

TWO NEW SPECIES OF PARROTS (AVES: PSITTACIDAE) FROM ARCHEOLOGICAL SITES IN THE MARQUESAS ISLANDS

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Abstract.—Two new species of extinct parrots, *Vini sinotoi* and *V. vidivici*, are described from bones collected in Polynesian archeological sites in the Marquesas Islands. *Vini sinotoi*, the largest species in the genus, is described from 100 bones of various skeletal elements from Ua Huka, with referred material from the islands of Hiva Oa and Tahuata. *Vini vidivici* is described from two bones from Hiva Oa, with referred material from Ua Huka and Tahuata. Among congeners, *V. vidivici* is exceeded in size only by *V. sinotoi*. Bones of *Vini ultramarina*, a small species known historically only from the Marquesan islands of Ua Pou and Nuku Hiva, are reported from sites on Ua Huka and Tahuata. These species of *Vini* probably lived sympatrically on each of the Marquesas islands until after the arrival of humans about 2000 years ago. The natural distribution and diversity of parrots in Polynesia can be learned only through studies of bones from archeological or paleontological sites. Based upon osteology and plumage, the monotypic genus *Phigys* of Fiji should be merged with *Vini*, a genus that is distinct osteologically from other Polynesian parrots.

During a visit to the Bernice P. Bishop Museum in 1985, Yoshihiko Sinoto and Toni Han showed the senior author a large number of unstudied bird bones from the Hane Archeological Site, Ua Huka, Marquesas, which had resided at BPBM for twenty years. Preliminary sorting of this material yielded about 8000 bird bones. In 1986, the authors visited the BPBM, completing the task of sorting the bird bones from Hane as well as from many other archeological sites in Polynesia. Among the 15,000 to 20,000 bird bones now in hand from the Hane Site are about 200 parrot bones. These are of great interest because no parrots are known historically from Ua Huka. The prehistoric avifaunas of eastern Polynesia are composed mainly of species that did not survive into historic times. For example, the parrot bones from Hane represent three species, two of which are extinct and one of which

survives only on the island of Ua Pou, Marquesas.

Materials and Methods

Museum acronyms are as follows: AMNH = American Museum of Natural History; BPBM = Bernice Pauahi Bishop Museum; UCMVZ = Museum of Vertebrate Zoology, University of California, Berkeley; USNM = National Museum of Natural History, Smithsonian Institution. When feasible, osteological nomenclature follows Baumel et al. (1979). Measurements were taken with dial calipers with 0.05 mm increments, rounded to the nearest 0.1 mm.

To determine generic relationships, we examined the tarsometatarsus and tibiotarsus in one or more skeletons of each of the following genera of mainly Indo-Australian parrots (nomenclature and sequence gen-

erally follow Peters 1937): *Nestor*, *Chalcopsitta*, *Eos*, *Trichoglossus*, *Pseudeos*, *Domicella*, *Lorius*, *Phigys*, *Vini*, *Glossopsitta*, *Charmosyna*, *Probosciger*, *Calyptorhynchus*, *Callocephalon*, *Cacatua*, *Eolophus*, *Nymphicus*, *Psittrichas*, *Eclectus*, *Geoffroyus*, *Prioniturus*, *Tanygnathus*, *Psittacula*, *Polytelis*, *Aprosmictus*, *Alisterus*, *Prosopeia*, *Psittinus*, *Loriculus*, *Platycercus*, *Purpureicephalus*, *Barnardius*, *Psephotus*, *Neophemma*, *Cyanoramphus*, and *Melopsittacus*. Measurements and other detailed comparisons were made on these skeletal specimens: *Vini* ("Phigys") *solitarius* UCMVZ 159203, USNM 277040, 277322; *V. ultramarina* USNM 76912; *V. peruviana* USNM 558033; *V. kuhlii* USNM 15432, 498417; *V. australis* AMNH 1278, 8009, USNM 319739, 319746; *Charmosyna placensis* USNM 558317; *Prosopeia tabuensis* USNM 291211, AMNH 2540; *Cyanoramphus novaezelandiae* USNM 344438, AMNH 9235.

The systematic descriptions in this paper are based mainly upon the tibiotarsus and tarsometatarsus, which are the most diagnostic post-cranial bones in Old World parrots. Among the avian fossils from the Hane Site, we have sorted out the tibiotarsi, tarsometatarsi, and most other skeletal elements of parrots. A more comprehensive account awaits the detailed sorting of the more numerous and varied bones of putative columbids (pigeons and doves), some of which closely resemble the bones of parrots.

