NOTES ON INDONESIAN BIRDS WITH SPECIAL REFERENCE TO THE AVIFAUNA OF JAVA AND THE SURROUNDING SMALL ISLANDS (II) [1]

by

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7. Some remarks on *Oriolus chinensis*, especially about the representatives of the species, obtained from Bawean Island and the Kangean Archipelago

There is much variation in the yellowish tint on the under parts of this oriole: the males may average clearer yellow than most female birds though certain females are nearly as beautiful as the most splendid males. When comparing *maculatus* with *celebensis* and *macassariensis* it cannot be denied that on the average representatives of this last form show a trifle more orange.

When looking upon the upper parts the individual variation is still more important than on the under surface, for besides specimens which are beautiful yellow there are others, belonging to both sexes, showing much green in the yellow, most strikingly observable in the females. In not yet fully adult specimens such a green shade is always present.

There is also a certain degree of variation in the extent of the yellow and white on the wing-quills; perhaps those tints are most emphatically present in birds of both sexes in nuptial dress.

The specimens of *celebensis* which I could study, agree rather well in the colour of the upper parts with *maculatus*, but *macassariensis* shows more orange.

The variation in width of the black occipital collar, running from the gape over the eyes to the occiput is also rather important, but in none of the adults, seen by me, it is so broad as is the case in certain specimens of *insularis*, known from the Kangean Archipelago and not so narrow as uses to be the case in *celebensis*, whereas perhaps *macassariensis* too has this collar very narrow, in this respect resembling *celebensis*. In juveniles the collar fails as is the case in a recently obtained bird from Legundi Island (Strait Sunda) and a second one from Bogor (West Java).

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[1]) Papers on the same subject appeared in Bulletin of the British Ornithologists' Club, Vol. 82, 1962, pp. 142, 147, 160 and Vol. 83, 1963, pp. 36, 56, 73 and 96 and in ARDEA, 50, 1962, p. 180-206. The first part of the present article was published in TREUBIA, Vol. 26, December 1962, p. 11-38.

The material secured by me in and around the Sunda Strait does not differ at all from other skins originating from Sumatra and Java, belonging to *maculatus*. There is much variation in the yellow of the upper side in birds from this region: a female secured on Panaitan-island *) in October shows this colour most beautiful, also when compared with our male birds, though a male from Udjung Kulon (most western peninsula of Java) does not differ much on this point. This female had a very small, not granular ovarium, but the Udjung Kulon male had large testicles of 11 to 12 mm. The other specimens from the island of Sebesi (Sunda Strait) (4) and Udjung Kulon (1) had a worn plumage or were moulting; they were shot in June and July. In June a juvenile was secured on the island of Legundi. Though both females obtained from Sebesi were moulting and have much green in the yellow of the upper surface, the ovaria were well granular which was not the case with our beautiful Panaitan-island female discussed above. The 2 males from Sebesi had a very worn plumage, showing distinct traces of moult on the breast, the foreneck and the pileum but the testicles were large, 10 - 12 and 6 - 8 mm, thus similar to that beautiful Udjung Kulon male. A second bird of the same sex originating from this region had a worn tail and badly developed reproductive organs.

There is no doubt that all Strait Sunda birds, including those originating from Panaitan-island and Udjung Kulon, belong to *maculatus*. After comparison of the old museum-material with our fresh skins it seems evident that there is little or no post-mortem discolouration of the plumage.

In his description of the typical material of *Oriolus chinensis insularis*, VORDERMAN 1) gives as his opinion that the yellow area on the occiput is smaller in adult birds than is the case in juvenile specimens, causing the black band being up till 20 mm wide. But in the 8 Kangean skins, obtained from adult birds- of which 7 have been taken recently- there are only 3 (including one bird collected by VORDERMAN) with a broad occipital band and in only 2 of them it reaches a width of 20 mm. So far I can see this character has nothing to do with age nor with the development of the gonads. Both fresh birds with the most extensive black on the occiput had small gonads and 2 with medium sized (2 - 6 mm) testicles had the black band very narrow. But it is a fact that no specimens classified as *maculatus* have the black area on the occiput so extensive as is the case in those 3 Kangean birds. The differences in the quantity of yellow on the wings and tail, accepted by VORDERMAN as a racial character, could not

*) This is the island formerly known as Prinsen- or Princes Island (Sunda Strait).

be confirmed by me; the individual variations on those points in material from the same locality may be so important that it seems very risky to consider it to be of subspecific value. The only bird of the species collected by VORDERMAN — now present in Bogor museum — has extremely little yellow on the wing but the plumage is in a very worn condition causing the yellow on the quill-edges and coverts to disappear.

Also the presence of an orange hue on the feathering of *insularis* cannot be called a striking character in the small series before me, though it must be said that the percentage of the skins, which show that orange tint is higher in *insularis* than it is in those belonging to *maculatus*. In 8 skins of *insularis* 5 show this character against only 3 of the 13 specimens of *maculatus*. The yellow on the under parts, including the undertail coverts varies much in all birds and it is not mixed with orange.

The few skins we obtained from Bawean Island show the typical characters of *insularis* much more convincing than those originating from the terra typica Kangean. All 3 adult specimens we collected on Bawean have a very wide black band on the occiput and show only little yellow on the wings. But the orange tint in the plumage is hardly present and only in 2 of the 3 adult skins, but because one of them was preserved in formalin, part of the orange hue might have faded away. The 2 male birds had large gonads (12 and 13 mm) and the female's ovarium was well-granular.

With a view to the above fact I do not hesitate to include Bawean Island into the range of *insularis*, which seems to be a valid subspecies on account of the wide black band on the occiput and the orange tint in the plumage of the upper parts, present in a percentage of the birds known under this name. The 3 adult Bawean birds, however, are somewhat duller, not only when considering the yellow but also in the black parties, so that Kangean specimens make a more brilliant impression. But the series in our hands originating from Bawean is too small to base a conclusion upon.

From the measurements given below it is evident that *insularis* averages larger than *maculatus*, showing a heavier bill, also established by HARTERT 2) and that in this respect too Bawean birds agree with skins from Kangean. Differences in size or in the colour of the plumage between Bawean birds and the other subspecies of this oriole make it useless to compare them with representatives of other races except *maculatus* and *insularis*. It seems impossible to unite the population, living on this island or in the Kangean Archipelago with *lamprochryseus* known from Solombo Besar, because birds of this race are said to be larger, whereas the diag-

nosis does not mention the wide black occipital band. The upper parts should be clearer, more golden yellow than in *maculatus*, the yellow tips on the inner webs of the innermost secondaries and tertiaries narrower and the yellow duller; the yellow wingmirror, finally, is said to be smaller.

