CLASSIFICATION OF THE HOUSE FINCH OF THE CHANNEL ISLANDS, SOUTHERN CALIFORNIA

PHILIP UNITT, San Diego Natural History Museum, P. O. Box 121390, San Diego, California 92112-1390; birds@sdnhm.org

The Channel Islands of southern California are renowned for their many endemic plants and animals. Among land birds, 22 endemic species or subspecies have been described. Not all of these are valid, however, and their distinctiveness spans a wide spectrum. Johnson (1972) categorized the islands' land birds in five strata ranging from the Island Scrub-Jay (*Aphelocoma insularis*) of Santa Cruz Island to those not known to differ from mainland populations. The last includes both species of which no subspecies endemic to the islands have been proposed, such as the Bushtit (*Psaltriparus minimus*), and described subspecies whose supposed differences have been discredited or found to be insufficient to meet the criteria for recognition. These synonymized names include *Colaptes cafer sedentarius* van Rossem, 1944 (with *C. auratus collaris*; AOU 1952), *Vireo mailliardorum* Grinnell, 1903 (with *V. h. huttoni*; AOU 1908), *Salpinctes obsoletus pulverius* Grinnell, 1898 (with *S. o. obsoletus*; Grinnell 1929), *Amphispiza belli clementeae* Ridgway, 1898 (with *A. b. belli*; Patten and Unitt 2002), and *Melospiza melodia micronyx* and *M. m. clementae* (the last two with *M. m. graminea*; Patten and Pruett 2009).

The status of the supposed subspecies of the House Finch (*Carpodacus mexicanus clementis*) has also been questioned. In the original description, Mearns (1898:259) reported the House Finches of the Channel Islands to differ from those of the mainland (*C. m. frontalis*) in their larger legs and feet, broader streaking on the underparts, shorter wings, and "bill much larger and more convex above." He designated a type specimen from San Clemente Island, U.S. National Museum of Natural History 134784, collected 25 August 1894. In comparing *clementis* to *frontalis* Ridgway (1901:140) wrote, "wing and tail averaging shorter, the bill decidedly and feet slightly larger; coloration somewhat darker." But Willett (1912:73) wrote, "I have examined specimens from several of the islands and fail to see that they differ appreciably from the mainland bird," and Howell (1917) synonymized *clementis*, discrediting the differences in color and pattern and pointing out that the average differences in wing and tail length are trivial. Grinnell (1915:108) recognized *clementis* but restricted its range to the four southern islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) and wrote "the characters of this form are most extremely developed in the birds on San Clemente Island. Birds from certain other islands of the Santa Barbara group are variously intermediate toward the mainland form." Van Rossem (1927:177) argued for retention of *clementis*, citing the heavier bill, brighter color of the male, and heavier streaking of the female as the diagnostic characters, though noting the differences "become apparent only when good series are compared." He identified the features of *clementis* as best developed on San Clemente and Santa Barbara islands and called the birds from Santa Catalina and Los Coronados islands (off Tijuana, northernmost Baja California) "*clementis*, intermediate toward *frontalis*." Willett (1933:162) responded, "while birds from San Clemente and Santa Barbara islands appear to show very slight *average* differences from mainland specimens, their differences are so minute, and there are so many specimens that are identifiable only by the locality of their capture, that the value to ornithology of continuing the use of the name *clementis* seems doubtful." Moore (1939:193) wrote that "*clementis* is certainly one of the weaker races" of the House Finch but maintained it on the basis of the heavier bill and supposedly buffier plumage of the female. He gave its range as "San Clemente Island, where its characters are expressed best. Birds of Catalina, Santa Barbara, San Nicolas, and Los Coronados islands are variously intermediate."

Grinnell and Miller (1944:454) also continued to recognize *clementis*, ascribing the House Finches of all four southern islands to it, though calling it "questionable." The last AOU checklist to list subspecies (AOU 1957) also gave *clementis* a range consisting of the four southern Channel Islands plus Los Coronados. In his table 1 Johnson (1972) specified the same range and in his table 2 mentioned only the heavier bill as a distinguishing character. He ranked *clementis* at the lowest level of distinctness, "weak differentiation."

