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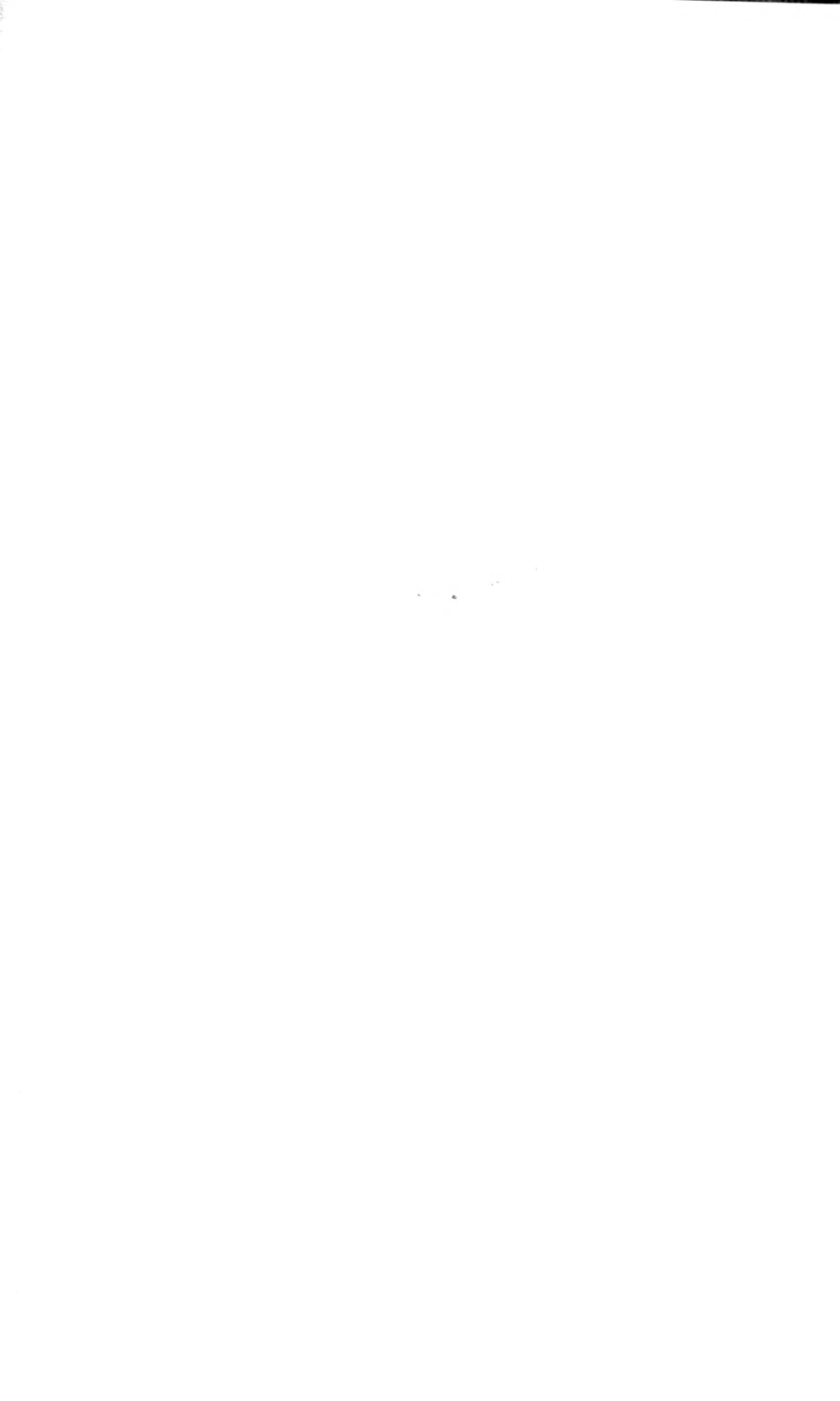
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## Geographical Variation in the Canary

### *Serinus sulphuratus*

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This canary ranges widely east and south of the African equatorial forest with a favorite habitat of grasslands with many scattered trees and shrubs. It shuns the forest and also thick brush. Although widespread, it is often local in occurrence, and is absent from some of the more arid areas, such as much of western South Africa and eastern Kenya. In terms of political units the species range is from western Kenya, Uganda, and adjacent Congo south to Cape Province, and west across the continent through Northern Rhodesia (and parts of adjacent Congo) and Angola.

The main geographical variation is of the "more or less" type: in general size (wing length) and size of bill (not only in length, but even more so in depth and consequent bulk), and in coloration (yellowishness or greenishness of plumage). The extremes, the large, very heavy-billed, green bird from Cape Province, and the smaller, moderate-billed, and yellower bird from Uganda, etc., appear sharply different.

