DURBAN MUSEUM NOVITATES

Issued by the Durban Museum, Durban, South Africa

Vol. VI ISSUED 15th OCTOBER, 1960 Part 3

RELATIONSHIPS WITHIN THE CAMAROPTERA FASCIOLATA—STIERLINGI—SIMPLEX COMPLEX OF WARBLERS

by

MICHAEL P. STUART IRWIN

(Zoological Assistant, National Museum of Southern Rhodesia, Bulawayo)

The formal taxonomic arrangement of the *Camaroptera simplex* (Cabanis) and *Camaroptera fasciolata* (A. Smith) groups of "Barred Warblers" as at present recognised presents a number of problems, as generally the one appears to replace the other geographically. The issue is, however, by no means straightforward, and it is now apparent on the basis of recent researches that three specific or semi-specific groups exist, each exhibiting independent geographical trends of variation.

As will be discussed in more detail later, it becomes necessary to separate a further group of populations under the name *stierlingi* from that of the southern *fasciolata*, as well as the *simplex* group, and henceforth be referred to as the *stierlingi* group.

Before considering either the geographical or ecological factors involved, it is first necessary to outline the basic morphological differences that separate each group. Birds of the *fasciolata*, *stierlingi* and *simplex* types are all more or less clear cut on colour grounds, yet tend to conform to one basic pattern, with some rather striking variations. These are summarized in the accompanying table.

[*Price* 3/- *nett.*]

Distinguishing features of the FASCIOLATA, STIERLINGI and SIMPLEX groups.

Form	Mantle	Rectrices	Wing-coverts	Barring of Underparts	Immature	Trend of Geographical var.
Fasciolata group: Races *fasciolata* and *pallidior*.	Tawny red-brown.	Tawny red-brown both above and below, tipped with pale buff.	Tipped buffish white.	Brown, on buffish white ground, strongly developed; abdomen and flanks strongly washed with russet.	Barring on abdomen and flanks reduced, throat earth-brown speckled with dull white.	Barring in *pallidior* is much reduced and confined to the upper breast and throat.
Stierlingi group: Races *stierlingi*, *irwini*, *buttoni* and *pintoi*.	Tawny red-brown like *fasciolata*, to pale red-brown and more earth-brown in northern races.	Tawny red to earth-brown above, but pale greyish brown below, and with narrower pale off-white tips.	Tipped buffish white to white.	Blackish brown on pure white to greyish white ground strongly developed, closer and less clearly defined in *buttoni*.	Like adult, but barring usually reduced, especially on flanks.	*Buttoni* shows an approach to the *simplex* group in earth-brown mantle and closer barring. In *stierlingi* the mantle is less reddish brown than either *irwini* or *pintoi* which are at times indistinguishable from *fasciolata* in this respect.
Simplex group. Races *katangae*, *undosus* and *huilae*.	Dark earth-brown to greyisb brown.	Dull mouse-brown to greyish brown, generally no pale tipping to rectrices, though occasional vestigially.	Plain in *katangae* and *huilae*, but pale tips present, though much reduced in *undosus*.	Reduced to shadow barring or fine vermiculations, otherwise overlain with grey on the throat and breast; abdomen pure grey, or buffish white.	Pale buff or white or with yellowish tinge down centre of abdomen, shadow barring occasionally rather well developed.	*Huilae* is overall much greyer than the earth-brown *katangae* but little difference evident in the shadow barring. On the other hand, *undosus* has the barring much better developed on the throat and breast, and shows a considerable resemblance to the *stierlingi* group.

The most striking distinguishing feature separating the *fasciolata* section is therefore undoubtedly the brown throat found in juvenile birds. In adult plumage the only guiding feature is the strong rufescent buffy suffusion on the abdomen and flanks, and otherwise there is a very close resemblance between it and the *stierlingi* section, with which they are usually regarded as conspecific. Between the *stierlingi* section and *simplex*, the differences at first appear more clear cut, but are not as great as they at first may seem. The main, and basic distinction, lies chiefly in the drastic reduction in the extent of the barring of the underparts; yet, as will be demonstrated later, the two groups hybridize freely in their zones of contact, and show more signs of intergradation than do the *stierlingi*/*fasciolata* groups, in which the genetic barrier seems possibly absolute.

