NOTES ON INDONESIAN BIRDS WITH SPECIAL REFERENCE TO THE AVIFAUNA OF JAVA AND THE SURROUNDING SMALL ISLANDS (III) *)

by

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11. On the Sunda Island Cuckoo-Dove *Macropygia phasianella* (TEMM.)

A small series of freshly obtained specimens from the islands in the Sunda Strait, Java's most western peninsula Udjung Kulon and from Deli and Tindjil Islands **) (off Java's south coast) led to the comparison of these specimens with the material present in the Bogor Museum of which this paper will be the report.

There is a considerable degree of variation in the maroon colour of the underparts and in the extensiveness and tinge of the metallic violet on the neck and mantle in male birds. Such is also the case with almost any part of the plumage of the females.

SIEBERS [9]) valued the brownish area on the innerweb of the first primary and greyish regions on the innerweb of the outermost tailfeathers to be of racial significance. I focussed my attention to these characters on account of their importance. SIEBERS was of the opinion that birds from Sumatra have no or little brownish on the innerweb of the first primary and that the quantity of this colour increases on specimens coming from more eastern localities. It should reach its maximum in *megala* known from the Kangean Archipelago. This conclusion, however, was based on only two specimens from Sumatra, one from Kangean and a series of specimens from Java. It is highly probable that none of these characters are of racial significance which I will try to make clear with some examples.

I agree with BODEN KLOSS [1]) who rejected *barussa* (he abusively named it *barussana*) though there remains a possibility that Sumatra birds are smaller in wingsize than the Javan representatives. Among the examined female birds originating from Java, the areas indicated above and South Sumatra there are three which show a very narrow brownish edge on the

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**) Formerly known as the Klapper- and Trouwers- Islands.

innerweb of the first primary. Two of these were obtained from Gedangan (Central Java) and one from Palembang. In two of these three birds this margin is hardly visible. The second bird from Gedangan shows this mark very conspicuously and is 3 - 4 mm wide, agreeing with a female from Tindjil island. Another female from the nearby Deli island has no brown at all on the first primary. While a male bird from the same locality shows a brown strip of about 2 mm wide on the primary, another one from Tindjil has so little brown that it is hardly visible. A male from Sebuku island has no brown except a narrow margin of 20 × 2 mm in the centre of the margin of the first primary. A male from the nearby Sebesi island again has a very distinct brownish zone of 2 - 4 mm wide. One female from the same locality shows a margin of 2 mm and another one of about 4 mm. Finally, two females from East Java and one from West Java (Tjibadak near Bogor) are quite similar in this respect. They all have a brownish margin on the innerweb of the first primary of 3 - 4 mm. From the above it is evident that the variability of this character is an individual and not a subspecific one.

The greyish mark on the innerweb of the outermost tailfeathers vary in all birds examined to about the same degree as the redbrownish region on the first primary. Birds from Tindjil island show much dull grey on the outertail feathers but this character varies in specimens from Sebesi and Sebuku as well as from Java. Hence it is not very useful to be used as a racial character.

Birds obtained from South Sumatra and the islands Legundi, Sebuku and Sebesi do not show important size differences when compared with those from Java. Also on account of some differences in wingsize as suggested in the diagnosis, the subspecies *barussa* with a winglength of 170 (♂) and 161 (♀) can hardly be maintained. SIEBERS himself gave as wingsize for Java birds 168, 175 (♂) and 165 - 174, av. 169.80 mm (5 ♀). BODEN KLOSS [1]) found 163 - 180 (♂) and 160 - 174 (♀) and I measured 166, 177 (♂) and 163 - 173, av. 168.57 mm (7 ♀). Though BODEN KLOSS arrived at the same conclusion I considered it useful to restudy the validity of *barussa* in order to procure more concrete particulars than presented.

I have no material from the Kangean Archipelago. I did not obtain a single specimen during my 1954 expedition to these islands so that I cannot have an opinion about SIEBERS' *megala* described from Kangean. If it is indeed so that there is such an important difference in wingsize as mentioned in the diagnosis, there seems reasons enough to separate Kangean's population of this Cuckoo-Dove without considering the character discussed above. Because such large wings are only known from one male

bird (the type) more material is highly necessary to confirm SIEBERS' experiences.

Judging from the diagnosis I am also inclined to consider with some suspicion several other subspecies, among which are *elassa* known from some islands off Sumatra's west coast, *hypopercna* from Simalur island and *borneensis* from Borneo. The subspecies *hypopercna* was described by OBERHOLSER on the basis of a single immature specimen. This race is said to be larger than *elassa* erected by the same author from Pagi island. But in which respect *hypopercna* does differ from *modiglianii* which was described 25 years earlier and which also should be larger than *elassa*, the diagnosis does not give us a clear indication. The differences in plumage as indicated by the author are of no subspecific significance. RIPLEY [7]) found it impossible to determine the validity of *hypopercna* with only one immature specimen available. He found a striking resemblance with the Nias race (*modiglianii*). He considered the latter subspecies larger than *emiliana* but when compared with *elassa* there seems also be a slight reduction in the amount of the irregular bars on the breast and several colour differences.

The subspecies *borneensis* was separated on account of some plumage differences. In my opinion their racial value is very doubtful if it is not established from large series, also considering the development of the reproductive organs which in this bird may have some influence on the feathering. For one male *borneensis* is given a wing measurement of 163 mm. It is also mentioned that Java birds have larger wing measurements (180 mm) than the Bornean race. However, in my opinion, Java birds with this wingsize must be seen as a high exception, because among the 20 skins I measured there was not a single one with such a long wing. There were no more than nine specimens which surpassed 170 mm, among which two specimens exceeded 175 mm (177 and 178 mm); nine had wings varying from 163 - 168 mm and only a single female had wings with a length of 163 mm. On this basis, if compared with *emiliana* from Java and Sumatra, *borneensis* is perhaps not well maintainable if no differences are available other than those mentioned in the diagnosis. Furthermore it is also doubtful whether the diagnostic characters are still applicable for larger series.

It is a remarkable fact that in this difficult Cuckoo - Dove so many subspecies have been described on the basis of only one (*elassa, hypopercna, megala, borneensis*) or two specimens (*barussa*). In one case even on only one immature specimen of unknown sex (*hypopercna*).

The subspecies *cinnamomea* known from Enggano islands as mentioned in CHASEN's [2]) list has been given specific rank by JUNGE [5]) and RIPLEY [7]). It is not being discussed in this paper.

Measurements (in mm) *of Macropygia phasianella emiliana*:

♂♂ Wing; Java: 166, 177; Sunda Strait including Deli and Tindjil island: 170, 171, 172, 173, 174, 178;

Tail; Java: 155, 158; Sunda Strait: 163, 168, 173, 175, 177, 178;

Culmen; Java: 17.2, 18.2; Sunda Strait: 16, 16.9, 17, 17, 18, 18.5;

Max., min. and average measurements:

	Java:	Sunda Strait:
Wing:	166, 177 / 171.50	170 - 178 / 173
Tail:	155, 158 / 156.50	163 - 178 / 172.33
Culmen:	17.2, 18.2 / 17.70	16 - 18.5 / 17.23

♀♀ Wing; Java: 163, 165, 167, 168, 172, 172, 173; Sunda Strait including Deli and Tindjil island: 164, 165, 167, 167, 170;

Tail; Java: 145, 150, 152, 152, 156, 158, 168; Sunda Strait; 156, 157, 160, 160, 166;

Culmen; Java: 16, 16.2, 17, 17.5, 17.6, 18, 18.9; Sunda Strait: 14.3, 16, 16, 16.7, 17.5;

Max., min. and average measurements:

	Java:	Sunda Strait:
Wing:	163 - 173 / 168.57	164 - 170 / 166.67
Tail:	145 - 168 / 154.43	156 - 166 / 159.80
Culmen:	16 - 18.9 / 17.31	14.3 - 17.5 / 16.10

Weight:

Strait Sunda: ♂♂ 145 - 210 / 165.83 ♀♀ 112 - 180 / 150.40 grammes

Some measurements compiled from literature:

BODEN KLOSS [1]) Wingsize:

emiliana Java ♂♂ 163 - 180 ♀♀ 160 - 174

SIEBERS [3])

emiliana Java	3 ♂	168, 170+ x, 175	5 ♀	$\frac{165 - 174}{169.80}$
barussa Sumatra	1 ♂	170	1 ♀	161
megala Kangean	1 ♂	204		

JUNGE [4])

Macropygia cinnamomea

2 ♂ Wing: 195, 200; Tail: 177, 178; Culmen: 20, 20.
3 ♀ Wing: 192, 193, 201; Tail: 173, 173; Culmen: 20, 20.

JUNGE [4])

modiglianii Nias	♂	Wing: 183; Tail: 180; Culmen: 17
	♀	Wing: 174; Tail: 160; Culmen: 16
hypopercna Simalur	♂	Wing: 186; Culmen: 18

RIPLEY [7])

modiglianii	♂	Wing: 184.5; Culmen: 17.50
	♀	Wing: 183, 185; Tail: 184, 184.5; Culmen: 16, 17
elassa	♂	(Type specimen) Wing: 179.5; Tail: 171 (moult); Culmen: 20
Macropygia cinnamomea		
	♂	Wing: 205.5; 207; Tail: 181.5; 198
	♀	Wing: 196, 203; Tail: 173, 179

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12. Some remarks on the Little Green Heron, *Butorides striatus* (LINN.) from the Indonesian Archipelago.

A study of freshly obtained and old, partly not yet studied, specimens in the Bogor Museum gave evidence how important colour differences in the plumage can be in birds belonging to the same population. This demonstrates the necessity of extensive series for comparison when studying this difficult bird on subspecific level. The freshly secured material consists of four males and five females from Karimundjawa islands, four males from Bawean, one male and one female from the Kangean Archipelago. The approximate 25 old skins originated from Java, Billiton, Borneo and Celebes.

The male birds from Karimundjawa had small to moderately developed gonads (testes: 4 - 15 mm). Among the females there are three specimens which had well granular ovaries and one specimen with hardly granular one; one juvenile has heavily streaked underparts and no ornamental plumes on the back. A male from Bawean had large reproductive organs (testes: 12 and 20 mm); another Kangean male showed moderate testicles (8 mm) whereas a female from the same locality had a well granular ovary.

