

VARIATION IN *CARPODACUS PURPUREUS* AND *CARPODACUS CASSINII*

By ALLEN J. DUVALL

In connection with the project of the Fish and Wildlife Service for a study of the birds of the State of Washington I have recently had occasion to examine rather large series of specimens of the two finches, *Carpodacus purpureus* and *Carpodacus cassinii*. The results of these studies were the disclosure of two hitherto unrecognized races, as well as other facts concerning the variation of these birds, which seem worthy of placing on record.

Carpodacus purpureus rubidus, new subspecies

Washington Purple Finch

Type.—Adult male, no. 269192, U. S. Nat. Mus. (Fish and Wildlife Service Collection); Harstine Island, Mason County, Washington, December 10, 1918; collected by George G. Cantwell, original number, 403.

Subspecific characters.—Similar to *Carpodacus purpureus californicus* in size, but darker in both sexes, the male especially, on the head, back, rump, and anterior lower parts; the female usually with a darker olive wash to the upper parts. Lacks the mottled effect of the upper back and nape of *Carpodacus purpureus purpureus*, because of less contrast between feather edges and centers; wing averages smaller.

Measurements (30 ♂♂ and 12 ♀♀ from southern British Columbia, Washington and Oregon).—Male: wing, 76.5-84.0 (av. 79.6) mm.; tail, 56.0-61.8 (58.6); exposed culmen, 11.0-12.5 (11.8); height of bill at base, 8.8-9.5 (9.0); tarsus, 18.0-20.0 (19.0); middle toe without claw, 12.7-14.0 (13.5). Female: wing, 74.0-79.5 (76.3); tail, 53.0-58.0 (55.0); exposed culmen, 11.0-12.0 (11.6); height of bill at base, 8.5-9.3 (8.9); tarsus, 18.0-19.5 (18.6); middle toe without claw, 12.8-14.0 (13.3).

Range.—Southwestern British Columbia, including Vancouver Island, south through Washington, west of the Cascades, to southwestern Oregon (Reston and Brownsboro). Occurs also on the east slopes of the Cascades in Oregon (Friend, Fort Klamath, and near Klamath Falls). Wanders south in winter to southwestern California (Glendora), northwestern Lower California (San Ramon), and west-central Arizona (Fort Verde).

Specimens in fresh fall plumage from Vancouver, Washington, and northern Oregon, stand out very noticeably from *californicus* in the absence of, or reduction in, pale feather edgings of the back, the northern population giving more of a reddish appearance.

No specimens of *rubidus* have been seen from north of central-eastern Vancouver Island, and Laing (Condor, 1942, 44:181) says that birds from the Bella Coola region are intermediate between *californicus* [= *rubidus*] and *purpureus*. This may be the area where the two come together, as typical *purpureus* occurs north and east of there.

A male taken in July at Fort Klamath, Oregon, is intermediate between *rubidus* and *californicus*, while specimens from Humboldt County, California, are typical *californicus*. One winter specimen examined from Fort Verde, Arizona, is *rubidus*, while others from the same locality are *californicus*.

Some indication of the movements of this new purple finch are found in data from the bird-banding returns in the files of the U. S. Fish and Wildlife Service. Lincoln (Tech. Bull. U.S.D.A., 32, 1927:48) records one banded on March 7, 1925, at Pasadena, California, and retaken on June 20, 1925, at Porter, Washington. Another was banded on February 12, 1935, in central California (Modesto) and retaken in May, 1935, at Vancouver, British Columbia; while a bird banded on January 31, 1937, on Vancouver Island (Courtney), British Columbia, was found dead at Independence, Oregon, March 15, 1940.

Palmer (Murrelet, 7, 1926:58) records the purple finch from Puebla, Mexico, but since *purpureus* is not recorded from Mexico, other than northern Lower California, it would appear that this observation was of *cassinii*, for it is known to have occurred in that general region.

Baird (Pac. R. R. Repts., 9, 1858:411, 413), in his original description of *californicus*, did not designate a type specimen, but in the 1860 edition of Baird, Lawrence and Cassin's "Birds of North America," in which plates appear, U. S. Nat. Mus. specimen no. 10230, from Fort Tejon, California, was figured in plate 72, fig. 2, and thus, as Grinnell (Univ. Calif. Publ. Zool., 38, 1932:303) has indicated, that specimen is the type.

***Carpodacus cassinii vinifer*, new subspecies**

Western Cassin Finch

Type.—Adult male, no. 367522, U. S. Nat. Mus. (Fish and Wildlife Service Collection); Swan Lake, Ferry County, Washington, June 17, 1942; collected by Stanley G. Jewett, original number, 1502.