Geographic Ranges

It now becomes necessary to summarize the respective geographical ranges within the three groups. *C.fasciolata* is distributed from south-western Matabeleland, Southern Rhodesia, westwards through the north-western Transvaal, across the dry Kalahari, and up through South-West Africa and the arid coastal strip of Angola to Benguela. It thus occurs south of the range of the *stierlingi* group, but, as will be shown later, overlaps with it geographically in south-western Matabeleland, but with ecological segregation.

Material examined: C.f.fasciolata 28 ♂♂ wing 57-64 (av. 60.7); 14 ♀♀ wing 56-62 (av. 58.8). *C.f.pallidior* 2 ♂♂ wing 60 mm.

The distribution of the *stierlingi* section is more complicated and partly discontinuous. The *stierlingi* group ranges from east-central to south-western Tanganyika Territory through northern Portuguese East Africa and Nyasaland east of the Shiré Rift, reappearing again west of the Rift, where it is generally distributed above about 2,000 ft., and in the neighbouring Eastern Province of Northern Rhodesia. West of a line running along the drainage of the Luangwa and Zambesi Valleys it again appears, ranging widely in a rather narrower band running south-west from Fort Hill, in north-western Nyasaland, through Northern Rhodesia (but not the Chinsali or Isoka districts, where it is replaced by *simplex*), from Mpika to Barotseland, but everywhere rather narrowly hemmed in, in the north by the geographically complementary *simplex* and in the south and east by the low-lying Zambesi/Luangwa River drainage system. It is absent everywhere from the Zambesi Valley east of the Victoria Falls (though it occurs in *Brachystegia* at Mopeia in northern Portuguese East Africa), but occurs from thence westwards to Kasane near the Bechuanaland Protectorate border.

It again is found commonly on the Southern Rhodesia plateau and adjacent Portuguese East Africa, ranging southwards to just north of Francistown in the Bechuanaland Protectorate, except where replaced by the *fasciolata* group, but is absent from the valley of the River Save in Portuguese territory, but it again reappears in the extreme southern part of that territory, and ranges westwards to the Olifants River and Newington in the eastern Transvaal. The position in north-eastern Northern Rhodesia and adjacent parts of Nyasaland is still rather obscure. *Simplex* occurs at both Chinsali and Isoka, and apparently comes directly between the northernmost population of *buttoni* at Mpika and the Fort Hill birds, and the existence of country probably ecologically in part unsuitable in the form of the Mafinga Mountains and the Nyika Plateau west of Lake Nyasa, must also be taken into account. Lynes (1934 : 86) found *C.s.undosus* common all over the middle and lower ground of the Iringa and Njombe highlands, but noted that it was absent from the highlands proper. This would probably likewise apply to either form in the high country around the north-west and north-east sides of Lake Nyasa, which would with the Lake itself, seem to isolate effectively the populations on either side of the Nyasa Rift, whose physical barriers closely coincide with the pattern of racial variation of *stierlingi*.

The *simplex* group have a northern distribution, ranging from Central Abyssinia and British Somaliland to the south-eastern Sudan and Kenya Colony, and in Tanganyika Territory west of the range of the *stierlingi* group to the Iringa highlands, then across the northern half of Northern Rhodesia, westwards to the plateau of Angola above the escarpment, the southern Belgian Congo and the Loango Coast.

Material examined: *C.s.katangae* 23 ♂♂ wing 59-63 (av. 61.0) mm. 10 ♀♀ wing 53-62 (av. 57.5) mm. *C.s.undosus* ♂ wing 62 mm. *C.s. huilae* ♀ wing 65 mm.