Power (1971, 1979, 1980) wrote extensively on the House Finch, emphasizing patterns of variation and processes of evolution. He quantified the pattern noted by earlier writers: a trend in average bill size from small to large from the mainland, through the northern Channel Islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa), to the southern islands other that San Clemente, to San Clemente. He integrated this pattern with that of the islands off Baja California, where the trend toward a large bill culminates on the most isolated island, Guadalupe, with the well-marked subspecies *amplus*. Scaling bill measurements to body weight, Power (1980) noted that in *frontalis* and *clementis* bill size varies in proportion to body size; only in *amplus* (and probably in the extinct *mcgregori* of the San Benito Islands, off central Baja California) is the bill disproportionately large.

Power sidestepped the question of classification, writing (1980:635) "it is clear that assigning island and west coast populations to the subspecies *clementis* or *frontalis* is an oversimplification and that we are dealing with a situation of almost clinal variation on which the subspecific designations are imposed." His appendices 4–6 (Power 1980:647–649) provide all the data with which the overlap of *clementis* and *frontalis* can be quantified, however, and the century of vacillation can be put to an end. In any of the measurements listed, <75% of the specimens lie outside the zone of effective overlap, as shown in a comparison by the criteria and procedure outlined by Patten and Unitt (2002) (Tables 1, 2). This result is the same whether the comparison is with *frontalis* from the mainland of southern California or from the area of Moscow, Idaho, and Pullman, Washington, where the bill averages slightly smaller (Power 1980).

In 2005, Robb S. A. Kaler, working at the time on San Clemente Island, expressed an interest in this question. We measured the bills of the House Finches in the San Diego Natural History Museum, generating data independent of those of Power. The means and standard deviations for bill depth, length, and width are almost identical to Power's. But these data also enabled me to quantify overlap in a combination of variables. For each specimen, I multiplied the three values for bill dimensions and took the cube root, for a variable representing bill "heaviness." In this comparison *clementis* does not reach the criterion of diagnosability either (Kaler in Sullivan and Kershner 2005; Tables 1, 2).

In considering Tables 1 and 2, note that in every case the value of $\bar{x} - St_{0.25 \text{ or } 0.01}$ for *clementis* is smaller than the value of $\bar{x} + St_{0.25 \text{ or } 0.01}$ for *frontalis*. That is, whether the comparison is evaluating overlap of 25% of *clementis* with 1% of *frontalis* or of 1% of *clementis* with 25% of *frontalis*, the lower tail of the distribution of *clementis* overlaps with the upper tail of the distribution of *frontalis* to such an extent that >25% of either subspecies falls within the range of 99% of the other.

Even though the differences between these populations do not meet the threshold of diagnosability for recognition as subspecies, they exemplify evolution below this level, as Power's studies have shown. Populations below the level of subspecies clearly contribute to a species' phenetic and genetic diversity and merit conservation regardless of how they are classified. The question of whether a population meets the criterion of subspecies may look like hair splitting, as in the checkered history of *Carpodacus mexicanus clementis*. But for subspecies to maintain their usefulness for understanding of birds' dispersal and migration, they should be defined by objective, consistent criteria. Eliminating invalid subspecies is a step toward an accurate

Table 1 Quantification of Overlap in Bill Size of Males of *Carpodacus mexicanus frontalis* and *C. m. clementis*