In my opinion most of these differences seem to have little or no racial significance, but I have not seen a single adult specimen of *lamprochryseus*, which makes it impossible to have a definite conclusion concerning the validity of this subspecies. In the Bogor collection are 2 juveniles from Bawean Island, obtained in 1928, which are classified as to belong to this race. They have wings of only 140 (♀) and 141 (♂) mm and a tail-length of 100 and 96 mm respectively, so that it is quite incomprehensible why these birds have been classified as *lamprochryseus*.

The subspecies *broderipii*, known from the Smaller Sunda Islands, is larger in all its dimensions as is borne out by the figures given below. In plumage it most resembles *insularis*, especially on account of the wide occipital collar.

There is not much individual variation in plumage between the 4 male and 3 female birds of this subspecies, present in the Bogor-collection, originating from Flores (6) and Lombok (1) but certain specimens show more orange in the feathering than others, which also could be established in birds obtained at the same locality and on the same date.

But not in a single female that orange tint is so strikingly present as in some males, whereas the average female bird is less brilliant yellow above.

The yellow in tail- and wingquills varies individually somewhat in tint and extension, but all females I could study had the central tailquills, entirely or partly, greyish yellow which could not be established in one of the 4 males before me.

A male bird, freshly obtained by me on Komodo Island (between Sumbawa and Flores) closely resembles a female of old date from Flores, because the upper parts are less brilliant than males use to be, but it may not be excluded that the sex of this specimen was wrongly determined by me for the gonads were very small indeed.

In the material measured by me there is rather much variation in wing and billsize and our Komodo bird shows an extremely long tail (121 mm). For the time being I think it justified to include Komodo Island into the range of *broderipii*.

I could not examine specimens of the subspecies *frontalis* WALLACE and *saani* JANY but the racial characters attributed to this last subspecies of which only two specimens could be examined by JANY 3) make its existence rather doubtful.

Measurements:

♂♂ Wing, *maculatus:* 138, 139, 142, 143, 143, 144, 145, 150; *maculatus* (Strait Sunda) : 140, 141, 147, 149; *insularis* (Kangean Archipelago) : 146, 149, 150, 150, 150, 152, 152; *insularis* (Bawean Island) : 149, 151; *broderipii* (Smaller Sunda Islands) : 155, 155, 157, 158, 164, 167 mm.

Tail, *maculatus*: 90, 90, 91, 95, 95, 97, 98, 100; *maculatus* (Strait Sunda) : 91, 91, 92, 94; *insularis* (Kangean Archipelago) : 88, 100, 101, 101, 102, 102; *insularis* (Bawean Island) : 100, 104; *broderipii* (Smaller Sunda Islands) : 106, 107, 111, 114, 115, 121 mm.

Culmen, *maculatus*: 28.9, 29.5, 30, 30, 30.5, 31, 31.2, 32.3; *maculatus* (Strait Sunda) : 31, 31, 31, 31.3; *insularis* (Kangean Archipelago) : 30, 30.5, 32, 32.8, 33, 33, 33.8; *insularis* (Bawean Island) : 29.8, 31.6; *broderipii* (Smaller Sunda Islands) : 32.6, 32.9, 32.9, 34, 34.6, 36.5 mm.

Max., min. and average measurements:

	maculatus	*maculatus* Strait Sunda	*insularis* Kangean	*insularis* Bawean	*broderipii*
Wing:	138 - 150 / 143	140 - 149 / 144.25	146 - 152 / 149.86	149; 151 / 150	155 - 167 / 159.33
Tail:	90 - 100 / 94.50	91 - 94 / 92	88 - 102 / 99	100; 104 / 102	106 - 121 / 112.33
Culmen:	28.9 - 32.2 / 30.43	31 - 31.3 / 31.08	30 - 33.8 / 32.16	29.8; 31.6 / 30.70	32.6 - 36.5 / 33.92

♀♀ Wing, *maculatus*: 133, 133, 135, 138, 141; *maculatus* (Strait Sunda) : 133, 133, 136, 139; *insularis* (Kangean Archipelago) : 140; *insularis* (Bawean Island) : 142; *broderipii* (Smaller Sunda Islands) : none.

Tail, *maculatus*: 86, 86, 90, 92, 96; *maculatus* (Strait Sunda) : 89, 92, 92, 95; *insularis* (Kangean Archipelago) : 104; *insularis* (Bawean Island) : 95; *broderipii* (Smaller Sunda Islands) : none.

Culmen, *maculatus*: 27.8, 29, 30, 31, 32; *maculatus* (Strait Sunda) : 26, 29.8, 31.2, 31.3; *insularis* (Kangean Archipelago) : 29; *insularis* (Bawean) : 31; *broderipii* (Smaller Sunda Islands) : none.

Max., min. and average measurements:

	maculatus	*maculatus* Strait Sunda	*insularis* Kangean	*insularis* Bawean
Wing:	133 - 141 / 136	133 - 139 / 135.25	140	142
Tail:	86 - 96 / 90	89 - 95 / 92	104	95
Culmen:	27.8 - 32 / 29.96	26 - 31.3 / 29.58	29	31

Literature.

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2. HARTERT, E. The Birds of the Kangean Islands. Nov. Zoölogica, 9, 1902.
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8. Some further notes on *Pycnonotus atriceps* subspp. known from Java and surrounding islands

At an earlier occasion already 1), I gave some particulars about this bird, especially referring to the subspecies *baweanus*, known from the island of Bawean (between East Java and Borneo). For that study I used about 80 skins originating from different localities, but principally from Java and Sumatra, besides 13 obtained at Bawean. After comparison of all those skins I proposed to reject *baweanus*, because neither OBERHOLSER 2) nor FINSCH 3) succeeded in producing a satisfying diagnosis when separating and discussing Bawean birds.

From the rather extensive material I could study at that time it became evident that the individual variations in the colour of the plumage are so important in specimens coming from the same locality, that it proved to be impossible to use any of the differences mentioned in the diagnosis for subspecific separation.

More recently collected material can only accentuate this conclusion; the examination of those fresh skins induced me to add some particulars to my previous notes.