Systematic Paleontology

Class Aves

Order Psittaciformes

Family Psittacidae

Subfamily Loriinae

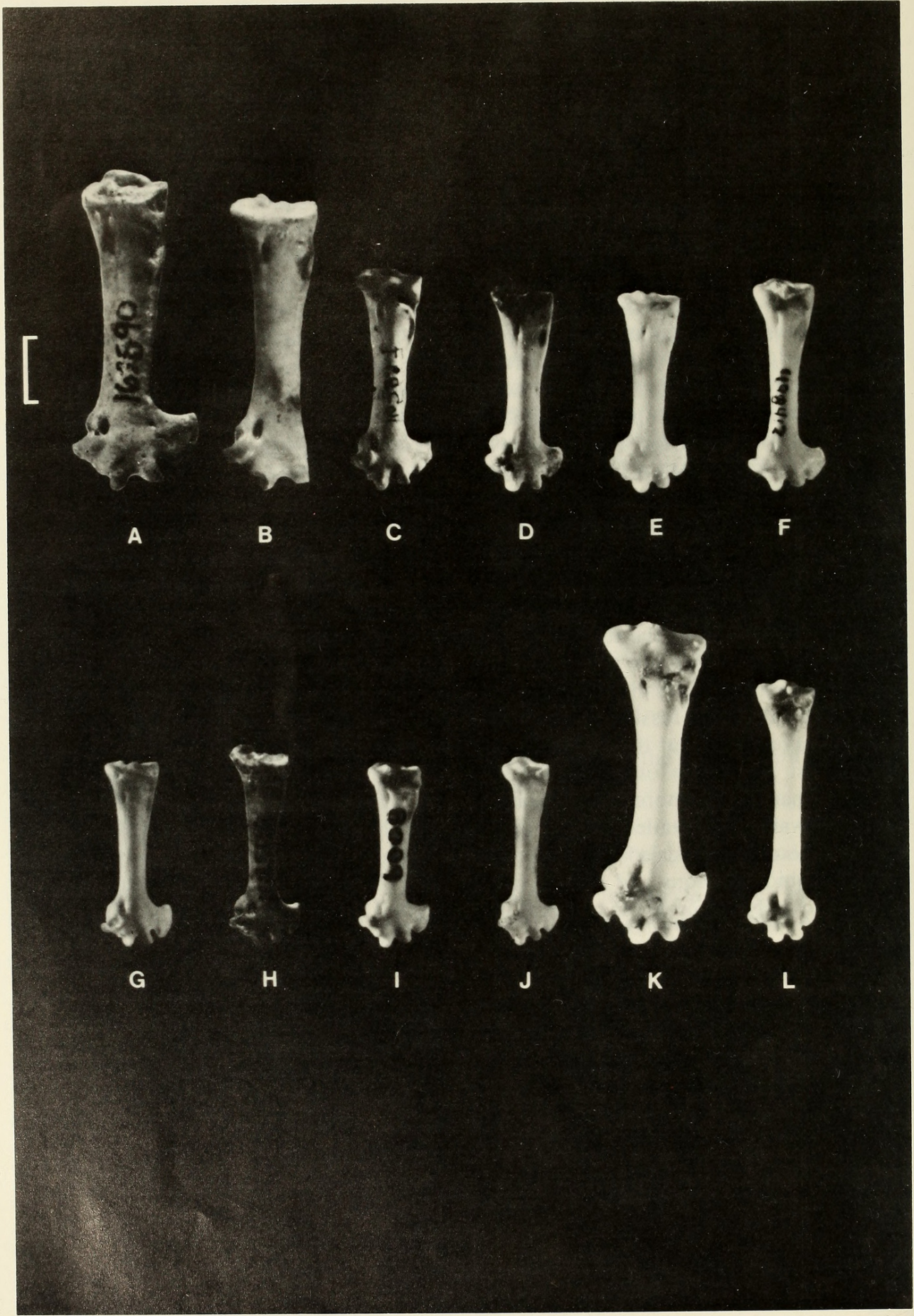
Genus *Vini* Lesson, 1831

In these fossils, the tarsometatarsus agrees with that in *Vini* and differs from that in all other genera listed above, in possessing the following combination of characters that are considered relative to the size of the bone:

shaft broad, though not extremely so, particularly in the proximal portion; hypotarsus very deep, with a single, large canal (in other genera, this canal may be incompletely closed, or may be separated into much smaller individual canals); foramen vasculare proximale large; inner trochlea large, joining the shaft nearly perpendicularly; middle trochlea broad although short; medial lobe of outer trochlea originates well distally from foramen vasculare distale, and protrudes well dorsally from the shaft.

