

**Allopatric species of birds
approaching in western Cameroon:
the *Nectarinia adelberti*, *N. rubescens* example**

by

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Introduction

The ornithogeography of Africa is studied quite intensely. Among those who pioneered the study of the interrelationship of the avifauna from different parts of the equatorial forest on this continent, in the first place such authors as Chapin (1932) for Lower Guinea and Marchant (1954) for Upper Guinea must be mentioned. In recent years, there have been attempts towards an ornithogeography of Africa by objective methods, through the computation of all the bird species' distributions combined, with ordinator (Diamond & Hamilton, 1980; Crowe & Crowe, 1982). These statistical studies have, of course, only been possible since the distribution of all terrestrial African land bird species has been mapped sufficiently accurate by Hall & Moreau (1970) and Snow (1978). It appears, however, that detailed case studies are necessary to understand the phenomena that caused the present bird distribution and especially to delimit the regions in need of field research.

Prof. M. Eisentraut has understood this a long time ago and discovered such an area with his pioneering studies in western Cameroon: the region where Upper Guinea and Lower Guinea meet (see his list of publications on this matter, including: 1963, 1968, 1969, 1970, 1973). It was therefore fitting, in my opinion, to submit a paper, for the present volume, with the key position of the Bight of Biafra well demonstrated. I have presented elsewhere (Louette, 1981) an analysis pertaining to the birds of this area in general.

The species under consideration

Upon examination of Hall & Moreau's (op. cit.) maps 301 and 302, one is struck by the almost perfect coverage of the African equatorial forest by the combination of ranges of the allopatric taxa of sunbirds *adelberti* and *rubescens*, both in the *Chalcomitra* group of *Nectarinia*, meeting "somewhere in

western Cameroon". I have already pronounced the tentative opinion (Louette, op. cit.) that these two might be more closely related than recognised generally. White (1963) and especially Hall & Moreau (op. cit.), place them in different superspecies: *adelberti* with *senegalensis* and *hunteri*; *rubescens* with *amethystina* and *fuliginosa*.

Nectarinia adelberti (Gervais)

This sunbird is endemic to forested Upper Guinea, eastwards from "Sierra Leone" (see Map 1). The type was said to have come from "Senegambia", but this is doubted by Bannerman (1948). The easternmost regular records are at Calabar (Nigeria) (Mackenzie, 1979), where it is apparently "resident and occasionally to frequently" seen. But there is also an observation from 7–8 km south of Kribi (Cameroon) by Turner & Forbes-Watson (1979). However, I have questioned this (Louette, op. cit.). The bird was seen "about ten meters up in a tree" and the authors said to have compared with the species observed before by them in Liberia, where another race occurs than the most likely one in Cameroon. Anyhow, no specimen was ever collected in Cameroon and, if correctly identified, I believe they saw a straggler.

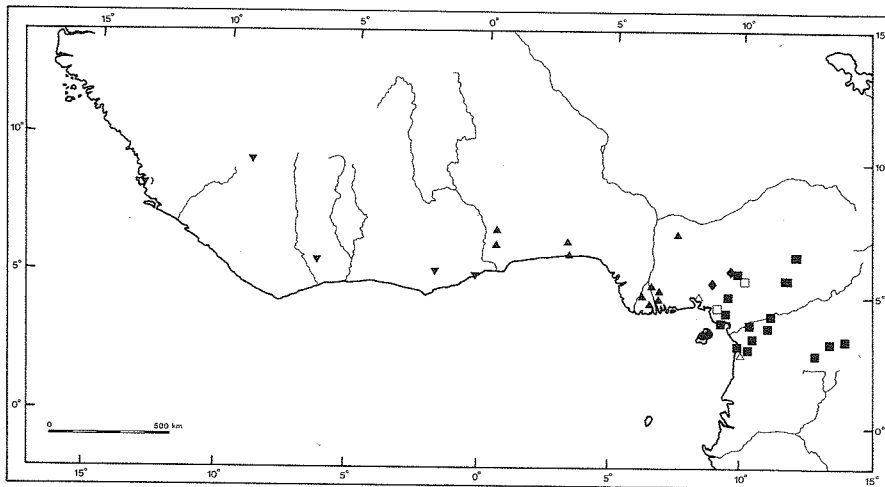
The species has two well-defined races: males of the nominate race, in the west (Ghana included) are chocolate-brownish coloured dorsally with more orange-brownish wings and a metallic-green cap on the forehead. Ventrally, the bird is pale chestnut, with a pale yellow breast, which is surrounded in turn by brown, coloured as the back. Also present are two metallic malar stripes. The female is a nondescript greyish and pale yellowish bird, with the typical pattern of a *Nectarinia* female (I will not elaborate here on colour of females, except for the race *rubescens stangerii*).

