

THE INDETERMINATE PARROT OF NUEVO LEÓN

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ABSTRACT.—The paleoavifauna of San Josecito Cave, Nuevo León, northeast Mexico, includes seventeen osteological elements of parrots. The late Pleistocene deposit has been radiocarbon-dated at 25,000-12,500 years B.P. The material is all assignable to the genus *Rhynchopsitta*, a pinecone specialist. Three species are recognizable on the basis of qualitative and quantitative characters: the smaller extant western Thick-billed Parrot, *R. pachyrhyncha*, the larger extant eastern Maroon-fronted Parrot, *R. terrisi*, and the still larger heavier-billed parrot here named *R. phillipsi*. Because of distinctive character differences in all elements represented (rostrum, ulna, carpometacarpus, humerus), the extinct *R. phillipsi* is not considered ancestral to *R. terrisi* but contemporaneous with it in the late Pleistocene. With the conversion of pinyon-juniper woodland of northern Mexico to Chihuahuan desertscrub and the restriction of coniferous forests to relictual populations 1,000 m upslope at the end of the Pleistocene, the Large-billed Parrot was lost from the local avifauna.

Loye Miller (1943), reporting on a late Pleistocene assemblage of birds from San Josecito Cave, Nuevo León, Mexico, noted an “indeterminate parrot” species among a fossil series of Thick-billed Parrots, *Rhynchopsitta pachyrhyncha*. At the time, the genus was considered monotypic and he had but a single modern comparative skeleton to work with. The unidentifiable fossils represented birds that were slightly larger than *R. pachyrhyncha* and qualitatively different but could not be assigned to either *Ara* or *Amazona*.

Moore (1947) described a second species in the genus *Rhynchopsitta*, the Maroon-fronted Parrot, *R. terrisi*, from Coahuila and Nuevo León in the Sierra Madre Oriental of northeast Mexico. This bird, similar in color pattern to *R. pachyrhyncha*, is somewhat larger. Apparently only one skeleton has been preserved in modern collections. Subsequent studies of the paleoavifauna of San Josecito Cave have failed to produce further parrot remains (Steadman *et al.* 1994). A reexamination of Miller’s fossils is appropriate now that both living species are represented osteologically. My study of the original fossil material shows that three species of *Rhynchopsitta* are represented in the San Josecito Cave deposit.

STATUS OF THE TWO LIVING TAXA

Parrots of the genus *Rhynchopsitta* are large, with moderately graduated tails. The cere is fully feathered. The “very large, excessively compressed” bill with a deep maxillary unguis distinguishes them from all other North American parrots (Ridgway 1916). They are believed to be most closely related to *Ara* (Forshaw 1973:352, 410). From cranial morphology alone, it is possible that *Rhynchopsitta*, *Aratinga*, and *Ara* are a monophyletic group. However, details of intergeneric relationships of New World parrots remain to be worked out. The species of *Rhynchopsitta* are the most “temperate” of the northern Neotropical parrots in that they are restricted to coniferous forests at higher elevations in northern Mexico and (at least formerly) the southwestern United States. Here their principal food is nuts extracted from pine cones.

The Thick-billed Parrot is bright green with red broadly across the forehead, lores, and superciliary, on the bend of the wings, and on the ankles (“thighs”). The yellow greater underwing coverts show as a conspicuous patch when the bird is in flight. The Maroon-fronted Parrot differs in being darker green, having brownish maroon on the head instead of red, and in lacking the yellow wing patches. It was described as a species, but

its taxonomic treatment has varied. Hardy and Dickerman (1955) suggested that the two were only subspecies, based on certain variations thought to exist within each taxon. They noted, however, an additional characteristic distinguishing *pachyrhyncha*, the bluish-green cast of its cheeks. Ely (1962) tentatively listed the eastern *terrisi* as a very well defined race, but later leaned toward considering the two full species (personal communication). Hardy (1967), after studying mate selection in parrots and finding even subtle phenotypic differences significant in this group, reconsidered the specific status of the two, doubting their conspecificity. (He did not mention the striking difference in underwing coverts.) In his definitive monograph on parrots of the world Forshaw (1973, 1989) treated the two allopatric forms as very distinct subspecies.

