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THE TAXONOMIC STATUS AND RELATIONSHIP OF SERINUS CITRINIPECTUS CLANCEY AND LAWSON, WITH NOTES ON RELATED MEMBERS OF THE GENUS

by

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Introduction

In the *Durban Museum Novitates*, vol. vi, 4, 1960 pp. 61-64, Clancey and Lawson described as new to science a distinctive canary, naming it *Serinus citrinipectus*, with type-locality Panda, near Inhambane, in southern Portuguese East Africa, and to which was applied the common name of Lemon-breasted Canary. This surprising discovery had been completely unexpected at this late stage of ornithological exploration in southern Africa and appeared too late for inclusion in the monographic work of Skead *et al.* (1960).

These authors described this new canary as being allied to *Serinus atrogularis* (A. Smith) and *Serinus mozambicus* (P. L. S. Müller), resembling the former on the upper-parts, but as differing absolutely in the more boldly patterned face, yellowish cheek-spot, white chin, and bright lemon yellow throat and breast, whitish lower breast, abdomen and crissum, warm buff flanks, the latter streaked with grey, and dark tipped bill. The female of *S.citrinipectus* differs from that of *S.atrogularis* in having the face patterned with grey, and the chin, throat, breast and flanks warm buff, the lower throat and the sides of the breast with a few nebulous spots and streaks of grey. Apart from these distinctive plumage characters the most salient difference is the marked sexual dimorphism, in contrast to that of its obviously nearest relatives.

This striking novelty was introduced on the ample basis of 9 adult males and a female, obtained at Panda and Manguyane, in the Sul do Save. Further, these authors were able to examine in captivity some forty locally trapped examples.

Just subsequent to the appearance of this description, Irwin (1960: 503-506) published a paper on some unusual canaries which had been obtained over a period, in a number of localities in southern Portuguese East Africa. These were demonstrated as showing certain resemblances to *Serinus atrogularis*, but were considered to be aberrant individuals of *Serinus mozambicus*, alongside in life which they lived. However, on the publication of the description of *Serinus citrinipectus*, it became at once obvious that these supposed aberrant individuals were in fact referable to this new form, and a reassessment of the relationships of these canaries again became necessary.

Descriptive Remarks

When *S.citrinipectus* was first discussed on the assumption of its being an aberrant form of *S.mozambicus*, showing features in common with the *S.atrogularis* assemblage of races, due then to the limited amount of material available and the lack of sufficient diagnostic adult males, any other conclusion would have been difficult. Now, however, the material to hand allows for a far greater understanding as to its relationship with other members of the genus within this group of small savannah canaries and to the individual variability to be found within the species. The notes that follow are based on an examination of the *Type* and paratypical series.

In colour and tone of the mantle the series shows relative constancy and as stressed in the original diagnosis, bears a very marked resemblance to the *S.atrogularis* group of races, rather than to *S.mozambicus*. A certain degree of inconstancy is apparent in the amount of yellow present on the cheek patch and the supra-loral spot and post ocular area; in four males it is greyish white, in one instance with a trace of yellow, whilst in the remaining five males it is more strongly suffused with pale lemon yellow. This post-ocular character, though a specific one, is not conspicuous and closely approaches the condition found in certain races of *S.atrogularis*, in which the facial and head pattern is inclined to be very variable subspecifically, but when looked at in its true perspective, the amount of variability exhibited is in reality no greater than that to be found in any of the populations of *S.atrogularis* or *S.mozambicus* and cannot be taken as indicating any basic genetic instability of the population, or as pointing to a hybrid origin as was previously suspected. The double wing-bar formed by the pale edgings to the

median and lesser wing-coverts is also inclined to vary as is the case with both *S.atrogularis* and *S.mozambicus*, with which species this character is shared. It is relatively most conspicuously developed in the yellow *S.mozambicus*.

