging canoes, wooden tapa beaters, and whalebone clubs. Most of the 300+ identifiable bird bones from the site are also beautifully preserved, mainly of seabirds (16 species represented, including petrels, shearwaters, tropicbirds, boobies, herons, and terns). Bones of 13 or 14 species of landbirds (rails, pigeons, parrots, kingfishers, and passerines), 11 of which are extinct on Huahine (Steadman 1989), are represented as well.

MATERIALS AND METHODS

Bird bones from the Fa'ahia Site are catalogued in the collections of the Département Archéologie, Centre Polynésien des Sciences Humaines, Tahiti (DAPT), and the Vertebrate Zoology Department of the Bernice P. Bishop Museum (BPBM). Modern skeletal specimens are from the National Museum of Natural History, Smithsonian Institution (USNM), the New York State Museum (NYSM), and the University of Washington Burke Museum (UWBM). Osteological terminology follows that of Baumel *et al.* (1979). Measurements were taken with dial calipers with increments of 0.05 mm, rounded to the nearest 0.1 mm.

The following modern skeletal specimens were examined in this study. All catalog numbers are USNM unless otherwise designated. *Hirundo rustica* NYSM 1453, *Lalage aurea* 557308, *L. maculosa* 290436, UWBM 42846, *Coracina tenuirostris* 557307, *Turdus poliocephalus* 559860, *Acrocephalus lusciniia lusciniia* 559139, *A. syrinx* 431411, *A. aequinoctialis pistor* 498372, 498373, *A. mendanae mendanae* NYSM 1148, 1149, *A. mendanae aquilonis* 318786, *A. atyphus atyphus* 318782, *A. kerearako* 559592, 559594, 559597, 559599, *Rhipidura rufifrons* 556243, *Myiagra oceanica* 431413, *Pachycephala simplex* 489242, *Artamus leucorhynchus* 290435, *Aplonis pelzelni* 430057, *A. atrifusca* 498059-498061, *A. cinerascens* 559603, 559604, UWBM 42817-42820, *A. tabuensis* 319773, 319777, UWBM 42839, 42858, 42883, 42890, *A. striatus* 121757, 121818, 121932, 561615, *A. opacus* 431418, 556239, *A. cantorooides* 345068, *A. mysolensis* 557251, 557257, 557260, 558324, *A. minor* 488933, *A. panayensis* 432061, 432063, 559091, 559091, 559094, *A. metallica* 557278, 557283, 557286, 557288, *Myzomela cardinalis* 556240, *Cleptornis marchei* 556246, *Foulehaio carunculata* 498062, UWBM 42887, *Philemon gilolensis* 557474, *Chaetoptila* sp. BPBM 388987 (Holocene fossil), *Zosterops conspiciata* 431416, *Erythrura trichroa* 431420.

SYSTEMATICS

The fossil tarsometatarsus is referred to *Aplonis* (Family Sturnidae) rather than to other passerine genera of Western or Eastern Polynesia (listed in Materials and Methods) because of the following unique combination of characters: stout shaft; all trochleae stout and short, with the inner trochlea especially broad; foramen vasculare distale located very near the trochleae.

Aplonis diluvialis, new species

Holotype: Complete tarsometatarsus, BPBM 166037, from Square U43, Layer IV, Fa'ahia Archaeological Site, Huahine, Society Islands, French Polynesia. Collected in 1984 by Y. H. Sinoto and associates.

