ENDEMIC BIRDS OF THE LITTLE SAN BERNARDINO MOUNTAINS, CALIFORNIA

By ALDEN H. MILLER

The Little San Bernardino Mountains which bound the Coachella Valley of California to the northeastward attain heights of somewhat over 5000 feet. Barren in aspect on their southern face, they nonetheless support along their crests and on their northern slopes large tracts of piñon-juniper woodland and open chaparral growth of scrub oak, mountain mahogany, and manzanita. These plant associations mark an Upper Sonoran belt which extends 40 miles southeastward from Morongo Pass. A small area of woodland and chaparral occurs still farther eastward on Eagle Mountain, separated by a gap of at least 20 miles from the area in the Little San Bernardino Mountains. Northwardly the woodland occurs scatteringly over a plateau, which is the heart of the Joshua Tree National Monument, to the mountains immediately south and west of Twentynine Palms, San Bernardino County.

The Upper Sonoran area lies between the Colorado and Mohave deserts and adjoins similar areas of coastal southern California only to the westward where, at the eastern flank of the great San Bernardino Mountain mass, there is a narrow connection across Morongo Pass with the chaparral and woodlands of western Riverside and San Bernardino counties.

This peninsula of the Upper Sonoran Zone, seemingly because of its constricted base, its length, and the arid, open aspect of its plant growth influenced by desert climate and surrounding desert lowlands, has developed and conserved in partial isolation distinctive races of some permanently resident types of birds. Their degree of distinctness is surprisingly great in view of the imperfect westward barrier to the transfer of individuals between coastal populations and those of the Little San Bernardino Mountains.

Three endemic forms, a Mountain Quail, a Plain Titmouse, and a Bush-tit, are herewith described. Further details of their ranges will doubtless be forthcoming as additional biological exploration in the area is conducted. I am indebted to the National Park Service, and particularly to Mr. James Cole, Custodian of Joshua Tree National Monument, for the opportunity to investigate the vertebrate fauna of the Monument area which embraces the ranges of these new subspecies.

Oreortyx picta russelli, new subspecies

Type.—First-year male, no. 94166 Mus. Vert. Zool., taken near Pinyon Wells [2 miles southwest, 4300 feet], Little San Bernardino Mountains, Riverside County, California, October 17, 1945, by Ward C. Russell; weight 227.5 gm.; orig. no. 9662.

Diagnosis.—Similar to *Oreortyx picta eremophila* but dorsal coloration posterior to upper back much less brown and less richly olive, the mid-back and adjoining wing surfaces Grayish Olive rather than Deep Olive, the rump, upper tail coverts, and rectrices even grayer, Deep Olive Gray to Dark Olive Gray. Gray of breast and head similar, though averaging slightly paler on the forehead; consequently these parts conspicuously lighter than in *confinis* of Lower California.

Range.—Resident of chaparral and piñon-juniper woodland of Little San Bernardino Mountains, from vicinity of Morongo Valley eastward; also mountains near Twentynine Palms and Eagle Mountain; all in Riverside and San Bernardino counties, California.

Specimens of *russelli* have been examined from the following localities: Black Rock Spring, 18 mi. NE Whitewater Station, 3000 feet, in San Bernardino County (1); Quail Spring, 3600 feet, San Bernardino County (1); 6 mi. W, 3 mi. S Twentynine Palms, 3200 feet, San Bernardino County (1); vicinity of Pinyon Wells, 4000-4300 feet, Riverside County (13); Eagle Mountain, 3500-4900 feet, Riverside County (3).

Van Rossem (Condor, 39, 1937:20-24) in his review of the races of *Oreortyx picta* reported that *eremophila* was the palest dorsally of the subspecies then known and that it and *confinis* were the grayist or least brown. On the belly and flanks the southern races are darker than *picta* and *palmeri*. No important differences in measurements have been revealed. It is now apparent that *russelli* shows the extreme of reduction of brown and olive dorsally in the species and is the palest gray on the anterior parts of the body. Geographically it is a terminal member of the group of races in a southeastward direction and it is quite as sharply differentiated as is *confinis* of Lower California. One may wonder whether it is a relict of a once more wide-ranging form of the southern interior which developed grayness and pallor in the mountains of Arizona and New Mexico. Probably not more than 2000 years ago Mountain Quail occurred in New Mexico where their bones have been taken in cave deposits (Wetmore, Condor, 34, 1932:141; Howard and Miller, Condor, 35, 1933:16).