Taxonomic treatment of the stierlingi group

Before this discussion can be carried further, it is first necessary to review the races of the *stierlingi* group in the light of the above discussion, as the present arrangement is unsatisfactory. Members of the group are rather variable individually in the extent or intensity of the barring on the underparts and the tone of the mantle, so that care must be exercised with small series or individual specimens. Nevertheless, variation is reasonably well-defined, and the following races can be recognised within the group:

(*a*) **Camaroptera stierlingi stierlingi**

Calamonastes stierlingi Reichenow, *Ornith.Monatsber.*, 1901, p. 39: Songea, south-western Tanganyika Territory.

Mantle brown, generally lacking any rufescent tinge, and in tone showing some approach to *C.s.undosus*.

Material examined: 3 ♂♂, 3 ♀♀, wing ♂♂ 62-65 (av. 63.3) mm.; ♀♀ 59-61 (av. 60.0) mm.

Range. From Morogoro, east-central to south-western Tanganyika Territory, south through northern Portuguese East Africa east of the Nyasa/Shiré Rift, to Alto Ligonha and Mopeia, and also on Malawi Hill at 2,000 ft., immediately to the west of Port Herald, southern Nyasaland.

(*b*) **Camaroptera stierlingi irwini**

Camaroptera fasciolata irwini Smithers and Paterson, *Bull. B.O.C.*, vol. 76, 1956, p. 119: Central Estates, Umvuma, Southern Rhodesia.

Mantle more reddish brown than in the nominate race, barring of underparts generally similar, through individually variable.

Material examined: Southern Rhodesia, adjacent Portuguese East Africa and Northern Rhodesia west of Luangwa Rift. 30 ♂♂, 35 ♀♀. Wing ♂♂ 56-66 (av. 63.3) mm.; ♀♀ 53-65 (av. 58.7) mm.

Northern Rhodesia east of Luangwa Rift, adjacent Portuguese East Africa and Nyasaland. 5 ♂♂, 3 ♀♀. Wing ♂♂ 62-67 (av. 64.2) mm.; ♀♀ 58-61 (av. 59.3) mm.

Range. Nyasaland west of the Nyasa/Shiré Rift, but not in the extreme north, the Eastern Province of Northern Rhodesia east of the Luangwa Rift, and the neighbouring pedicle of Portuguese East Africa, south at least to Furancungo. Absent from the lower and middle Zambesi Valley, but reappearing on the plateau of Southern Rhodesia and adjacent Portuguese East Africa and ranging south to the north-eastern Bechuanaland Protectorate north-west of Francistown, and in the extreme west to Kasane, but crossing over the Zambesi River from the Victoria Falls to about 50 miles to the west, and thence through the Southern Province of Northern Rhodesia where it intergrades with *C.s.buttoni*.

Remarks: The S.A.O.S. List Committee, *Ostrich*, vol. xxix, 1, 1958, p. 41, rejected the race *C.s.irwini*, but on the basis of the material then available it would seem that the Committee were in actual fact comparing the populations of *C.s.irwini* from within its range in Northern Rhodesia with those of Southern Rhodesia,

not with true *C.s.stierlingi*, none then being available; hence this decision no longer carries any weight and should be revised by the body concerned.

(*c*) **Camaroptera stierlingi buttoni**

Calamonastes fasciolatus buttoni White, *Bull, B.O.C.*, vol. 67, 1947, p. 55: Ndola, Northern Rhodesia.

Differs by having the barring on the underparts closer and less well-defined, mantle greyish-brown with a close approach to *C.s.katangae* in tone, but more variable in the south of its range where it intergrades with the previous race.

Material examined: 18 ♂♂, 6 ♀♀. Wing ♂♂ 58-66 (av. 62.9) mm.; ♀♀ 54-61 (av. 57.4) mm.

Range: From the Mpika district, north-eastern Northern Rhodesia, south-west and south of the range of *simplex* to the Gwembe Valley and west to Mankoya, and the Sesheke district of Barotseland.

Remarks: Three specimens examined from Fort Hill in extreme northern Nyasaland (the type-locality of *neglecta*), are difficult to place racially, but are perhaps nearer to *C.s.buttoni* in their closer barring, which is, however, unusually dark and by the more mouse-brown mantle. Geographical considerations may point to their representing an isolated or even hybrid population, possibly linking up to the south with that at Karonga and the Chinteche and Kota Kota districts, but isolated from true *C.s.buttoni* in the Mpika district, by the *simplex* group which, as already discussed, is found in the geographically intervening Chinsali and Isoka areas of Northern Rhodesia. More detailed collecting is certainly necessary to resolve this question.