The other genera of parrots that occur in Polynesia besides *Vini* are *Prosopeia* and *Cyanoramphus*. These genera were compared with the fossils in skeletal elements other than the tarsometatarsus. The fossils agree with modern species of *Vini* and differ from *Prosopeia tabuensis* as follows: rostrum—narrow medial bar of os nasale, sharp dorso-medial ridge of os premaxillare, narrow distal half of os premaxillare; mandible—shallow mandibular ramus, pointed pars symphysialis; femur—small facies articularis acetabularis, slender shaft; tibiotarsus—shallow shaft, although much expanded laterally in distal portion, outer condyle short and shallow; tarsometatarsus—proximal end deep with large, single hypotarsal canal expanded dorso-ventrally, shaft broad, especially in proximal portion, ventral surface of shaft concave, medial lobe of outer trochlea expanded dorso-ventrally, ventral side of medial trochlea broadly excavated in distal aspect.

The fossils agree with modern species of *Vini* and differ from *Cyanoramphus novaezelandiae* as follows: rostrum—large nares, sharp dorso-medial ridge of os premaxillare, narrow distal half of os premaxillare; mandible—shallow mandibular ramus, different overall shape and size of articular region, different placement of foramen in surangular region, pointed pars symphysialis; femur—small facies articularis acetabularis, small crista trochanteris; tibiotarsus—narrow and shallow shaft, although much expanded medio-laterally near distal end, both



condyles short and shallow; tarsometatarsus—proximal end deep with hypotarsal canal complete, shaft broad, ventral surface of shaft concave, foramina vascularia proximalia large, inner trochlea large, medial trochlea broad, lateral lobe of outer trochlea long.

Vini sinotoi, new species
Figs. 1, 2

Holotype.—Complete tarsometatarsus, BPBM 162590, Area A, Square R108, Layer IV, Hane Site (MUH-1), Ua Huka, Marquesas Islands; Y. H. Sinoto and associates, Jul 1964.

Topotypical paratypes.—Hane Site, Ua Huka (Area A, various squares, Layers II–V, with most specimens from Layer IV; Area B, various squares, Layers V, VI). Collected by Y. H. Sinoto and associates in 1964 and 1965. 6 coracoids, BPBM 162744, 163298, 165512, 165533, 165534, 165566. 1 scapula, BPBM 165535. 5 humeri, BPBM 162990, 163288, 163300, 165510, 165588. 33 tibiotarsi, BPBM 162592, 162593, 162745–162749, 162992, 162993, 163232, 163233, 163289, 165502, 165513–165518, 165536, 165548, 165550, 165551, 165553, 165567, 165568, 165576, 165577, 165591, 165606, 165619, 165620, 165622, 165626. 49 tarsometatarsi, BPBM 162591, 162750–162755, 162994, 162995, 163042, 163043, 163151, 163285–163287, 165503, 165519–165523, 165537–165539, 165549, 165554–165558, 165563, 165564, 165569–165573, 165578–165581, 165583, 165610, 165611, 165621, 165628, 165631–165634, 165641, 165642. 1 pedal phalanx, BPBM 163290.

Tentatively referred material: rostrum, BPBM 165531. 2 quadrates, BPBM 162742, 165597. 4 mandibles, BPBM 162743, 165562, 165584, 165638. 3 sterna, BPBM 162991, 165532, 165547.

Other paratypes.—Hanatekua Shelter No. 2 Site (MH-11; also known as MH-3-12), Hiva Oa, Marquesas Islands; P. Bellwood, Dec 1967: 1 coracoid, BPBM 165645, Excavation F3, 100–120 cm depth, Layer 10b (pre-occupational Layer). 1 tibiotarsus, BPBM 166067, Excavation E2-F2, 100–150 cm depth, Layer 10b (pre-occupational Layer).

Hanamiai Site, Tahuata, Marquesas; B. Rolett, 1985: 1 rostrum, BPBM 166062, Square N11, Layer H32 (depth 245–250 cm). 1 carpometacarpus, BPBM 166065, Square M12, Layer H22a (depth 235–240 cm).