Because there are no or hardly any post-mortem alterations, old and fresh skins of the species seem to have the same value for a subspecifical study. The 18 newly obtained adult specimens of the normal (greenish) variety agree nearly perfectly with the large series of old material, present in Bogor Museum. The same holds good for the 7 freshly collected birds of the dark phase after comparison with the 8 old skins before me. There is a possibility, that old material of birds belonging to the greenish phase becomes a trifle clearer yellow on the lower under parts, including the undertail-coverts because among the fresh skins we fail to find a single one which is so clear yellow as are the lightest specimens, originating from divergent localities, obtained as far back as 1928 or still longer ago.

But also among the 18 freshly obtained greenish skins from Bawean (3) and Strait Sunda (15) there are 9 (1 from Bawean) with much yellow in the plumage of the lower underparts; the other 9 belong to the darkest specimens of the large series before me.

One obtains a rather similar picture when looking at the upper parts. Much yellow in the feathers below often seems to go together with a more yellowish green shade above. As is the case when considering the under surface, there are no other than individual differences having nothing to do with the locality of origin. This also holds good for the variety in tone of the metallic sheen in the black of the head and the variety in area of that colour. Colour differences as indicated here may be influenced by the development of the reproductive organs, but this could not be confirmed when studying the material used when preparing this paper.

With a view to the fact that OBERHOLSER 4) separated the subspecies *chrysophorus* and *hyperemnus* on account of differences in the plumage as found by me as to be of individual importance only, I am of the opinion that their validity may be strongly doubted.

When studying the melanistic phase of these birds one arrives at the same conclusion when looking for differences in tone of the colour and in the markings of the plumage. And also in this case one fails to discover much difference between old and fresh material. Among the 7 fresh birds from Bawean there are 2 with very little green on the wing-quills and coverts, but to a much smaller degree than a specimen obtained in 1928 which I described already in my first paper.

Among the 25 fresh skins of adult birds there are 7 melanistic ones and they all originate from the island of Bawean where we only obtained 3 normally coloured specimens. The Bogor museum now contains 23 birds of this species obtained from Bawean, among which are no less than 15 melanistic ones, showing, however, an apparently normally coloured skin and a normal blue eye. There are 8 ♂, 6 ♀ and 1 bird of unknown sex, so that in this island the melanistic phase seems to be equally present in both sexes. Among the 72 birds of this species from other territories there are only 2 (♂) melanistic ones coming from Bantam (West Java) and Japara (Central Java).

As I pointed out already in the article referred to above, birds of the dark phase are not yet known from Sumatra, so far I do know, and they may be called rather uncommon to rare in Java. But as a result of my collecting activities and with a view to my field-experiences I am inclined to suppose that Bawean's population of the species consists of at the least 50% of melanistic birds.

It seems of some importance to pay attention to the fact that no bird in the dark phase is present among the 10 specimens collected by me on Panaitan-island and among the 6 originating from the other islands in

and around the Sunda Strait, though it is supposed that a fauna living on small islands inclines to develop melanism.

In accordance with F. C. VAN HEURN 5) we found several melanistic individuals with still some greenish or yellowish feathers in the plumage and on the contrary greenish birds, showing melanistic traces in the feathering. Interesting particulars concerning colour aberrations as above and the possible causes thereof are given by BERNH. RENSCH 7).

Looking upon the wing-measurements of 20 birds studied by me and 31 mentioned in literature originating from Java, Sumatra and Billiton, there are indications that specimens from the two last mentioned islands are somewhat shorter in the wing than those from Java. Among the 7 males from Sumatra measured by me and the 14 measured by others, there is not a single bird having a wing larger than 78 mm, whereas there are 3 having wings of 79, 80 and 81 mm among the 8 birds originating from Java.

But specimens with the longest wings in the series before me come from the islands in and around Strait Sunda and from Bawean, with maxima in the population of this last island as is evident from the figures given below. Among 6 ♂ from Panaitan-island there are 4 having wings of 79, 79, 81 and 82 mm; 2 from the islands Sebesi and Sebuku (Strait Sunda) have a wing of 79 and 81 mm, whereas among the 14 males from Bawean there are 2 with wings of 79 mm and 8 of 80, 80, 80, 81, 81, 82, 83 and 83 mm. Still a more important difference seems to exist in the size of the tail of both sexes when comparing Bawean birds with those originating from other localities.

Though formerly (1, p. 52) I supposed that Java birds average somewhat heavier in the bill than those from Bawean, this could not be confirmed when studying the more than 20 freshly collected skins, though a bird from Java has an exposed bill of 14 and a Panaitan-island bird of 14.5 mm. The large individual difference in bill-size in specimens of the same population (Panaitan-island), viz. 11 - 14.5 mm makes it rather doubtful whether much value may be attached to this difference. I think that the same holds good for the other differences in size mentioned above, because there is much overlapping and birds originating from Panaitan-island have a not much shorter wing than those from Bawean. The difference in tail-length too may not be considered of subspecific importance when looking upon the individual variation of 12 mm within 14 males of the same population, as is the case with birds coming from Bawean.

The particulars given above, obtained from freshly obtained material, confirm the results of my previous investigations, viz. that *baweanus* must

be rejected and Bawean Island may be included into the range of the nominal race.

I think the same may be suggested on behalf of the subspecies *chrysophorus* (already rejected by CHASEN 7) and *hyperemnus*. Besides some colour-differences which seem not acceptable, as we remarked above already, OBERHOLSER 4) mentioned a "much stouter" bill for *hyperemnus*, but this organ is rather plastic in all representatives of the species as is evident when looking at the figures given below, so that it seems very risky to see such a difference to be of racial value.

The measurements of the 3 ♂ and 3 ♀ taken by JUNGE 8) of birds belonging to the subspecies *hyperemnus* fit exactly within those as found by me, for he gives as a wing-length 75 - 80, as a tail-length 65 - 70 and as bill-size 13 - 14 mm. But birds of this race may have a somewhat longer tarsus than representatives of the other subspecies, discussed above. Among the 38 birds of which I measured the tarsus, there is indeed not a single one measuring 16.5 mm, as has been found by JUNGE as the maximum in *hyperemnus* (15, 16, 16, 16, 16 and 16.5 mm). We found the tarsi varying from 12 to 15.8 mm. But I do not think it justified to consider such a subtile difference to be of sufficient importance for subspecific separation [1]). Moreover, much depends on how the measurements have been taken; there seems to be some difference in the method in which tarsi and also bill-measurements are carried out by the different authors, which makes it difficult to decide on account of particulars on this behalf derived from literature only.

