

DESCRIPTION OF A NEW RACE OF *CARPODACUS MEXICANUS*

By ROBERT T. MOORE

In collections from Sinaloa have appeared specimens of a new race of the House Finch which I am herewith describing. For the loan of material my thanks are gratefully given to Dr. Barbour and Mr. Peters of the Museum of Comparative Zoology, and to Dr. Friedmann of the Smithsonian Institution, and also to Dr. Oberholser of the Bureau of Biological Survey for the loan of the type of *Carpodacus mexicanus sonoriensis*. All capitalized names of colors in this paper are taken from Ridgway's "Color Standards and Color Nomenclature."

***Carpodacus mexicanus rhodopnus*, new subspecies. Sinaloa House Finch**

*Type*.—Nesting male adult; number 9413, collection of Robert T. Moore; original number 19735; El Molino, on seacoast twenty-five miles southwest of Culiacan, Sinaloa, Mexico; May 26, 1934; collected by Chester C. Lamb.

*Subspecific characters*.—Smallest and most extensively red of all the races of *mexicanus*; entire under parts, including under tail coverts, under wing coverts, axillars, as well as back, rump and tips of upper tail coverts, suffused with various hues of red. Nearest to *Carpodacus mexicanus ruberrimus* Ridgway and birds of southern Sonora hitherto known as *Carpodacus mexicanus sonoriensis* Ridgway, but breeding birds of *rhodopnus* differ from breeding birds of both in being smaller and darker, having throat, jugulum and abdomen blotched with Carmine instead of Nopal Red to Rose Red, and red more extensive; under tail coverts almost completely unstreaked white, suffused with Jasper Red, instead of streaked white without suffusion; rump and forehead darker red, crown darker brown. Fall birds in fresh plumage have underparts darker, Dark Vinaceous to Hydrangea Red, instead of Corinthian Red; upper parts also darker. Females have mixed yellow and brown, or red and brown, or yellow, red and brown rumps; late fall females have suffusion of yellow or pink on jugulum and abdomen, and color of rump intensified. I have not seen *potosinus*, but obviously *rhodopnus* differs still more sharply from this form, as well as from *nigrescens* and *mexicanus mexicanus* of eastern Mexico, by absence of brown streaks, greater extension of red on underparts and much smaller size.

*Range*.—Arid Tropical Zone of central Sinaloa along coast, extending as far north as Guamuchil on Rio Mocerito and possibly south to Mazatlan, and east in cultivated valleys to foothills of main range of Sierra.

*Remarks*.—The thirty-three available specimens come from El Molino, Culiacan, Reforma and Guamuchil. Specimens from Ahome and Yecorato in extreme northern Sinaloa are variously intermediate. I suspect that when an adequate series is collected between Ahome and Guamuchil, the Rio Mocerito, or some approximating line, will prove to be the northern boundary of the race. South of Culiacan *rhodopnus* is absent or rare. In three years of collecting, Chester C. Lamb has observed only one individual, a doubtful sight record, at Mazatlan. In the spring of 1936 the author saw none at La Union, Concordia or Panuco, considerable towns where it might be expected. This apparent hiatus in the range of the species extends for a distance of two hundred miles and overlaps the boundary of the state of Nayarit possibly as far as the vicinity of Tepic. An explanation of it may be found in the change of flora and topography. Both *frontalis* of southern Arizona and so-called *sonoriensis* of Sonora are confined to towns and villages of the cactus plains and deserts. These conditions extend southward along the coastal plains on the east side of the Gulf of California for seven hundred miles without conspicuous floral change as far as Culiacan in central Sinaloa. From about this point southward some important modifications occur. The interstices between the huge cacti become jammed with an impenetrable mass of brush, and near Mazatlan coconut palms begin to dominate the landscape. Finally, at the Nayarit border the mountains come down to the coast, and, joining the mangrove swamps, interpose an effective barrier to low coastal races.

In the mountain towns of Nayarit and Colima a very different high-plateau race occurs. Scattering specimens from these states and Michoacan agree with five specimens from Durango, and thirteen specimens from Jalisco, in exhibiting much larger measurements, more vivid color of underparts, approaching Scarlet, extension of Scarlet to upper abdomen only, and heavy streaks on the latter. These birds were formerly known as *rhodocolpus* (Cabanis), but recent investigation by van Rossem (Bull. Mus. Comp. Zool., vol. 77, 1934, pp. 419-420) have proved this name invalid. They are closer to *frontalis* of southern Texas than to *rhodopnus*. When more specimens are avail-

able, it may be found advisable to group them with the large and extensively scarlet birds of Guanajuato under a new subspecific name, unless the darker race, *Carpodacus mexicanus potosinus* Griscom of San Luis Potosi, may include them satisfactorily.