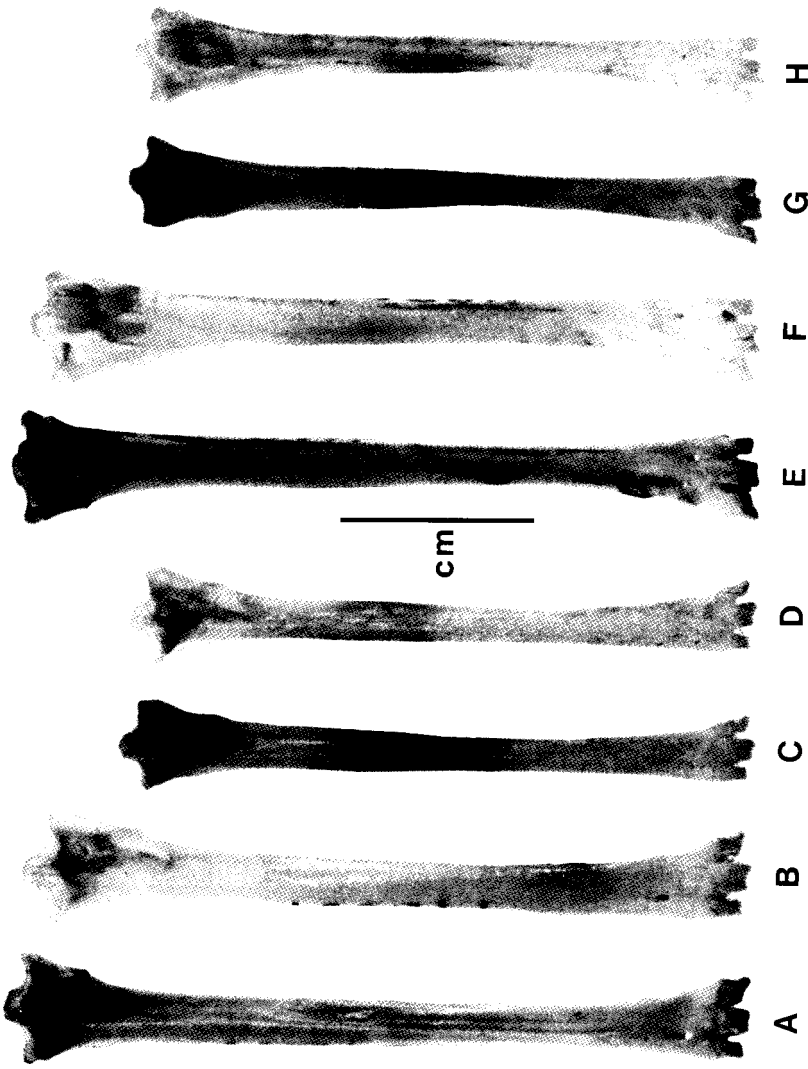


FIGURE 3 — The tarsometatarsus in dorsal (A-D) and plantar (E-H) aspects. A, E. *Aplonis diluvialis*, holotype, BPBM 166037, sex unknown. B, F. *Aplonis atrifusca*, USNM 498059, male. C, G. *Aplonis tabuensis*, UWBM 42839, male (hypotarsus damaged). D, H. *Aplonis cinerascens*, UWBM 42819, male. Scale bar = 1 cm

TABLE 1. — Measurements (in mm) of the tarsometatarsus of *Aplonis*, giving mean, range, and sample size. F = female, M = male, U = sex unknown

	Total length	Proximal width	Proximal depth	Minimum width of shaft	Minimum depth of shaft	Distal width	Depth of middle trochlea
<i>Aplonis diluvialis</i>	38.0	5.3	5.1	1.9	1.3	4.2	2.0
Holotype, BPBM 166037	1	1	1	1	1	1	1
Society Is.: Huahine (U)							
<i>A. atrifusca</i>	35.3	5.5	5.7	2.1	1.2	4.3	2.4
American Samoa:	33.6-36.9	5.4-5.6	5.5-5.8	2.0-2.1	1.2-1.3	4.3-4.4	2.3-2.4
Tutuila (M)	3	3	3	3	3	3	3
<i>A. cinerascens</i>	32.7	4.8	4.5	1.8	1.1	3.5	2.0
Cook Islands:	31.9-33.8	4.4-5.1	4.4-4.6	1.7-1.9	0.9-1.2	3.3-3.7	1.8-2.2
Rarotonga (2M, 4F)	6	6	6	6	6	6	6
<i>A. tabuensis</i>	29.2	4.3	3.8	1.2	0.8	2.9	1.6
Tonga: Niuafo'ou (U)	29.1-29.3	4.2-4.4	3.8-3.9	1.2	0.8-0.9	2.8-3.0	1.6-1.7
	2	2	2	2	2	2	2
<i>A. tabuensis</i>	30.5	4.6	4.2	1.8	1.2	3.4	2.2
Eua, Tonga (2M, 2F)	28.9-32.6	4.5-4.7	4.1-4.3	1.7-1.8	1.2	3.3-3.5	2.0-2.2
	4	4	3	4	4	4	4
<i>A. striatus</i>	25.2	4.0	3.9	1.2	1.0	2.9	1.9
New Caledonia (M)	24.7-25.8	3.8-4.2	3.6-4.1	1.2-1.3	0.8-1.1	2.8-2.9	1.8-2.0
	4	4	4	4	4	4	4
<i>A. pelzelni</i>	26.7	3.9	3.9	1.3	0.8	2.9	2.6
Caroline Islands:	1	1	1	1	1	1	1
Ponape (F?)							