I could not examine material of the subspecies *fuscoflavescens* (HUME) and *hodiernus* (BANGS & PETERS).

Measurements:

♂♂ Wing, *atriceps* (Java and Sumatra): 74, 75, 76, 76, 76, 77, 77, 77, 77, 77, 78, 78, 79, 80, 81; *atriceps* (Panaitan-island): 76, 78, 79, 79, 81, 82; *atriceps* (other islands Strait Sunda): 76, 79, 81; *baweanus* (Bawean Island): 76, 76, 76, 79, 79, 80, 80, 80, 81, 81, 82, 83, 83 mm.

Tail, *atriceps* (Java and Sumatra): 63, 64, 64, 64, 64, 65, 65, 65, 65, 66, 66, 67, 67, 67, 72; *atriceps* (Panaitan-island): 62, 66, 67, 67, 68, 68; *atriceps* (other islands Strait Sunda): 64, 65, 67, 68; *baweanus* (Bawean Island): 62, 65, 67, 68, 68, 69, 69, 70, 70, 70, 73, 74, 74 mm.

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[1]) After finishing this typescript Peters' Checklist of the Birds of the World, Vol. IX was published in which (p. 227-228) *chrysophorus* is united with *P. a. atriceps* but *hyperemnus* and *baweanus* still always are considered as valid subspecies.

Culmen, *atriceps* (Java and Sumatra) : 11.5, 11.5, 11.9, 12, 12, 12.2, 12.5, 12.5, 12.5, 12.5, 12.6, 12.6, 12.9, 14; *atriceps* (Panaitan-island) : 11, 12, 12, 12.1, 13, 14.5; *atriceps* (other islands Strait Sunda) : 12.9, 12.9, 13.3, 13.5; *baweanus* (Bawean Island) : 11.6, 12.1, 12.4, 12.5, 12.5, 12.6, 12.6, 12.8, 12.9, 12.9, 13, 13 mm.

Max., min. and average measurements:

	atriceps Java & Sumatra	*atriceps* Panaitan-island	*atriceps* Other islands Str. Sunda area	*baweanus* Bawean Island
Wing:	74 - 81 / 77.20	76 - 82 / 79.17	76 - 81 / 78.67	76 - 83 / 79.93
Tail:	63 - 72 / 65.60	62 - 68 / 66.33	64 - 68 / 66	62 - 74 / 69.21
Culmen:	11.5 - 14 / 12.37	11 - 14.5 / 12.33	12.9 - 13.5 / 13.15	11.6 - 13 / 12.59

Measurements of tarsus:

	atriceps Java & Sumatra		*atriceps* Panaitan-island		*baweanus* Bawean Island
10 ♂	12 - 15.80 / 14.24	6 ♂	13.90 - 15.50 / 14.97	8 ♂	13.50 - 15.30 / 14.48

♀♀ Wing, *atriceps* (Java and Sumatra) : 74, 74, 75, 75, 77; *atriceps* (Panaitan-island) : 75, 79, 81; *atriceps* (other islands Strait Sunda area) : 73, 76; *baweanus* (Bawean Island) : 76, 76, 76, 79, 80, 80 mm.

Tail, *atriceps* (Java and Sumatra) : 61, 65, 65, 65, 68; *atriceps* (Panaitan-island) : 61, 66, 67; *atriceps* (other islands Strait Sunda area) : 60, 61; *baweanus* (Bawean Island) : 65, 65, 66, 67, 70, 73 mm.

Culmen, *atriceps* (Java and Sumatra) : 11.5, 11.8, 12.7, 12.8, 12.9; *atriceps* (Panaitan-island) : 10.2, 11.2, 11.6; *atriceps* (other islands Strait Sunda) : 12.1, 13.1; *baweanus* (Bawean Island) : 11.5, 12, 12, 12.2, 12.9, 13.2 mm.

Max., min. and average measurements:

	atriceps Java & Sumatra	*atriceps* Panaitan-island	*atriceps* Other islands Str. Sunda area	*baweanus* Bawean Island
Wing:	74 - 77 / 75	75 - 81 / 78.33	73; 76 / 74.50	76 - 80 / 77.83
Tail:	61 - 68 / 64.80	61 - 67 / 64.67	60; 61 / 60.50	65 - 73 / 67.67
Culmen:	11.5 - 12.9 / 12.34	10.2 - 11.6 / 11	12.1; 13.1 / 12.60	11.5 - 13.2 / 12.30

Measurements of tarsus:

	atriceps Java & Sumatra	*atriceps* Panaitan-island	*bawcanus* Bawean Island
	10 ♀ 12 - 14 / 13.36	1 ♀ 14.90	3 ♀ 14.90 - 15 / 14.97

Measurements from literature:

subsp. *atriceps* CHASEN, Birds of Billiton (Treubia, 16, p. 225)
Wing: 75 - 78 (5♂) 77 (1♀)

BODEN KLOSS, Sumatra birds (Treubia, 13, p. 341)
Wing: 74 - 78 (4♂) 73 - 76 (6♀)

CHASEN & HOOGERWERF, Sumatra birds (Treubia, 18, Suppl., 1941, p. 73)
Wing: 71 - 78 (10♂) 74 - 79 (5♀)

subsp. *hypercmnus* JUNGE, Simalur birds (Temminckia, I, 1936, p. 54/5)
Wing : 75, 78, 78.5 (♂) ; *Tail:* 66, 66.5, 68 (♂) and 65, 68, 70 (♀)
Culmen: 13 - 14 (♂♀)
Tarsus : 15 - 16.50 (♂♀)

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9. On the validity of some subspecies of *Pachycephala cinerea*, known from Indonesia

After comparing 60 freshly collected skins, originating from Panaitan-island (28), other islands in Strait Sunda (12), Udjung Kulon (3), Deli-island (Indian Ocean) (2), Karimundjawa Islands (8) and the Kangean Archipelago (7), I fully agree with BODEN KLOSS & CHASEN's conclusion 1) that this species is so variable that it seems impossible to deal with it subspecifically, except perhaps on size.

The individual colour differences on tail, wings and upper parts are most striking in fresh skins. Old material uses to be rather uniformly coloured but often differs much from recently obtained birds, originating from the same locality. This fact makes it impossible to reach satisfying results when comparing fresh skins with those collected a long time ago, so far it concerns colour-differences in the plumage.

Material of old date is lighter on the wings and upper parts, more buffy brown in stead of showing different shades of olive-brown and olive-grey on the upper parts and pileum as is the case in fresh skins.