In spite of similarity in overall color pattern, osteologically the two are readily distinguished as species on qualitative characters. The best elements distinguishing *terrisi* are skull: (1) fossa temporalis larger, extending farther medially; (2) ala tympanica notched rather than squared; (3) basitemporal plate more deeply excavated and/or more strongly ridged; and (4) cranial vault less rounded, more flattened proximally giving the profile a very different shape (Fig. 1); mandible: post articular process relatively longer and narrower; sternum: relatively longer; pelvis: wings of ilium not expanded laterally at proximal ends; femur: distal end of shaft expanded laterally above external condyle; tibiotarsus: intercondylar groove broader, less U shaped; tarsometatarsus: profile of proximal end very different.

There are behavioral and ecological differences as well. The two species are distinguishable by vocalizations (Aldegundo Garza de León, personal communication). Miguel Á. Gómez Garza notes that *R. terrisi* has a lower register than *R. pachyrhyncha*.



FIG. 1. Comparison of *Rhynchopsitta* crania: above *R. terrisi*; below *R. pachyrhyncha*; scale = 1 cm.

Though it is highly social in the nonbreeding season, *R. pachyrhyncha* is essentially a solitary tree nester, occupying snags or old woodpecker holes, at least formerly those of the Imperial Woodpecker, *Campephilus imperialis* (Thayer 1906, Bent 1940, Phillips *et al.*, 1964). In contrast, *R. terrisi* is a colonial nester in cliffs (Gómez Garza 1991; Lawson and Lanning 1981).

MATERIALS AND METHODS

Miller's (1943) fossil materials, housed at Los Angeles County Museum (LACM), were compared with over two dozen *R. pachyrhyncha* skeletons, including wild-taken, captive but presumably wild-taken, and captive-reared individuals, and one wild-taken *R. terrisi* from various collections. Final comparisons were made with San Diego Natural History Museum specimens (SD). Osteological terminology for the most part follows Baumel *et al.*, (1993). All measurements are in mm, taken with dial calipers read to the nearest 0.1 mm. A measurement \underline{n} followed by (+) indicates slight abrasion probably affecting the reading, while (\underline{n})+ indicates a measurement that is definitely affected, but not to a great extent; [\underline{n}] indicates that the number is useful only as a minimum value because part of the unit measured is missing. Species identifications were made on the basis of qualitative characters, although the elements preserved sort out well by size also.

THE SAN JOSECITO FOSSIL MATERIAL

All the parrot fossils recovered from San Josecito Cave are assignable to the genus *Rhynchopsitta*. Most of these bear the California Institute of Technology lot number "(CIT) 192" followed by the LACM individual specimen numbers. Some fossils are marked with individual CIT numbers.

The following elements represent the smaller living *R. pachyrhyncha*: right humerus, some abrasion, LACM 127925; right ulna, complete, LACM 127927; right ulna, missing proximal articulations, LACM 127928; right ulna, complete, CIT 3394; left carpometacarpus, missing metacarpal III, LACM 127926; left carpometacarpus, complete, CIT 3393; right femur, complete, CIT 3392.

The following elements are assignable to the larger living *R. terrisi*: rostrum, CIT 3390; left humerus, some abrasion, LACM 127924; right humerus, abraded, CIT 3391.

The remainder of the elements represent a third, undescribed extinct form that may be known as

Rhynchopsitta phillipsi new species

HOLOTYPE.—Nearly complete rostrum, lacking most of the proximal articulating surface, area of cere, and premaxilla tip. CIT 192/LACM 127931.