Diagnosis.—Larger than other species of *Vini* in all elements (Tables 1, 2). Hypotarsus relatively deeper than in others. Distal lobe of outer trochlea of tarsometatarsus protrudes dorsally from shaft relatively less than in *V. kuhlii*, *V. australis*, or *V. peruviana*. Area between the middle and outer trochleae less deeply excavated than in *V. kuhlii* or *V. ultramarina*. Lateral expansion of distal end of tibiotarsus begins more proximally to the tuberculum of the medial side of the shaft, just proximal to the pons supratendineus, than in *V. vidivici*, *V. solitarius*, *V. kuhlii*, or *V. peruviana*, wherein this expansion begins at the tuberculum.

Etymology.—Named for Dr. Yosihiko H. Sinoto, in recognition of his many accomplishments in the archeology of eastern Polynesia, particularly in the Marquesas Islands. The faunal material excavated by Dr.

Fig. 1. The tarsometatarsus of selected Pacific parrots, in dorsal aspect: A, *Vini sinotoi* new species, holotype, BPBM 162590; *B, *V. sinotoi* new species, paratype, BPBM 163043 (outer trochlea damaged); *C, *Vini vidivici* new species, holotype, BPBM 165647; D, *V. solitarius* male, USNM 277040; E, *V. solitarius*, female, USNM 277322; F, *V. kuhlii*, female, USNM 498417; G, *V. ultramarina*, no sex, USNM 76912; H, *V. ultramarina*, no sex, BPBM 162588; I, *V. australis*, male, AMNH 8009; J, *V. peruviana*, male, USNM 558033; K, *Prosopeia tabuensis*, female, AMNH 2540; L, *Cyanoramphus novaeselandiae*, male, AMNH 9235; (* = mirror image of actual specimen. Scale bar = 1 cm).