The colouring of the under surface perhaps does not show important post-mortem alterations, but in old as well as in fresh material there is much variation in the light parties on breast and throat and in the extension of this area, apparently without having any racial significance.

In our recently obtained material, birds with the darkest upper parts come from the Kangean Archipelago; among the 6 adult specimens from that locality there are 3 being darker, less olivish brown, than any other fresh material in the large series before me. Two skins from the Karimundjawa Archipelago do not differ much from these dark Kangean birds, but they still are a trifle lighter.

Besides the individual variations in the colour of the feathering of fresh skins, the bill of this species seems a rather plastic organ, but on this point there is sometimes a larger similarity in birds of the same population than seems to be the case in the colour of the plumage. It cannot be denied that the specimens originating from the Karimundjawa Islands average longer in the bill than nearly all other 115 birds examined by me. The figures given below show this, though perhaps in a less distinct way than visually. Moreover the tip of the upper mandible averages perhaps in being more distinctly hooked. But on account of the fact I failed to discover other differences in Karimundjawa's population of this *Pachycephala* it seems not justified to separate it on account of these rather subtile differences.

BARTELS & STRESEMANN 2) separated Java birds as *butaloides* because of their shorter wing (79 - 84 against 84 - 89 mm in the nominal race), but among our 98 birds collected within the range of *butaloides*, there are 33 with a wing-length of more than 84 mm and 11 of exactly 84 mm and among all these 98 skins, there are only 7 showing a wing shorter than 80 mm. With a view to this fact the subspecies *butaloides* seems hardly maintainable, even when we restrict its range to Java only, for among the 20 skins coming from this island, measured by me, there are 6 with a wing varying from 84 to 88 mm and only 6 measuring 80 mm or shorter.

The validity seems the more doubtful when considering the important individual difference in wing-length in birds originating from the same locality (77 - 88 mm in 10 male birds from Java and 78 - 87 mm in 13 females from the areas in and around the Sunda Strait).

Because STRESEMANN 3) suggested, when describing the subspecies *secedens* — with a given wing-length of 82 - 84.5 mm — that the average size of this race may be somewhat smaller (etwas beträchtlicher) than in birds belonging to the nominal form, it seems next to certain that *secedens* does not differ in size from birds originating from Sumatra, Java and surrounding areas studied by me. This is also evident from the wing-measurements, given by DE SCHAUENSEE for representatives of the nominal race (Proc. Acad. Sc. Philadelphia, 91, 1939, p. 360): ♂♂ 78, 79.5, 80 and ♀♀ 79.5 and 82.5 mm.

On account of the above I am of the opinion that this subspecies too cannot be accepted on the strength of STRESEMANN's diagnosis, because there is too much individual variation in the colour of the upper parts. And in size also *secedens* does not differ from representatives of *vandepolli* so far I could establish.

DELACOUR 4) used the subspecific name *vandepolli* for the whole population living in Malaya, Sumatra, Java, Bali and Borneo (partly), rejecting *butaloides*. DE SCHAUENSEE and RIPLEY 5) are of opinion that "*vandepolli* differs in having the edges of the secondaries clay colour instead of the same colour as the back". As measurements are given for the wing: 85, 88, 88 and for the bill: 13, 13 and 13.5 mm, thus fitting in with our measurements for birds from Java and surroundings. Though I strongly doubt the existence of any subspecific difference in the colour of the edges of the secondaries between *cinerea, vandepolli* and *butaloides*, I cannot decide whether *vandepolli* is a valid race or not without having seen a sufficient large series of topotypical material. When it is true that there are no subspecifical differences between *butaloides* and *vandepolli*, which causes DELACOUR 4) to synonymize *butaloides* with *vandepolli*, there is apparently no more reason to maintain this last race than there exists in upholding *butaloides*: they both may perhaps be rejected, including their ranges into that of the nominal race.

According to DE SCHAUENSEE and RIPLEY 5) *Pachycephala cinerea* from Nias should differ at a glance from the populations of the larger islands on account of its much larger bill. But as bill-size these authors give 13.5 mm, so not differing from *vandepolli*, measured by the same authors (!) and perfectly fitting in with my bill-measurements in birds from Java, Sumatra and surroundings, for among the 98 measured birds

there are only 48 with an exposed culmen of less than 13.5 mm. Perhaps birds belonging to populations living on smaller islands incline to an increase in bill-size (see measurements of Karimundjawa birds below), which then may no longer be considered as a character of racial importance.

Still an other subspecies, *nesiotis*, was described by OBERHOLSER on account of rather doubtful characters. As diagnosis is given: "Anterior lower parts darker; pileum not so purely gray (more brownish), remainder of upper surface more rufescent, particularly the edgings of wing-quills". But it may be considered as a known fact that these characters are applicable for the greater part to juvenile birds.

From the foregoing it seems evident that it is rather senseless — in any case scientifically not justifiable — to create so many subspecies on account of such dubious characters of so a variable bird as is this *Pachycephala* without being in the position to dispose of good series, by preference of fresh material.

"This is a most difficult bird to understand and in spite of good series in our possession the racial divisions here adopted can only be regarded as tentative" (CHASEN, 6) is exactly also my opinion. A revision of the species seems necessary to arrive at a more satisfying picture than to-day's one can allow us.

VOOUS 7) rejected *butaloides* also, but in my opinion this was not fully justified with so little material at hand. That author states that the species is a characteristic inhabitant of mangroves and Casuarina forests, and all sorts (!) of coastal bushes.

Because of its generality this statement is confusing and not right for in real mangrove, that is to say tidal forests, the species is often not to be found at all or must be called a rare appearance. But sometimes it shows some preference for a coastal vegetation on dry grounds and then it may happen that the birds become typical inhabitants of such areas as is the case on Panaitan-island (HOOGERWERF, 8). But here the bird is at the same time a common appearance in the lower zones of the primeval forest spred all over this enormous island, as also could be established by me on Krakatau, Karimundjawa and Kangean. In Java the species is common too in many inland regions I do know, f.i. in the surroundings of Bogor, even in the Botanical Gardens (HOOGERWERF, 9) and it is also known from areas rather high above sea-level (a.o. Tjibodas, about 1400 m above the sea; HOOGERWERF, 10).

SICCAMA 11) was not quite right in supposing that this species belongs to the resident inhabitants of the tidal forests, for also in the neighbour-

hood of Djakarta the situation is as pictured above and DELACOUR's statement (4, pag. 298) "Common in a narrow fringe along the shore, confined to mangrove and casuarina belts" is also far from being in accordance with the real situation and therefore misleading.