Subspecific characters.—Similar to typical *cassinii*, of the Rocky Mountains, but darker; in males the crown patch crimson to oxblood red, instead of spectrum red to light carmine; the back with more of a purplish (less pinkish) suffusion, the dusky streaking appearing more numerous and darker; the rump of a deeper pink, and the anterior lower parts appearing purplish. The general appearance is more purplish, less pinkish or reddish.

Measurements (14 ♂♂ and 7 ♀♀ from British Columbia and Washington).—Male: wing, 89.5-96.0 (av. 92.8) mm.; tail, 59.5-66.0 (62.5); exposed culmen, 11.8-13.8 (12.8); height of bill at base, 8.8-10.0 (9.3); tarsus, 19.0-20.5 (19.6); middle toe without claw, 14.0-15.5 (14.5). Female: wing, 87.5-91.5 (89.4); tail, 58.5-64.0 (61.7); exposed culmen, 11.5-14.0 (12.8); height of bill at base, 8.8-9.8 (9.3); tarsus, 18.5-19.8 (19.0); middle toe without claw, 13.5-15.0 (14.1).

Range.—Breeds from southwest-central and central-southern British Columbia (Mosher Creek and Okanagan Valley), south through Washington and Oregon, east of the Cascades, to north-central California; and east to southwestern and central Idaho. In winter found spread out over its breeding area from central-southern British Columbia and northeastern Washington southward.

The southern limit of this race has not been determined, as no breeding specimens have been seen from the southern part of its range in California or northern Lower California. Birds from northern California show a trend away from the British Columbia-Washington population, as the crown patch is not as dark. It may be that birds from central and southern California are the same as the birds from Nevada. The Great Basin birds from Nevada, while placed with *cassinii*, are the lightest of any examined.

The breeding range of true *cassinii* then, as now understood, is from northwestern Wyoming, west to central-northern Utah and western Nevada, south to southern Nevada, north-central Arizona, and central-northern New Mexico, and east to central-southern Colorado (Rio Grande), and central-southern and northeastern Wyoming. Winters over most of its breeding range from east-central Wyoming (Converse County), north-central Colorado, and west-central Nevada, south through Arizona and New Mexico to Coahuila (Sierra Guadalupe), San Luis Potosi (Charcas) and the Valley of Mexico. Occurs as a straggler in northwestern Nebraska (Crawford and Monroe Canyon). McLellan (Proc. Calif. Acad. Sci., ser. 4, 15, 1926:306) lists a specimen taken on May 16, on Maria Madre of the Tres Marias Islands, and there is in the United States National Museum collection a worn male specimen taken in the pine forest at Mirador, Vera Cruz, in June, 1864, by C. Sartorius, which apparently represents the southern limit for this species; whether or not it represents a breeding bird or is just a wanderer is not certain.

No specimens have been seen from western Montana and northern Idaho to determine the form there.

Baird's description of *Carpodacus cassinii* was based on two male specimens taken at Camp 104, Pueblo Creek, New Mexico [= 10 miles E Gemini Peak, Arizona] on January 22, 1854, and one female taken about 75 miles west of Albuquerque, New Mexico, on November 15, 1853. Since a full description was given of a male, and since

Pueblo Creek was listed first, Pueblo Creek, Arizona, is hereby designated as the restricted type locality. Male no. 6421, U. S. National Museum, is selected as the type because the other male, no. 6420, from the same locality, was sent to the Buenos Aires Museum in April of 1872, and perhaps is not now extant.

Although careful study of specimens bears out the knowledge of many observers in the field that the Cassin and Purple finches are two distinct species, they are obviously so closely related and approach one another in appearance so markedly that an analysis of their morphological points of difference and similarity seems warranted.

Ridgway (U. S. Nat. Mus. Bull. 50, pt. 1, 1901:126) gives size of wing and exposed culmen as the main distinguishing characters, and in the present study the wing was found to be the constant which served to distinguish the two definitely, although the tail usually was also a good criterion. Male *cassinii* has a wing which, in 51 examples, was never less than 89 mm., and averaged 92.5 mm., whereas the male of *purpureus* has a wing not more than 87 mm., in 94 examples, with average of 80.8 mm. As can be seen from these figures there is no overlap in wing measurements between the maximum of the smaller and the minimum of the larger, and there is approximately 12 mm. difference in the averages. One female specimen, however, from the Deschutes National Forest, Lake County, south-central Oregon, while like *cassinii* in color, is the smallest specimen of that species seen, and in the wing is just above the maximum measurements of typical *purpureus* from the eastern United States (83.8 mm.); the tail is typical of *purpureus* (55 mm.). The bill is also more like the *purpureus* group. This exceptionally small individual might have been considered an intergrade between the species *purpureus* and *cassinii* if it were not for the fact that in color it shows no indication of intermediacy; also, others from the same region are typical of *cassinii*.