Eremophila in typical form extends east through the San Bernardino Mountains (critical specimens from Bluff Lake, Foresee Creek, Fish Creek, and Cactus Flat). Just east of Morongo Pass *russelli* has been taken (Black Rock Spring).

The new race is named in appreciation of Ward C. Russell, skilled and veteran collector of birds and mammals.

Parus inornatus mohavensis, new subspecies

Type.—Adult male, no. 94208 Mus. Vert. Zool., taken at Pinyon Wells, 4000 feet, Little San Bernardino Mountains, Riverside County, California, October 12, 1945, by Alden H. Miller; weight 15.6 gm.; orig. no. 5581.

Diagnosis.—Back and crown less olivaceous and brownish than in nearby coastal races of *Parus inornatus* of Upper California; near Hair Brown and Deep Grayish Olive instead of Deep Olive or Olive Brown of *P. i. transpositus*; much darker and browner gray than in *P. i. ridgwayi* to eastward. Under parts whiter than in *transpositus*, the drab and drab-gray of flanks and under tail coverts reduced in extent and intensity, becoming Smoke Gray. Wing and tail lengths not significantly different from those of *transpositus, murinus* of Lower California, and *ridgwayi* of Providence Mountains. Bill longer, in average, than in coastal races but not as long as in the gray titmice, *ridgwayi* and *zaleptus*.

Range.—Resident of piñon-juniper-scrub oak association of Little San Bernardino Mountains, San Bernardino and Riverside counties, California. Extends from Morongo Valley eastward to vicinity of Little San Bernardino Mountain, north of Mecca. Not found on Eagle Mountain to eastward.

Specimens of *mohavensis* have been examined from the following localities: Quail Spring, 3600-4500 feet, San Bernardino County (5); Pinyon Wells, 4000-4300 feet, Riverside County (12).

This race displays a grayness which exceeds that of *murinus* of northern Lower California. Among the coastal races of the species, only *cineraceus* of the Cape district equals *mohavensis* in reduction of brown dorsally. *Cineraceus* is, however, paler gray and its wing and bill are shorter. *Kernensis* is browner dorsally than *mohavensis*, although it is fully as pale ventrally. Both *murinus* and *kernensis* are well isolated from *mohavensis* by the intervening *transpositus* which is still browner.

Although it is thought that *mohavensis* has developed as a gray-backed type in an arid area through modification of a coastal brown-backed titmouse, the loss of brown and the increase in average size of the bill suggest intergradation with the gray titmice of the interior. The geographic range is such as also to point to this possibility. There is, however, a gap of about fifty miles of unsuitable desert terrain between the ranges of *mohavensis* and *ridgwayi*, a formidable barrier for a strictly resident species. On the other hand, there must be continuity with *transpositus* in the juniper belt in the vicinity of Morongo Valley along the east flank of the San Bernardino Mountains. *Mohavensis* in its total of color characters is distinctly closer to the coastal complex of races than to *ridgwayi*. It is problematical, therefore, whether the characteristics of *mohavensis* have

been derived in any part through occasional interbreeding of a coastally derived population with vagrants of *ridgwayi,* which rarely might have moved southwestward across the desert. *Mohavensis* shows no exceptionally great amplitude of individual variation such as often occurs in areas of secondary intergradation.

There are statistically significant differences in mean of bill length among *transpositus, mohavensis* and *ridgwayi* (see fig. 17). However, the extremes for *mohavensis* and *transpositus* are essentially the same. We may suppose that the same kinds of genes for size of bill are present in the two populations but that there is a different frequency of their occurrence. Possibly there has been a selective influence associated with the piñon habitat which has worked on the gene types present in an original *transpositus*