(*d*) **Camaroptera stierlingi pintoi,** subsp. nov.

Type: ♂, adult. Umbeluzi, near Lourenço Marques, southern Portuguese East Africa. Collected 8 July, 1955, by A. A. da Rosa Pinto. In the Museu Dr. 'Alvaro de Castro, Lourenço Marques. Registration No. 5224.

Description: Differs from *C.s.irwini* by having the barring of the underparts more clearly defined, sparser, though with some individual variation. White of underparts clearer, rather than the off-white appearance of the other races, some faint buffy suffusion on the upper chest, though this not always present. Mantle slightly more russet in tone than *irwini* though variable.

Measurements of the Type: Wing 62, tail 50, culmen 13.5, tarsus 20 mm.

Material examined: (including ♀ eastern Transvaal) 5 ♂♂, 6 ♀♀, 5 oo wing-measurements as follows: ♂♂ 59-62 (av. 61.0) mm.; ♀♀ 54-62 (av. 57.0) mm.

Range: So far only known from southern Portuguese East Africa, south of the Save River, and westwards to the Olifants River and Newington, eastern Transvaal. Portuguese localities with numbers of specimens in parenthesis are: Umbeluzi (10); Maqueze (1); Mapai (1); Inhalomo (1); Funhaluro (1); and Mabote (1).

Remarks: This new race is named in honour of the collector, Dr. A. A. da Rosa Pinto, in recognition of his contributions to African ornithology.

Probably isolated geographically from the populations of *C.s. irwini* to the north of the Sabi/Save River system, and from the Limpopo River valley within Southern Rhodesia, west of the Bubye River junction, where it is either in part replaced by the *fasciolata* group, or otherwise lacking where the country is ecologically unsuitable. The habitat of this form is given by Rosa Pinto (*in litt.*) to be *Brachystegia* and mopane woodland, except at Umbeluzi, where it was found in dry, park-like savannah with dominant *Acacia* spp., *Spirostachys*, and *Sclerocarya*, etc.

Ecological Relationships within the Groups

Consideration now requires to be given to the ecological requirements of the different groups. The *fasciolata* section are inhabitants of arid acacia—*Commiphora* woodland—and occur generally in areas where the rainfall averages in the region of 16 inches per annum or less. The *stierlingi* group are, on the other hand, virtually restricted to some form or another of *Brachystegia* woodland though they are abundant in *Baikiaea* association on Kalahari sand and local in mopane on the plateau in the south of Southern Rhodesia, but are everywhere absent from the hot, low-lying baobab and mopane country of the main river valleys, as already outlined under discontinuous distribution; though they occur at least in part of the Limpopo drainage. This discontinuity, with some modification, is rather graphically illustrated in the vegetation map of Africa (Keay *et al.*, 1959), where suitable habitat is provided generally by categories 10 and 18, with the species generally absent, or at least very local in category 22. They feed on or near the ground in light cover under the canopy. The *simplex* group in contrast, where they replace the *stierlingi* section, are ecologically identical,

their distribution being one of mutual geographical replacement, though there appears to be much modification of the ecological requirements of nominate *simplex*, which is a bird of more arid thorn country, but this does not directly concern us here. Both groups, it should be emphasised, are very partial to cover on termite mounds, at least in *Brachystegia* woodland.