*Specimens examined.*—Sinaloa (*rhodopnus*), 36; southern Sonora and extreme northern Sinaloa (*frontalis* × *rhodopnus*), 59; Lower California (*ruberrimus*), 25; western United States from Oregon to Colorado, and California to Texas (*frontalis*), 482; Santa Cruz Island (*frontalis*), 17; San Clemente Island (*clementis*), 71; Santa Barbara Island, Catalina Island, Los Coronados Islands and San Nicolas Island (*clementis*), 94; San Benito Island (*mcgregori*), 5; Guadalupe Island (*amplus*), 8; birds formerly known as *rhodocolpus*, Durango 5, Jalisco 14, Michoacan 1, Colima 1, Guanajuato 7; true *mexicanus mexicanus* from Distrito Federal 9, Hidalgo 6, Morelos 1, Puebla 4, Guerrero 26; *m. roseipectus* (?) from Oaxaca 2; *nigrescens* from Tamaulipas 1.

The important variations in intensity, streaking and recession of color on the long-enduring feathers of *Carpodacus mexicanus*, unrelieved by a spring molt, render winter-taken birds of little value for taxonomic purposes. (For a pains-taking study of these variations, see Harold Michener and Josephine R. Michener, *Condor*, vol. 33, 1931, pp. 12-19; also see Grinnell, *Univ. Calif. Publ. Zool.*, vol. 7, 1911, pp. 179-195.) It is fortunate, therefore, that in this excellent series of thirty-six specimens of *rhodopnus*, eleven males and seven females are breeding, nesting birds, the females upon dissection having shown eggs in the oviduct.

Considering the females first, the frequently bright color of the rump seems to be an important character. Generally this color is yellow, but sometimes it is red and occasionally mixed red and yellow. It must not be confused with the buff of immatures of both sexes, present apparently in every known race. This buff disappears in the adult plumage. Red or yellow of the rump seems to be incipient in nearly all races, although generally, as in *frontalis*, consisting of rare traces, requiring microscopic inspection. Conspicuous rump color is absent or rare except in *ruberrimus* (14 per cent), so-called *sonoriensis* (40), and *rhodopnus* (73). *Rhodopnus* is the only race in which every female shows at least some trace of color.

Male breeding birds of *rhodopnus* are uniform in color of the underparts, and the full extension of red coloration is maintained both in worn breeding birds of May and June, and in winter specimens. This stands out in decided contrast with *ruberrimus* and *sonoriensis*, in which forms a recession occurs in the red areas, progressively from the fall until the breeding season, by the gradual destruction of the red barbs and barbules. A microscopic study of the feathers, not only of *rhodopnus* but also of hundreds of specimens of *ruberrimus*, *sonoriensis* and *frontalis*, proves this conclusively. This recession of the red areas is no new discovery and credit must be given to the Micheners (*loc. cit.*), who noted the process while examining 1563 banded live *frontalis* of California. Many individual birds were recaptured a number of times by them and the feather changes recorded. The present author has extended their study to the underparts and included *ruberrimus*, *sonoriensis* and *rhodopnus*. The accompanying table gives the results graphically and shows the great contrast of the three northern forms with *rhodopnus* in every effect of feather wear, except intensity. Specimens have been grouped according to the months in which they were taken and the fact made of use, that maximum-colored individuals in the northern races show their increase of red by an extension posteriorly on the underparts. By selecting only those birds which show red on the most posterior parts and comparing this maximum extension by critical months, a reliable average is obtained for each race. Incidentally this method probably eliminates all birds which are not fully adult, since the Micheners have shown that maximum extent of color is correlated with increasing age.