Both *S.citrinipectus* and *S.atrogularis* agree in having the sides of the face generally darker, with the pale areas more restricted and therefore at first appear less clearly patterned when compared with the bolder outline presented by *S.mozambicus* with its contrasting bright yellow, dark stripe running through the eye and conspicuous moustachial streak. In *S.citrinipectus* the vestigially developed eyestripe, caused by its narrow restriction to the supra-loral and post-ocular region, and this, combined with the reduced light facial patch, and the broader, though less easily definable dark area running through the eye, provides one of the most important specific distinctions in pattern between it and its nearest relatives. There is never any trace of a frons in *S.citrinipectus* which has the forehead completely streaked, again in this respect it is very similar to certain members of the *S.atrogularis* assemblage of races; thus, *S.a.lwenarum* White and *S.a.kasaicus* White, have a dull white supra-loral spot and a pale post-ocular streak. This is developed into an eyestripe in the populations of *S.a.seshekeensis* Grant and M— Praed, *S.a. semideserti* Roberts, and *S.a.fitzsimonsi* Roberts, in a variable degree, and reaches its greatest development in *S.a.deserti* (Reichenow), which has the forehead also largely white. The geographically distant *S.a.reichenowi* Salvadori of East Africa is in some respects rather similar, but has a white unmarked throat, and, as suggested by Chapin, (1954:600), may in fact represent another specific group, best kept apart from *S.atrogularis*.

On the under-parts the paratypical series of *S.citrinipectus* show little variation, two individuals appear to have the yellow of the chest more restricted, but do not yet seem to have quite assumed adult dress, as they still have new yellow feathers developing on the throat.

The variable extent of the white on the tail must be considered next. This taxonomically variable character was treated at length in the original discussion on the supposed aberrants, and the degree of its development was taken as indicative of relationship with *S.atrogularis*; similarly, those with the least amount of white (and greatest amount of yellow on the under-parts) were considered to show the closest approach to *S.mozambicus*. But the detailed examination of the paratypical series show it to be a very variable factor, with the inner web of the outermost pair of tail-feathers ranging through from almost wholly white to largely dusky, though always

retaining the white tip. When originally discussing the "aberrants" it was thought that the amount of white present could be correlated inversely with the degree of yellow pigment present in the plumage. This seems in fact to have been largely fortuitous and in reality reflecting only individual differences; the extent of yellow again in turn only reflects the degree of maturity in the males; age or sex does not appear to have any bearing on the amount of white present either.

Other Related Species

Clancey and Lawson discussed briefly *Serinus dorsostriatus* (Reichenow) as also showing some general similarity in colour to *S.citrinipectus*, but remarked that its generally larger bodily size combined with other characters ruled out any very close relationship, and with this statement I agree. However, it should be noted that there is little difference in the average wing length, though the tail of *S.dorsostriatus* is proportionately much longer. *S.dorsostriatus* also possesses a well-developed yellow frons and eyestripe, but like *S.citrinipectus* has a yellow cheek patch below the ear coverts, but these characters are equally shared by a number of forms and the similarity to *S.mozambicus* is rather greater, and the greenish edges to the feathers of the head and mantle help reduce any similarity between either *S.citrinipectus* or any of the members of the *S.atrogularis* group. Mention must also be made of the anomalous *Serinus flavigula* Salvadori, which at that time I had not examined personally; but I have subsequently had on loan from the British Museum (Natural History) the specimen collected by Benson (*vide* Benson 1947: 47), on which Mrs. Hall's remarks quoted originally, were based. I previously, *op. cit.*, discussed this form somewhat briefly; wherein I quoted Mrs. B. P. Hall, who suggested at the time that it was little more than an intermediate between *S.mozambicus* and *S.atrogularis*, because *S.flavigula* possessed grey ear coverts and no eyestripe or frons, thus closely resembling *S.a.xanthopygius* Rüppell of northern Abyssinia. However, it must be noted that the few recorded localities of *S.flavigula* are not from within the stated range of *S.a.xanthopygius*, but of *S.a.reichenowi*, which like *S.mozambicus* has a pale frons and reasonably well-developed eyestripe. In addition *S.a.reichenowi* has a lightly spotted chest and lower throat in contrast to *S.flavigula* which has a correspondingly much better developed black chest-band, more similar to that found in the black-throated group of races of *S.atrogularis*, though the nearest member of this assemblage, *S.a.somereni* Hartert, occurs no nearer than Uganda, and is a bird of apparently rather moister country. It must not be overlooked either, that the specimen collected by Benson at Yavello