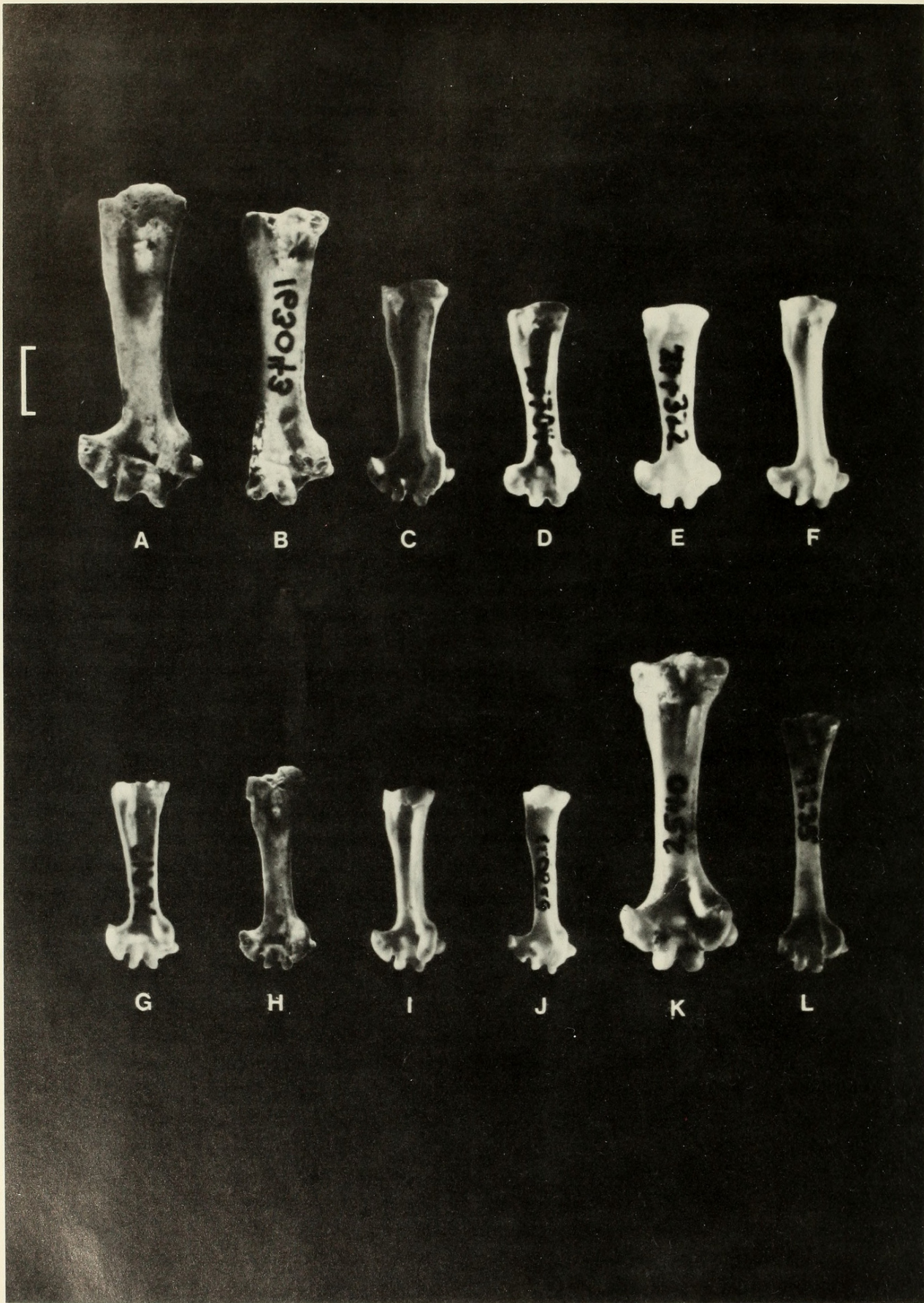


Fig. 2. The tarsometatarsus of selected parrots, in ventral aspect. Same specimens and sequence as in Fig. 1. Scale bar = 1 cm.

Sinoto provides crucial evidence for understanding past relationships between animals and people on islands.

Vini vidivici, new species

Figs. 1, 2

Holotype. — Complete tarsometatarsus, BPBM 165647, Excavation E2-F2, 100–140 cm depth, Layer 10b (pre-occupational Layer), Hanatekua Shelter No. 2 Site (MH-11; also known as MH-3-12), Hiva Oa, Marquesas Islands; P. Bellwood, 19 Dec 1967.

Topotypical paratype. — 1 tibiotarsus, BPBM 165646, same locality as Holotype.

Other paratypes. — Hane Site, Ua Huka, Marquesas Islands (Area A, various squares, Layers III–V; Area B, various squares, Layers V, VI); Y. H. Sinoto and associates, 1964–1965: 9 coracoids, BPBM 162986–162989, 163231, 165508, 165560, 165574, 165575. 3 humeri, BPBM 165561, 165582, 165587. 1 carpometacarpus, BPBM 162944. 7 tarsometatarsi, BPBM 162763, 162985, 165501, 165543, 165565, 165636, 165637. 2 tentatively referred mandibles, BPBM 165624, 165625.

Hanamiai Site, Tahuata, Marquesas Islands; B. Rolett, 1985: 1 coracoid, BPBM 166064, Square M11, Layer H27 (depth 232–242 cm). 2 tarsometatarsi, BPBM 166059, Square K9, Layer G/H 15 (depth 230–240 cm), BPBM 166061, Square M11, Layer H27 (depth 232–242 cm).

Diagnosis. — Larger than in any species of *Vini* except *V. sinotoi* (Tables 1, 2). Distal lobe of outer trochlea of tarsometatarsus protrudes dorsally from the shaft relatively less than in all except *V. sinotoi*. Lateral expansion of distal end of tibiotarsus begins at the tuberculum on the medial side of the shaft, just proximal to the pons supratendineus (begins more proximally in *V. sinotoi* and *V. australis*).

Etymology. — A *jeu de mots* rooted in the Latin declaration “Veni, vidi, vici,” Julius Caesar’s announcement to the senate of his

victory at Zela over Pharnaces, King of Pontus, in 47 B.C. (Evans 1968:722). The meaning, “I came, I saw, I conquered,” may be projected into the prehistoric situation in the Marquesas and elsewhere in Polynesia, where people came to an island, saw the native parrots, and then conquered them, leaving behind only the bones.

From the Hanamiai Site are a pedal phalanx (BPBM 166060, square J11, Layer G/H15, depth 230–240 cm) and an ungual phalanx (BPBM 166066, square M11, Layer H30, depth 250–255 cm) that pertain either to *V. vidivici* or to *V. sinotoi*. Other than being much larger than in *V. ultramarina*, these specimens have no diagnostic characters.

Vini ultramarina (Kuhl, 1820)

Figs. 1, 2

Referred material. — Hane Site, Ua Huka, Marquesas Islands, (Area A, various squares, Layers III–V; Area B, various squares, Layers V, VI); Y. H. Sinoto and associates, 1964–1965: 1 scapula, BPBM 165598. 4 coracoids, BPBM 162977, 163291, 165524, 165525. 9 humeri, BPBM 163292, 165540, 165585, 165593, 165594, 165599–165601, 165618. 2 carpometacarpi, BPBM 165526, 165592. 6 femora, BPBM 162766–162768, 163041, 165527, 165544. 17 tibiotarsi, BPBM 162759, 162760, 162978–162981, 165506, 165589, 165602–165605, 165607, 165608, 165623, 165627, 165640. 26 tarsometatarsi, BPBM 162761, 162762, 162764, 162765, 162982–162984, 163293, 165504, 165505, 165541, 165542, 165559, 165590, 165596, 165612–165617, 165629, 165630, 165635, 165643, 165644.