The males of the race *eboensis* Jardine, occurring from Togo eastwards, are much more uniform in brown colours than the nominate race, but otherwise similar. The dorsal side is identical to the nominate race, the ventral side being decidedly darker chestnut and the wing coverts are similar in colour to the back, not contrasting in colour.

Measurements of *N. adelberti* figure in Table 1. There is indeed a superficial resemblance with *senegalensis* and *hunteri*, e.g. in the "straw" like structure of the coloured breast feathers in males.

Nectarinia rubescens (Vieillot), synonym: *N. angolensis* (Lesson)

The vicariant species occurs in forest on Fernando Po and from western Cameroon towards western Kenya and northern Angola. It is a trifle larger than *adelberti* (see measurements in Table 1), but otherwise similar in shape and bill structure and in general colour. It bears also a superficial resemblance to *amethystina* and *fuliginosa*, in the positioning of metallic feather patches. The nominate race occupies virtually the whole range of



Map 1. Localisation of specimens examined (closed symbols) and particular records (open symbols) of *Nectarinia adelberti* and *N. rubescens* in western Africa. ▼ *N. a. adelberti*, ▲ *N. a. eboensis*, ◆ *N. r. crossensis*, ● *N. r. stangerii*, ■ *N. r. rubescens*.

the species except for extreme western Cameroon and Fernando Po. This sunbird is chocolate brown all over except for a metallic forehead cap, reflecting greenish (front), lined with a purplish band backwards; metallic coloured malar stripes and a metallic green coloured breast, again with a purplish edge towards the belly. The females are virtually indistinguishable from those of *adelberti*.

In the birds on Fernando Po (*stangerii* Jardine) females have heavier breast-streaking than continental specimens. I have seen 2 adult female birds collected by Prof. M. Eisentraut (ZFMK 63.938, 68.655) and compared with much material from Cameroon and Zaïre and think that indeed the race can be accepted, although the males are identical in colouration to mainland birds (see also Amadon, 1953 and Eisentraut, 1973 with whose findings I agree).

The name *N. r. crossensis* (Serle, 1963) was proposed for two male and one accompanying female specimens from the localities Mamfé and "West of Bamenda", both in western Cameroon; males differing only from nominate birds in lacking the metallic breast colour, this one being replaced by the same dark brown as present on other parts of the bird. These birds, said to require confirmation as a separate race by White (1965) and Eisentraut (1973), form the key in the following discussion. The two male birds are fully adult. It must be stressed that the metallic breast is one of the first adult male characteristics that is developed in *rubescens*. Therefore it is exclu-

Table 1: Measurements of *Nectarinia adelberti* and *N. rubescens* (in mm).

Males	wing		tail		total culmen		tarsus	
	n	mean range	n	mean range	n	mean range	n	mean range
<i>N. a. adelberti</i> Sierra Leone: 1, Ghana: 2, ZMB: 2, KMMA: 1.	3	62.7 (61.5-64.0)	2	— (35.5-37.0)	2	— (20.0-21.0)	3	15.2 (15.0-15.5)
<i>N. a. eboensis</i> Togo: 2, Nigeria: 7, Benin: 3, ZNB: 1, BMNH: 5, ZFMK: 2, MNHN: 3, KMMA: 1.	10	63.0 (60.5-66.0)	11	38.8 (36.0-42.0)	11	20.5 (19.0-22.0)	11	16.0 (15.0-16.5)
<i>N. r. crossensis</i> Cameroon: 1. BMNH.	1	66.0 —	1	45.0 —	1	22.5 —	1	16.0 —
<i>N. r. stangerii</i> Fernando Po: 4. KMMA: 1, ZFMK: 3.	4	67.9 (67.5-68.5)	4	44.5 (43.0-46.0)	3	20.7 (20.0-22.0)	4	16.5 (16.0-17.0)
<i>N. r. rubescens</i> Cameroon: 13, Guinea Equatorial: 1, ZMB: 5, BMNH: 1, ZFMK: 2, MNHN: 3, KMMA: 3.	14	65.1 (62.0-67.5)	14	41.3 (37.0-45.5)	13	20.9 (19.5-23.0)	13	16.0 (15.0-17.0)

Table 1 (continued)