The transition zone of the fasciolata and stierlingi groups

As yet our knowledge of what actually happens where the one group replaces the other is still imperfect, but sufficient is known for some conclusions to be drawn and the position discussed in detail on the basis of material evidence. *Fasciolata* is relatively common in the vicinity of Francistown, in the north-eastern Bechuanaland Protectorate, from whence a small series is available, the habitat being acacia thorn-veld, while 35 miles to the northward on the main Francistown/Plumtree road, *stierlingi* has been taken in mopane and thin *Brachystegia* growing on rocky Matopos-type outcrop. To the east, in Southern Rhodesia on the Ingwesi Ranch, Syringa, at approximately 21° 00′ S., 27° 53′ E., R. H. N. Smithers, in 1956-57, collected three birds of *stierlingi* type within a mile of the homestead in cover in mopane veld, where the form is not uncommon. Much earlier, in June, 1951, Smithers obtained *fasciolata* in approximately the same spot (Smithers *in litt.*) but in this instance in "thorn tree veld", to quote the collector's label. There is thus at least a five year interval between the collecting of each form, and this is perhaps worth stressing, should any range modification of either have taken place over this period.

In May, 1960, the author discovered *fasciolata* on Sentinel Ranch at 22° 08′ S., 29° 30′ E., and approximately 30 miles west of Beit Bridge. The species was extremely local and seemed more or less restricted to a limited area of red wind-blown sand on which grew an association of *Acacia tortilis*, *A.nigrescens*, *A.senegal*, *Terminalia pruniodes*, *Boscia rhemaniana*, *Grewia bicolor*, *Commiphora mollis*, *C.pyracanthoides*, *C.pretoriae*, and the peculiar *Sesamothamnus lugardii*. Here the species was relatively common, but did not occur in adjacent belts of mopane, though once taken in a partly transitional association.

Habits showed several points that differed from that of the *stierlingi* group, in part probably brought about through physical differences of the habitat. Members of the species were noted flying low from one small tree to the next, especially favouring the *Commiphora* spp., dropping in low at the base of the foliage and then

proceeding to work their way up through the dense branches before flying on to the next.

Still further to the east, *fasciolata* was collected by Smithers at Beit Bridge and at Sinyoni (Singwanyone) 22° 12′ S., 30° 13′ E., about 15 miles to the east; again on the same day (22 June, 1955), *stierlingi* was obtained by the same collector at Malangundi, 46 miles further east of Beit Bridge at 22° 8′ S., 30° 42′ E. In addition Priest (1934:222) records *stierlingi* also at Beit Bridge and gives a full description. In each instance there was a distinct difference in the habitat, *fasciolata* being from thorn bush and *stierlingi* from mixed mopane and *Combretum*. None of this material shows any sign of intergradation, each remaining quite true to type, and furthermore a distinct ecological difference appears to be upheld, which possibly prevents or inhibits hybridization. More detailed collecting and field work remains to be done, but provisionally at least it is considered desirable to treat *fasciolata* and *stierlingi* as two reproductively isolated specific groups, both justifiably supported both ecologically and morphologically.

Voice

Supporting biological data is provided by the voice differences evident in the three groups. That of the *stierlingi* group was first adequately described by Vincent (1935: 514-515) as a fluty "biririt-biririt" and this is the usual call in Northern Rhodesia and Nyasaland as borne out by C. W. Benson and his African, Jali Makawa (oral communication); and the call in Southern Rhodesia does not differ in any way, where near Salisbury in May, 1960, the author and Jali Makawa listened to the call and the latter was able to make the birds respond through mimicking their calls. There would, therefore, appear to be no geographical voice variation within the group. But in contrast, the call of *fasciolata* heard earlier in the same month on Sentinel Ranch was strikingly different, being a loud and strident "hreep-hreep-hreep" or "kreep" etc. uttered from near the top of a tall bush or *Commiphora* tree; further, B. Donnelly (oral communication) informs me that this is the call as heard by him at Lake Dow in northern Bechuanaland. Also, Smithers (field note book dated 21 June, 1955) detected differences between *fasciolata* in the vicinity of Beit Bridge in comparison with *stierlingi* as heard at West Nicholson, consistent with the above. Similarly, Moreau & Moreau (1939 : 305-306) and Benson (1946: 195) describe the calls of *C.simplex*, which differ again from those of the *stierlingi* group, and it was chiefly on these grounds that Benson (1956:25) refrained from treating them as conspecific.