was taken in an area whence *S.mozambicus* is not known to occur, and as yet there seems to be no indication that *S.flavigula* occurs anywhere within the range of *S.mozambicus*. Further, there seems to be little to support the statement by Mackworth-Praed and Grant (1955: 1063) that *S.mozambicus* is generally distributed in Abyssinia. Smith (1957: 331) records it from neighbouring Eritrea as very local in woodland of a denser nature and not in dry acacia and this is generally what one would expect.

It was Benson who originally suggested that this specimen appeared attributable to *Poliospiza* (*Serinus*) *flavigula*. Previously Sclater, (1930: 822) had suggested that *S.flavigula* might be but a mutant *P.a.xanthopygius*, however, it should be stated further, that in the original description of *S.flavigula* by Salvadori, no mention whatsoever is made of the black chest band, so some doubt must surround the exact identity of this specimen, though in all other respects it agrees with the characters subscribable to *S.flavigula*, and is considered here as such, at least for convenience of discussion. In turn Mackworth-Praed and Grant describe *S.flavigula* as having a blackish band on the lower neck, probably on the basis of the Benson specimen.

S.flavigula is, however, sympatric with *S.dorsostriatus*, so that the possibility of its being a hybrid *S.d.maculicollis* Sharpe x *S.a. reichenowi* cannot be ruled out, but the very dark throat and chest patch seems to militate against this view, especially as there is not even an incipient eyestripe or frons in *S.flavigula*, coupled also with the lack of any green pigments on the upper-parts, which are brown like that of *S.a.reichenowi*. With such conflicting evidence it is perhaps best to retain *S.flavigula* as a localised monotypic species like *S.citrinipectus*, rather than attempt to accommodate it unnaturally elsewhere, or to dismiss it simply as of hybrid origin, especially as it cannot truly be said to combine to a sufficient degree any of the expected characters that are found in its relatives. Benson only found it the once, and it may be a mere relict.

Variation within S.mozambicus and S.atrogularis

To understand properly the degree of relationship between *S.citrinipectus*, *S.mozambicus* and *S.atrogularis* it is necessary first to study more fully the extent of variation exhibited by the different populations of these two species, more especially that of the highly polytypic *S.atrogularis*.

In the populations of *S.mozambicus* of South and Central Africa comprising the nominate forms and the races *S.m.vansoni* Roberts,

S.m.granti Clancey and *S.m.samaliyae* White; the tail is normally tipped with a variable amount of white admixed with yellow, the white extending in a varying degree along the outer edge of the inner web of the rectrices. In the populations of the *S.atrogularis* group of races there is a very wide degree of individual as well as racial variation which can be treated in some detail. Macdonald (1957: 166) drew attention to the fact that of the southern group of populations (and this applies equally to those of south-central and East Africa) are divisible into two distinct groups: a black-throated section occupying most of the south and east of the species range and including the Central African races; and a streaky-breasted group with a more western distribution occupying an area from Benguela southwards through most of South-West Africa and south-eastwards to the northern Cape, Orange Free State, Basutoland and southern Transvaal; and again be it noted by *S.a.reichenowi* and its allies in East Africa, which have white throats. Among the black-throated group, the central African populations of *S.a.lwenarum* and the very similar *S.a.kasaicus*, as well as *S.a.kasamaensis* Benson, are heavily saturated and very similar forms and have very little white present in the rectrices, but as one proceeds southwards the amount of white increases until in the populations of the Southern Rhodesian plateau and the neighbouring Bechuanaland Protectorate, which are currently referred to the races *S.a.semideserti* and *S.a.fitzsimonsi*, have the inner webs of the outermost pair of feathers largely white, but showing a great deal of individual variation, of a similar nature to that exhibited by *S.citrinipectus*. In contrast, as represented by the races *S.a.deserti*, *S.a.ovamboensis* Roberts and *S.a.impiger* Clancey, the white in the tail is largely lacking. Here again in these three forms, an approach to the pattern of *S.mozambicus* exists in the persistence of a readily definable dull white eyestripe coupled with a pale and rather distinctive frons, but of course without any yellow, these facial pattern characters seem largely clinal and begin first to appear via the populations of *S.a.semideserti* in north-eastern Bechuanaland and adjacent Southern Rhodesia. It is evident that the relative amount of white present in the rectrices of the *S.atrogularis* assemblage of forms is too variable to be used as a reliable specific character alone, as *S.citrinipectus* covers at least in part the same range of individual variation, but is much whiter-tailed in comparison in most cases.