Measurements (subsp. *vandepolli*, freshly collected skins):

♂♂ Wing, Panaitan-island: 80, 80, 80, 80, 81, 81.5, 82, 82, 82.5, 83, 83, 84, 85, 85, 85, 85, 86; Other islands in Strait Sunda: 80, 82, 83, 83, 85, 85, 85, 85, 85, 86, 86; Karimundjawa Islands: 83, 85, 85, 86, 87, 87; Kangean Archipelago: 87, 88 mm.

Tail, Panaitan-island: 60, 63, 65, 65, 65, 65, 65, 65, 65, 66, 66, 66, 67, 67, 68, 68; Other islands in Strait Sunda: 61, 62, 63, 64, 64, 64, 65, 65, 65, 67, 67; Karimundjawa Islands: 63, 64, 67, 68, 68, 70; Kangean Archipelago: 65, 65 mm.

Culmen, Panaitan-island: 12, 12, 12.5, 13, 13, 13.5, 13.5, 13.5, 14, 14.5, 14.5, 15, 15, 15, 15, 15; Other Islands in Strait Sunda: 12.1, 12.5, 12.9, 13, 13.3, 13.4, 13.5, 13.8, 13.9; Karimundjawa Islands: 14, 14.5, 15, 15.5, 15.6; Kangean Islands: 11.1 mm.

Max., min. and average measurements:

	Panaitan-island	Other islands Strait Sunda	Karimundjawa Islands	Kangean Islands
Wing:	80 - 86 / 82.64	80 - 86 / 84.09	83 - 87 / 85.50	87; 88 / 87.50
Tail:	60 - 68 / 65.38	61 - 67 / 64.27	63 - 70 / 66.67	65; 65 / 65
Culmen:	12 - 15 / 13.81	12.1 - 13.9 / 13.16	14 - 15.6 / 14.92	11.10

Same subsp., skins of old date:

	Krakatau Group of islands Strait Sunda		Java	
Wing:	82 - 89 / 85	5♂	77 - 88 / 83.70	10 ♂
Tail:	63 - 66 / 64.60	5♂	60 - 69 / 64.40	10 ♂
Culmen:	11.50 - 14 / 12.78	5♂	12.50 - 14 / 13.44	10 ♂

♀♀ Wing, Panaitan-island: 76, 80, 80, 80, 80.5, 82, 82, 82, 83; Other islands in Strait Sunda: 78, 79, 80, 81, 82, 82, 82, 82, 83, 84, 84, 85, 87; Karimundjawa Islands: 82, 84, 85, 85, 85, 85; Kangean Islands: 83, 83, 83, 84 mm.

The upper parts are very variable too, not only in the blue or bluish green of the mantle and wings, but also in the tint of the much lighter blue of back and upper tail coverts, in the colour of cap and occiput and of the more or less cinnamon coloured nuchal collar. In the three old skins (♂) of *fraseri* before me the mantle and wings vary from light, somewhat bluish coloured green to dark greenish blue and still they originate from West Java and two of them from exactly the same locality. In these birds there is also much colour-difference on back and uppertail coverts and, finally, there is some variation in the tint of the crown. The situation is rather similar when looking upon our three recently collected skins from Karimundjawa (2 ♂, 1 ♀), though they were all secured at about the same date and on exactly the same locality.

When mixing 3 ♂ and 1 ♀ belonging to *fraseri* and obtained in 1928, 1936 and 1942 with the 11 birds of *cyanopteryx* before me, it is quite impossible to separate *fraseri* from *cyanopteryx* without looking on the labels. But the 4 ♀ of this latter subspecies have a somewhat lighter crown than all males of the same race and all 4 *fraseri* skins. Two of our Karimundjawa birds (♂ and ♀) agree with *cyanopteryx* females because of their light pileum but the third skin (♂) from Karimundjawa closely resembles darkest-headed *fraseri*, but certain *cyanopteryx* too.

All specimens of *javana* which I could study, together with the only skin of *gouldi* differ at a glance from both subspecies mentioned above because of the divergent tint of crown and neck which is of a rather uniform cinnamon, giving those parts quite another appearance.

Both *isoptera* and *floresiana* before me cannot be separated from certain individuals of *fraseri* or *cyanopteryx* but the only *simalurensis* is very dull on the mantle and the wings which, however, may be caused by the fact that the feathers are heavily worn. RIPLEY 2) considered *isoptera* already as a synonym of *sodalis* but the only two skins of *floresiana* seen by me, do not justify a definite conclusion so far the validity of this race is concerned, though I do look upon it with a certain degree of suspicion.

I classified Karimundjawa birds as *fraseri* on account of the geographical position of the islands of origin and because of the striking difference with Bornean birds seen by me in the Bogor museum. Of this Karimundjawa material which was collected in October, the female had the ovarium well granular (ovi 2-3 mm), but of the males the gonads were rather small (test. 2-3 and 8-10 mm).

After comparison with a large series of this Kingfisher in the collection of the Leiden museum, it became evident that our Karimundjawa birds fit rather well in Java's *fraseri*. Among 6 skins from Borneo pre-

sent in Leiden, three show about the same uniformly coloured cinnamon-yellowish occiput and nape as the Bornean material studied by me in Bogor. All these three specimens- however- have a considerably larger wing, bill and tail as the average *fraseri* from Java and *cyanopteryx* known from Sumatra. On account of this they differ from the Bornean birds in the Bogor museum which show smaller measurements, even when compared with *fraseri*. The remaining three birds from Borneo are similar in size with those Bogor skins and this also holds good for two recently collected skins from this island. All these five specimens have a dark occiput or a colour which falls within the variations of *fraseri*. Owing to this it seems probable that Borneo is inhabited by two different races, viz. one with a uniformly coloured cinnamon-yellowish occiput, living in Central and Northeast Borneo, which might be called *javana* and a subspecies with a less uniformly tinted occiput and nape living in Southeast- and Central East-Borneo, which perhaps is identical with *fraseri*.

The study of the Leiden material made it evident that *cyanopteryx* is separable from *fraseri* on account of the clearer blue and green upper parts and wings, which may be accepted as a racial character so long *simalurensis* is maintained as different from *fraseri* owing to colour-differences of the upper body which seem less strikingly present than those between *fraseri* and *cyanoteryx* so far it concerns the material seen by me.