Females	wing		tail		total culmen			tarsus				
	n	mean	range	n	mean	range	n	mean	range			
<i>N. a. adelberti</i> Guinea: 1, Ivory Coast: 1. MINHN.	2	—	(56.0-56.5)	2	—	(30.5-33.0)	2	—	(16.5-18.5)	2	—	(14.5-15.5)
<i>N. a. eboensis</i> Nigeria: 1, Togo: 1. ZFMK, ZMB.	2	—	(55.5-60.0)	2	—	(32.0-33.5)	2	—	(19.5-20.0)	2	—	(14.5-16.0)
<i>N. r. crossensis</i> Cameroon: 1. BMNH.	1	60.0	—	1	36.5	—	1	22.0	—	1	15.0	—
<i>N. r. stangerii</i> Fernando Po: 2. ZFMK.	2	—	(61.5-63.5)	2	—	(37.5-39.0)	2	—	(19.5-20.0)	2	—	(16.0-16.5)
<i>N. r. rubescens</i> Cameroon: 2. ZMB, KMMA.	2	—	(57.0-64.0)	2	—	(34.5-38.5)	2	—	(21.0-22.0)	2	—	(15.5-16.0)

Table 2: Measurements of *Nectarinia* (*Chalcomitra*) specimens from the KMMA collection (in mm).

	wing		tail		total culmen		tarsus	
	mean	range	mean	range	mean	range	mean	range
<i>N. hunteri</i> 5 ♂ from Kenya	70.4	(69.0–72.5)	48.5	(46.0–52.0)	26.8	(26.0–27.0)	17.6	(17.0–18.0)
<i>N. senegalensis</i> 5 ♂ from Sudan	66.8	(66.5–67.5)	45.5	(44.0–46.0)	25.1	(24.0–26.0)	16.6	(16.0–17.5)
<i>N. amethystina</i> 5 ♂ from Zaïre (Shaba)	68.4	(67.0–69.0)	42.8	(42.0–43.0)	24.9	(24.5–25.0)	16.7	(16.0–18.0)
<i>N. fuliginosa</i> 5 ♂ from Zaïre (Lower Zaïre)	68.3	(66.5–70.5)	44.5	(42.5–45.5)	24.0	(23.5–24.5)	17.6	(16.5–18.0)

ded that they are merely immatures. These *crossensis* specimens represent in my opinion the "missing link" for consideration on possible relationship between *adelberti* and *rubescens*.

The other species in the *Chalcomitra* group

As already mentioned briefly, four other species belong in this group, which is rather uniform in plumage pattern.

Nectarinia hunteri and *N. senegalensis* resemble each other quite close, having both a scarlet breast patch, differences being the metallic shoulder and rump patches in *hunteri*, which on the other hand lacks the metallic throat of *senegalensis* and has less blue barring on the scarlet; it appears also to be somewhat larger (see measurements in Table 2). These two were put in a superspecies, together with *adelberti* by Hall & Moreau (op. cit.) but from the measurements one can see that there is an appreciable size difference.

Nectarinia fuliginosa and *N. amethystina* also are very similar to each other. They are characterized by a purplish-metallic throat and upper breast. *Fuliginosa* is of a paler brown above and has some minor differences in metallic colour compared with *amethystina*, but it is the only species in the group having pectoral tufts (yellow). Hall & Moreau (op. cit.) thought these two formed one superspecies together with *rubescens*. *Fuliginosa* has a western coast distribution and *amethystina* is limited to southern savannas so that they are allopatric to *rubescens*, except at the coast and in southern Zaïre and northern Angola. The size can be deduced from measurements in Table 2 and these species prove to be quite larger than *rubescens*.

I have to add that *senegalensis* and *amethystina* being sympatric over wide areas, the six species cannot possibly be included all in one superspecies. As explained below, I split *Chalcomitra* into three, not two superspecies.

Discussion

It appears that we can limit the present discussion on relationship to the species *adelberti* and *rubescens* only. The measurements indicate that size differences between the two species are slight.

- 1). Size augments from west to east, especially tail-length, and to a lesser extent wing-length, *a. eboensis* being somewhat larger in general than *a. adelberti*, *r. rubescens* (r) in turn being larger than *a. eboensis* (e) (approximate proportions for male measurements e/r: wing: 97%; tail: 94%; total culmen: 98%; tarsus: 100%).
- 2). *Crossensis* does not seem to differ at all in size from *r. rubescens*, but

stangerii (s) appears to be somewhat longer-winged and longer-tailed in our small sample (r/s: wing: 96%; tail: 93%; total culmen: 101%; tarsus: 97%).

- 3). These figures prompt to the conclusion that the size proportion of *a. eboensis* versus *r. rubescens* is about equal to the size proportion of *r. rubescens* versus the island form *stangerii*.