The facial pattern, too, in *S.atrogularis* inclines both towards that of *S.mozambicus* with pale frons and eyestripe as it does also *S.citrinipectus* to a similar degree. In neither of these two species is there such sexual dimorphism as found in *S.citrinipectus*.

Other Variation within S.citrinipectus

It cannot at this stage definitely be decided whether *S.citrinipectus* is in any way polytypic; however, some demonstrable variation is indicated in the sample populations so far known and it may eventually prove necessary to divide the species subspecifically.

Since the appearance of the original description, two further examples, a male and a female, have been obtained at Beira in December; an area again supposedly well-worked ornithologically. They are in very fresh dress, evidently just having undergone a full body moult; by comparison the *Type* and paratypical series exhibit a considerable degree of wear on the mantle. Quite adult, these two new birds differ from the paratypes through having the feathers of the mantle generally more saturated, with black centres and edged conspicuously with rusty buff, almost a bright rufescent, not olive buff. The tone of the head and nape does not differ so greatly, but nevertheless the forehead, crown and nape appear greyer, the whole contrasting rather conspicuously with the rest of the mantle, this being more obvious in the male than in the female. On the under-parts the male is rather similar, except that the abdomen and flanks are a richer pinkish buff and this is especially noticeable in the female. On the basis of wear alone, it is difficult to account fully for these rather obvious differences, and it must be emphasised that none of the examples so far collected matches this pair. This plumage saturation may well be correlated with high rainfall, as Beira receives between 56-60 inches per annum.

Thus Clancey, *in litt.*, kindly informs me that Mr. Jack Scheepers, the professional bird-catcher of Bela Vista, Maputo, Sul do Save, who first drew his attention to the existence of *S.citrinipectus*, told him that two distinct races of the species occurred within its known range, one darker and richer than the other. He also told Clancey that the species was well known to the natives of Moçambique by the name of "Sharice".

Further, one of the two males from Tambara, as discussed by Irwin (*op. cit.*) though in rather worn plumage, is however, more like the original series, as are all other birds so far collected. But it is more olivaceous in appearance in respect of the pale edges to the mantle feathers and this olive tone extends to the crown and nape which are less greyish than normally found. The yellow of the under-parts seems to extend further down onto the abdomen and flanks, but as it is a rather poorly made skin, this effect may be unduly and unnaturally accentuated. A full understanding of the range of variation exhibited by *S.citrinipectus* will have to await the collection of more adequate series, and it is not possible at this stage to define any regular geographic variation.

The Immature Plumages

The immature male of *S.citrinipectus* is coloured exactly like the adult female, but perhaps is slightly less rich on the under-parts. Very young birds in first plumage at present remain unknown, but one of the original Maringa series, a female, possesses an indistinct gorget on the chest, formed by a few feathers with darkish centres, that appear to be the remnant of the juvenile state, in which it would presumably be more heavily spotted, but there is no evidence of any spotting on the throat or chin. In juvenile *S.mozambicus* the chest is lightly but rather profusely spotted, but with the throat unmarked. *S.atrogularis* is similarly spotted, but the spotting extends equally over the throat and chin. It remains to be discovered whether or not *S.citrinipectus* has the throat spotted or plain and this would provide a useful indication of its relationships. At this juncture attention should be drawn to certain misconceptions as to the age and sex of the specimens originally discussed by Irwin.