There is apparently little *post-mortem* discolouration but fresh skins have somewhat more vivid colours on the wings and upper parts than old ones. The same holds true for formalin preserved specimens as is evident from some skins among the Bawean and Kangean material. There is a considerable degree of variation in the colour of the underparts of 30 skins from the areas indicated above which are classified as or considered to belong to *javanicus*. This is also observable in specimens originating from the same locality.

Five females from Karimundjawa and one from Kangean differ from any other skin including the five males from the same localities. Females from Pontianak, Edam island (Bay of Djakarta), Bone (South Celebes) collected respectively in 1931, 1920 and 1912 all closely resemble females from Karimundjawa. They differ from five other females from Java, two from Billiton and two from Buton (South Celebes) in the very dark

foreneck and the brownish buffy tint of the chest while the lower underparts are more intensively washed with this colour. Furthermore there are more or less distinct dark streaks on the central part of the foreneck and chest and well-defined markings on the throat in certain birds. These markings give the impression as if they were juveniles but all Karimundjawa and Kangean specimens had well granular ovaries, sometimes showing ova of 2 - 4 mm. In addition to the skin from Bone which resembles the fresh Karimundjawa females, another female from Celebes is still much darker on the lower foreneck and chest. However, both these Celebes females are lighter on the abdominal region than the fresh Karimundjawa material. The female originating from the Bay of Djakarta is a trifle lighter on the foreneck and chest but it may have been a semi adult specimen.

It is to be regretted that when compiling this paper I could not dispose of a single male from Java for comparison with the four recently collected males from Karimundjawa, four from Bawean and one from Kangean. The four males from Karimundjawa do not differ considerably from the Java females and the two Billiton males. As already remarked by VAN BEMMEL and VOOUS [1]) these birds are a trifle lighter. Among the males, the four from Bawean and the only specimen from Kangean are darker on the foreneck and chest than those from Karimundjawa and Billiton. These parts are not only darker but also washed with a dirty buffy tint, while the lower underparts are also darker and dirtier in colour than in the fresh Karimundjawa and the old Billiton material. These five males resemble the females from Karimundjawa and Kangean but the latter are still darker on the foreneck. Moreover the light markings on the foreneck and chest fail in the males from Bawean and Kangean and there are no spots on the white of the throat and foreneck. These males show resemblance to the two males from Borneo secured near Pontianak in 1931 and nearby Ketapang in 1941. Two males obtained from Bone (Celebes) in 1912 and 1913 are still darker on the lower foreneck and chest but lighter on the lower underparts, looking rather similar to a female from the same locality. The four males from Karimundjawa do not differ much from four females from Java and the two males from Billiton.

When comparing colour differences in the plumage, the upperparts are not less important than the under surface. MAYR pointed out, as quoted by VAN BEMMEL and VOOUS [1]), that sexes differ in the plumage of the upperparts, the male being on the average darker than the female and shows narrower buffy edges on the wing coverts. At another occasion MAYR [6]) remarked that the female is smaller than the male and that she

also has the lanceolate feathers of the back shorter and shows more spotting on the throat.

When looking at fresh material with badly as well as well developed gonads it seems hardly justifiable to indicate that males are darker above than the females. In material originating from Karimundjawa islands it is so that the males make a lighter greyish impression on account of the intensively developed lanceolated mantle feathers. These are shorter and less numerous in the females. There is much variation in the tint of the upper parts in birds of both sexes, perhaps principally caused by the development of the gonads. It is rather dangerous to speak of constant sexual dimorphism in the plumage though the males in nuptial dress may show the lanceolated occipital feathers longer and the ornamental plumes on the back heavier.

Birds of both sexes in nuptial plumage show striking ornamental plumes on the back and may have the occipital crest heavier, showing a more or less distinct metallic green shine. The upper parts give quite a different aspect when compared with birds in their non-nuptial period. When comparing a male from Kangean with testicles of 8 mm and a female from the same locality with well granular ovary, it cannot be denied that the female is much darker than the male, principally because the plumes are less numerous and much less clear grey. It is also impossible to establish any differences in the width of the buffy edges on the wingcoverts in both these specimens. In the remaining fresh birds the smallest wing-coverts in the females show the buffy edges more strikingly than in the males though differences in this respect on the larger wing-coverts are not constant. In my material the light edges on the wing-coverts are usually more buffy coloured in the females than in the males. In many cases they are nearly white but this character is also not constant and in certain skins the opposite is the case.

The four males from Bawean island have more green on the pileum and the remaining upper parts than the males from Karimundjawa though they did not differ much in the development of the reproductive organs. The male bird from Kangean seems somewhat intermediate between the rather dull green Karimundjawa birds and the more intense green males from Bawean. It has an extremely heavy bundle of ornamental plumes on the back, nearly reaching the tip of the tail. A male from Borneo (Pontianak) showing a large crest is much greener on the upper surface than another Bornean male from Ketapang. The plumes are green for the greater part in the first male but grey in the second one. This Pontianak male shows much resemblance to two Celebes males for these skins too

have plumes which are more metallic green than grey, making them different from all old and fresh male birds. These show some resemblances to a skin of *amurensis* I saw, which is decidedly larger. The two Billiton males and the only one male from Buton (Celebes) do not differ much in the upper parts from fresh Karimundjawa birds and the skin of old date obtained at Ketapang (Borneo).

Three out of the five fresh female skins from Karimundjawa differ from the males originating from the same locality by the less numerous and less grey plumes and also because of their shorter crest; two females had badly developed ovaries, the lanceolated mantle feathers are not very strikingly present and they are more bronzy green than grey, which makes them at once different from a female with large gonads. Also in the Kangean female the ornamental plumes are more green than grey, though they are well developed. Perhaps these plumes become clear grey in birds with growing reproductive organs. The Pontianak female agrees rather well with a female from Karimundjawa with a small ovary because the plumes are not very striking and they are bronzy green, causing the disappearence of hardly any grey in the upper parts. A female from Celebes resembles the males from this island, but the plumes are darker and less numerous, causing this female being much darker than males, thus again showing the opposite picture as suggested by MAYR.

Five females from Java, two from Billiton and two from Buton do not differ much in the colour of the upper surface from our fresh Karimundjawa material and they show the same individual variations. A female from the Bay of Djakarta resembles a female with a small ovary from the Karimundjawa islands and another female from Djakarta resembles another female from Karimundjawa with large ovarium.

The material originating from Celebes and Pontianak requires perhaps further study because it varies in the colours of the well developed plumes but the skins studied were obtained so far back as 1912, 1913 and 1931 and do not justify a difinite conclusion.

The subspecies *moluccarum* differs distinctly from *javanicus* on account of the quite different tint on the lower neck and upper back, usually purer grey in the latter subspecies, dirtier and slightly washed with brown in *moluccarum*. In *papuensis* the neck and upper back are still darker with a predominance of brown. It is rather remarkable that the female from Pontianak resembles much *papuensis* when looking upon the tint of the lower neck and upper back, but the male originating from the same locality does not differ much from *javanicus*. A female from Celebes seems still darker on those parts than *papuensis* but both

Celebes males seem closer to *moluccarum*, certainly not resembling *javanicus*. Also two females from Karimundjawa islands and from Kangean are very dark on those parts as is the case in a juvenile female from Karimundjawa with a wing of only 155 mm, which is largely bronzy brown above with a greenish black pileum and nape.

The only (semi adult) male of *amurensis* studied was secured by me in 1937 in the central part of Acheen (North Sumatra) in a habitat quite unknown for the coastal regions visiting *javanicus*. This subspecies is considered to be a migrant in the Indonesian Archipelago. In West Java too I repeatedly observed the subspecies *amurensis* on stony riverbeds, sometimes in mountainous well forested areas rather high above sealevel; two specimens in my private collection were lost.

When looking upon the upper parts, this Sumatra bird resembles the females from Pontianak and Celebes discussed above; as is the case in those females the lower neck and upper back are somewhat glossy bronzy brown. This immature bird is distinctly different from nearly all *javanicus* on account of its large wing (188 mm).

The subspecies *steini* described by MAYR [5]) could not be compared with the birds at hand because there is not a single skin of this race available in Bogor. In size it seems intermediate between *javanicus* and *amurensis*.

In view of the important individual variation in birds belonging to the same subspecies, sometimes even occurring among birds originating from the same localities, it is necessary to be very critical when establishing colour differences in the plumage as racial characters. Also in the measurements it seems extremely difficult to find well-defined size differences as racial characters.

For birds originating from Celebes and Kangean MAYR [5]) gives as wingsize 169 - 179 for the males and 174 for the females, whereas I noted for Kangean: 178 (♂) and 175 (♀) and for Celebes: 168, 174 (♂) and 163 mm (♀) which measurements fit rather well in those given by MAYR. They also agree with the measurements of our Java material and of birds coming from the neighbourhood of this island. This makes it evident that MAYR's figures, 183 mm for the wing of a female from Java and 180 mm for a Bali bird are rather large. I never encountered a single bird from Java and the surrounding islands which had a winglength of 180 mm. Most of them even remain below 175 mm.

Looking at the figures given below it is evident that wing- and tail-measurements do not vary much in both sexes, though females average a trifle smaller than males.

JUNGE [4]) gives many measurements of this heron originating from different parts of Indonesia. So did MAYR [5]) and VAN BEMMEL and VOOUS [1]). Considering these figures so far it concerns Java birds it is evident that the maximum winglength found by JUNGE for ten adult specimens (163 - 171 mm) is 12 mm shorter than the only female measured by MAYR. But JUNGE's maximum is also lower than mine for birds originating from the small islands around Java. I established in nine males and six females from Karimundjawa, Bawean and Kangean a winglength which varied from 162 to 178 mm. A Billiton male measured by VAN BEMMEL and also by me shows a wing of 180 mm. These measurements justify the supposition that *javanicus* may vary in winglength from 162 (a female from Karimundjawa) to 183 mm (on account of MAYR a female from Java).