DIAGNOSIS.—The rostrum has the overall shape of *Rhynchopsitta* (Figs. 2,3), being more narrow and laterally compressed than in *Ara*, but is more massive than the two living species (see comparative measurements); palatal concavity more deeply excavated than in *Ara* or *Amazona*; differs from *R. terrisi* in being more tumid, especially below the culmen, distal to the nares, broader across palatal area, and from *R. pachyrhyncha* in being less acutely angled in dorsal and ventral outlines. The lateral contour of the tomium differs from both *terrisi* and *pachyrhyncha*.

TYPE LOCALITY AND HORIZON.—San Josecito Cave, lat. 23 degrees 57'21" N, long. 99 degrees 54'45" W, Municipio de General Zaragoza, 8 km SW of Aramberri, southern Nuevo León, Sierra Madre Oriental, Mexico. Elevation about 2,250 m. Late Pleistocene.



FIG. 2. Comparison of *Rhynchopsitta* rostra, lateral view: above *R. phillipsi*, holotype, LACM 127931; middle *R. terrisi*; bottom *R. pachyrhyncha*; scale = 1 cm.



FIG. 3. Comparison of *Rhynchopsitta* rostra, ventral view: above *R. phillipsi*, holotype, LACM 127931; middle *R. terrisi*; bottom *R. pachyrhyncha*; scale = 1 cm.

REFERRED MATERIAL.—Humeri (with some gnawing): left, LACM 57056, right LACM 57057 (matching pair?), left LACM 57058; left LACM 57059, missing proximal head and part of distal articulation; these four differ from *R. terrisi* and *R. pachyrhyncha* in configuration of processes and most tendinal attachments, and from similar sized *Amazona finschi*, *A. aestiva*, and *A. autumnalis* in having a deeper and about 50% larger brachial depression (Fig. 4). Ulna: left LACM 127929. Carpometacarpus: right LACM 127930.

DESCRIPTION.—The rostra of the three species of *Rhynchopsitta* form a graded series with *phillipsi* being the largest and heaviest, *terrisi* the intermediate, and *pachyrhyncha* the smallest and most slender (Table 1). The carpometacarpus of *R. phillipsi* is 5% longer than that of *terrisi* (Fig. 5); its facet for digit III is smaller than that of *terrisi*; the extensor digitorum communis is shallower (most noticeably distally) than in either *terrisi* or similar sized *Ara severa*, and it broadens distally. The fossil ulna of *R. phillipsi* is missing the olecranon; its tuberculum ligamenti collateralis ventris is narrower, forming roughly an acute triangle in *R. phillipsi* rather than being broader and more rounded as in *R. terrisi*; it extends farther down the outer margin of the impressio brachialis than in *R. terrisi* (Fig. 6). Even with some abrasion to the distal end of the ulna, the tuberculum carpalis is much broader in *R. phillipsi* than in *R. terrisi*. The tendinal groove (incisura tendinosa) on the dorsal aspect is deeper in *R. phillipsi* than in congeners. Although the humerus of *R. phillipsi* is only slightly longer (3.4%) than that of *R. terrisi*, its greater shaft diameter (5.25–7.75 %) suggests that the extinct species may have been heavier and stockier (Table 2).

ETYMOLOGY.—Named in honor of Allan R. Phillips who devoted his career to the study of North American birds, particularly those of Mexico and the Southwest. (No comparison is implied between the Large-billed Parrot and the ornithologist for whom it is named.)

TABLE 1
MEASUREMENTS (MM) OF THE ROSTRUM OF THREE SPECIES OF *RHYNCHOPSITTA*

species	specimen #	height maxilla	depth unguis	width maxilla	ext. width at maxillary depression	int. width across maxillary depression
<i>phillipsi</i>	127931	21.0	7.3	[22.0]	17.0	11.0
<i>terrisi</i>	3390	17.1	6.0	[20.0]	18.7	9.3
<i>terrisi</i>	modern	18.8	7.0	20.0	14.5	10.0
<i>pachyrhyncha</i>	¹ modern					
	41794	17.9	7.0	19.5	14.9	9.3
“	43409	18.9	5.5	19.7	13.6	9.7
“	45844	17.7	6.3	20.2	15.8	9.7
“	45846	16.5	5.2	1.0 8.3	12.5	8.7

¹ modern *R. pachyrhyncha* from SD, without rhamphotheca.