	Power (1980:647)		SDNHM specimens	
Variable	*clementis*[a]	*frontalis*[b]	*clementis*[a]	*frontalis*[c]
Depth (*D*)				
Mean ($\bar{x}$)	8.86	8.25	8.74	8.14
SD (*S*)	0.35	0.29	0.39	0.30
n	168	44	45	74
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	8.62	8.96	8.47	8.85
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	8.04	8.45	7.80	8.34
Width (*W*)				
Mean ($\bar{x}$)	7.79	7.44	7.64	7.35
SD (*S*)	0.23	0.24	0.24	0.27
n	173	45	49	78
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	7.64	8.02	7.48	7.99
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	7.26	7.60	7.06	7.53
Length (*L*)				
Mean ($\bar{x}$)	8.88	8.29	8.89	8.14
SD (*S*)	0.34	0.29	0.39	0.43
n	169	43	49	78
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	8.65	8.99	8.62	9.16
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	8.09	8.49	7.95	8.43
$DLW^{1/3}$				
Mean ($\bar{x}$)			8.33	7.86
SD (*S*)			0.26	0.24
n			45	74
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]			8.15	8.42
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]			7.70	8.02

[a]Specimens from San Clemente Island only.

[b]Specimens from area of Moscow, Idaho, and Pullman, Washington.

[c]Specimens from mainland southern California.

[d]$t_{0.25}$ for *clementis*, $t_{0.01}$ for *frontalis*.

[e]$t_{0.01}$ for *clementis*, $t_{0.25}$ for *frontalis*.

understanding of biodiversity. Other subspecies from the Channel Islands especially in need of reevaluation are *Callipepla californica catalinensis*, *Thryomanes bewickii nesophilus*, and *T. b. catalinae*.

It is a pleasure to contribute this paper in honor of Robert W. Dickerman, whom I first met while examining specimens from the Channel Islands. Thanks to Robb Kaler for his painstaking work in measuring House Finch bills and for raising the question. And thanks to Daniel D. Gibson and Michael A. Patten for prompting me to complete this analysis.

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Table 2 Quantification of Overlap in Bill Size of Females of *Carpodacus mexicanus frontalis* and *C. m. clementis*

	Power (1980:647)		SDNHM specimens	
Variable	*clementis*[a]	*frontalis*[b]	*clementis*[a]	*frontalis*[c]
Depth (*D*)				
Mean ($\bar{x}$)	8.75	8.31	8.70	8.00
SD (*S*)	0.32	0.33	0.32	0.40
n	63	23	21	52
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	8.53	9.13	8.48	8.96
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	8.00	8.53	7.89	8.27
Width (*W*)				
Mean ($\bar{x}$)	7.77	7.39	7.73	7.29
SD (*S*)	0.24	0.23	0.37	0.30
n	65	24	23	57
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	7.61	7.96	7.48	8.01
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	7.19	7.55	6.80	7.49
Length (*L*)				
Mean ($\bar{x}$)	8.87	8.30	8.90	8.17
SD (*S*)	0.35	0.34	0.37	0.54
n	66	24	23	55
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]	8.63	9.16	8.65	9.46
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]	8.03	8.54	7.97	8.54
$DLW^{1/3}$				
Mean ($\bar{x}$)			8.31	7.81
SD (*S*)			0.29	0.31
n			21	52
$\bar{x} \pm St_{0.25 \text{ or } 0.01}$[d]			8.11	8.54
$\bar{x} \pm St_{0.01 \text{ or } 0.25}$[e]			7.58	8.02

[a]Specimens from San Clemente Island only.

[b]Specimens from area of Moscow, Idaho, and Pullman, Washington.

[c]Specimens from mainland southern California.

[d]$t_{0.25}$ for *clementis*, $t_{0.01}$ for *frontalis*.

[e]$t_{0.01}$ for *clementis*, $t_{0.25}$ for *frontalis*.

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Note added in proof: In the 53rd supplement to its *Check-List of North American Birds*, the American Ornithologists' Union Checklist Committee (*Auk* 129:573–588) adopted the genus *Haemorhous* Swainson, 1837, for the three North American species of *Carpodacus* and *Artemisiospiza* Klicka and Banks, 2011, for the Sage Sparrow. For the sake of consistency within the index for a volume, *Western Birds* will adopt these changes in volume 44, issue 1.