RENSCH [8]) obtained two males from Sumbawa with wings of 185 and 186 mm which he classified as *javanicus* and he mentioned a Sumatra bird with a wing of 186 mm, which suggests the possibility that the maximum winglength for *javanicus*, living in the Indonesian Archipelago is still larger than indicated above. RENSCH supposed that the found winglength may indeed be considered extremely large for this race; in my opinion wings measuring more than 180 mm must be considered uncommon in true *javanicus* from the Indonesian area. So far as it concerns RENSCH' birds from Sumbawa classified as *javanicus*, some doubt may arise about the real identity because he remarked having observed his birds repeatedly along rivers and brooks and in swamps („Diese kleinen Reiher sah ich mehrfach an Flusz-und Bachufern, in Sümpfen und in der Mangrove"). If this statement means that the birds were observed in the interior of Sumbawa, they perhaps belong to another race because as far as I do know *javanicus* does not occur in such a habitat. Much later MAYR [5]) described the subspecies *steini* for the Lesser Sunda Islands after studying material (4 ♂, 2 ♀) originating from Flores, Alor, Sumba and Timor. Perhaps RENSCH' birds belong to this race. As wingsize for three male birds MAYR mentioned 178, 183 and 186 mm; in colour the representatives of *steini* should be intermediate between *javanicus* and *moluccarum*. So far as it concerns the wing, tail and culmen measurements there seems little reason to be enthousiastic about the validity of *steini*. Because I could not dispose of any material for comparison I must refrain from giving a definite conclusion.

JUNGE [4]) also measured a winglength of 181, 183, 185, and 187 mm among the only six specimens from Simalur island (off Sumatra's westcoast) which he studied together with 27 skins originating from other localities, showing a largest wing of only 179 mm. Nevertheless JUNGE

included Simalur into the range of *javanicus*, rejecting *icastopterus*, so that the winglength of *javanicus* in the 32 birds he measured varied from 163 to 187 mm. The largest wingsize was of an egglaying female bird, thus certainly not a migrant.

OBERHOLSER described birds from Simalur as *icastopterus*, which was as we will see below synonymized with *amurensis* by CHASEN [3]) and with *actophilus* by RIPLEY [9]). AMADON (see SMYTHIES [10]) united the latter again with *amurensis*. It is perhaps true that Simalur birds indeed do not belong to *javanicus* and JUNGE's conception goes too far but it does not satisfy to consider all those large birds as *amurensis*, which actually has a much larger wing. This is evident from the figures given by JUNGE [4]) who mentioned a wing of 196 - 215 mm, and by MAYR [5]) who mentioned 201, 211, 214 mm for the winglength of three male and 201 and 205 mm for two female birds.

CHASEN [3]) already united *carcinophonus* and *abbotti* (known from Borneo) with *javanicus* and *actophilus* and *icastopterus* with *amurensis*; later RIPLEY [9]) considered *carcinophonus*, *abbotti* and *carcinophilus* identical with *javanicus* and synonymized *sipora* from Simalur, Nias etc., with a winglength of 182.5 (♂) and 170.5 (♀) with *spodiogaster*, known from the Andaman and Nicobar islands. He mentioned still another female bird originating from North Pagi (off Sumatra's westcoast which is the terra typica of OBERHOLSER's *actophilus*) with a wing of 190 mm and wrote: "These birds presumably represent a northern race found in China and Siam, which migrates during winter to the southern islands". RIPLEY looked upon *icastopterus* as a synonym of *actophilus*, which he recognized as a good subspecies, migrating from the Asiatic mainland and recorded from Simalur and the Pagi islands. He apparently overlooked that long-winged egglaying female bird from Simalur as measured by JUNGE which makes it evident that large birds need **not** be migrants.

AMADON (see SMYTHIES [10])) united *actophilus* together with *connectens* again with *amurensis*. But MAYR [5]) was of the opinion that it is probably not correct to consider OBERHOLSER's *actophilus* and *icastopterus* as referable to either *amurensis* or *connectens* like PETERS [7]) and other authors have done recently. He assumed that there is no evidence that representatives of both these races migrate regularly as far as Sumatra and Java. There is some evidence in such a direction since JUNGE has proven that a winglength (in a female bird) of 187 mm may be found in representatives of a breeding subspecies.

CHASEN [3]) suggested that those large-winged birds may belong to *connectens* known from southern China, which averages smaller than

amurensis. As wing-range of long-winged "winterbirds" examined by him, CHASEN mentioned 186 - 202 mm, agreeing rather well with the wing-range (180 - 200 mm) for *connectens* given by STRESEMANN [11]). But without knowing the exact number of measured birds and the months during which this material was obtained, it is difficult to believe in the occurrence of *connectens* in the Indonesian area. Moreover this race seems hardly or not maintainable. But I suppose that there are reasons to believe in the occurrence of *amurensis* within the Indonesian Archipelago and it may have been representatives of this race which I encountered in the interior of North Sumatra and West Java. These birds were met with along freshwater rivers and stony riverbeds, a habitat which I do not know for the subspecies *javanicus*. Therefore, in my opinion, birds in collections classified as *javanicus* and originating from such a habitat, must be considered with much suspicion.

MAYR [5]) suggested to accept *abbotti* for the subspecies living in Borneo, except for the eastern part of this island, where *carcinophonus* occurs. Both races are synonymized with *javanicus* by CHASEN and RIPLEY.

BISWAS [2]) has the opinion that the Indian representatives of the species cannot be identical with *javanicus* because they are distinctly paler in colouration and have a longer moustachial streak and longer wings. I did not see any Indian specimens of this heron and therefore cannot have an opinion about the colour differences in the plumage but the wing-measurements as given by him for Indian birds (18 ♂ 174 - 184 and 6 ♀ 177 - 182 mm) fit rather well within those found in Java, so that separation on account of wingsize differences seems unacceptable. A comparison of wing measurements of these 24 birds with 3 ♂ and 2 ♀ Javan birds must be considered insufficient to draw a definite conclusion from. There are also no exact particulars in BISWAS' paper about the material he used for comparison when studying the plumage.

Looking at the colour and size variations among birds belonging to the same population and with a view on the taxonomic confusion which I have tried to picture above, I share JUNGE's opinion that it is not advisable to separate more subspecies from the existing ones. JUNGE [4]) already remarked: "A splitting up in races causes more confusion than clearness in this case, especially because till now we have been poorly informed about this species from Sumatra and from most regions of the Asiatic continent". SMYTHIES [10]) quoted DEIGNAN's opinion that no one really knows anything about this species in south Asia. These frank contentions must refrain us from setting up still more subspecies as long as no satisfactory revision on the strength of as much material as possible is available.

Measurements (in mm):

subsp. *javanicus:*

♂♂; Wing (Karimundjawa Islands): 168, 169, 172, 175; Bawean Island: 171, 174, 177, 178; Kangean: 178; Other parts of Indonesia (Billiton, Borneo and Celebes): 168, 171, 173, 177, 179;

Tail (Karimundjawa Islands): 63, 65, 67, 67; Bawean: 65, 66, 66, 66; Kangean: 69; Other parts of Indonesia (Billiton, Borneo and Celebes): 61, 62, 64, 66, 69;

Culmen (Karimundjawa Islands): 60, 60, 60, 63.7; Bawean: 62, 63.2, 63.7, 65; Kangean: 64; Other parts of Indonesia (Billiton, Borneo and Celebes): 57, 58.7, 58.8, 61.2, 65;

Max., min. and average measurements:

	Karimundjawa	Bawean	Kangean	Indonesia	Java (measured by JUNGE, Leiden)
Wing:	168 - 175 / 171	171 - 178 / 175	178	168 - 179 / 173.60	169 - 177 / 171.80
Tail:	63 - 67 / 65.50	65 - 66 / 65.75	69	61 - 69 / 64.40	62 - 66 / 64.80
Culmen:	60 - 63.70 / 60.93	62 - 65 / 63.48	64	57 - 65 / 60.14	60 - 63 / 61.60

♀♀ Wing (Karimundjawa Islands): 162, 162, 163, 177; Kangean: 175; Other parts of Indonesia (Billiton, Borneo and Celebes): 167, 167, 168, 169, 179;

Tail (Karimundjawa Islands): 60, 61, 61, 65, 66; Kangean: 65; Other parts of Indonesia (Billiton, Borneo and Celebes): 59, 61, 62, 66, 71;

Culmen (Karimundjawa Islands): 55.2, 58.2, 58.5, 62, 63.5; Kangean: 64; Other parts of Indonesia (Billiton, Borneo and Celebes): 57.8, 60, 62.2, 62.7, 63;

Max., min. and average measurements:

	Karimundjawa	Kangean	Indonesia	Java (measured by JUNGE Leiden)
Wing:	162 - 177 / 166.40	175	167 - 179 / 170	154 - 169 / 162.60
Tail:	60 - 66 / 62.50	65	59 - 71 / 63.80	57 - 66 / 61.50
Culmen:	55.2 - 63.5 / 59.48	64	57.8 - 63 / 61.14	59 - 61 / 59.90

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13. Some notes on the Moluccan Kestrel, *Falco moluccensis* (BP.)

Some recently obtained Kestrels from the Kangean Archipelago (1 ♂, 3 ♀) and from Komodo island (♀) (Lesser Sunda Islands) when compared with old material, partly originating from the same locality show important differences. It is dangerous to establish racial characters if freshly secured skins and material of old date are being compared. The taxonomical difficulties are still accentuated in the rather important individual variation and the often striking differences in plumage between sexes and specimens of different ages as pointed out previously by students of this species, most thoroughly by SIEBERS [6].

On the basis of characters indicated by SIEBERS for separating juveniles from adults, I suppose that three Kangean birds (1 ♂, 2 ♀) and the Komodo female are adults because the remaining specimen has still some rusty red in the grey on the apical halves of the tail. The gonads of the recently collected male were small (test.: 5mm), one female had a very small and another one a large ovary (ovum 15 mm). The characters found by SIEBERS to separate the sexes agree rather well with the material from Kangean and Komodo but the markings on the innerwing coverts are more buffy than reddish. Our freshly obtained skins were partly preserved

in formalin but this seems of little importance since a female not preserved in that way does not differ from the others either.

The underlying colour in old skins, especially on the wings and the upper surface, is much lighter, clearer redbrown, giving them quite a different appearance from fresh material. While these skins were secured at different periods and from the same locality this dissimilarity formed one of the main reasons for writing these notes.

The three males present in the Bogor Museum, originating from Sumba belonging to the subspecies *renschi* can be separated at a glance from a male of *javensis* from the island of Bali. And also from a Celebes male and three males from Sumbawa and Flores all belonging to *occidentalis**), because of the much lighter underparts, especially the abdominal area, undertail coverts and tibial feathering. This is also the case when the only available female of *renschi* is compared.