The transition zone of the stierlingi and simplex groups

Benson (1957:160) drew attention that *C.s.buttoni* occurred in the Mpika District at 11° 46′ S., 31° 21′ E., but that less than twenty miles away at 11° 32′ S., 31° 19′ E., was replaced by *C.s.katangae*. Additional collecting in Northern Rhodesia seemed to suggest that the two groups replaced each other geographically, so it was decided to try and collect between the two nearest known localities of each form in an attempt to ascertain what actually took place in the replacement zone. Thus, while on a collecting trip to Northern Rhodesia, at the suggestion of C. W. Benson and C. M. N. White, the Kanchibiya River was chosen as approximately as near as possible to where *simplex* had already been obtained, and so it was decided to work southwards from this point into the known range of the *stierlingi* group. Two main camps were established, the first approximately one mile south of the Kanchibiya River bridge on the main Mpika/Kasama road, and a point 12 miles further to the south on the same road. Collecting began on the 26th March, 1960, and terminated on the 31st of the month. During this period I had the able assistance of Benson's African collector, Jali Makawa, whose help and ability in the field assured success. In the short time available it was possible to obtain a series of ten specimens as follows:

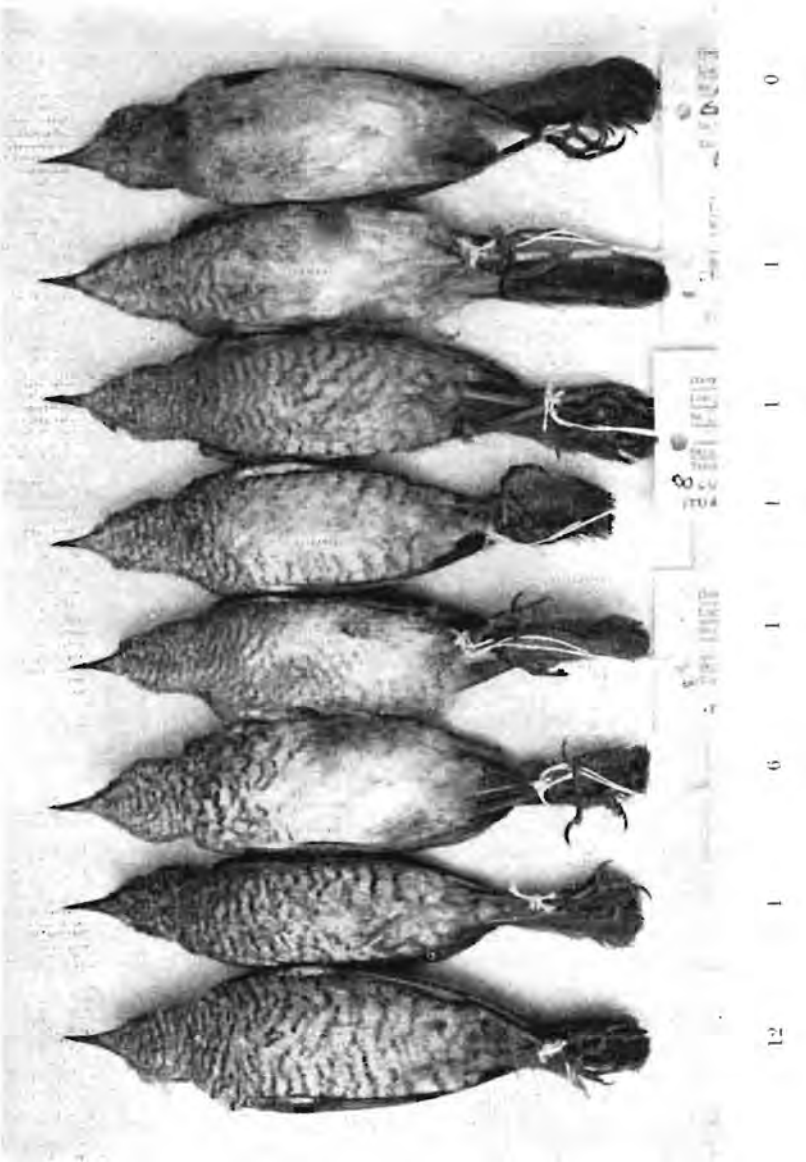
(*a*) 4 ♂♂, ♀, approximately 1-2 miles south of Kanchibiya.