It has been generally assumed that *cassinii* possessed a relatively large bill, and on gross examination of a few examples, as well as in average measurements, this was found to be true, but when a large series of the two was examined it was found that there was considerable overlap, *purpureus* having a maximum of 12.5 mm., and *cassinii* a minimum of 11.0 mm., in the males. This indicates that *cassinii* is not consistently a "big-billed" bird, and that the bill size alone is insufficient for specific determination.

The following tables show the size range and averages of the two species and their races as now understood from this study:

Male						
Subspecies	Number of specimens	Wing	Tail	Exposed culmen	Height of bill at base	
<i>C. p. californicus</i>	28	75.5-83.0 (79.4)	55.0-61.3 (58.8)	10.3-12.5 (11.4)	8.1-9.5 (8.9)	
<i>C. p. rubidus</i>	30	76.5-84.0 (79.6)	56.0-61.8 (58.6)	11.0-12.5 (11.8)	8.8-9.5 (9.0)	
<i>C. p. purpureus</i>	36	80.0-87.0 (82.8)	54.5-61.5 (58.5)	10.0-11.8 (10.8)	8.3-9.5 (8.9)	
<i>C. c. cassinii</i>	10	89.5-95.0 (92.8)	60.5-68.0 (63.5)	11.0-13.0 (12.6)	8.5-9.5 (9.1)	
<i>C. c. vinifer</i>	14	89.5-96.0 (92.8)	59.5-66.0 (62.5)	11.8-13.8 (12.8)	8.8-10.0(9.3)	
Female						
Subspecies	Number of specimens	Wing	Tail	Exposed culmen	Height of bill at base	
<i>C. p. californicus</i>	14	74.0-79.0 (77.5)	54.0-60.0 (57.1)	10.5-12.0 (11.4)	8.5-9.5 (9.0)	
<i>C. p. rubidus</i>	12	74.0-79.5 (76.3)	53.0-58.0 (55.0)	11.0-12.0 (11.6)	8.5-9.3 (8.9)	
<i>C. p. purpureus</i>	12	79.0-83.0 (80.6)	55.0-60.5 (57.3)	10.0-11.8 (10.8)	8.5-9.0 (8.9)	
<i>C. c. cassinii</i>	12	87.0-93.0 (89.7)	59.0-63.5 (61.4)	11.5-13.0 (12.3)	8.8-10.0(9.3)	
<i>C. c. vinifer</i>	7	87.5-91.5 (89.4)	58.5-64.0 (61.7)	11.5-14.0 (12.8)	8.8-9.8 (9.3)	

In plumage the male Cassin Finch has the back and scapulars vinaceous or pinkish vinaceous mixed with grayish, with dark-conspicuous streaks which give this finch more of a brownish gray appearance. Males of *purpureus* have the back and scapulars reddish or purplish brown, with centers of feathers forming darker streaks, but no birds

with such heavily streaked backs, as in *cassinii*, have been examined. Below the pinkish or wine color extends well down on the breast, sides and flanks, while in *cassinii* it is not as extensive; also the color of the breast in the male *cassinii* is paler than the crown, whereas in *purpureus* it is nearly the same color.

Females of *cassinii* almost always lack the olive green characteristic of the upper surface of *purpureus*, although some examples of *purpureus* lack the olivaceous and are as grayish as *cassinii*. Only an occasional specimen of *cassinii* shows a faint tinge of olive in the lower back and rump. Below, the dusky streakings of *cassinii* are more cuneate or narrowly wedge shaped, while in *purpureus* they are deltoid or broader, giving a noticeably finer streaked appearance in *cassinii*.

The juvenal plumage is very markedly different, in that *cassinii* is much paler (light grayish brown) and the streaks fuscous on the under parts rather than rusty brown both above and below, as in *purpureus*.

Thus it can be seen that the Cassin Finch shows no overlap in wing measurement or color pattern in relation to the Purple Finch, even in areas where the two species breed very close together in British Columbia, Oregon, and California.

For the loan of invaluable material used in this study to supplement the material in the United States National Museum, appreciation is expressed to Dr. Alden H. Miller, of the Museum of Vertebrate Zoology, University of California, and to Mr. Stanley G. Jewett and Mr. James A. Munro.

Fish and Wildlife Service, United States Department of the Interior, Washington, D.C., July 14, 1945.