It is more difficult, however, to separate the only male which we obtained from the Kangean islands which according to MAYR [3]) belong to the range of *javensis* if compared with these five males of which four should belong to *occidentalis* on account of the localities of origin. There seem to be only individual variations in tint and markings on the underparts, though those parts and especially the tibial feathers are darker in the Kangean bird. They show clear, very pronounced markings consisting of black spots like in a male of *occidentalis* from Flores. In the latter bird, however, the tibia are much lighter than in the one from Kangean.

On the upper parts the contrast between the dark, almost black spots and the reddish brown groundcolour is less intensive than in other skins. This makes this fresh skin at once distinguishable from the old material, though in this respect too the individual variability is considerable. The less striking contrast is caused by the darker, dirtier tinge of the underlying colour. The same difference is observed when the Kangean male is compared with the three males of *renschi*. I failed to discover any difference in tint or markings on the innerwing, remiges, lower back and uppertail-coverts between this Kangean skin and the remaining material nor in the markings on the pileum and the neck.

Among the three females originating from Kangean one is not yet fully adult. Another specimen is heavily damaged on the under surface but together with another adult it nearly closely resembles this semiadult female. The latter is much darker below than any other female. In this

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*) For the time being I do not think it fully justifiable to change the subspecific name *occidentalis* as suggested by MEES [4]).

immature bird the black markings predominate and the brownish undercolour is duller, except on the chin, throat and lower underparts. The third Kangean female is lighter than the remaining ones, differing, however, from the other races previously discussed in the dull markings below though the tibial feathers are distinctly barred. This specimen has a very worn plumage which makes it not well suitable for comparison with birds having a normal plumage.

The only freshly obtained adult female from Komodo island resembles the dark Kangean birds: it is darker than the other specimens in the series studied. The upper parts of the two dark Kangean females are quite different from the other birds. They are distinctly darker and show not much difference between adults or semi-adults though the immature plumage is brighter reddish brown and the streaks on the pileum are less striking.

The other colour appearance of Kangean's Kestrels is not only caused by the darker undercolour but also by the denser spots and bars. These are perhaps characters which MAYR [3]) attributed to *javensis*, but the Komodo female almost exactly resembles those Kangean birds. The third Kangean female is lighter, much duller (as on the under surface) than all other skins. This is also the case when compared with birds having a similar worn plumage.

Like the case with many *occidentalis* and *javensis* every individual of the three Kangean females vary much in tint and markings of the pileum and the neck. It is rather dangerous to consider such differences to be of subspecific significance. The adult females from Kangean and Komodo show wide black shaft streaks, heavier than in any other examined bird. The markings on the innerwing-coverts seem heavier in the Kangean birds but in this respect too the Komodo skin does not differ from the Kangean females. With a view on the large colour uniformity in freshly secured birds coming from Kangean and Komodo island I became suspicuous about the validity of *javensis* but comparison with material present in Leiden gave evidence that we may have to deal with a tenable subspecies.

When 13 males and five females of *javensis* from Java, five males and six females of *occidentalis* from Celebes, all present in the collections of the Leiden Museum are compared with the four males from Bali, Sumbawa and Flores, one adult male and two females from Kangean, it seems impossible to me, without looking on the labels, to separate the material on account of differences on the underparts so far as it concerns material of old date. This makes it rather doubtful to accept MAYR's [3]) diagnosis on this point when separating *javensis*. When considering the

upper parts, however, the diagnostic differences seem acceptable: the dark bars of the male birds are more pronounced in *javensis* and the dark occipital streaks are a trifle broader. Between females there is apparently no or only very little difference.

All (1 ♂, 3 ♀) freshly obtained birds from the Kangean Archipelago and the Komodo female are again at a glance separable from these old *occidentalis* and *javensis* specimens because of the darker upper and underparts. This is principally caused by the more bronzy brown tinge of the ground-colour but these differences are not or hardly observable in two old Kangean skins present in Leiden. They do not differ from the old *javensis*. These old skins are strikingly different from the fresh ones originating from the same islands. Because of this similarity with *javensis* in the material of old date the Kangean birds may belong to this race in spite of the fact that the characters of *javensis* are not applicable to the freshly obtained birds from the Kangean Archipelago. The Komodo female should belong to *occidentalis* but I fail to see the difference when looking at the fresh skin.

MAYR [3]) considered birds from the Lesser Sunda Islands between Lombok and Alor intermediate between subspecies occurring in the surrounding areas. They should be most closely related to *occidentalis* but he recognizes *renschi* from the island of Sumba and proposes a new race for Timor and the Southwestern islands.

CHASEN [1]) and DELACOUR [2]) considered *microbalia* identical with the Javan population. MAYR [3]) had the opinion that it may be united with *occidentalis* from Celebes. It seems impossible to unite Kangean's population with *microbalia* because Kangean birds show larger and broader dark bars on the wings and upper parts than *occidentalis* and even than many *javensis*. They have the occipital streaks broader except in one male in which they are very narrow.

MEES [4]) considered *microbalia* which is only known from the type, at best a doubtful endemic race and there seems indeed some reasons to doubt its validity. Since I did not see a single bird of this subspecies I cannot have an opinion on this matter. I fail to understan why, zoogeographically speaking, it is most unlikely that Solombo birds would be closer to those from Celebes than to those from Java as expressed by MEES. According to DELACOUR [2]) the Javanese race also inhabits Borneo though this island is much closer to Celebes than it is to Java.

Following SMYTHIES [7]) MEES considered the differences between *occidentalis* and *javensis* "at most rather slight" which seems right as proven by my experience.

I have not seen representatives of MAYR's *timorensis* nor of both Moluccan forms *moluccensis* and *bernsteini* but so far as the measurements are concerned there are no important differences when the figures given by SIEBERS [6]) and MAYR [3]) are considered. STRESEMANN [8]) had the opinion that the south Moluccan representatives of the species cannot be seen as a unit and considered them *occidentalis* $\gtrless$ *orientalis*.

The subspecies *renschi* is perhaps a trifle larger in wing and tail than *occidentalis* and *javensis*. *Timorensis* and birds from the Kalao-Djampea-Group of islands (off Celebes) are apparently smallest but with a view on the variations in size within the same subspecies there seems no base for accepting size differences to be of subspecific significance.

It should be worth restudying the validity of all six or seven Indonesian races of this species by comparing sufficient large, critically arranged series.

Measurements (in mm):

♂ ♂ Wing; *javensis*: 221, 222, 223, 225, 225, 227, 228, 230, 232, 236;
occidentalis: 217, 225, 225, 226, 228;
renschi: 225, 227, 236;
Kangean Archipelago: 227;

Tail; *javensis*: 145, 146, 146, 152, 154, 154, 156, 160, 162, 163;
occidentalis: 147, 148, 153, 160, 161;
renschi: 153, 155, 161;
Kangean Archipelago: 153;

Culmen; *javensis*: 14.5, 14.5, 15, 15, 15, 15, 15.5, 15.5, 16, 16;
occidentalis: 14.9, 15.3, 15.5, 15.6, 15.8;
renschi: 13.5, 14, 15.5;
Kangean Archipelago: 15;

Max., min. and average measurements:

	javensis	*occidentalis*	*renschi*	Kangean islands
Wing:	221 - 236 / 226.90	217 - 228 / 224.20	225 - 236 / 229.33	227
Tail:	145 - 163 / 153.80	147 - 161 / 153.80	153 - 161 / 156.33	153
Culmen:	14.5 - 16 / 15.20	14.9 - 15.8 / 15.42	13.5 - 15.5 / 14.33	15

♀ ♀ Wing; *javensis*: 225, 227, 230, 232, 232, 237, 237, 237, 241, 242;
occidentalis: 220, 229, 231, 234, 235;
renschi: 235;

Kangean Archipelago: 230, 234, 240;
Komodo Island: 234;

Tail; *javensis*: 145, 148, 150, 151, 155, 155, 157, 158, 160, 164;
occidentalis: 150, 152, 155, 155, 169;
renschi: 156;
Kangean Archipelago: 159, 163, 168;
Komodo Island: 154;

Culmen; *javensis*: 13.5, 15, 15, 15.5, 15.5, 16, 16, 16.5, 16.5, 16.5;
occidentalis: 14, 15, 15.8, 16.8, 17;
renschi: 16.1;
Kangean Archipelago: 15.5, 16.5;
Komodo Island: 16;

Max., min. and average measurements:

	javensis	*occidentalis*	*renschi*	Kangean isl.	Komodo
Wing:	225 - 242 / 234	220 - 235 / 229.80	235	230 - 240 / 234.67	234
Tail:	145 - 164 / 154.30	150 - 169 / 156.20	156	159 - 168 / 163.33	154
Culmen:	13.5 - 16.5 / 15.60	14 - 17 / 15.72	16.1	15.5 - 16.5 / 16	16

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14. On the Indonesian races of *Alcedo meninting* HORSF., especially about the validity of the subspecies *verreauxii*

Though the subspecies *verreauxii* is recognized as a valid race, well distinguishable from *meninting* on account of size and colour differences, there are several authors who rejected or doubted its validity. This diversity of opinions induced me to study the material present in the Bogor Museum.

When comparing the underparts of 17 species of the nominal race with an equal number of specimens belonging to the subspecies *verreauxii*, and the only specimen of *proxima* present in Bogor's Museum, there are only some inidividual variations recognizable in the brown of these parts. Very dark and extremely light specimens are present in *meninting* as well as in *verreauxii; proxima* cannot be distinguished from representatives of the two other races. There is no sexual dimorphism on this point either.

Also on the sides of the head and the neck there are rather important variations which have nothing to do with racial characters. Not only in the extension of the black at the base of the lower mandible but also in the extent and the colour of the light patch between the eyes and the nostrils. The quantity of the blue colour on the sides of the head varies much but in the examined series the male birds have bluer cheeks than the females. Finally, there is a rather considerable variability in the light shoulder-patch, usually strikingly present but sometimes almost absent.