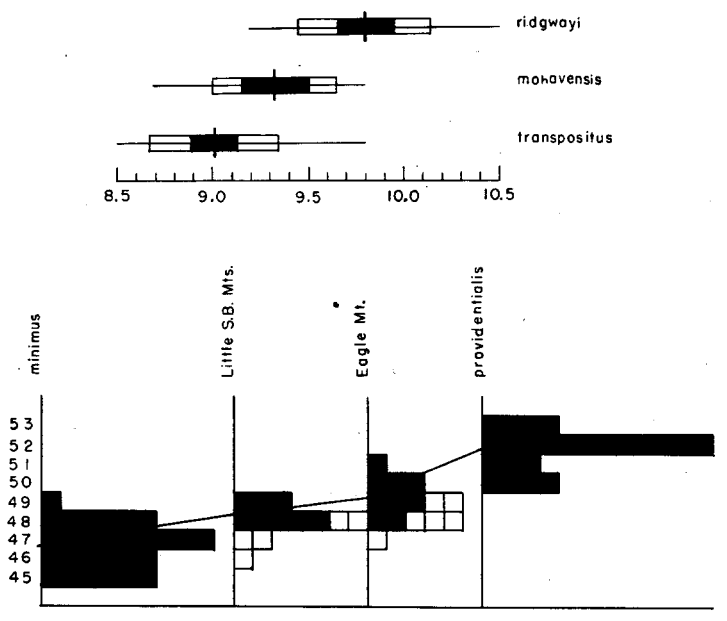

Fig. 17. Upper, graph representing lengths (mm.) of bill from nostril in races of *Parus inornatus.* Extreme limits of variation shown by lengths of horizontal lines; means marked by vertical lines; rectangles represent standard deviation; dark parts of rectangles, twice the standard error of the mean. Where dark areas do not overlap, the differences in mean are statistically significant.

Lower, frequency distribution of wing length (mm.) in races and populations of *Psaltriparus minimus.* Solid squares, males; open squares, females; line connects averages of males.

stock to establish the frequency characteristic of *mohavensis.* Thus there has been a modification in the direction of *ridgwayi,* which race evidently evolved in a similar floral environment, but this modification seems to have occurred without introduction of any of the genes for extremely large bill found in *ridgwayi* and without complete loss of the determiners for very small bill size that are present in *transpositus.*

In regard to color, the situation is different. No individual of *mohavensis* is identical with any member of *ridgwayi* or of *transpositus,* recently collected examples of which have been compared.

Measurements in millimeters of males

	Wing			Tail			Bill length from nostril		
	No.	Mean	σ	No.	Mean	σ	No.	Mean	σ
P. i. transpositus	26	70.78±.28	1.42	24	59.46±.36	1.76	30	9.01±.06	0.34
P. i. mohavensis	11	70.91±.34	1.12	10	60.20±.62	1.99	12	9.31±.09	0.31
P. i. ridgwayi from Providence Mts.	28	70.75±.29	1.57	28	58.43±.23	1.21	27	9.80±.06	0.33

Psaltriparus minimus sociabilis, new subspecies

Type.—Adult male, no. 94224 Mus. Vert. Zool., taken at Pinyon Wells, 4000 feet, Little San Bernardino Mountains, Riverside County, California, October 15, 1945, by Alden H. Miller; weight 5.9 gm.; orig. no. 5609.

Diagnosis.—Similar to *P. m. minimus* in that dorsal surface of head and neck darker than back, but pileum sooty and much less brown, near Deep Mouse Gray rather than Hair Brown; back less brownish gray, near Mouse Gray; under parts paler, especially laterally, as in *P. m. californicus*. Wing and tail length greater, in average intermediate between *P. m. minimus* and *P. m. providentialis*. Dorsal coloration darker, much more neutral gray, than in *P. m. californicus*.

Range.—Resident of piñon-juniper-scrub oak association of Little San Bernardino Mountains and adjoining mountains to northward, disconnectedly east to Eagle Mountain, all in Riverside and San Bernardino counties, California.

Specimens of *sociabilis* have been examined from the following localities: Quail Spring, 3600 feet, San Bernardino County (1); Barker Dam, 4000 feet, Riverside County (1); 6 mi. W, 3 mi, S Twenty-nine Palms, 3200 feet, San Bernardino County (2); Pinyon Wells, 4000-4300 feet, Riverside County (9); Eagle Mountain, 4200-4750 feet, Riverside County (15).

The coastal bush-tits and those of the Great Basin constitute two very differently colored groups of races. The coastal group has a dark pileum which contrasts with a lighter back whereas the interior group possesses a light pileum, lighter than the back or at most concolor with it. Where these groups adjoin, the hybridized populations show striking segregation into dark and light-capped types, with few if any individuals that display intermediacy. This situation prevails along the east flank of the Sierra Nevada in Inyo County and in eastern Lassen County, California.