(*b*) 2 ♂♂, ♀, approximately 6-7 miles south of the same point; and

(*c*) ♂, ♀, 12 miles south.

This series is of great interest as they provide a virtually complete range of intergradation from birds of the *simplex* to *stierlingi* groups. The characters shown by these intergrades is not that of normal geographical variation, with a gradual transition of characters, but of the obvious secondary hybridization of different stocks that are reproductively incompletely isolated. Benson (*in litt.*) was influenced in treating both as separate species on the basis of a clear-cut distinction between the calls of each, but this seems to be an insufficient factor, when not further supported by an ecological change to prevent interbreeding.

However, on the basis of the material so far available, a partial barrier must exist. Firstly, the transition zone would seem to be only 12 or 15 miles wide, and is probably actually less, also the available specimens show a variety of points indictaive of an uneven transition. Secondly, the birds themselves are probably more or less sedentary, though there is no way of proving this other than by inference and habits, which would not indicate any great potenti-



CAMAROPTERA STIERLINGI BUTTONI ♀ *CAMAROPTERA SIMPLEX KATANGAE*

From region of geographical replacement and hybridization

Figures on horizontal line represent distance in miles south from the Kanchibiya River, Northern Rhodesia. The birds at either end are typical of *C.s.buttoni* and *C.s.katangae*, the balance being intermediate

(*Photo:* A. L. Bevis)

ality for movement. The species group as a whole is sociable, moving about in the understudy in small parties and with a more or less continuous or blanket-type of distribution over suitable terrain. They are probably also rather strongly territorial both in and out of the breeding season, though this is only to be inferred from random observation in Southern Rhodesia, that in suitable country "barred warblers" are usually to be observed continually in the same places, though this does not necessarily mean they are always the same individuals.

Plate I illustrates the variation involved. All the material shows probably a stronger approach to the *stierlingi* group than to *simplex* but the two extremes are sufficiently striking, and additional collecting would make the pattern even more complete. The uneven though rapid transition would seem to support the view that, though they may hybridize in their zones of replacement, a barrier to complete interbreeding must exist, or that hybrids may have reduced fertility; otherwise a much broader zone of intergradation would follow.

The 11 specimens (including the original Benson skin from 11° 32′ S.) can now be discussed. The two specimens from locality (*c*) represent virtually pure *buttoni* and are fully barred. The three from (*b*) show a great reduction in the barring of the abdomen and flanks, though in one ♂ it is slightly more pronounced and accompanied by a faintly buffy suffusion, but in turn this specimen has the throat and chest somewhat greyer with a tendency towards the *simplex* type, through the blurring of the reduced barring with grey. Of the five specimens from (*a*), one is completely barred like *buttoni* but with an admixture of grey on the chest and throat; the other four all have reduced and much finer barring, two with greyish chests, the one more so than the other, and one with a simple reduction in barring; the final bird has the barring virtually restricted to the upper chest and throat, but lacks a general greyish suffusion. Benson's original specimen is to all intents and purposes true *simplex*, falling within the normal range of individual variation. The tone of the mantle is very variable throughout, but then there appears to be no very great constancy in either *C.simplex katangae* or *C.stierlingi buttoni*, both exhibiting a tendency towards the greyness of one or the brownish of the other. Further, a specimen recently collected by Benson in the Serenje District at 13° 16′ S., 30° 06′ E. also seems to show the influence of *simplex* by having the barring on the abdomen and flanks considerably restricted, and may also be of hybrid origin.

The wing-measurements of this series is as follows: 8 ♂♂ 58-66 (av. 62.6) mm., 4 ♀♀ 59-63 (av. 60.6) mm.