Difference in the quantity of blue on the cheeks is considered by CHASEN and BODEN KLOSS [3]) as an aberration. According to them SHARPE identified the rusty cheeked birds as females, whereas MEYER & WIGLESWORTH and LAUBMANN attributed this character to the juvenile plumage. In my opinion SHARPE's view was the right one for among the many birds seen by me there is not a single male which have rusty cheeks. Although there are two females which have blue cheeks, there is a possibility that they were wrongly sexed. Of two distinct juveniles, the male has a blue and blackish cheek while the female has a rusty one. This is in contrast to LAUBMANN's opinion.

The blue on the wings varies also rather importantly but in our series *meninting* averages bluer on the wing than *verreauxii*; there is also much blue in *proxima*. About the same holds good for the blue on the upper surface which may vary from clear blue to light bluish green;

the quantity of this colour varies much within the same subspecies. However, when seen in series it cannot be denied that birds of the nominate race average bluer on the upper parts and show a somewhat different tone of this colour than is the case in *verreauxii*, though there is some overlapping.

The presence of a rather small quantity of blue in a bird secured from Panaitan island (Sunda Strait) makes it closer related to *verreauxii* than to the Javanese race *meninting*. With a view on the size, the light somewhat greenish tinged blue on the back and uppertail coverts it again resembles the latter race, since *meninting* is somewhat larger than *verreauxii*. The gonads of this bird were destroyed but it is supposed to be a female because it has hardly any blue on the cheeks.

The only male specimen of *proxima* seems closer related to *meninting* than to *verreauxii*. The upper parts of *proxima* are a trifle more blue than in the latter race, but in size it surpasses representatives of both races. A single specimen of *proxima* seen by JUNGE [6]) is said to be slightly greener blue on the upperside than all other representatives of the species examined by him, but in my material such a difference could not be observed.

When looking at the figures given below there is no evidence of important individual variation in winglength, but the billsize within the same subspecies may vary considerably. However, our material shows a rather distinct difference in all its measurements, most strikingly in the billsize, between *meninting* and *verreauxii* which seems reason enough to maintain the latter subspecies even if there should be no differences in plumage as supposed by certain authors.

CHASEN and BODEN KLOSS [3]) have the opinion that typical *meninting* of Java is paler or more turquoise than *verreauxii* known from the Malay Peninsula, Sumatra and Borneo. It is also larger, the wing length ranging from 64 to 70 mm in *meninting* against a maximum of 65 mm in *verreauxii* which is in accord with my experiences. But when discussing a large series of birds from West Sumatra, ROBINSON and BODEN KLOSS [11]) did not recognize *verreauxii* though their four examined specimens had wings of only 62 - 63 mm.

JUNGE [6]) failed to discover the differences in plumage as indicated by CHASEN and BODEN KLOSS [3]) between the two subspecies discussed. He agreed as to the difference in size like he also did with a male bird from Enggano island. Later JUNGE [7]) returned to the subject and concluded that after comparing 16 birds from Sumatra with an equal series from

Java, neither size nor colour differences are important enough to justify the existence of *verreauxii*. DE SCHAUENSEE [12]) classified with some hesitation four birds from the Batu islands having wings of 65 mm (♂) and 66, 67, 68 mm (♀) as *verreauxii*. He remarked that RILEY [9]) was perhaps right in suggesting that this race is identical with *meninting*, but that he had not enough material at hand to decide.

From the above it is evident that I cannot share this opinion and therefore I agree with the situation as it exists now. Besides a small difference in size there are some differences in the blue on the wings and upper parts though these two characters are only recognizable when sufficient large series are available.

The validity of OBERHOLSER's *callima* is doubted by STRESEMANN [13]), STUART BAKER [16]) considered this race synonymous to *meninting*. JUNGE's [6]) experiences with OBERHOLSER's *subviridis* may lead to the supposition that this race may be considered a very weak one too. STUART BAKER could not study the value of *subviridis* because of lack of material but he stressed the difficulties when studying this Kingfisher subspecifically when no good series are available. There is no proof that this condition was fulfilled when OBERHOLSER [8]) described the subspecies *callima* and *subviridis*; he did not even mention the number of specimens studied, neither does he give any real evidence of size differences between these two subspecies and birds belonging to the nominate race. RIPLEY [10]) considered these two races together with *proxima* synonyms of *meninting*.

Though in my opinion *post mortem* changes in the plumage are not very important, it seems wise to take into account the differences in collecting periods when looking for racial characters in the plumage of this species.

Measurements (in mm.):

♂ ♂ Wing; *meninting*: 63, 64, 64, 65, 65;
verreauxii: 61, 61, 62, 63, 63;
proxima: 67;

Tail; *meninting*: 26, 28, 28, 29, 33;
verreauxii: 26, 26, 26, 27, 28;
proxima: 30;

Culmen; *meninting*: 37, 39, 39.5, 40, 40.8;
verreauxii: 35.3, 36, 36, 38.4;
proxima: 38;

Max., min. and average measurements:

	meninting	*verreauxii*	*proxima*
Wing:	63 - 65 / 64.20	61 - 63 / 62	67
Tail:	26 - 33 / 28.80	26 - 28 / 26.60	30
Culmen:	37 - 40.8 / 39.26	35.3 - 38.4 / 36.43	38

♀ ♀ Wing; *meninting*: 65, 66, 66, 67, 67;
meninting (Panaitan island): 65;
verreauxii: 63, 64, 64, 64, 65;

Tail; *meninting*: 26, 30, 30, 31, 32;
meninting (Panaitan island): 28;
verreauxii: 26, 27, 27, 28, 31;

Culmen; *meninting*: 32, 36.8, 38.5, 39.5, 39.8;
meninting (Panaitan island): 37.5;
verreauxii: 28.8, 31.9, 33, 35, 36,8;

Max., min. and average measurements:

	meninting	*meninting* (Panaitan island)	*verreauxii*
Wing:	65 - 67 / 66.20	65	63 - 65 / 64
Tail:	26 - 32 / 29.80	28	26 - 31 / 27.80
Culmen:	32 - 39.8 / 37.32	37.50	28.8 - 36.8 / 33.10

Some measurements compiled from literature:

Wingsize

JUNGE [7])

meninting Java 16 ♂ ♀ 63 - 69 / 65.10

DE SCHAUENSEE [12])

meninting Java 2 ♂ 65, 66
verreauxii Sumatra 4 ♂ 64 - 66
verreauxii Batu Islands 1 ♂ 65
verreauxii Batu Islands 3 ♀ 66, 67, 68

BODEN KLOSS [1])

verreauxii Sumatra 1 ♂ 62
verreauxii Sumatra 1 ♀ 62

STRESEMANN [15])

verreauxii Borneo 4 ♂ 64, 64, 65, 65

verreauxii Borneo 1 ♀ 63

CHASEN [2])

verreauxii Billiton Isl. 1 ♂ 62

verreauxii Billiton Isl. 2 ♀ 63, 64

JUNGE [7])

verreauxii Sumatra 16 ♂ ♀ $\frac{62 - 68}{64}$

CHASEN & BODEN KLOSS [4])

verreauxii Borneo 2 ♂ 62, 63

verreauxii Borneo 1 ♀ 64

CHASEN & HOOGERWERF [5])

verreauxii Sumatra 1 ♂ 60

ROBINSON & BODEN KLOSS [11])

verreauxii Sumatra 3 ♂ 62, 62, 62

verreauxii Sumatra 1 ♀ 63

VOOUS [17])

verreauxii Borneo 4 ♂ ♀ 63, 63.5, 64.5, 65.5

RILEY [9])

verreauxii Sumatra 5 ♂	Wing:	$\frac{60\text{-}63}{61.80}$	Tail:	$\frac{23.5\text{-}28.5}{26.20}$	Culmen:	$\frac{36.5\text{-}41}{39.60}$
verreauxii Borneo 3 ♂	,,	$\frac{60\text{-}62.5}{61.20}$	,,	$\frac{24.5\text{-}27}{25.50}$	,,	$\frac{39\text{-}41}{39.80}$
verreauxii Sumatra 4 ♀	,,	$\frac{59\text{-}66}{62.40}$	,,	$\frac{24.5\text{-}28}{26}$	,,	$\frac{34\text{-}38}{36.70}$
verreauxii Borneo 1 ♀	,,	61	,,	27	,,	40.50

Recapitulation of wing measurements:

verreauxii			*meninting*	
25 ♂	$\frac{60 - 66}{62.14}$	5 ♀ $\frac{59 - 66}{61.70}$	2 ♂	65, 66
20 ♂ ♀	$\frac{62 - 68}{64.07}$		16 ♂ ♀	$\frac{63 - 69}{65.10}$

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15. On some races of the White-collared Kingfisher, *Halcyon chloris* (BODD.) within the Indonesian Archipelago.

Nearly 30 freshly collected birds, principally originating from the satellite islands of Java which all may belong to the same subspecies, show such important individual variations that it seems worthwhile to record the result of my study on this material and a comparison made with a large number of skins of old date present in the Bogor Museum.

In a series of 60 skins belonging to six different subspecies it is hardly possible to establish any other than individual differences in the tint of the underparts. Exception is found in material of the nominal race which averages somewhat darker, more buffy, on these parts. Six out of ten specimens of this form are distinctly buffy below

rather similar to only two specimens from a series of ten *palmeri* from Java. This colour still seems to be more strikingly present in juvenile birds as already pointed out by several authors. This makes such birds at once separable from young *palmeri* which are white with dark markings on the chest without or hardly any buff.

When considering our birds, with closed wings, on the flanks the most important individual variation can be established in the colour of the wings and also in the tint of the dark line running from the base of the bill, below the eyes to the neck. The wing-coverts vary from light bluish green to almost deep blue, but the remiges are rather uniformly blue, not or hardly mixed with green. If seen with the light coming from behind the tint on the auriculars varies in my series from bluish green to nearly black. This seems to have neither to do with the sex nor with the development of the gonads. There is f.i. a male bird from Bawean island with testicles of about 6 mm which is almost black on that region. A second male from the same island had the gonads still somewhat larger and show very light auriculars. The same holds good for some freshly secured birds from Panaitan island. In fresh skins this dark tint is nearly always mixed with some greenish or shows a greenish shade, giving thus a different impression when viewed with the light from behind and from aside. In old material the auriculars seem to average duller but often the difference in tint is maintained. This is evident from several skins belonging to *chloris*, a single skin of *chloroptera* I could dispose of and some *palmeri* from Sebesi island (Sunda Strait), Karimundjawa and the Bay of Djakarta.