Colouration in females being essentially similar we have to turn to the male plumage. The colours are replaced as follows from west to east in *adelberti*: *eboensis* is darker brown ventrally and on the wing coverts, giving it a generally more uniform appearance than *adelberti*, tending towards *rubescens*. From east to west, the races in *rubescens* have the following colour replacement: *crossensis*, loss of metallic breast, present in the other races. A comparison between *eboensis* and *crossensis* results in the following difference: straw-coloured breast replaced by brown, identical to ventrum; appearance of purplish band behind metallic green cap. Brown ventrum and dorsum completely similar, as well as malar stripe. The very restricted *crossensis* population could have been the result of a more recent injection of *N. adelberti* blood into *N. rubescens* (maybe the metallic breast patch is commanded by few genes only). There is, however, no information on the situation east of Calabar and west of Mamfé where contact is expected between *eboensis* and *crossensis*.

If one assumes that these taxa are related, then one could therefore postulate that the early speciation of *proto-adelberti* occurred in the western part of the forest and *proto-rubescens* in the eastern part of the forest, from a common ancestor. In all probability, during a drier period in the Pleistocene, the equatorial forest was cut into a western and an eastern part near the Bight of Biafra (by savanna? — see Louette, 1981); this gap seems to have formed a barrier for species as those under consideration. In this case the gap has a taxonomical more important consequence than the one more to the west (separating the two *adelberti* races).

For the *adelberti* division it is important to stress that it was not the Dahomey gap proper that must be taken responsible because the birds in the forest patch in Togo (and Benin) belong to the eastern *eboensis*. One must consider that another forest gap, in eastern Ghana, was effective in this particular case. The species, however, is nowadays not at all limited to high forest, but occurs also "in the neighbourhood of native villages" (Bannerman, 1948), "open country . . . orchard bush . . . and the old farms" (Marchant, 1953), "riverine areas and Calabar city" (Mackenzie, 1979), although from its range map it appears to be a stenotypic rain forest belt species.

Still making hypotheses, the *eboensis* population may be due to an earlier injection of *rubescens* blood into *adelberti*, pertaining to the loss of warm-chestnut colouration.

Conclusion

In view of the situation analysed, I consider *N. adelberti* and *N. rubescens* as a typical allospecies pair in one superspecies, being a good example of a "complete equatorial forest" coverage. The population "*crossensis*" could be due to a limited extent of hybridization and, pending new information, it must be accepted as stable and geographically well localized and thus valid as a race of *rubescens*, where it belongs in measurements and colour-pattern.

The population on Fernando Po is to be considered also as a valid race (*stangerii*), with characteristics versus *r. rubescens*: darker and broader streaks ventrally in females, but also somewhat larger wing and tail lengths.

Furthermore, I consider there are two other superspecies in *Chalcomitra*. *N. senegalensis* and *N. hunteri* are morphologically quite close to each other, with a complete savanna coverage. They are even more different in size than *adelberti* and *rubescens* (proportions of ± 105 – 107% in means of measurements).

N. amethystina and *N. fuliginosa* form a third superspecies. These two are allopatric and about the same size (equal approximately to *senegalensis*). The possession of tufts in one species, absent in the other, represents in my opinion an appreciable barrier for genetic exchange, comparable to the colour differences between *adelberti* and *rubescens*.

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Zusammenfassung

Die afrikanischen Nektarvögel der *Chalcomitra*-Gruppe lassen sich, anders als bisher angenommen, in drei Superspezies gliedern, die sich aus jeweils zwei Allospezies zusammensetzen: *Nectarinia (Chalcomitra) senegalensis* + *N. (Ch.) hunteri*, *N. (Ch.) amethystina* + *N. (Ch.) fuliginosa* sowie *N. (Ch.) adelberti* + *N. (Ch.) rubescens*. Die ursprünglich waldbewohnenden Arten *N. adelberti* und *N. rubescens*, bisher nicht als so nahe miteinander verwandt betrachtet, erwiesen sich als echte Allospezies in einer und derselben Superspezies. Ihre artliche Differenzierung erfolgte vermutlich im Zusammenhang mit der Trennung des westafrikanischen Waldgebietes in einen östlichen und einen westlichen Teil, die im Gebiet der Bucht von Biafra während einer pleistocänen Trockenperiode erfolgt sein dürfte. Es erscheint möglich, daß die von Serle 1963 aus West-Kamerun beschriebene *Chalcomitra rubescens crossensis*

sensis ihre Entstehung z. T. der Introgression von *adelberti*-Genen verdankt, wie auch die von Togo bis Calabar verbreitete *N. adelberti eboensis* Jardine aus einer früheren Vermischung von westlicher *N. adelberti* mit östlicher *N. rubescens* hervorgegangen sein könnte. *N. rubescens stangerii* Jardine von Fernando Po ist eine unterscheidbare Subspezies.

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