Hanamiai Site, Tahuata, Marquesas Islands; B. Rolett, 1985: 1 mandible, BPBM 166057, Square I10, Layer D6 (depth 150–160 cm). 1 sternum, BPBM 166063, Square L11, Layer I37 (depth 260–265 cm). 1 humerus, BPBM 166058, Square I10, Layer F9 (depth 180–190 cm).

Table 1.—Measurements of the tarsometatarsus of selected parrots (in mm), with mean, range, and sample size. Standard deviation is provided for samples of 10 or more. DE = Distal End; FVD = Foramen Vascular Distale; FVP = Foramen Vascular Proximale. F = female. M = male. U = sex unknown.

	Total length	Length: FVP to DE	Length: FVP to FVD	Proximal width	Least width of shaft	Least depth of shaft	Distal width
<i>Vini sinotoi</i>							
Hane Site, Ua Huka	22.8+ ± 0.8 21.6–24.0+ 10	18.7+ ± 0.7 17.7–20.1 12	14.6 ± 0.7 13.2–15.9 24	6.8+ 6.5–7.5+ 4	3.5 ± 0.1 3.2–3.8 34	2.1 ± 0.1 1.8–2.3 35	9.5+ 9.2–9.6+ 3
<i>Vini vidivici</i>							
Hanatekua Shelter No. 2 Site, Hiva Oa	18.3 1	15.0 1	11.5 1	5.5 1	2.6 1	1.6 1	7.4 1
<i>Vini vidivici</i>	—	16.9 1	13.4 13.0–13.8 2	6.6 1	3.0 2.9–3.0 2	2.0 2.0 2	—
Hanamiiai Site, Tahuata							
<i>Vini vidivici</i>	17.0 1	13.5 1	10.7 10.2–11.2 3	5.0+ 1	2.5 2.4–2.6 6	1.5 1.4–1.6 6	—
Hane Site, Ua Huka							
<i>Vini solitarius</i>	15.3 15.2–15.4 2	12.4 12.4–12.5 2	9.8 9.8 2	4.6 4.5–4.6 2	2.0 2.0–2.1 2	1.4 1.4–1.5 2	6.2 6.1–6.2 2
Modern specimens							
Viti Levu, Fiji (M)							
Taveuni, Fiji (F)							
<i>Vini kuhlii</i>	16.0 15.9–16.1 2	13.4 13.3–13.6 2	10.6 10.4–10.9 2	4.4 4.3–4.5 2	2.0 1.9–2.1 2	1.2 1.2 2	6.0 6.0–6.1 2
Modern specimens							
Washington Island (F, U)							
<i>Vini ultramarina</i>	14.3 1	12.1 1	9.6 1	4.1 1	1.9 1	1.2 1	5.7 1
Modern specimen							
Marquesas (exact island unknown; U)							
<i>Vini ultramarina</i>	15.1 14.5–15.6 6	12.6 11.9–13.1 6	10.1 ± 0.4 9.2–10.8 15	4.3+ 3.9+–4.4+ 5	2.0 ± 0.1 1.9–2.2 27	1.2 ± 0.1 1.1–1.4 27	5.7+ 5.5+–5.9+ 4
Hane Site, Ua Huka							
<i>Vini australis</i>	13.7 13.3–13.9 4	11.4 11.2–11.7 4	8.9 8.5–9.3 4	3.9 3.8–3.9 4	1.8 1.6–1.9 4	1.2 1.1–1.2 4	5.4 5.3–5.5 4
Modern specimens							
Upolu, Western Samoa (2M), Niuafo'ou, Tonga (2U)							
<i>Vini peruviana</i>	13.8 1	11.9 1	9.3 1	3.4 1	1.5 1	0.9 1	5.0 1
Modern specimen							
Captive (M)							

Table 2.—Measurements of the tibiotarsus of selected parrots (in mm), with mean, range, and sample size. Standard deviation is provided for samples of 10 or more. CF = Crista Fibularis; DE = Distal End; PE = Proximal End; PS = Pons Supratendineus. F = female. M = male. U = sex unknown.