Though the single skin of *chloroptera*, two of *meyeri*, one of *azela* and some of *chloris* I studied, may average darkest on the auriculars, it cannot be denied that a bird secured from Panaitan island (Sunda Strait), some from Karimundjawa and all specimens from the Kangean Archipelago do not differ at all in this respect from those old skins. This important variation makes it quite impossible to separate birds belonging to *chloris* from *palmeri* and when considering our (scanty) material of *chloroptera* and *azela*, it again seems hardly justifiable to consider the difference in tint on the auriculars to be of subspecific value. Very large series of these subspecies may indeed be absolutely necessary in order to accept differences in this respect as a racial character. This is apparently also the case when differences in tint of the wing-coverts and in the colour or extension of the light supercillary are considered.

Still more individual variation can be established in the colour of the upper parts, not only in the greenish or bluish tint, but also in the

extention of the black and white nuchal collar. Even in birds originating from the same locality and secured at about the same time there is sometimes such an important individual variation that it seems hardly possible to rely upon such differences for subspecific separation. This is evident from the fresh material from Panaitan island, Karimundjawa and Kangean. When speaking about colour differences it is necessary to take into account the direction whence the light falls on the plumage and the way how the material has been prepared because the width of the nuchal collar can be considerably influenced by the taxidermist. Looking at the material with the light from behind most skins are light green but with the light from aside the colour turns to blue without much green in it and a skin prepared with a long neck shows a wide nuchal collar. A bird with the neck being pressed between the shoulders gives an impression of having a very narrow collar.

When the three skins of *azela*, *chloroptera* and *humii* are mixed with large series of *chloris* or *palmeri*, they are inseparable without looking on the labels. Nor is it possible to distinguish freshly collected birds from Strait Sunda, Karimundjawa, Kangean or Komodo Island (between Sumbawa and Flores) when they are included into the series of old material belonging to *palmeri* and *chloris* which partly originate from the same localities. From this it is evident that it is most difficult to accept any colour difference as a racial character and that *post-mortem* changes in the plumage, caused by long storage are not very important. Though there are some indications that skins preserved in formalin become a trifle more blue, this seems not always the case as shown by some Kangean skins preserved in this preservative. In this case the same individual colour variations can be observed like in the series from Panaitan island which was preserved dry. There is also no evidence that the differences in colour are considerably influenced by the development of the reproductive organs, for a male bird with testicles of about 12 mm is much bluer above than another one which had the gonads in a similar stage of development. Birds collected in Kangean in August and September had those organs well developed and those secured in Bawean in June showed similar development except one bird. In September the situation on Panaitan island was similar to the one found in the Kangean and Bawean material. Females from Karimundjawa shot in October and November had small gonads, the males large ones.

STRESEMANN [9]) already pointed to the difference in plumage among juveniles of *chloris* and *palmeri*; he moreover mentioned the very dark

upper parts of *chloris* juveniles. Both facts were also observed by me and seem important enough to be maintained as subspecific characters.

The single skin of *chloroptera* *) studied agrees with the particulars given by JUNGE [2]) because this bird has indeed dark auriculars. This is also the case in the single specimen of *azela* from Enggano island. JUNGE [3]) also reported that the specimens he examined showed this character. Both these forms differ distinctly in measurements but *chloroptera* is of about the same size as *palmeri* and *chloris*. Many specimens of these two races also have almost black auriculars, which is the case with the whole population of *Halcyon chloris* from Kangean so far it concerns the material seen by me. I did not succeed in finding any difference between this *chloroptera* skin and many representatives of the species originating from Sumatra, Java and all of my Kangean birds. But larger series, especially of *chloroptera* are necessary to enable me to have a definte conclusion about the value of this subspecies. There might be a possibility that birds belonging to this form average larger in size as proven by the measurements taken by JUNGE. This is evident from the wingsize as given by DE SCHAUENSEE [8]) for birds from the Batu islands. According to PETERS [6]) they also belong to the range of *chloroptera*. My measurements taken from specimens coming from Karimundjawa, Bawean and Kangean, however, show a remarkable resemblance to those of *chloroptera* as compiled from literature. As remarked above, all my Kangean birds resemble this latter race in having the very dark auriculars. This makes *chloroptera* rather difficult to be maintained if sufficient numbers or large series indeed do not show other differences with representatives of the species from the Kangean Archipelago. It is impossible to maintain the same subspecies for two groups of islands so far apart, separated by territories inhabited by other forms, *viz. azela* from Enggano island, *laubmanniana* from South Sumatra and *palmeri* from Java.

The subspecies *azela* is decidedly smaller than *palmeri* or *chloris*. *H. c. humii* found in some regions of northern Sumatra is still smaller than *azela* so that both these races can be maintained, even when there are no differences in the plumage between those and the other races discussed above. I did not examine *laubmanniana* (syn. *cyanescens*) which according to PETERS should inhabit South Sumatra so that I have no opinion about that race. JUNGE [4]) did not notice any difference between Javan and Sumatran birds and united them again under the name *cyanescens*.

*) This a bird from Simalur island should belong to the range of *laubmanniana* according to RIPLEY [7]) but to *chloroptera* according to PETERS [6]). I have followed PETERS.

When looking for differences between *palmeri* and *chloris* there is in the first place the difference in the juvenile plumage and, probably, also a more buffy tint in the underparts of the adults of *chloris*. Moreover this subspecies may average a trifle smaller than *palmeri* as proven by the measurements given by VAN BEMMEL and VOOUS [1]). This can, however, not be confirmed by my figures, though the weights I found (♂ 65 - 82, ♀ 73 - 85 gr) for *palmeri* from Strait Sunda, Karimundjawa, Bawean and Kangean indeed are heavier than those given by these authors for *chloris* (♂ 51 - 61, ♀ 54 - 61 gr). The weigths as given by STRESEMANN [2]) for birds of the latter subspecies from Ceram, *viz.* 85 and 93 gr seem rather heavy.

Two skins in the Bogor collections, classified as *meyeri* and originating from the Togian islands (North Celebes) resemble *chloroptera* because of the dark auriculars but they seem closer to *chloris* in size. It is perhaps right to synonymize *meyeri* with *chloris* as was done by VAN BEMMEL and VOOUS.

MAYR [3]) described not less than five new subspecies of this Kingfisher, partly on account of colour-differences which in my opinion are subject to much individual variation. No representatives of these races are available in Bogor which makes it impossible to have an opinion about their validity. With a view on the very large individual variations among representatives of the same subspecies, it seems justified to suppose that the species *chloris* which has about 50 subspecies, has been seriously oversplit.

I have classified the recently collected birds from the Sunda Strait area, Karimundjawa, Bawean and Kangean islands as *palmeri* with the remark, however, that the birds obtained from the latter three groups of islands seem to be larger in size than *palmeri* from Java, especially in their bill. Secondly the Kangean birds are very uniform in having the auriculars very dark.

The two freshly obtained skins from Komodo island were included into the nominate race only because this island is considered to be part of the range of *chloris*. I fail to see any reliable difference between those Komodo birds and good series of *palmeri* but my material from this island is insufficient to base a conclusion on.

Measurements (in mm) :

♂ ♂ Wing; *palmeri* (Java) : 105, 106, 107, 109, 114; *palmeri* (Panaitan Island, Sunda Strait) : 103, 108, 113; *palmeri* (Sebesi Island, Sunda Strait) : 114; *palmeri* (Karimundjawa Islands) : 110, 113, *palmeri* (Bawean

Island): 108, 109, 114, 115, 118, 118; *palmeri* (Kangean Islands): 110, 113, 116; *chloris* (Celebes, Moluccas): 106, 107, 109, 109, 110, 112, 114; *chloris* (Komodo Island): 113, 114;

Tail; *palmeri* (Java): 66, 68, 68, 71, 71; *palmeri* (Panaitan Island): 68, 69, 74; *palmeri* (Sebesi Island): 74; *palmeri* (Karimundjawa): 67, 69; *palmeri* (Bawean): 70, 71, 72, 73, 74, 76; *palmeri* (Kangean): 68; 76, 77; *chloris* (Celebes and Moluccas): 62, 64, 65, 69, 69, 69, 72; *chloris* (Komodo): 69, 72;

Culmen; *palmeri* (Java): 41.5, 43.2, 44.1, 44.7, 48.1; *palmeri* (Panaitan Island): 42.3, 43.7, 44.5; *palmeri* (Sebesi): 46; *palmeri* (Karimundjawa): 49.4, 51; *palmeri* (Bawean): 43.5, 47, 47, 48, 48.5, 48.8; *palmeri* (Kangean): 44.8, 45, 47; *chloris* (Celebes and Moluccas): 42.2, 42.3, 44.3, 44.5, 45.1, 45.5, 45.5; *chloris* (Komodo): 46.5, 48.5;

Max., min. and average measurements:

	palmer Java	*palmeri* Panaitan Island	*palmeri* Sebesi	*palmeri* Kar. Djawa	*palmeri* Bawean
Wing:	105 - 114 / 108.20	103 - 113 / 108	114	110, 113 / 111.50	108 - 118 / 113.67
Tail:	66 - 71 / 68.80	68 - 74 / 70.33	74	67, 69 / 68	70 - 76 / 72.67
Culmen:	41.5 - 48.1 / 44.32	42.3 - 44.5 / 43.50	46	49.4, 51 / 50.20	43.5 - 48.5 / 47.13

	palmeri Kangean	*chloris* Celebes, Mol.	*chloris* Komodo
Wing:	110 - 116 / 113	106 - 114 / 109.57	113, 114 / 113.50
Tail:	68 - 77 / 73.67	62 - 72 / 67.14	69, 72 / 70.20
Culmen:	44.8 - 47 / 45.60	42.2 - 45.5 / 44.20	46.5, 48.5 / 44

♀ ♀ Wing; *palmeri* (Java): 109, 110, 112, 113, 114; *palmeri* (Panaitan Island): 104; *palmeri* (Sebesi): 114; *palmeri* (Karimundjawa): 109; 110, 112, 112, 113, 115, 117; *palmeri* (Bawean): 105; *palmeri* (Kangean): 110, 115; *chloris* (Celebes and Moluccas): 110, 110, 111, 113, 113; *azela* (Enggano Island): 100; *chloroptera* (Simalur Island): 116; *humii* (Berhala Island): 95;