## CORRELATION OF WEAR ON UNDERPARTS OF MALES WITH INCREASED INTENSITY OF REDS, INCREASED APPEARANCE OF STREAKING, AND RECESSION OF RED AREA

	September- December	January- February	March- April	May- June
Percentage of males showing intense red coloration				
<i>ruberrimus</i>	0	0	88	100
<i>sonoriensis</i>	0	40	80	100
<i>rhodopnus</i>	0	50	67	100
Percentage of males showing obvious streaking				
<i>ruberrimus</i>	71	100	88	100
<i>sonoriensis</i>	64	80	90	100
<i>rhodopnus</i>	0	0	0	0
Percentage of males showing complete extension of noticeable red to under tail coverts				
<i>ruberrimus</i>	71	0	25	0
<i>sonoriensis</i>	55	0	10	0
<i>rhodopnus</i>	100	100	100	100
Percentage of male <i>frontalis</i> showing complete extension of red to and including upper abdomen				
<i>frontalis</i>	64	37	42	23

Numbers of males examined in compiling the averages in this table: *Carpodacus mexicanus ruberrimus*, 18; *Carpodacus mexicanus sonoriensis* (?), 30; *Carpodacus mexicanus rhodopnus*, 20; *Carpodacus mexicanus frontalis*, 85. Three-fifths of the specimens of *frontalis* in March and April were only slightly worn, still showing delicate whitish tips to breast feathers.

Turning to other characters, the rump of *rhodopnus* averages darker than either *ruberrimus* or *sonoriensis*, approximating Nopal Red as compared with Scarlet-Red to Scarlet. The forehead also averages slightly darker. Fall birds, October to November, are slightly darker and grayer above than *sonoriensis* or *ruberrimus* of the same months; they are decidedly darker than the birds of Durango and Jalisco.

The almost complete lack of streaking of the under tail coverts and abdomen of *rhodopnus* is one of its most outstanding characters. In this it differs quite as markedly from its nearest relatives, *ruberrimus* of Lower California and the birds of Sonora, as it does from all other races of *mexicanus*. Eight out of the eleven breeding *rhodopnus* have no streaks, and the other three exhibit only vestigial remnants of obscure shaft streaks, whereas all nine breeding *ruberrimus* and all twelve *sonoriensis* have conspicuous streaks. The only exception in this contrasting picture is a single specimen from Guamuchil on the southern boundary line of the area of intergradation in northern Sinaloa. This bird, having many of the characters of *sonoriensis*, including a streaked, whitish abdomen and long culmen, was taken in the middle of March and may be a migrant from the north.

With regard to fall and winter males, all thirteen *rhodopnus* are extensively red, to and including the under tail coverts; most of them have no streaks, only four showing a few obscure fine shaft lines. By contrast, more than seventy-five per cent of the *sonoriensis* males have no red on the abdomen and under tail coverts and are conspicuously streaked. Van Rossem (Trans. San Diego Soc. Nat. Hist., vol. 6, 1931, p. 295) has called attention to migrant *frontalis* in southern Sonora and has marked four specimens as such in the Dickey Collection, but the elimination of these few birds has little effect on the averages in such a large series. Of the remaining *sonoriensis* only two appear to be unstreaked and only four completely and extensively red, since some with pink under tail coverts have white abdomens and vice versa. By an unfortunate choice, Ridgway selected one of these red, seemingly unstreaked, winter males as the type, whereas his original description clearly depicts a streaked spring bird; but the series available to Ridgway was small. With the present accumulation of a large number of representatives of every form and the new light cast upon the problem by the discovery of the race to the south of the range of *sonoriensis*, Ridgway's treatment of the problem must be reconsidered.

Van Rossem in his report on the collection of land birds from Sonora (*loc. cit.*), Mexico, recognized the race of *sonoriensis* with apparent reluctance. Having no adequate series from Sinaloa available, the conclusion he reached was the logical one at that time. Holding in abeyance for the moment all geographical questions, it is clear that all the characters of *sonoriensis* are strictly intermediate ones between *frontalis* of Arizona and *rhodopnus* of Sinaloa, but the same is true of *ruberrimus* of Lower California, which has no contact with *rhodopnus*. If the ranges of *ruberrimus* and *sonoriensis* were connected at the northern end of the Gulf of California, the two groups would be recognized as identical. Ridgway separates them solely on the basis of measurements and these vary so little in our larger series as to be unimportant. In coloration the breeding birds are indistinguishable and the winter birds are far closer than has previously been suspected. It has been overlooked that some specimens of *ruberrimus* in winter plumage are as extensively red as any *sonoriensis*. A September specimen from Lower California, number 16,963, in the collection of the U. S. National Museum, has extension of red to and including the whole abdomen and under tail coverts. In addition there are three specimens, numbers 13,558, 13,559, and 13,054, in the Dickey Collection, September, October and March birds from Concepcion Bay, Lower California, which also exhibit red on the under tail coverts. The table (p. 205) shows this comparison graphically. It disregards the few specimens in each race that show red on the under tail coverts, but which have whitish abdomens. However, this omission affects the averages but little. The percentages prove that both forms in their winter plumages show a similar tendency toward a more expansively red bird and that, when presence of red on the under tail coverts is considered, *ruberrimus* actually has the largest percentage, 71 as compared with 55. It is noticeable that in neither form is there at hand a single January or February bird showing red on the under tail coverts and only a few in March and April, most of which prove on examination to be late-molted individuals as yet little affected by wear. I have completed the picture by including *frontalis* in the table. In as much as the red does not reach beyond the abdomen in this race, I have based the percentages on the maximum-red specimens, those showing red as far posteriorly as this area. The results are the same as depicted for *ruberrimus* and *sonoriensis* (with respect to red on the under tail coverts) in that they reveal a recession of the red areas, correlated with increase of wear on the feathers. To quote the Micheners (p. 19), "The reds become brighter as the filmy barbules are worn away and the extent of the colored areas decreases as the barbs wear off."