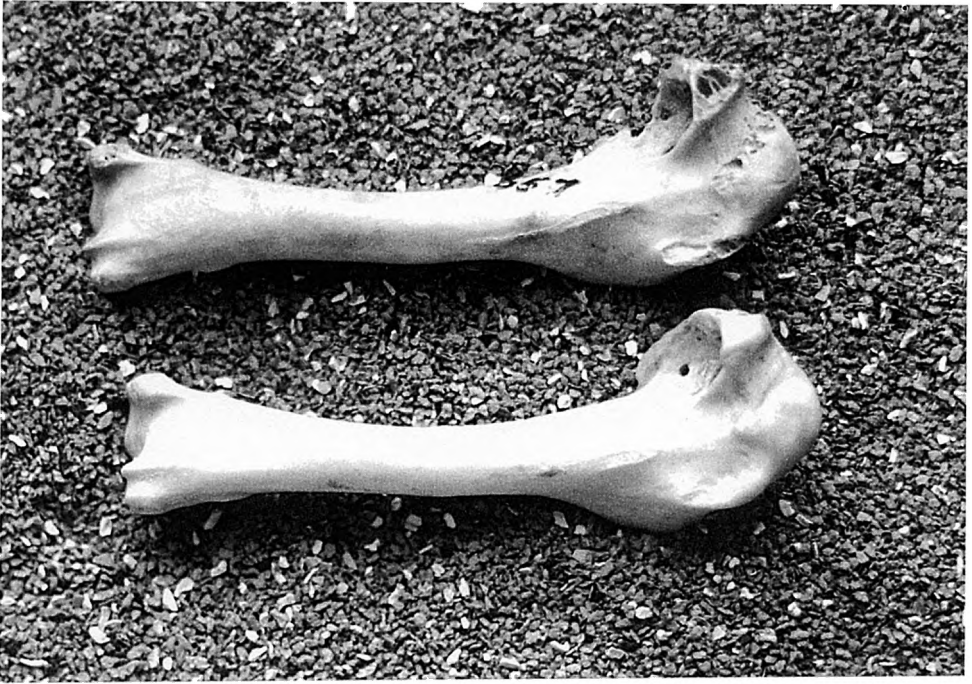


FIG. 4. *Rhynchopsitta* humeri, anconal view: above *R. phillipsi*, referred right humerus, LACM 57057; below *R. terrisi*; scale = 1 cm.



FIG. 5. *Rhynchopsitta* carpometacarpi, dorsal view: above *R. phillipsi*, referred right carpometacarpus, LACM 127930; below *R. terrisi*; scale = 1 cm.

TABLE 2
MEASUREMENTS (MM) OF THE HUMERUS OF THREE SPECIES OF *RHYNCHOPSITTA*¹

species	specimen # ²	total length	width head	depth head	distal width	width shaft	depth shaft
<i>phillipsi</i>	57056	57.2(+)	16.6	7.0	[10.9]	6.0	4.9
“	57057	57.5	16.6(+)	7.7(+)	12.0	5.7	4.9
“	57058	56.4	[16.0]	8.4	11.9(+)	6.0	5.0
“	57059	----	----	---	12.3	5.8	5.0
<i>terrisi</i>	127924	54.5	15.5	7.0	11.3	5.5	4.4
“	3391	54.5	15.2	7.1	11.1	5.7	4.7
“	modern	56.2	16.1	7.0	11.3	5.5	4.7
<i>pachyrhyncha</i>	12795	53.0(+)	15.2	6.6	10.6	5.8	4.6
“	modern						
	n=10						
	mean	51.00	14.60	7.14	10.72	5.26	4.29
	SD	1.17	0.31	0.25	0.28	0.17	0.18
	range	49.0–	13.9–	6.7–	10.2–	4.9–	3.9–
		52.9	15.0	7.5	11.1	5.5	4.5

¹ Species determinations based on qualitative characters.