Tail; *palmeri* (Java): 65, 69, 69, 69, 74; *palmeri* (Panaitan Island): 70; *palmeri* (Sebesi): 72; *palmeri* (Karimundjawa): 67, 68, 71, 72, 72, 73, 77; *palmeri* (Bawean): 72; *palmeri* (Kangean): 69, 74; *chloris* (Celebes, Moluccas): 66, 67, 69, 71, 72; *azela* (Enggano): 66; *chloroptera* (Simalur): 75; *humii* (Berhala Island): 61;

Culmen; *palmeri* (Java): 41.5, 44.9, 45, 46, 48.2; *palmeri* (Panaitan Island): 45.8; *palmeri* (Sebesi): 46.7; *palmeri* (Karimundjawa): 42, 43, 48, 48, 48.4, 49, 51.1; *palmeri* (Bawean) 47.5; *palmeri* (Kangean): 49.1, 49,3; *chloris* (Celebes, Moluccas): 42.2, 44, 44.3, 44.8, 45.2; *azela* (Enggano): 41; *chloroptera* (Simalur): 46.5; *humii* (Berhala Island): 43.6;

Max., min. and average measurements:

	palmeri Java	*palmeri* Panaitan Island	*palmeri* Sebesi	*palmeri* Kar. Djawa	*palmeri* Bawean
Wing:	109 - 114 / 111.60	104	114	109 - 117 / 112.57	105
Tail:	65 - 74 / 69.20	70	72	67 - 77 / 71.43	72
Culmen:	41.5 - 48.2 / 45.12	45.80	46.70	42 - 51.5 / 47.13	47.50

	palmeri Kangean	*chloris* Celebes, Mol.	*azela* Enggano	*chloroptera* Simalur	*humii* Berhala
Wing:	110, 115 / 112.50	110 - 113 / 111.40	100	116	95
Tail:	69, 74 / 71.50	67 - 72 / 69	66	75	61
Culmen:	49.1 - 49.3 / 49.20	42.2 - 45.2 / 44.10	41	46.50	43.60

Some measurements compiled from literature (in mm):

JUNGE [1]); *palmeri*:

75 ♂ ♀ Java; Wing: 105 - 116; Culmen: 38 - 48 mm

JUNGE [2]); *chloroptera*:

6 ♂ Simalur Island; Wing: 109 - 119.5 / 114.58; Tail: 72 - 80 / 75.58
Culmen: 41.50 - 50 / 45.67

7 ♀ Simalur Island; Wing: 110 - 118 / 114.43 Tail: 74 - 77.5 / 76.07
Culmen: 43 - 50 / 47.58

DE SCHAUENSEE [3]); *chloroptera*:

6 ♂ Batu Islands; Wing: 108.5 - 119 / 112.42

3 ♀ Batu Islands; Wing: 110 - 119.5 / 115.67

VAN BEMMEL & VOOUS [1]) ; *chloris:*

8 ♂ Muna & Buton Isl. (South Celebes) ; Wing: $\frac{99 - 108}{103.63}$

Tail: $\frac{62 - 70}{66.50}$

7 ♀ Muna & Buton Isl. (South Celebes) ; Wing: $\frac{99 - 112}{105}$

Tail: $\frac{63 - 70}{67.29}$

Weights (in grammes) :

Sunda Strait Islands: 5 ♂ $\frac{68.4 - 81.6}{74}$; 1 ♀ 73.20

Karimundjawa Islands: 2 ♂ 78; 80 ; 4 ♀ $\frac{77 - 85}{81}$

Bawean Island: 4 ♂ $\frac{65 - 80}{74.75}$; 1 ♀ 80

Kangean Islands: 3 ♂ $\frac{70 - 78}{73.33}$; 2 ♀ 75, 80

Compiled from literature:

VAN BEMMEL & VOOUS [1]) ; *chloris*:

Muna & Buton (South Celebes) : 7 ♂ $\frac{51 - 61}{54.86}$; 3 ♀ $\frac{54 - 61}{58.67}$

STRESEMANN [9]) ; *chloris*:

Ceram: ♂ ♀ 85 and 93

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16. Some remarks about the Crested Tree-Swift, *Hemiprocne longipennis* (RAFINESQUE).

Rather large individual variations in plumage in small series of specimens of the subspecies *longipennis*, obtained from the Strait Sunda area and from the Kangean Archipelago formed the reason to compare these fresh skins with the already existent material of this subspecies present in the Bogor Museum and some other races known from the Indonesian region. This comparison gave evidence that some *post-mortem* changes do occur which seem also important enough to be recorded.

The recently obtained material consists of 3 ♂ and 3 ♀ originating from Java's most western peninsula Udjung Kulon, Panaitan island (Sunda Strait) and from the Kangean Archipelago.

A female bird from Udjung Kulon had a full grown egg in its ovary, the male showed well developed gonads (test.: 3 - 4 mm.). Both birds from Panaitan island had small gonads as was the case with the two Kangean specimens of which the female had the ovary well granular. One bird from Panaitan island has still some traces of the juvenile plumage: some dark bars on the chest and belly. The small secondaries are grey for the greater part, having whitish edges, averaging darker than in the adults.

When comparing ten birds belonging to the nominal race with a similar number of *harterti*, eight of the subspecies *wallacei* and three of *perlonga*, it is evident that birds belonging to *longipennis* are lighter on the underparts than those of the other races, though hardly noticeable in *harterti* of which — however — none is so light below like several individuals of the nominate race. Representatives of the subspecies *wallacei* and *perlonga* are distinctly darker below than *longipennis* or *harterti* and the three skins of *perlonga*. Not only on account of the smaller whitish region on the abdomen, but also because of the darker tint of the grey.

The birds collected in the Sunda Strait area and in the Kangean islands do not agree at all with our old *longipennis* material from Java. They show distinctly less white below even when compared with *harterti* and the grey is also purer than in old skins. Owing to the fact that these differences are present in birds collected in such divergent areas such as the Sunda Strait and the Kangean Archipelago, they are supposedly caused by the differences in the period of collecting. This makes it necessary to be very critical when fresh material is being compared with old skins if one looks for subspecific characters.

There is also some variation in the tint of the cheeks and the sides of the foreneck in birds obtained from the same locality. Usually the light

and dark areas are more clearly marginated in *longipennis* than they are in *harterti* and perhaps still less in *perlonga*, but they show the most contrast in *wallacei*. This holds good for both sexes but can only be used when studying series. There is also some individual variation in the reddish brown on the ear-coverts in the males, being somewhat clearer in *longipennis* than in *harterti*, apparently still darker in *perlonga* and darkest in *wallacei*. In representatives of the latter race this colour may cover the smallest area. The bluish tinge on the wings, especially on the wing-coverts is subject to considerable variation. This is also the case with the whitish tint and its extent on the smaller secondaries and wing-coverts, which makes it rather dangerous to consider such differences to be of subspecific value, Most of our freshly obtained material has much blue on the wings, most obvious in both Kangean specimens, whereas the brownish tint on the ear-coverts in birds originating from Udjung Kulon and Kangean is darker than in the old skins from Java. The male bird (with well developed reproductive organs) from Udjung Kulon has no reddish brown at all on the cheeks.

When looking at the upper parts, I fail to discover the racial differences between *longipennis* and *harterti* as mentioned by STRESEMANN [7]). The tint of the feathering on the lower back and uppertail-coverts varies so considerably in the series examined that it does not seem advisable to consider such differences to be of subspecific importance. In the males of *longipennis* only the whitish colour on the smallest secondaries is somewhat lighter than in *harterti*, but as already remarked above there is a great deal of individual variation in this respect. Perhaps *harterti* has more pure metallic green on the neck and mantle than *longipennis* like in all examined females and in some males. The subspecies *wallacei* and *perlonga* do not differ much in this respect when compared with *longipennis;* in the three examined specimens of *perlonga* the white on the wings is extremely poor. JUNGE [1]) considered *perlonga* as a well recognizable race, separable from the nominate race and from *harterti* by larger wings, but he could not compare his *perlonga* with well preserved *longipennis* material.

The difference indicated by MEYER and WIGLESWORTH [3]) *viz.* that *wallacei* should be bluer above than *longipennis* could not be confirmed in my material. There is more blue in the five females of *longipennis* than in the eight skins belonging to *wallacei*. Nevertheless RIPLEY [5]) considered *wallacei* a tenable subspecies on account of its bluer upper parts.

Our fresh material of the nominate subspecies is darker above, especially on the lower back and uppertail-coverts, but there is an important difference in this respect between both (fresh) Udjung Kulon birds and the four recently obtained skins from the nearby Panaitan island and the far-away Kangean. The four skins from the latter area are distinctly darker on those parts than all other *longipennis* studied, though less strikingly observable when compared with the Leiden material, which I have seen. On account of the fact that similarity on this point is present in birds originating from divergent territories it is not justifiable to consider it as a good racial character.

Summarizing I am of the opinion that *harterti* is a very thin race (RIPLEY [5] already doubted the validity about 20 years ago). *H. l. wallacei* and *perlonga* are well defined subspecies, especially on account of size differences; *perlonga* is somewhat larger than *harterti* and *longipennis*, while *wallacei* is still larger than *perlonga*. There might be also some colour differences in the plumage of the latter races when compared with *harterti* or *longipennis*.

I could neither compare specimens of *ocyptera* from Nias nor *thoa* from Enggano and Batu islands (off Sumatra's West coast) but they both are considered with some suspicion by PETERS [4]), being synonymized with *perlonga* by RIPLEY [5]). JUNGE [2]) and DE SCHAUENSEE [6]) considered *thoa* a synonym of *perlonga*.