	Length: DE of CF to DE	Length: DE of CF to PE of PS	Least width of shaft	Least depth of shaft	Distal width	Height of condylus medialis	Depth of condylus medialis	Depth of condylus lateralis
<i>Vini sinotoi</i>								
Hane Site, Ua Huka	32.4 31.3–33.4 4	28.1 27.0–29.5 6	2.6 2.3–3.0 9	2.2 ± 1.0 2.0–2.4 25	6.4 6.3–6.5 7	4.6 ± 0.2 4.2–4.9 13	5.3 5.0–5.8 5	3.9 3.9 2
<i>Vini viduici</i>								
Hanatekua Shelter No. 2, Hiva Oa	25.6 1	22.0 1	2.2 1	1.6 1	5.4 1	3.6 1	4.3 1	3.4 1
<i>Vini solitarius</i>								
Modern specimens	23.0 1	19.6 1	2.0 1	1.5 1	4.3 4.2–4.4 2	2.9 2.9 2	3.6 3.5–3.8 2	2.9 1
Viti Levu, Fiji (M)								
Taveuni, Fiji (F)								
<i>Vini kuhlii</i>								
Modern specimens	23.8 23.4–24.3 2	21.2 20.7–21.6 2	1.6 1.6–1.7 2	1.2 1.2 2	4.4 4.3–4.4 2	2.8 2.8 2	3.4 3.4–3.5 2	2.8 2.8–2.9 2
Washington Island (F, U)								
<i>Vini ultramarina</i>	—	—	1.7 1	1.1 1	—	2.9 1	3.0 1	—
Modern specimen								
Marquesas (exact island unknown; U)								
<i>Vini ultramarina</i>								
Hane Site, Ua Huka	—	21.0 1	1.6 1.5–1.7 6	1.3 ± 0.1 1.2–1.5 10	4.2 4.0–4.3 3	2.8 2.5–3.2 5	3.3 1	2.6 2.5–2.9 3
<i>Vini australis</i>								
Modern specimens	20.7 20.5–21.0 4	18.4 18.3–18.6 4	1.6 1.5–1.6 4	1.2 1.2–1.3 4	3.6 3.5–3.8 4	2.5 2.5–2.6 4	3.0 3.0 4	2.3 2.2–2.3 4
Upolu, Western Samoa (2M), Niuafo’o, Tonga (2U)								
<i>Vini peruviana</i>								
Modern specimen	19.6 1	17.6 1	1.4 1	1.0 1	3.0 1	2.4 1	2.8 1	2.2 1
Captive (M)								

Discussion

Systematics and osteology. — The large size of *Vini vidivici* and especially of *V. sinotoi* suggested at first that these forms may belong in *Cyanoramphus*, the only other genus of psittacid recorded from eastern Polynesia. For this reason, more detailed osteological comparisons were made between *Vini* and *Cyanoramphus*, as well as the geographically next closest genus of parrot, *Prosopeia* of Fiji and Tonga (see “Systematic Paleontology”). These comparisons show that the fossils clearly pertain to *Vini* and are distinct from *Cyanoramphus* or *Prosopeia*. *Charmosyna*, a polytypic genus that occurs from Fiji west through the New Guinean region, is also distinct from *Vini*, at least in the single species of *Charmosyna* available (see “Generic Diagnosis”). Our comparisons for *Cyanoramphus* are based upon *C. novaezealandiae* of New Zealand, as the only known skeleton of *C. zealandicus* of Tahiti (reported by Schauenberg 1970) was unavailable. Similarly, the comparisons for *Charmosyna* are based upon *C. placentis* of the Moluccas rather than *C. amabilis* of Fiji, for which no material is available.

The monotypic genus *Phigys* accommodates the species *solitarius* of the Fijian Archipelago. We found no characters in the tibiotarsus or tarsometatarsus to distinguish *Phigys* from any species of *Vini*. The plumage of *Phigys* also resembles that of *Vini* in both color and pattern (see duPont 1976: plate 18, or Forshaw 1977:72–73). Therefore we recommend synonymizing the genus *Phigys* G. R. Gray, 1870, with *Vini* Lesson, 1831.

Although *Vini* is distinct osteologically from other genera of parrots, the species within *Vini* are rather uniform osteologically, with differences in size and occasionally in proportions being the only diagnostic features at the species level. We had no skeleton of *V. stepheni*, a species known only from Henderson Island. The tarsal measurements of skins of *V. stepheni* (16–18

mm, $n = 8$) resemble those of *V. kuhlii* (17–18.5 mm, $n = 25$; Holyoak and Thibault 1984:123–124), so we are confident that *V. stepheni* is much smaller than either *V. sinotoi* or *V. vidivici*.