I could not discover any sexual dimorphism in the plumage, but in all subspecies the females average larger than the males as is evident from the figures given below.

JUNGE 3) focussed attention already on the important variation in the colour of the plumage on the upper parts of this large Kingfisher, especially on the pileum. He was of the opinion that the cap is of a uniform dark brown directly after moulting and becomes paler and paler afterwards on account of abrasion and fading, finally changing into a whitish brown just before moulting again. In my opinion that is not always the case and certainly not to such an important degree to explain the often striking differences in tint of the pileum between birds of different subspecies.

The subspecies *simalurensis* is accepted by that author on account of differences in the tint of the blue on the upper surface. As JUNGE remarked already ROBINSON and KLOSS 4) classified Sumatran birds as *cyanopteryx* with considerable hesitation because of the supposed similarity with *javana*. They established as the only difference after comparing 6 skins of each population, that three out of six skins originating from this island had browner caps than all six Bornean ones, which induced JUNGE to write:

"So after what is said above about the colour changes of the pileum it is possible that they are identical".

Though we can agree with JUNGE so far it concerns certain colour variations as is evident from my notes given above, I fail to see the suggested similarity of Bornean *javana* with the populations of this Kingfisher living on Java and Sumatra, known as *fraseri* and *cyanopteryx* because of the quite different tint of the occiput and neck. There is some individual variation in this respect in *javana* too but this is not very important and the striking uniformity in the colour of upper head and nuchal collar in many adult birds never seems to disappear and this tint, moreover, is quite different from nearly all other skins belonging to the races mentioned above except perhaps *gouldi*. Moreover *javana* averages smaller than birds from Java and Sumatra. In my opinion *javana* and *fraseri* are two well-defined subspecies, in any case much better distinguishable than *cyanopteryx* from *fraseri* which are however, united by DELACOUR 5), for reasons unknown to me. That author recognizes only *malaccensis, fraseri, simalurensis, sodalis* and *floresiana* so far it concerns Indonesia.

The subspecies *arignota*, also described by OBERHOLSER from Sumatra, is synonymized in CHASEN's Handlist 6) with *cyanopteryx* but BODEN KLOSS 7) classified two birds from Palembang as *arignota* because of their smaller size; this race should be restricted to Southeast Sumatra and Billiton. CHASEN 8) identified three females from Billiton as *cyanopteryx* and it is true that the wing-measurements given by him do not justify separation. When restudying these skins together with those from Palembang, I failed to find any difference in size or in colour of the feathering which might be important enough to maintain *arignota*.

Nesoeca seems to be a good subspecies on account of the large size, when looking upon the measurements given by DE SCHAUENSEE 9) for he gives as wing-size 152-155 mm (♂♂) and 158-163 mm (♀♀), but OBERHOLSER 10) mentioned as average winglength for 6 ♂: 146.90 mm, thus smaller than certain specimens of *hydrophila* (considered by PETERS 12) as a synonym of *malaccensis*) and *cyanopteryx* as is obvious from the figures given below. With a view to the rather doubtful characters mentioned in the diagnosis of the subspecies *nesoeca* and *isoptera*, it seems justified to follow RIPLEY 2) in uniting both these subspecies with *sodalis* though RICHMOND's diagnosis 11) seems hardly sufficient to uphold even this last race. Because I could not study material of true *sodalis* I have no definite opinion as is the case with *intermedia* HUME, known from the

Nicobar Islands and *malaccensis* SHARPE from the Riouw- and Lingga-Archipelago.

From the figures compiled from literature as given below it is evident that the variations in measurements in 46 ♂ and 39 ♀ belonging to 14 different "subspecies" amount to 17.5 (♂) and 18 mm (♀) for the wing, 15.5 and 21 mm for the tail and 14.5 and 18 mm for the exposed culmen, which seems not very important for such a large bird. Minimum measurements could be established for wing and culmen in the males of *malaccensis*, for the wing in *fraseri* and *arignota* and for the tail of *gouldi* and the maximum length of wing and culmen for *nesoeca* and for the tail in *isoptera*. In the females the smallest wing was found in *simalurensis*, the smallest tail in *gigantea* and the smallest culmen in *fraseri* and *arignota* (= *cyanopteryx*). Maxima could be established in *cyanopteryx* and *nesoeca* (= *sodalis*) for the wing, in *intermedia* for the tail and in *sodalis* for the culmen.

The variations in size indicated above do not differ much from those found by me in the 18 ♂ and 13 ♀ present in the Bogor museum, but in this case *javana* proved to be smallest in all dimensions in birds of both sexes except the tail of the males, in which *gouldi* measured 4 mm shorter than *javana*, a minimum not reached in any other race as is evident from the figures given below. But this does not seem very important because in the females of this subspecies the tail-size varies from 85 to 105 mm. In *isoptera* (= *sodalis*) the longest tail in the males and the largest wing and culmen in the females could be established, in *floresiana* the largest wing in the males was found and in *fraseri* the longest culmen, whereas it was a female of *javana* (!) which showed the longest tail.

PETERS 12) includes *hydrophila* into *malaccensis* though according to the figures, given below there may exist a difference in wingsize in the males of both these races of 17 mm (154.50 against 137.50). With a view to these rather important size differences in wing (of *malaccensis*) and in tail (of *javana*) and in billsize in the females of *intermedia* (11 mm) and *simalurensis* (11 mm), in addition to which may be asked attention for the important individual difference in wingsize in 10 ♂ of *nesoeca* (= *sodalis*) of which OBERHOLSER mentions as a minimum 143 and DE SCHAUENSEE 6) a maximum of 155 mm, there seems not much reason for accepting size-differences as racial characters so far it concerns the subspecies mentioned above of which 64 ♂ and 52 ♀ in total could by studied, though *javana* (6 ♂ 5 ♀), *malaccensis* (including *hydrophila*) (7 ♂ 3♀) and *fraseri* (9 ♂ 6 ♀) average smallest — *javana* perhaps smallest of all —, and *sodalis*, including *isoptera* and *nesoeca* (12 ♂ 10 ♀) largest.

Measurements (in mm):

♂♂ Wing, *fraseri* (Java): 140, 145, 147; *fraseri* (Karimundjawa Islands): 145, 148; *javana*: 136, 137, 137, 138, 140; *cyanopteryx*: 138, 142, 145, 146, 148; *isoptera*: 148; *floresiana*: 150; *gouldi*: 144.