Recession of the red area of the under parts having been proved for the three forms to the north of Sinaloa, *sonoriensis*, *ruberrimus* and *frontalis*, the question arises, why does this process not occur in *rhodopnus*. The answer is found in the individual feather. In *rhodopnus* the abdominal feathers of winter specimens are usually red, almost or entirely, to the gray base of the feather and seldom have shaft-streaks. In *sonoriensis* the feather is red, in most cases, only on a portion of the tip and sides of the feather and there is a subterminal area of white with a heavy brown shaft streak. Heavy wear on the barbs of the *rhodopnus* feather leaves the tip still red, whereas in *sonoriensis* the red is eliminated and the worn tip, which in December was near the middle of the feather, is white with a broad brown streak bisecting it. This white and brown subterminal area, which was concealed in the winter plumage by the tip of the next feather above, is now exposed by the destruction of the latter. In *sonoriensis* the specimens which appear to be so completely red are found to have relatively broad shaft streaks of brown, completely or almost completely concealed by the tips of feathers lying just above. This is true even of the under tail coverts when pink. Wear removes the tips and exposes the streaks. The Micheners noted this in their study of *frontalis*. They remark (p. 14): "These brown feathers are not replacement feathers and are

simply the remains of former red ones . . . ." In *rhodopus* there are either no concealed shaft-streaks, or they are so narrow and obscure that this area, exposed in the breeding season, appears red or pink instead of brown.

It is obvious that the few expansively red, winter *sonoriensis* are merely the individual top-waves of an incarnadining tide, which had its inception in *frontalis* in the north and reached its ultimate maximum in *rhodopus* in the south. As the red color spreads down the under parts from chest to tail, it pigments only a narrow subterminal band of the new feathers, which completely wears away in the northern forms. Farther south the pigmentation extends deeper into the feathers, until finally in *rhodopus* wear cannot destroy all the color on the individual feather. Our few extensively red specimens from southern Sonora may now be viewed as merely symptoms of a tendency and serve to confirm the conclusion that southern Sonora is a true intergrading area in this species.

Let us now consider the type of *sonoriensis*. In the first place, it was taken at Alamos in extreme southern Sonora on December 30, during the very period when the greatest extension of red occurs. Nevertheless this bird does not have a red lower abdomen and shows only a moderate amount of pink on the under tail coverts. It does not appear to be heavily streaked, but a lifting of the tips of the various feathers reveals considerable streaking on the abdomen and exceedingly large and wide streaks on the under tail coverts. Had this bird lived until the month of May, its under tail coverts and abdomen would have been white, conspicuously marked by brown streaks. In the second place, size is the most important character in winter plumages, and the type is an extremely large specimen. Among twenty-five males (including all supposed migrants) taken in southern Sonora in winter plumage, only four individuals have a wing measurement of over 76 mm. and only two a tail measurement over 60 mm. Of these the type of *sonoriensis* is the only one which has maximum size in both wing and tail. Considering both measurements, it is therefore the largest of all the twenty-five specimens taken in southern Sonora. In fact, one has to go entirely north of the assumed range of *sonoriensis*, namely to Kino Bay, to find the first specimen, taken at any time of the year, which has both measurements larger, and this specimen has been marked *frontalis* by van Rossem, in which determination I concur. Furthermore, the type is larger than the average of three winter-taken specimens from the northern half of the state and about the average of the six breeding birds from Saric, Sonora, far north near the United States border. The latter point is important, because birds of the breeding season in *sonoriensis*, *ruberrimus* and *rhodopus* have almost identically the same averages as the winter specimens (see table of measurements).