<u>A. opacus</u>	30.3	4.7	4.4	1.6	0.9	3.5	2.0
Caroline Islands:	1	1	1	1	1	1	1
Ponape (M)							
<u>A. opacus</u>	28.6	4.3	4.0	1.5	0.7	3.4	1.9
Marianas Islands:	1	1	1	1	1	1	1
Serigan (F)							
<u>A. cantoroides</u>	ca.20.6	3.4	3.4	1.3	0.8	2.6	1.5
Captive (M)	1	1	1	1	1	1	1
<u>A. mysolensis</u>	22.7	3.6	3.4	1.2	0.8	2.8	1.5
Northern Moluccas:	22.1-23.2	3.4-3.8	3.3-3.6	1.1-1.3	0.7-0.8	2.5-2.9	1.4-1.6
Halmahera (2M,2F)	4	4	4	4	4	4	4
<u>A. minor</u>	20.6	3.4	3.0	1.0	0.6	2.3	1.4
Philippines: Mindinao	1	1	1	1	1	1	1
(F)							
<u>A. panayensis</u>	22.4	3.5	3.4	1.2	0.8	2.7	1.5
Philippines: Negros,	22.2-22.8	3.3-3.6	3.4	1.0-1.3	0.7-0.8	2.6-2.7	1.4-1.6
Culion, Busuanga	4	4	4	4	4	4	4
(2M,2F)							
<u>A. metallica</u>	22.0	3.5	3.4	1.1	0.8	2.8	1.4
Northern Moluccas:	21.4-22.4	3.3-3.8	3.2-3.5	1.0-1.1	0.6-0.8	2.6-2.9	1.4-1.5
Halmahera (2M,2F)	4	4	4	4	4	4	4

Diagnosis: A large species of *Aplonis* (Table 1), the tarsometatarsus of which differs from that of congeners as follows: intercotylar tuberosity smaller than in *A. atrifusca*, *A. cinerascens*, or *A. metallica*, and blunter than in *A. striatus*; more proximal placement of tuberositas musculo tibialis cranialis; fossa metatarsi I shorter and more distally located than in all except *A. pelzelmi*; foramen vasculare distale located nearer to the trochleae than in *A. cinerascens*, *A. striatus*, *cantoroides*, *A. mysolensis*, *A. minor*, *A. panayensis*, or *A. metallica*; inner trochlea more expanded laterally and dorso-ventrally; in dorsal aspect, medial flange of middle trochlea smaller (= same size as lateral flange); incisura intertrochlearis medialis shallower; small sulcus on the medial side of inner trochlea deeper than in *A. atrifusca*, *A. tabuensis*, *A. opacus*, or *A. mysolensis*; inner trochlea originates and extends farther distally (relative to middle trochlea) than in all except *A. pelzelmi* and *A. tabuensis*.

Etymology: The new name is taken from the Latin *diluvialis*, meaning of an inundation, of a flood, or of a deluge (Brown 1956:337), in reference to the fact that the cultural strata of the Fa'ahia Site are saturated today by ground water and are overlain by sand deposited by storm waves.

DISCUSSION

Aplonis diluvialis is matched in its large size and stoutness only by *A. atrifusca* of Samoa, from which it differs in many qualitative features (see Diagnosis). No skeletons are available for *A. mavornata*, an historically extinct species known only from Mauke, Cook Islands (Olson 1986). *Aplonis mavornata* is smaller than *A. cinerascens* in all dimensions, including a tarsal length (from a skin) of 27.4 mm (Olson 1986). Therefore *A. mavornata* was much smaller than *A. diluvialis*.

"*Turdus*" *ulietensis* was a passerine bird of unknown affinities, collected on Raiatea (Ulietea), Society Islands, during Cook's Second Voyage (Greenway 1958: 377, 378; duPont 1976: 121; Olson 1986: 203, 205; Pratt *et al.* 1987: 327; Fuller 1988: 196, 197). The only existing specimen of *T. ulietensis* is a painting dated 1 June 1774 by Georg Forster in the British Museum (Natural History). Based on descriptions of *T. ulietensis* by Latham and Forster (quoted in Greenway 1958: 378), I believe that *T. ulietensis* may have been a starling rather than a thrush, although this cannot be demonstrated with certainty unless a whole specimen is found that agrees with the painting. "*Turdus*" *ulietensis* was very similar in size to *Aplonis cinerascens*, and thus was significantly smaller than *A. diluvialis*.

To summarise, the only unequivocal Eastern Polynesian records of *Aplonis* are from Rarotonga (*A. cinerascens*; extant but rare), Mauke (*A. mavornata*; extinct in the 19th century), and Huahine (*A. diluvialis*; extinct, probably for centuries). This extremely discontinuous distribution suggests that other extinct species or populations of starlings await discovery elsewhere in the Cook and Society islands, and perhaps in the Tuamotus and Marquesas islands as well.

The current rarity of *Aplonis cinerascens* and the complete loss of *A. mavornata* and *A. diluvialis* indicate that the starlings of Eastern Polynesia are (were) more vulnerable to human activities than the widespread and usually common *A. tabuensis* of Western Polynesia, which seems to thrive in second growth or forest edges. The extinction of *A. diluvialis* probably was caused by human factors, such as the clearing of forests, the introduction of non-native plants, the introduction of diseases carried by non-native birds, and predation by humans and rats. Like at least 11 other extinct landbirds from

the Fa'ahia Site, *A. diluvialis* has not been recorded on Huahine during the past 200 years. It probably became extinct before the European discovery of Huahine.

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