Tail, *fraseri* (Java): 91, 92, 93; *fraseri* (Karimundjawa): 96, 98; *javana*: 85, 86, 88, 88, 89; *cyanopteryx*: 86, 91, 91, 91, 92; *isoptera*: 100; *floresiana*: 92; *gouldi*: 81.

Culmen; *fraseri* (Java): 71.2, 72.5, 73.8; *fraseri* (Karimundjawa): 74.4, 78; *javana*: 68.8, 69.2, 72, 73.3, 75.2; *cyanopteryx*: 72, 73, 74, 75.2, 76; *isoptera*: 77.5; *floresiana*: 73; *gouldi*: 77.9.

Max., min. and average measurements:

	fraseri Java	*fraseri* Kar. Djawa	*javana*	*cyanopteryx*	*isoptera*	*floresiana*	*gouldi*
Wing:	140 - 147 / 144	145; 148 / 146.50	136 - 140 / 137.60	138 - 148 / 143.80	148	150	144
Tail:	91 - 93 / 92	96; 98 / 97	85 - 89 / 87.20	86 - 92 / 90.20	100	92	81
Culmen:	71.2 - 73.8 / 72.50	74.4; 78 / 76.20	68.8 - 75.2 / 71.70	72 - 76 / 74.04	77.50	73	77.90

♀♀ Wing, *fraseri* (Java): 151, 155; *fraseri* (Karimundjawa): 154; *javana:* 143, 144, 153; *cyanopteryx*: 149, 150, 151, 153; *isoptera*: 159; *floresiana*: 155; *simalurensis*: 148.

Tail, *fraseri* (Java): 98, 100; *fraseri* (Karimundjawa): 99; *javana*: 85, 92, 105; *cyanopteryx*: 90, 92, 93, 94; *isoptera*: 96; *floresiana*: 98; *simalurensis:* 95.

Culmen: *fraseri* (Java): 74.8; *fraseri* (Karimundjawa): 76; *javana*: 69, 69.2, 73; *cyanopteryx*: 72, 72.1, 74.7, 75.8; *isoptera*: 79; *floresiana*: 76.5; *simalurensis*: 77.8.

Max., min. and average measurements:

	fraseri Java	*fraseri* Kar. Djawa	*javana*	*cyanopteryx*	*isoptera*	*floresiana*	*simalurensis*
Wing:	151; 155 / 153	154	143 - 153 / 146.67	149 - 153 / 150.75	159	155	148
Tail:	98; 100 / 99	99	85 - 105 / 94	90 - 94 / 92.25	96	98	95
Culmen:	74.80	76	69 - 73 / 70.40	72 - 75.8 / 73.65	79	76.50	77.80

Size-variations in all (18) ♂♂:

Wing:	136	(*javana*) —	150	(*floresiana*)	= 14 mm
Tail:	81	(*gouldi*) —	100	(*isoptera*)	= 19 mm
Culmen:	68.8	(*javana*) —	78	(*fraseri*)	= 9.2 mm

Size-variations in all (13) ♀♀:

Wing:	143	(*javana*) —	159	(*isoptera*)	= 16 mm
Tail:	85	(*javana*) —	105	(*javana*)	= 20 mm
Culmen:	69	(*javana*) —	79	(*isoptera*)	= 10 mm

For max., min. and average measurements compiled from literature see p. 156 & 157.

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Max., min. and average measurements in mm, compiled from lit

	simalurensis	*isoptera*	*sodalis*	*nesoeca*	*cyanopteryx*	*hydroph*
♂♂ Wing:	139 - 141 / 140	145 - 152.5 / 148.80		143 - 155 / 150.33	142.5 - 146 / 144.40	154.5
Tail:	89.5 - 94 / 91.50	90 - 97.5 / 93.90		90 - 93 / 91.40	85.5 - 94.5 / 91.10	93.5
Culmen:	78.5 - 81.5 / 79	73.5 - 82 / 78.70		76.5 - 83 / 80.20	72 - 73 / 72.50	75
♀♀ Wing:	145 - 152 / 147.90	148; 154 / 151	158 - 161 / 159.38	158 - 163 / 160.60	163	152; 1 / 153
Tail:	94 - 100 / 96.80	92; 96 / 94	101 - 104 / 102.50	95; 102 / 98.50	99	96.5; / 96.8
Culmen:	72 - 83 / 77.90	79; 85 / 82	84.5 - 88 / 86.25	80.5; 86.5 / 83.50	75	79.5; / 82.8

Size-variations in all (46) ♂♂:

Wing: 137.50 (*malaccensis, fraseri, arignota*) — 155 (*nesoeca*) = 17.50 mm

Tail: 82 (*gouldi*) — 97.50 (*isoptera*) = 15.50 mm

Culmen: 68.50 (*malaccensis*) — 83 (*nesoeca*) = 14.50 mm

:e [principally from OBERHOLSER 8)]:

accensis	*floresiana*	*fraseri*	*javana*	*gouldi*	*gigantea*	*arignota*
5 - 146 / 141.50	145	137.5 - 141 / 139	141	139.5 - 141.1 / 140.50	148.5 - 152.5 / 150.80	137.5 - 141 / 139
6 - 94 / 89.90	91	86.5 - 92 / 88.90	92	82; 84 / 83	89 - 94.5 / 91.30	86.5 - 92 / 88.90
3.5 - 75 / 71.20	81	70.5 - 76.5 / 73.50	77	80; 82 / 81	74.5 - 78.5 / 76.70	70.5 - 76.5 / 73.50
	intermedia					
47 - 156 / 152.80	151 - 159 / 154.60	147.5 - 150.5 / 148.70	150; 152.5 / 151.30	147.5; 153 / 150.30	147; 155 / 151	147.5 - 150.5 / 148.70
8 - 100 / 99.30	94 - 105 / 96.70	92 - 98.5 / 94.20	93; 98 / 95.50	90.5; 96.5 / 93.50	84; 89.5 / 86.80	92 - 98.5 / 94.20
3 - 78.5 / 76.30	73 - 84 / 78.40	70 - 75.5 / 73	73.5; 75 / 74.30	76; 80.5 / 78.30	78; 82.5 / 80.30	70 - 75.5 / 73

Size-variations in all (39) ♀♀:

Wing: 145 (*simalurensis*) — 163 (*cyanopteryx, nesoeca*) = 18 mm

Tail: 84 (*gigantea*) — 105 (*intermedia*) = 21 mm

Culmen: 70 (*fraseri, arignota*) — 88 (*sodalis*) = 18 mm