With respect to this basic feature of pattern, *socialibis* falls with the coastal group. On Eagle Mountain, however, there is evidence of an interior element. Three of fifteen bush-tits taken there show a light ashy pileum comparable to that found in *P. m. providentialis,* although one is partly dusky and may be classed as intermediate. The other aspects of these birds, back color and size, do not differ significantly from those of other members of *sociabilis* with which they were associated in flocks. Due primarily to the ability of the character of dorsal pattern to show simple segregation, there is therefore rather clear evidence that there has been an intrusion of *providentialis* stock.

The populations of *sociabilis* in the western part of the range of the race, in so far as sampled, have shown no decisive *providentialis* traits. In back color they are the same as the Eagle Mountain sample and this is true also of tail length. Wing length, however, shows a graded increase, of the same order in both males and females, from *P. m. minimus,* through the Little San Bernardino sample and the Eagle Mountain sample, to the Providence Mountains population (see fig. 17). Thus the Eagle Mountain group in this respect also displays more evidence of *providentialis* blood than the typical *sociabilis* of the Little San Bernardino Mountains. Indeed fresh increments from this source may even today cross the 50 miles of intervening desert from the Providence Mountains. This seems more likely in this species than in the more strictly woodland-dwelling Plain Titmouse.

Could all the principal features of typical *sociabilis* have been derived from junction of *P. m. minimus* and *P. m. providentialis*? This cannot be answered finally without full

knowledge of the genetic mechanisms controlling the colors involved. The darkness of the dorsal coloration of *sociabilis* seems not to show influence of the light neutral gray of *providentialis* but the reduction of the brown element could be attributed to this parental influence. The pileum in fresh-plumaged birds from mixed flocks sampled in Lassen County is nevertheless brown, not dull sooty as in *sociabilis*. However, it does seem fully possible that out of an initially diverse parentage the *sociabilis* population might have retained and established its particular combination of features in which there are high gene frequencies for dark, contracting pileum (from *minimus*), for dark gray dorsum (from *minimus*), for grayish as against more brownish hue (some factors from *providentialis*), and for fairly pallid sides (some factors from *providentialis*); length of wing and tail seem to reflect a multiple factor situation with genes from both parental types persisting and yielding intermediate averages.

Some of the color characters might have been attained merely through modification of *P. m. minimus* by indirect (selective) environmental effect, as is thought to have been true in the titmouse and quail described in this paper. However, a better view in light of clear evidence of some dual ancestry is that a wide variety of genes was assembled by interbreeding of diverse stocks, from which state certain genes subsequently have gained predominance to produce a new combination of prevalent characters. The amplitude of variation, except in dorsal pattern on Eagle Mountain, is no greater than in other races of bush-tits. In short, we have here a normally uniform race, occupying a considerable area, not merely an intergrading zone, which has had a history of hybridization of strongly contrasting elements. Out of this hybrid background a new combination of features has been established with fairly uniform aspect.

The case is parallel in several ways to the hybrid origin of a race of junco in the Cassiar district of British Columbia, *Junco hyemalis cismontanus* (Miller, Univ. Calif. Publ. Zool., 44, 1941:341 ff.). Hybrid origin in itself has no bearing on the question of existence of a race. If a population or series of populations has all the attributes of a geographic race, namely reasonable constancy in one or more characters over an appreciable area, the method of origin is of no consequence taxonomically, although it is of the utmost theoretical interest. Such races represent new constellations of genes and may, quite as much as other geographic races, provide critical combinations of qualities that may have greatest survival value and may at some future time lead to a new species or be the one element of the present species that may survive an unfavorable environmental change.

Measurements in millimeters of males

	Wing			Tail			Bill length from nostril		
	No.	Mean	σ	No.	Mean	σ	No.	Mean	σ
P. m. minimus from southern California	28	46.65±.21	1.14	23	51.22±.45	2.14	28	4.74±.03	0.16
P. m. sociabilis	17	48.88±.22	0.90	15	54.87±.32	1.26	15	4.86±.05	0.19
P. m. providentialis	23	51.70±.20	0.95	19	56.47±.36	1.57	20	4.83±.05	0.23

Museum of Vertebrate Zoology, Berkeley, California, January 25, 1946.