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

David W. Steadman and Marie C. Zarriello

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-
generally follow Peters 1937): Nestor, Chalcopsis, Eos, Trichoglossus, Pseudeos, Domi-
cella, Lorius, Phigys, Vini, Glossopsitta, Charmosyna, Probosciger, Calyptorhynchus, Callocephalon, Catucata, Eolophus, Nympicus, Psitrichas, Eclectus, Geoffroy-
sus, Prioniturus, Tanygnathus, Psittacula, Polytelis, Aprosniictus, Alisterus, Prosopeia, Psittinus, Loriculus, Platycterus, Purpureicephalus, Barnardius, Psephotus, Neope-
ma, Cyanoramphus, and Melopsittacus. Measurements and other detailed compar-
isons were made on these skeletal speci-
mens: Vini ("Phigys") solitarius UCMVZ
159203, USNM 277040, 277322; V. ultra-
marina USNM 76912; V. peruviana USNM
558033; V. kuhlii USNM 15432, 498417; V. australis AMNH 1278, 8009, USNM
319739, 319746; Charmosyna placensis
USNM 55831; Prosopeia tabuensis USNM
291211, AMNH 2540; Cyanoramphus no-
vaenlandiae USNM 344438, AMNH 9235.

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

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, par-
ticularly in the proximal portion; hypotar-
sus very deep, with a single, large canal (in
other genera, this canal may be incomplete-
ly closed, or may be separated into much
smaller individual canals); foramen ven-
culare proximale large; inner trochlea large,
joining the shaft nearly perpendicularly;
middle trochlea broad although short; me-
dial lobe of outer trochlea originates well
distally from foramen vascular 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 com-
pared 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, nar-
row distal half of os premaxillare; mandi-
ble—shallow mandibular ramus, pointed
dorsal symphysialis; femur—small facies ar-
ticularis acetalbaris, slender shaft; tibio-
tarsus—shallow shaft, although much ex-
panded 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 ex-
cavated in distal aspect.

The fossils agree with modern species of
Vini and differ from Cyanoramphus novaen-
landiae as follows: rostrum—large nares, sharp
dorso-medial ridge of os premaxillare, nar-
row distal half of os premaxillare; mandible—shallow mandibular ramus, dif-
ferent overall shape and size of articular re-
gion, different placement of foramen in sur-
angular region, pointed pars symphysialis;
femur—small facies articularis acetalbaris,
small crista trochanteris; tibiotarsus—nar-
row and shallow shaft, although much ex-
panded 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.


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).


**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 trochlea 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 archaeology of eastern Polynesia, particularly in the Marquesas Islands. The faunal material excavated by Dr.
Sinoto provides crucial evidence for understanding past relationships between animals and people on islands.

*i vidivici*, new species

*Fig. 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.


*Diagnosis.*—Larger than in any species of *Vini* except *V. sinoloi* (Tables 1, 2). Distal lobe of outer trochlea of tarsometatarsus protrudes dorsally from the shaft relatively less than in all except *V. sinoloi*. 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. sinoloi* 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. sinoloi*. Other than being much larger than in *V. ultramarina*, these specimens have no diagnostic characters.

*Vini ultramarina* (Kuhl, 1820)

*Fig. 1, 2*

*Referred material.*—Hane Site, Ua Huka, Marquesas Islands (Area A, various squares, Layers II-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, 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 Vasculare Distale; FVP = Foramen Vasculare Proximale. F = female. M = male. U = sex unknown.

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<th>Species</th>
<th>Total length</th>
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<th>Length: FVP to FVD</th>
<th>Proximal width</th>
<th>Least width of shaft</th>
<th>Least depth of shaft</th>
<th>Distal width</th>
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Table 2.—Measurements of the tibiotalars 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 = Pon Supratendineus. F = female. M = male. U = sex unknown.

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<td>2.8</td>
<td>3.3</td>
<td>2.6</td>
</tr>
<tr>
<td>Hane Site, Ua Huka</td>
<td>1</td>
<td>1.5–1.7</td>
<td>1.2–1.5</td>
<td>4.0–4.3</td>
<td>2.5–3.2</td>
<td>1</td>
<td>2.5–2.9</td>
<td></td>
</tr>
<tr>
<td><em>Vini australis</em></td>
<td>20.7</td>
<td>18.4</td>
<td>1.6</td>
<td>1.2</td>
<td>3.6</td>
<td>2.5</td>
<td>3.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Modern specimens</td>
<td>20.5–21.0</td>
<td>18.3–18.6</td>
<td>1.5–1.6</td>
<td>1.2–1.3</td>
<td>3.5–3.8</td>
<td>2.5–2.6</td>
<td>3.0</td>
<td>2.2–2.3</td>
</tr>
<tr>
<td>Upolu, Western Samoa (2M), Niuafou’o, Tonga (2U)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><em>Vini peruviana</em></td>
<td>19.6</td>
<td>17.6</td>
<td>1.4</td>
<td>1.0</td>
<td>3.0</td>
<td>2.4</td>
<td>2.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Modern specimen</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Captive (M)</td>
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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, *Prosopoeia* of Fiji and Tonga (see "Systematic Paleontology"). These comparisons show that the fossils clearly pertain to *Vini* and are distinct from *Cyanoramphus* or *Prosopoeia*. Chamosyna, 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 *Chamosyna* available (see "Generic Diagnosis"). Our comparisons for *Cyanoramphus* are based upon *C. novaezelandiae* of New Zealand, as the only known skeleton of *C. zealandicus* of Tahiti (reported by Schauenberg 1970) was unavailable. Similarly, the comparisons for *Chamosyna* are based upon *C. placentalis* 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 archaeological 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 archaeological 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 Marquesian 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 millennium 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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Biological Survey, New York State Museum, The State Education Department, Albany, New York 12230.