But there are intermediates of various sorts. Size and color do not always march together, and neither follow uniformly smooth clines, although some could be considered stepped reversing clines. To sketch this briefly:

The larger-billed, green-yellow Cape Province bird is replaced by a moderately yellow, moderately large-billed bird in northeastern South Africa; a small-billed, yellow bird occurs from Southern Rhodesia to Uganda, a small-billed, moderately green bird in Angola, and a moderately large-billed, moderately green-yellow bird in Kenya.

The difficulty of codifying this variation in terms of species and subspecies is shown by various taxonomic treatment. Roberts (1948

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(6th impression), *Birds of South Africa*, pp. 367–368) recognized two species: *S. sulphurata* with three subspecies, and *S. shelleyi* with none. The revised 1957 edition recognizes only one species with three subspecies, as does White (1963, *Revised Check-list Afr.—finches—*, p. 771) (but not all the same three that Selater, 1930, *Syst. Av. Aethiop.*, p. 816, recognized), while Clancey (1966, *Durban Mus. Novit.*, 7, pt. 13, p. 608) recognizes five races. Thanks to the series in Field Museum of Natural History, and the loan of material from the Museum of Comparative Zoology (courtesy of Dr. R. A. Paynter), the American Museum of Natural History (courtesy of Dr. Dean Amadon), and the United States National Museum (courtesy of Dr. G. E. Watson), it is possible to re-evaluate the situation with results differing somewhat from all the above. Perhaps the most notable of the changes is the recognition of the remarkable similarity between the populations from Kenya and those of the far distant southern Portuguese East Africa–Natal area. Angola birds are similar to these in color but not in bill size.

The problem can be considered from one point of view as lumping or splitting and the identification of specimens. But, from another point of view, the subspecies concept is more meaningful when considered as a way of codifying geographical variation with names so we can more easily talk about it. How many names are useful for this? Two treatments are possible: one, using two, or the other, using five subspecies names.

I. From a broad, over-all point of view, only two names could be used:

1. *S. s. sulphuratus* Linnaeus, 1776

*Range.*—Cape Province.

*Diagnosis.*—The largest, most heavy-billed, and greenest birds, with a dark olive breast band contrasting with the vivid yellow throat.

*Remarks.*—This is the only population that is clearly separate from all the others.

2. *S. s. sharpei* Neumann, 1900

*Range.*—That of the species north of Cape Province.

*Diagnosis.*—This includes variable populations, but in color and size all are separate from the above in being less greenish and more yellowish; most populations are also smaller in size.



II. If this treatment be not accepted, it becomes necessary to use at least the five subspecies outlined below:

1. *S. s. sulphuratus* Linnaeus, 1776—Cape of Good Hope

*Range*.—Cape Province.

*Diagnosis*.—The darkest, greenest subspecies, with distinct dark olive breast band, also larger and more heavy-billed.

2. *S. s. wilsoni* Roberts, 1936—Kloof, Natal

Synonym: *S. s. languens* Clancey, 1962, Durban Mus. Novit., 6, pt. 15, p. 193—Sul do Save, southern Portuguese East Africa.

*Range*.—From Natal and Orange Free State to southern Portuguese East Africa.

*Diagnosis*.—Like *sulphuratus*, but yellower on breast, flanks, and upper parts.

*Remarks*.—*S. s. languens* was described as like *wilsoni* in color but smaller. Male wing 74–78 (av. 76) vs. 80.5–85.5 (av. 83.1), but see measurements in table. At most, this can be considered a slight tendency toward the smaller, brighter yellow *S. s. shelleyi* to the north.

3. *S. s. shelleyi* Neumann, 1903—Kafuro, northeastern Tanganyika.

Synonym: *S. s. loveridgei* van Someren, 1921.—Lumbo, Portuguese East Africa.

*Range*.—Southern Rhodesia, extreme southern Nyasaland, and northern Portuguese East Africa, presumably across central Tanganyika to Uganda and adjacent Congo.

*Diagnosis*.—Differs from both the above in being yellower, the olive breast band being faint or obsolete, in the shorter wing, and in the much smaller bill, more evident in its lesser bulk than its somewhat shorter length.

*Remarks*.—A female from Lumbo, northern Portuguese East Africa (the type locality of *loveridgei*) is small, wing 72, culmen 10, and very yellow, agreeing with females of *shelleyi* from Uganda in this). Vincent (1936, Ibis, p. 116) says that *shelleyi* from the littoral of Portuguese East Africa are smaller than those from inland.

Four specimens from eastern southern Nyasaland area, and two from Southern Rhodesia are slightly greener than Uganda *shelleyi* but are best placed here.

4. *S. s. frommi* Kothe, 1911—Namanjera southwestern Tanganyika.

*Range*.—Southwestern Tanganyika, Northern Rhodesia (and probably adjacent Congo and northern Nyasaland) and Angola.