In the discussion on this series, all of which were then considered as fully adult, it is now quite apparent that this in fact was not so and in addition some mis-sexing was also involved. As a result of this, a supposed female, from Maringa, is in its plumage characters sub-adult male in the process of assuming the yellow throat and breast of the adult; likewise a bird from Tambara sexed as female, but showing some yellow, must also in reality be a sub-adult male. Again of the material housed at Lourenço Marques, a bird from Catuane, sexed female but accompanied by a question mark, and with a considerable amount of yellow, must also be a male.

Size-factors

In size *S.citrinipectus* averages slightly smaller than does *S. mozambicus* alongside which it lives, and in the skin at least appears bodily smaller and less robust.

The following table of measurements are taken from the available series of *S.citrinipectus* and are compared directly with that of the *S.mozambicus* populations alongside with which it occurs (number of specimens in parenthesis):

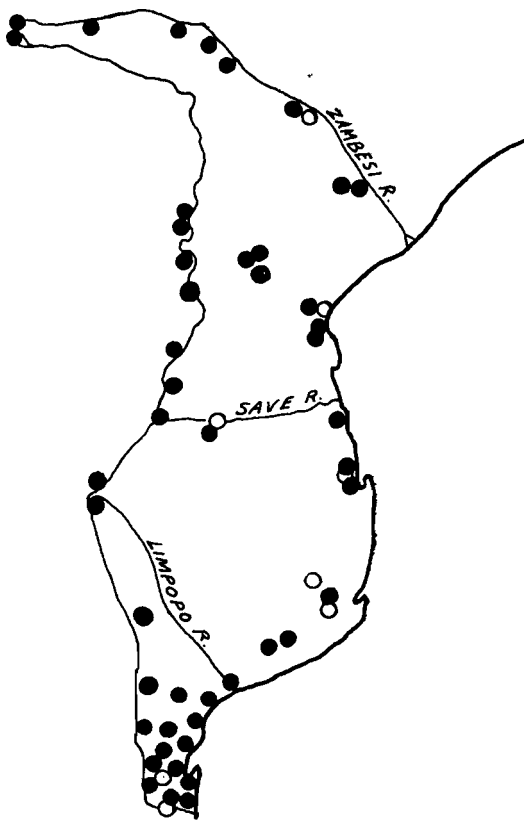
		S.mozambicus	*S.citrinipectus*
Wing	♂♂ ...	65-70 (28) av. 67.0 mm.	63-68 (16) av. 65.0 mm.
	♀♀ ...	64-70 (23) av. 67.2 mm.	64-67 (7) av. 64.4 mm.
Tail	♂♂ ...	37-43 (28) av. 39.5 mm.	36-40 (16) av. 37.3 mm.
	♀♀ ...	38-44 (23) av. 40.0 mm.	35-40 (7) av. 37.4 mm.

The Geographical Aspect

Compared with its nearest relatives, occupying between them the greater portion of the savannahs of continental Africa, *S.citrinipectus* is a species of comparatively circumscribed distribution in the eastern low-veld of Portuguese East Africa (fig. 1), but nevertheless from north to south it has an overall range of no less than seven hundred miles. Apart from the series collected at Panda and Manguyane it is known from the four Maringa specimens, one of which is now in the British Museum (Natural History), and 2 males from 16 miles east of Tambara Fort on the Zambesi River. These were previously listed by Irwin (1956: 39) as *S.mozambicus*. In the Museu Dr. Alvaro de Castro, Lourenço Marques, there is a male and female from Changalane and a male and an unsexed bird, almost certainly a female, from Vilanculos; there is also a male and female from Catuane. Still more recently Mr. M. O. E. Baddeley, taxidermist at the Durban Museum, collected outside Beira, the male and female previously discussed; these latter are now in the collection of that institution. Twenty-three specimens from eight separate localities are therefore known to exist in museums.