² All specimen numbers refer to fossil specimens.

DISCUSSION

Few fossil parrots have been described from North America. *Conuropsis fratercula* Wetmore, based on a humerus from the upper Miocene of Nebraska, is smaller than the Holocene *C. carolinensis*, the Carolina Parakeet. *Conuropsis* is smaller than *Rhynchopsitta* spp. *Ara autocthonae* Wetmore is known from a tibiotarsus recovered from kitchen middens on St. Croix in the Virgin Islands. *Ara tricolor* Bechstein persisted in Cuba until at least 1864 (Forshaw 1973; Walters 1995). It was larger than the two living species of *Rhynchopsitta*. No skeleton of this species was preserved, but Wetmore (1928) assigned a partial carpometacarpus from a spring to this species on the basis of size. Other West Indian species of *Ara* have become extinct within historic times but are unknown osteologically. However, *Ara* spp. and *Rhynchopsitta* spp. are readily distinguished both cranially and postcranially.

The fossil materials reported on by L. Miller (1943) were excavated by Chester Stock and associates for the California Institute of Technology between 1935 and 1941 (Stock 1943). The original cave floor was excavated to a depth of about 12 m. Subsequent radiocarbon datings based on soil humates give a range of 25,000 to 12,500 yr B.P. for Stock's materials (Arroyo-Cabrales *et al.* 1995).

Steadman *et al.* (1994) excavated less than half a cubic meter from this late Pleistocene stratum and found no further remains of *Rhynchopsitta*. They noted that the avifauna represented “is a time-transgressive series of small samples of local birds” with no exact modern analogs. Under the cooler regime represented by the deposit, they believe true alpine conditions may have extended to elevations as low as San Josecito Cave. Areas now occupied by Chihuahuan desertscrub in northern Mexico were pinyon-juniper

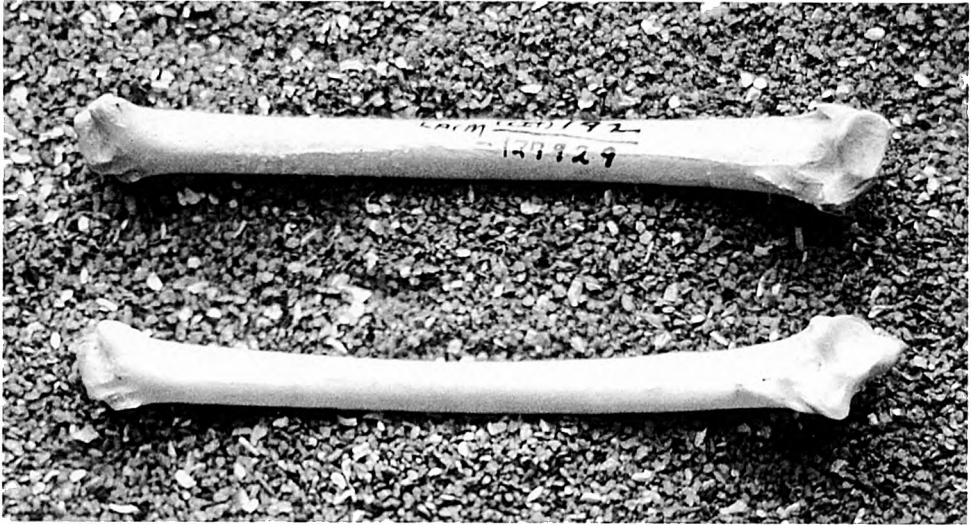


FIG. 6. *Rhynchopsitta* ulnae, palmer view: above *R. phillipsi*, referred left ulna, LACM 127929; below *R. terrisi*; scale = 1 cm.