*Diagnosis*.—A small subspecies like *shelleyi* with a small bill but greener, with a more pronounced olive breast band, thus approaching in color both *wilsoni* and *sharpei*.

*Remarks*.—This name has usually been placed in the synonymy of *shelleyi*, although the characters of this race, greenishness and small bill, have been pointed out by Traylor (1962, Publ. Cult. Co. Diam. Ang., Lisboa, no. 58, p. 130).

I have not seen the type of *frommi* which is from Namanjera, in Ufipa, latitude  $7^{\circ} 34' S.$ , longitude  $31^{\circ} 07' E.$ , but the description says “. . . like *sharpei* but smaller—and in regard to color—under parts sulphur yellow with breast and flanks greenish yellow. . . .” I have a single specimen from Tukuyu, latitude  $9^{\circ} 16' S.$ , longitude  $33^{\circ} 38' E.$ , that agrees well with this, and with two Northern Rhodesia birds (Ndola and Lundazi) and most Angola birds.

From northern Nyasaland (Vipya Plateau, 6,000 ft.) I have but a single female (= ♂?) wing 76, culmen 12 mm. It is much greener below than Uganda *shelleyi* and agrees with male *frommi*.

Certain specimens in Field Museum from Mt. Moco and Mt. Soque in Angola are much darker and greener than a series in the American Museum from various parts of Angola and one from Mt. Moco. The meaning of this discrepancy is not clear.

5. *S. s. sharpei* Neumann, 1903—Marangu, Kilimanjaro

*Range*.—Western Kenya highlands and Kilimanjaro.

*Diagnosis*.—Differs from its geographical closest relative *shelleyi* in being larger, larger-billed, and more greenish with a light olive breast band; very similar to the far distant *wilsoni*.

*Remarks*.—The main character of this subspecies, on the northwestern edge of the range of the species and separated from *wilsoni* by *shelleyi*, is one of geography. As

## TABLE OF MEASUREMENTS

I found it difficult to measure the bill satisfactorily. The measurements used here are the result of remeasuring the whole series in one day. Larger bills tend to be very much more massive than shorter ones, so that the observable differences are greater than measurements indicate.

	Wing (mm.)	Culmen (mm.)
<i>S. s. sulphurata</i>		
Cape Province sex ?	(9) 81-87 (av. 83.6)	(9) 12-14 (av. 13)
<i>S. s. wilsoni</i>		
Southern Portuguese		
East Africa ♂	(4) 77-79 (av. 78.1)	(4) 12-13 (av. 12.7)
Natal sex ?	(6) 81-87 (av. 83.6)	(6) 12-13.5 (av. 12.7)
<i>S. s. shelleyi</i>		
Uganda ♂	(10) 76-78 (av. 76.8)	(10) 11-12 (av. 11.4)
Lake Kivu to Lake Tanganyika area ♂	(7) 76-80 (av. 77.2)	(7) 11-12 (av. 11.5)
Extreme southern Nyasaland ♂ ?	(4) 72-73 (av. 72.3)	(4) 10.5-11 (av. 10.7)
Southern Rhodesia ♂	(2) 76, 76	(2) 12, 12
<i>S. s. frommi</i>		
Angola ♂	(7) 77-80 (av. 78.5)	(6) 10.5-12 (av. 11.1)
Northern Rhodesia ♂	(2) 78-81	(2) 12, 12
S. W. Tanganyika ♂	(1) 80	(1) 11
<i>S. s. sharpei</i>		
Kenya ♂	(7) 77-84 (av. 81.5)	(7) 12-14 (av. 12.8)

*wilsoni* itself shows internal geographical variations, I hesitate to attempt to set forth small differences observable in the specimens in hand.

The recognizing of *sharpei* on the basis of geography alone may be questioned as it is the beginning of a checker-board pattern of characters well known from elsewhere, as, for example, in the case of the parrot *Tanygnathus lucionensis* of the Philippines (Rand and Rabor, 1960, Fieldiana: Zoology, 35, p. 420). However, as *sharpei* is the single instance of the reduplication of characters in the species *S. sulphuratus*, the above treatment is maintained.

## GENERAL

In the above, the geographical variation of *Serinus sulphuratus* is outlined in general terms, and is also codified into subspecies frame-

work at two levels. The first, recognizing only two subspecies, would satisfy few workers. Transferring *wilsoni* of Natal, etc., to the subspecies *sharpei* would be especially unsatisfactory to many. Recognizing five subspecies is the only logical refinement, and would bring the treatment of this species more in line with the recent revisionary work on other species in South Africa. Even so, additional variation within subspecies: *frommi*, *shelleyi*, and *wilsoni* is indicated. An attempt to correlate variation with climatic and geographical factors was not fruitful.













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