Its exact distributional limits are not yet known, but as it has been collected near Tambara on the south bank of the Zambesi River, within a few yards of the river itself, it will almost certainly be found to extend into northern Portuguese East Africa and possibly the lower river area of Nyasaland in the Port Herald district. As it occurs at Maringa within about forty miles of the Southern Rhodesian border, it may be expected in the ecologically similar low country of the south-eastern part of that territory between the Sabi and Limpopo River systems. Further, its having been taken at Catuane on the border between Portuguese territory and the low country of north-eastern Zululand makes its occurrence within the Republic of South Africa a virtual certainty. It can also be expected to occur in eastern Swaziland and the lowveld areas of the Kruger National Park adjacent to the Portuguese boundary.

Whether or not it is generally distributed remains to be ascertained, but it seems highly probable that the populations are largely restricted and localised to small pockets of suitable country. This would account for its belated discovery and the fact that *S.mozambicus* seems to be very much more numerous throughout. The numbers encountered at Panda seems to point not only to its localisation, but that it may be abundant where it occurs. Its distribution is most probably that of a relict species in the process of gradual disappearance, possibly in part due to direct competition with



Range of *S.mozambicus* (closed circles) and *S.citrinipectus* (open circles) in Southern Portuguese East Africa from specimens and literature.

S.mozambicus. Should it indeed be in the gradual process of natural extinction, this would be a further pointer to its belonging near to the basic stock from which both *S.mozambicus* and *S.atrogularis* were derived.

Ecology

The precise ecological requirements of *S.citrinipectus* are not known. In virtually every instance where field notes have been available, it has been noted as found in flocks alongside *S.mozambicus*, this was the case as already noted at Maringa in 1950, and likewise Clancey and Lawson found it living alongside *S.mozambicus* at Panda, but noticed that it seemed to form larger and more com-

pact flocks, more so than was usual with *S.mozambicus* with which it occurred, or that which is normal with *S.atrogularis*. No precise ecological data accompanies the material housed at Lourenço Marques, but Irwin *op. cit.* quotes information supplied by Dr. A. A. da Rosa Pinto as to the type of country in which they were found; it being one of open deciduous savannah woodland with *Acacia* spp. (*A.spirocarpa*, *A.nigrescens* etc.) with *Sclerocarya caffra*, *Combretum* spp. and *Terminalia* etc.

At Changalane, Vilanculos and Catuane, *S.mozambicus* has also been collected, which gives further emphasis to their close association in life. On the same day that it was obtained at Changalane, 2 males and a female of *S.mozambicus* were also shot; and a few days only separates the dates of collection of both species at Vilanculos and Catuane.

The preference of the species for areas of native cultivation was noted by Clancey and Lawson and this was the state of affairs apparent at Maringa; further the two from near Tambara were on the largely cultivated flood-plain of the Zambesi River. *S.mozambicus*, too, is also frequently associated with cultivation, so both would seem to be ecologically alike in this preference, and such similar ecology may lead to much direct interspecific competition with the seeming lack of differential adaption and ecological separation, which would be probably detrimental to one species or the other.

The rather detailed vegetation map of Portuguese East Africa given by Grandvaux Barbosa (1957: 26) is helpful in understanding the vegetation complexes involved, but it is not possible to correlate the recorded localities of *S.citrinipectus* with any one vegetation type, other than that the gamut ranges through the usual rather generalised association of the *Colophospermum mopane* "Mopane" areas to the equally widespread types of the dry *Brachystegia* "Miombi" complex; in fact its habitat range is covered by virtually any of the relatively dry savannah types of woodland.

Interspecific Relationships

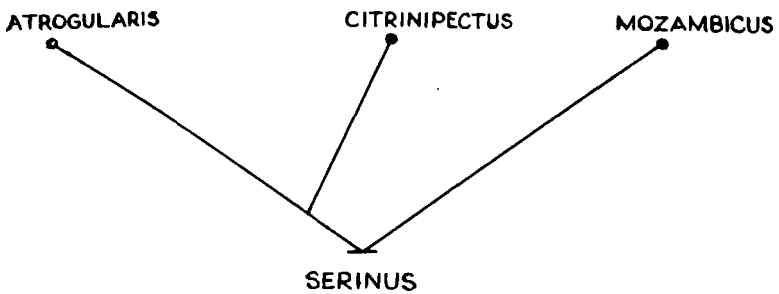
To assess the degree of specific relationship between three such forms is not a straightforward task, as there may have been a certain amount of convergence between them, and the degree of racial variation, especially among the various forms of *S.atrogularis*, some of which approach *S.mozambicus*, at least in pattern if not in colour, accentuates the problem.