AVERAGE MEASUREMENTS IN MILLIMETERS OF RACES OF *CARPODACUS MEXICANUS*

	Wing	Tail	Exposed culmen	Height of bill at base
Male Adults				
11 breeding <i>rhodopus</i> , central Sinaloa	71.1	55.23	9.55	7.40
11 winter <i>rhodopus</i> , central Sinaloa	71.2	54.8	9.51	7.43
8 breeding <i>sonoriensis</i> (?), southern Sonora	73.7	56.8	9.99	8.11
19 winter <i>sonoriensis</i> (?), southern Sonora	73.7	57.7	9.90	7.74
type of <i>sonoriensis</i> , winter ♂, B. S. no. 164324	76.1	60.5	10.1	7.6
1 winter <i>frontalis</i> , Kino Bay, northern Sonora	77.4	60.7	9.4	7.9
6 breeding <i>frontalis</i> , Saric, extreme Sonora	77.64	59.2	10.28	8.1
9 breeding <i>ruberrimus</i> , Lower California	72.71	56.94	10.27	8.11
6 winter <i>ruberrimus</i> , Lower California	72.9	56.35	10.3	7.98
18 <i>rhodocolpus</i> (?), Guanajuato, Durango, Jalisco, Colima and Michoacan	80.0	60.6	10.5	8.42
Female Adults				
11 <i>rhodopus</i> , central Sinaloa	68.7	53.0	9.41	7.4
14 <i>sonoriensis</i> (?), southern Sonora	71.9	55.8	10.07	7.80
3 <i>ruberrimus</i> , Lower California	69.6	53.5	10.15	8.1

On the basis solely of the critical characters of size and concealed streaking, the type would be considered a migrant *frontalis* from the northern part of Sonora, along with three other specimens of slightly smaller size which are marked *frontalis* in the Dickey Collection. To sum this up, in view (1) of identity with specimens of *ruberrimus* in color, (2) identity with *frontalis* of northern Sonora in size, and (3) the fact that the bird was taken in December when the expansion of red reaches its maximum, it would seem wise to consider this type an expansively red migrant *frontalis* from northern Sonora.

This leaves the bird of southern Sonora without a name. I can perceive no advantage in coining one. The critical birds in the *mexicanus* group for taxonomic purposes are the breeding birds and the long series from southern Sonora are not only not distinguishable from breeding *ruberrimus* in size or color, but are exactly intermediate between *frontalis* of northern Sonora and *rhodopus* of Sinaloa. On the other hand, in view of the present isolation of *ruberrimus* in Lower California, I can raise no objection to recognizing that race, nor would I protest the use of the name *ruberrimus* for the birds of southern Sonora, if anyone desires a handle for these intergrades. Certainly there are many true intergrades in other species, whose subspecific names are still recognized. If this is deemed an illogical suggestion, it may not be impertinent to ask if Nature herself was illogical in creating two similar forms under nearly parallel conditions, one of them an intergrade and the other a true race.

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## EAGLE "CONTROL" IN NORTHERN CALIFORNIA

By FREDERICK H. DALE

The use of the airplane in hunting predators, affording as it does a highly efficient means for destroying large birds, particularly eagles, should arouse the keen interest of all conservationists. Between February 1 and March 31 of this year, I had the opportunity of studying first-hand the conditions under which this type of hunting was being carried on in the country east of Red Bluff, Tehama County, California. It was apparent that several important phases of this rigorous campaign of predator control were being overlooked by the persons engaged in the activity.

During the period mentioned I did not have the privilege of observing the actual killing of an eagle, but I did see five eagles that local herders stated had been killed or crippled from an airplane, and I saw the airplane hunting for the birds on one occasion. The facts reported here have been gleaned from newspaper accounts and from interviews with two persons who have actually taken part in the hunting, as well as from interviews with other persons connected in some way with sheep raising in the Sacramento Valley.

The method used in hunting eagles is related by Mr. Ben Torrey of Corning, California, in a letter published in the sporting page of the San Francisco Chronicle. This evidently was written for the purpose of interesting hunters in this new sport. In his letter Torrey says, "I use my airplane, which is a three-place biplane. I removed the left door so the gunner can shoot out to the left. I have ribbons taped on the wires so they will not shoot into the propeller. The ribbons are simply indicators so as not to get [the] muzzle in that area. I recommend a shot gun with about No. 2 shot. At times I am able to fly within 50 feet of the bird by getting behind and slightly over it. We are permitted to kill golden eagles, but not the bald variety . . . ."

"This is something new and I am in the business of taking passenger-hunters out. In an hour's time I usually cover over 70 or 80 miles of territory . . . ."