The parrot bones from the archeological sites on Ua Huka, Hiva Oa, and Tahuata permit an assessment of species-level relationships, although they are not adequate for analysis of intraspecific variation. The limited sample suggests that there may be interisland differences in size, with both *V. sinotoi* and *V. vidivici* being larger on Hiva Oa and Tahuata than on Ua Huka (Table 1).

Extinction and biogeography. — The stratigraphic association of bones of extinct parrots with cultural materials shows that these species survived until after the arrival of Polynesians. A brief review of the chronology and stratigraphy of the archeological sites permits an assessment of the time of extinction. A discussion of the causes of extinction of parrots and other birds in the Marquesas will be presented in a future publication.

The Hane Site on Ua Huka, known also as the Hane Dune Site, has provided much of the basis for the four proposed cultural phases of the Marquesas (Sinoto 1966, 1970, 1979). The Hane Site records the earliest known aspects (Phase 1, Initial Contact) of Polynesian culture in the Marquesas (beginning about A.D. 300 according to Sinoto, or about 200 B.C. or earlier according to Kirch 1986). In his analysis of the faunal material from Hane and other sites in the northern Marquesas, Kirch (1973: see especially pp. 27–37) reported an abundance of bird bones (not further identified) in the strata of Phase 1, with very few bird bones in the strata that represent Phase 2, (A.D. 600–1300), and none in the strata of Phase 3 (A.D. 1300–1600) or Phase 4 (A.D. 1600–1800). Phase I of Marquesan culture is represented by Layers III–V of Area A and Layer VI of Area B (Kirch 1973:27). The bones of extinct parrots, as well as those of other

extinct birds yet to be described, occur only in stratigraphic Layers II through V of Area A and Layers V and VI of Area B. Thus nearly all of the parrot bones are from Phase I Layers, although a few bones of each of the three species occur in strata assigned to Layer II of Area A and Layer V of Area B, both of which represent Phase 2 of Marquesan culture. Unfortunately, precise stratigraphic data were lost for some (less than 5%) of the Hane bird bones sometime between 1964 and 1984. Nevertheless, the data at hand indicate that the extinction of most landbirds on Ua Huka, including the parrots, occurred within the first millenium of human settlement.

The parrot bones from the Hanatekua Shelter No. 2 Site, Hiva Oa, are from pre-occupational levels (Y. H. Sinoto, pers. comm.). There is no radiocarbon chronology for this site (Bellwood 1972).

From the Hanamiai Site, Tahuata, the specimens of *Vini sinotoi* and *V. vidivici* are from Layers G/H and H, whereas those of *V. ultramarina* are from Layers D, F, and I. "I" is the lowermost Layer in this well stratified site. Radiocarbon ages (in years B.P.) on charcoal for the Hanamiai Site are 130 ± 100 (Layer B), 620 ± 90 (Layer F), and 850 ± 60 and 1250 ± 100 (Layer G) (B. Rolett, pers. comm.). Additional radiocarbon ages are pending. The stratigraphic distribution of parrots at Hanamiai suggests that *V. ultramarina* survived longer on Tahuata than its larger, extinct congeners, although all three co-existed at one time. The possible longer survival of *V. ultramarina* on Tahuata is in accord with the fact that this small species survived into historic times on two islands in the Marquesas (Nuku Hiva, Ua Pou), whereas the two larger species of *Vini* apparently became extinct before European contact.

The historical distribution of species of *Vini* outside of the Marquesas suggests that certain of these species as well have not survived on all of the islands that once made up their natural ranges. For example, a fossil

sternum from a cave on Mangaia, southern Cook Islands, has been referred to *Vini* cf. *V. kuhlii* (Steadman 1985), a species previously known only from Rimatara and Tubuai, 480 km east-southeast of Mangaia. In light of the historic or prehistoric extirpations from certain islands of *V. kuhlii*, *V. ultramarina*, *V. australis*, and *V. peruviana*, and the complete losses of *V. sinotoi* and *V. vidivici*, we might expect additional undescribed species of *Vini* to show up in future archeological or paleontological excavations in Oceania. At a minimum, we can expect new island records for the known species. One or more species of *Vini* probably once existed throughout the many islands of Polynesia that are not inhabited by parrots today.

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