woodland in glacial times, with stunted spruce-pine forest above (Van Devender 1990). Holocene warming restricted the coniferous woodlands vertically to about 1,000 m higher, greatly diminishing their extent. This no doubt reduced the range of the intermediate-sized *Rhynchopsitta terrisi* to its present several small relictual populations in the Sierra Madre Oriental and probably led to the extinction of the large *R. phillipsi*, likewise a cone seed specialist based on bill morphology.

The smallest species, *R. pachyrhyncha*, has been the most geographically widespread in the Holocene, with great numbers at one time nomadically invading non-breeding areas to the north, south, and even southeast. This continued until the species was reduced by extensive logging of its breeding areas in the Sierra Madre Occidental during the 20th century, perhaps exacerbated by the loss of nesting cavities once provided by Imperial Woodpeckers in old forests as well as by the onslaughts of the pet trade. That this species should appear in the San Josecito Cave avifauna is not surprising, given its movements. Ely (1962) reported that "one of my most reliable guides claims to have collected scarlet-fronted birds 11 miles east of San Antonio de las Alazanas [Coahuila] in the winter months" within the present breeding range of *terrisi*.

While *pachyrhyncha* and *terrisi* feed preferentially on pine seed (nut) crops, when these are unavailable the parrots eat acorns, wild cherries, other seeds, and even pine buds (Forshaw 1973). When pressed, they may forage for acorns and pine nuts on the ground (Bent 1940). Ely (1962) reported *terrisi* feeding on pinyon nuts which they are able to extract from the green still-closed cones. He also found them feeding on the nectar of agave flowers and Gómez Garza (1991) notes they take agave seeds as well. Because *phillipsi* shares a strongly laterally compressed bill with its congeners, presumably it too was a pine cone specialist.

There is a number of examples of late Pleistocene taxa that appear to be the direct ancestors of Holocene species. A well-documented case is that of the Black Vulture, *Coragyps atratus*. The larger Pleistocene form *C. "occidentalis"* I regard as only a

temporal subspecies of the Holocene species. Howard (1968) has demonstrated geographic variation in the late Pleistocene populations, with a western North American form, *C. a. occidentalis* L. Miller, and a smaller form, based on 156 measurable bones, from San Josecito Cave, *C. a. mexicanus* Howard. Geographic variation in the contemporary populations involves primarily size also. There are no qualitative differences, however, between any of these taxa (Howard 1968, Rea pers. obs.). Another example appears to be the roadrunner, *Geococcyx californianus conklingi* Howard, recovered in both San Josecito Cave excavations, and modern *C. c. californianus*. Again, there appear to be no qualitative differences between Pleistocene and modern bones (Harris and Crews 1983, Steadman and associates 1994).

The relationship of *R. phillipsi* to *R. terrisi* does not appear to be one of ancestor to descendant. Strong qualitative osteological differences distinguish the two. I believe that *R. phillipsi* and *R. terrisi* were sympatric in the northern Sierra Madre Oriental, with the smaller *R. pachyrhyncha* present perhaps only nomadically. So far as can be told now, given the loose stratigraphic controls of Stock's excavations, the three *Rhynchopsitta* species were at least roughly contemporaneous. The changing ecological conditions of the Holocene I think account for the extinction of the largest of these three cone specialists.

An interesting footnote is that in one place Loye Miller (1943:144) said, correctly, that there were three species of parrots represented in the San Josecito Cave avifauna. As now known, one of these proves to be the Maroon-fronted Parrot, discovered as a living species only later in that decade. But for lack of osteological material the connection between the extant *R. terrisi* and one of the fossil species was not made for another half a century. (I hold little hope of *R. phillipsi* being discovered alive.)

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