This zone of hybridization must therefore exist wherever the one form replaces the other, and in Northern Rhodesia extends on a broad front for over 800 miles or more and presumably continues into south-eastern Angola to the distributional limits of the *stierlingi* group, which are yet unknown. Probably also, the two continue to hybridize throughout their mutual ranges in Tanganyika Territory, where *C.s.katangae* is replaced by *C.s.undosus*, distinguished principally by the more clearly defined and finer barring on the throat and breast and showing the undoubted influence of *stierlingi*.

The only other possibly recorded instance of hybridization is that of *Camaroptera simplex neglectus*, described by Benson in *Bull B.O.C.* 56: pp. 71-72, 1936, from Fort Hill in northern Nyasaland. I have not personally examined the unique *Type*, but it is now generally conceded to be a hybrid, having a dusky grey chin and throat like *simplex*, but a reddish back more like *stierlingi*. This relationship was first suggested by Benson (1940:620) and *in litt.*, and is further tentatively indicated by the material from Fort Hill, as already discussed in the systematic section.

Specific Taxonomic Treatment

It now remains to decide on the taxonomic treatment to be adopted within the three groups. Specific status seems indicated where there is a change in the botanical association as with the *fasciolata* group, but the existence of a narrow hybrid zone between the *stierlingi* and *simplex* groups as against outright intergradation, militates against the simple reduction of both to the status of races. They may conveniently be regarded as semi-species in what may represent a case of secondary contact and hybridization, as the process of speciation is not yet complete. All three can perhaps be regarded as belonging to one superspecies, comprising one full species and two semi-species. The distributional pattern of the superspecies, with some modification, forms a close parallel to the many instances of those complementary forms with an arid acacia/moist savannah type of distribution as discussed by Hall (1960: 395-400) and (1960a: 420-439), with the two extremes occurring within close geographical proximity in western Angola, where *C.f.pallidior* thrusts northwards up the arid coastal strip and is replaced by the very different looking *C.s.huilae* on the moist plateau, though in this instance, with the added complication of two closely allied semi-species themselves replacing each other

geographically in moist savannah, but accompanied by a narrower zone of hybridization.

Acknowledgments

In the preparation of this paper my thanks are due to Mr. C. W. Benson and Mrs. B. P. Hall, both of whom read through the original draft and made many useful suggestions. For the loan of material I have to thank the British Museum (Natural History); Mr. P. A. Clancey, Director of the Durban Museum and Art Gallery, who has also kindly provided the facilities for publication; Mr. O. P. M. Prozesky of the Transvaal Museum, Pretoria; and the Director of the Museu Dr. 'Alvaro de Castro, Lourenço Marques.

REFERENCES

Benson, C. W. (1940). "Further notes on Nyasaland Birds", pt. 3, *Ibis* 82: 583-629.

Benson, C. W. (1946). "Notes on the Birds of Southern Abyssinia", *Ibis*, 88: 180-205.

Benson, C. W. (1956). "A Contribution to the Ornithology of Northern Rhodesia", *Occ. Pap. Nat. Mus. S. Rhod.*, 21b: 1-51.

Benson, C. W. and White, C. M. N. (1957). *Check List of the Birds of Northern Rhodesia:* 1-166, Government Printer, Lusaka.

Hall, B. P. (1960). "The Ecology and Taxonomy of some Angola Birds", *Bull. Brit. Mus.* (*Nat. Hist.*), 6 (7): 370-483.

Hall, B. P. (1960a). "The Faunistic Importance of the Scarp of Angola", *Ibis*, 102: 420-439.

Keay, R. W. J. et al. (1959). *Vegetation Map of Africa South of the Tropic of Cancer.* l'Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale, with the assistance of U.N.E.S.C.O. 1-24 and map. Oxford.

Lynes, H. (1934). "Contribution to the Ornithology of Southern Tanganyika Territory", J.f.O., 82: Sonderheft: 1-47.

Moreau, R. E. and Moreau, W. M. (1939). "Observations on some East African Birds", *Ibis*, 81: 298-323.

Priest, C. D. (1934). *The Birds of Southern Rhodesia*, 3: 1-355.

Vincent, J. (1935). "The Birds of Northern Portuguese East Africa", pt. 8, *Ibis*, 77: 485-529.