S.citrinipectus has the distinction among this closely related trio of being strongly sexually dimorphic, which conflicts with the general similarity of the sexes in *S.mozambicus* and *S.atrogularis*, though

the latter tends to exhibit a certain amount of dimorphism, and that in turn varies geographically in its extent. These secondary sexual characters present in *S.citrinipectus,* are the lemon yellow throat and breast of the adult male and the yellow face pattern with the remainder of the under-parts pinkish or reddish-buff, as similarly are the whole of the under-parts of the females, which lack all trace of yellow. The distinctive, though at first rather cryptically developed, facial and head pattern comprises of the pale supra-loral and post-ocular regions and pale cheeks. These characters are very constant and of a specific nature and in direct contrast to the rather bold pattern found in the *S.mozambicus,* and thus rather closer to some of the races of *S.atrogularis.* The resemblance is again striking in the presence of the grey head-top and in the streaking of the mantle and in the absence of any green. The race of *S.atrogularis* that shows the greatest degree of similarity to *S.citrinipectus* in general pattern, if the black throat is ignored, is *S.a.lwenarum,* which possess an incipient post-ocular streak and supra-loral spot and narrow pale cheek patch. This form, however, has a greatly reduced amount of white in the tail, otherwise on the basis of colour pattern, they are very similar, even to the extent of *S.a.lwenarum* having the flanks noticeably pinky-buff and finely streaked. On the pattern of the throat and breast only does the resemblance fade.

As already noted the amount of white in the tail in the populations inhabiting most of the Southern Rhodesian plateau and the Bechuanaland Protectorate agree better with *S.citrinipectus* in its extent, but the tendency to the development of a wholly pale frons and an eyestripe, which culminates in *S.a.deserti* in South-West Africa, is puzzling. The degree of racial variation in *S.atrogularis* as it affects pattern is great, much more so than with *S.mozambicus,* which varies basically mostly in colour, though the extent of the eyestripe does effect some forms. It is only the replacement of the black or spotted throat and chest by yellow and through the marked sexual dimorphism, that *S.citrinipectus* differs so widely.

The fact that *S.citrinipectus* is completely allopatric to *S.atrogularis* points to the greater relative probability in its relationship being to that form rather than to *S.mozambicus* with which it is completely sympatric. It would seem that *S.citrinipectus* was derived initially from some early *atrogularis*-like stock, probably at a stage when the *atrogularis-mozambicus* ancestors were less clearly segregated ecologically and differentiated morphologically than they are at the present day. This relationship is shown in Fig. 2.



Suggested relationship of the three species

Finally, consideration must be given to the possible part played by convergence. Some forms of *S.atrogularis* approach *S.mozambicus* in respect of colour pattern, whereas others show an even closer approach to *S.citrinipectus*. The difference between *S.atrogularis* and *S.mozambicus* are, however, absolute when the divergent colouring of each is taken into consideration. *S.atrogularis* is possibly the most primitive of the three as the retention of streaking on the chest and throat culminating in the majority of races in a largely black throat seems to be a retention and further accentuation of juvenile characters, which have since been completely lost in the other two, in which yellow has supplanted a more primitive colour-pattern. The opposite view of course can be put forward that *S.atrogularis* are the most advanced, but it is perhaps true that the latter is the more primitive, rather than assuming that it has lost the yellow pigments in the course of its development.

The three species do however, form a graded series with *S.citrinipectus* largely in an intermediate position between two divergently coloured though nevertheless closely related stocks. Finality is not possible in a discussion of this nature, but the facts and arguments brought out in this paper do help throw a certain amount of light on the evolutionary history of this close-knit trio of species as well as some of their immediate allies, and so provide a better understanding of their relationships and origins.

Acknowledgments

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through which institution I received the loan of critical material, and who has helped in other ways as well as offering criticism of the draft.

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