Measurements (in mm.):

♂ ♂ Wing; *longipennis* (Java): 167, 167, 168, 168; *longipennis* (Udjung Kulon): 162; *longipennis* (Panaitan island): 164; *longipennis* (Kangean Archipelago): 171; *harterti* (Sumatra, Billiton): 154, 155, 158, 160, 169; *wallacei* (Celebes): 179, 181, 181, 182, 183; *perlonga* (Simalur): 175, 178;

Tail; *longipennis* (Java): 94, 96, 107, 107; *longipennis* (Udjung Kulon): 105; *longipennis* (Panaitan island): 86; *longipennis* (Kangean): 106; *harterti* (Sumatra, Billiton): 72, 88, 91, 92, 99; *wallacei* (Celebes): 98, 110, 114, 118, 119; *perlonga* (Simalur): 110, 112;

Culmen; *longipennis* (Java): 5.1, 5.5, 6.5, 6.8; *longipennis* (Udjung Kulon): 6.8; *longipennis* (Panaitan island): 5.5; *longipennis* (Kangean): 5.5; *harterti* (Sumatra, Billiton): 5, 6, 6, 6, 6; *wallacei* (Celebes): 6, 6, 6, 6.1, 7; *perlonga* (Simalur): 6.5, 6.5;

Max., min. and average measurements:

	longipennis Java	*longipennis* Udjung Kulon	*longipennis* Panaitan island	*longipennis* Kangean
Wing:	167 - 168 / 167.50	162	164	171
Tail:	94 - 107 / 101	105	86	106
Culmen:	5.1 - 6.8 / 5.98	6.8	5.5	5.5

	harterti Sumatra, Billiton	*wallacei* Celebes	*perlonga* Simalur
Wing:	154 - 169 / 159.20	179 - 183 / 181.20	175, 178 / 176.50
Tail:	72 - 99 / 88.40	98 - 119 / 111.80	110, 112 / 111
Culmen:	5 - 6 / 5.80	6 - 7 / 6.22	6.5, 6.5 / 6.50

♀ ♀ Wing; *longipennis* (Java) : 155, 159, 165, 167, 168; *longipennis* (Udjung Kulon) : 165; *longipennis* (Panaitan island) : 156; *longipennis* (Kangean) : 168; *harterti* (Sumatra, Billiton, Borneo) : 157, 161, 162, 164, 165; *wallacei* (Celebes) : 177, 182, 184; *perlonga* (Simalur) : 180;

Tail; *longipennis* (Java) : 90, 93, 94, 98, 106; *longipennis* (Udjung Kulon) : 106; *longipennis* (Panaitan island) : 85; *longipennis* (Kangean) : 103; *harterti* (Sumatra, Billiton, Borneo) : 81, 97, 98, 99, 101; *wallacei* (Celebes) : 114, 117, 119; *perlonga* (Simalur) : 99;

Culmen; *longipennis* (Java) : 5.8, 6.5, 6.5, 6.8, 7; *longipennis* (Udjung Kulon) : 6.5; *longipennis* (Panaitan island) : 6.7; *longipennis* (Kangean) : 6; *harterti* (Sumatra, Billiton, Borneo) : 5.9, 6, 6.1; *wallacei* (Celebes) : 5.6, 5.7, 6; *perlonga* (Simalur) : 6;

Max., min. and average measurements:

	longipennis Java	*longipennis* Udjung Kulon	*longipennis* Panaitan island	*longipennis* Kangean
Wing:	155 - 168 / 162.80	165	156	168
Tail:	90 - 106 / 96.20	106	85	103
Culmen:	5.8 - 7 / 6.52	6.5	6.7	6

	harterti Sumatra, Billiton Borneo	*wallacei* Celebes	*perlonga* Simalur
Wing:	157 - 165 161.80	177 - 184 181	180
Tail:	81 - 101 95.20	114 - 119 116.67	99
Culmen:	5.9 - 6.1 6	5.6 - 6 5.77	6

Some measurements compiled from literature:

JUNGE [1])

			Wing	Tail	Culmen
perlonga	9	♂	171 - 181	86 - 109	6 - 7
	4	♀	174 - 181	86 - 114	7

JUNGE [2])

perlonga Enggano	3	♂	175 - 180 177	103 - 117 109.33	6 - 7 6.33
	3	♀	177 - 181 179.33	94 - 115 106	6.5 - 7 6.83
perlonga Batu islands	2	♂	177, 179		
	1	♀	176		

DE SCHAUENSEE [6])

perlonga Simalur, the Batu & Pagi islands	3	♂	171.5 - 180
	3	♀	177 - 183
ocyptera Nias	7	♂	163.5 - 175 166.50
ocyptera Nias, Malay Pen., Sumatra, Borneo, etc.			156 - 175
harterti Sumatra, Banka, Pen. Siam	10	♂	156 - 171.5 164.40
longipennis Java, Bali			160 - 174
wallacei Celebes			167 - 190

RIPLEY [5])

perlonga West Sumatra Islands	17 ♂ ♀	$\frac{164 - 180}{173.10}$	(♂ ♂)
		$\frac{169.5 - 183.5}{174.90}$	(♀ ♀)
longipennis Java, Borneo, Sumatra	17 ♂	$\frac{159 - 170.5}{164.30}$	
	23 ♀	$\frac{155 - 173.5}{166}$	

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17. On the Indonesian subspecies of the Coast-Swallow, *Hirundo tahitica* GMELIN.

Material obtained a considerable time ago consisting of 16 skins belonging to the subspecies *javanica*, 14 of *frontalis*, a single adult and two juveniles of *abbotti*, was compared with five freshly secured specimens from the Sunda Strait area, the Karimundjawa islands and the Kangean Archipelago which all belong to the range of *javanica*. It is impossible to discover any racial difference on the under surface, though there are rather important individual differences in the extension and tone of the reddish brown on the chin, throat and foreneck and in the tint of the lighter parties of the remaining underparts. I also failed to find any constant difference in the markings on the undertail-coverts, in the light patches on the tailquills or in the scaly or not scaly appearance of the remaining under surface.

The subspecies *abbotti* is said to have a rather darker foreneck than the average *javanica* (BODEN KLOSS [2]) and the race *frontalis* known from the Lesser Sunda Islands and East Indonesia including New Guinea should have a very pale and uniformly coloured belly (STRESEMANN [12]). According to RENSCH [7]) *frontalis* should have the frontal area, throat and chest darker chestnut than in *javanica*. I failed to find any of those differences being of subspecific significance in the series examined, except in three birds from New Guinea. They have a rather white belly though not very distinct. The individual variability in the two subspecies is large. The examined material originating from Celebes and the Lesser Sunda Islands does not differ at all from *javanica*, neither in the colour of the underparts nor in any other respect. This uniformity was already observed by MAYR (STRESEMANN [12]) leading to the proposal to include Celebes within the range of *javanica*. As winglength RENSCH [7]) mentioned for the males of *frontalis* 100, 104, 108 and for the females 100 and 104 mm, apparently not differing from *javanica*.

So far it concerns the darker brownish chin and throat in *abbotti* I agree with JUNGE [6]) in rejecting differences in this respect as subspecific characters in the two races, but I could not dispose of much material of *abbotti*. The skin with the darkest chin and throat in my series originates from the Kangean Archipelago and the colour is not even russet brown but more dull brown, the frontal spot being still darker, more umber brown, differing from any other bird in the studied series; moreover this frontal patch is very small. It is to be regretted, however, that it is the only skin I obtained on these islands. The fact that it was preserved in formalin seems not very important because in a Karimundjawa bird preserved in the same way the brown colour did not change at all.

There is a tendency towards a "scaly appearance" in the plumage of the underparts in several birds, perhaps more often in those originating from Celebes or the Lesser Sunda Islands than in the material from Java. It is also rather distinct in the Kangean skin and in a specimen from Enggano, both being parts of the range of *javanica*.

There are only individual differences on the upper parts; in some birds the shine on the feathers is metallic greenish instead of blue. This is even observed in specimens from the same locality. The brownish frontal patch varies considerably in extent and also somewhat in tinge: sometimes this patch is very small but in several birds it reaches till about the middle of the occiput. The Kangean bird can be separated at once on account of the very small patch which is darker in colour than on the chin and throat without even a russet shadow in the brown.

The birds secured in the Sunda Strait region, Kangean and the Karimundjawa islands respectively in the months June, September and October all had small gonads. The Kangean bird had just moulted.

ROBINSON and KLOSS [10]) thought it improbable that Sumatran birds differ from those of Java and JUNGE [6]) rejected OBERHOLSER's *hypolampra* as well as *abbotti*. It was the opinion of BODEN KLOSS [2]) that *abbotti* could be maintained for the northern part of Sumatra whereas DE SCHAUENSEE [11]) also classified some of these swallows originating from the Batu islands (West Sumatra) as *abbotti* without giving other particulars than the wing-measurements which do not differ from those of *javanica*. A bird collected in Acheen (North Sumatra) was classified as *javanica* by CHASEN [4]) with the remark that typically *javanica* and *abbotti* can be separated without much difficulty but that much variation can be observed in the colour of the throat in those two races. He further remarked that it "certainly" cannot be separated from *javanica*, but that other specimens from North East Sumatra are *abbotti*! In his Handlist CHASEN [3]) maintained *hypolampra* as the race which inhabits Nias island (West Sumatra), mentioning as the range of *abbotti* Sumatra except Lampongs (South Sumatra) which should be part of the range of *javanica*. DELACOUR [5]) gives as the range of *abbotti* the larger part of Sumatra, Lampongs (South Sumatra) which should be part of the range of *javanica*.

VAN BEMMEL and VOOUS [1]) followed MAYR and STRESEMANN [12]) when identifying two birds from the island of Buton (South Celebes) as *Hirundo tahitica javanica*. This seems right when considering my series from Sumatra, Java and Celebes. I suppose that also birds from the Lesser Sunda Islands are inseparable from *javanica* though RENSCH [8]) classified some birds with wings of 107 (♂) and 103 mm (♀) from Sumba as *frontalis* without giving the reason why.

On the strength of the material studied together with the particulars derived from literature, I am of the opinion that *abbotti* does not represent a tenable subspecies and that the range hitherto attributed to this race must be included into that of *javanica*. The subspecies *frontalis* seems a rather thin race, perhaps restricted to certain parts of the Moluccas and New Guinea. Celebes and the Lesser Sunda Islands may be considered parts of the range of *javanica*.

Measurements (in mm):

♂ ♂ Wing; *javanica* (Java): 103, 103, 103, 105, 106; *javanica* (Sunda Strait area): 102; *javanica* (Karimundjawa Islands): 103; *javanica* (Ka-

ngean Archipelago) : 100; *frontalis* (Moluccas and Lesser Sunda Islands) : 103, 105, 107, 108, 110;

Tail; *javanica* (Java) : 41, 43, 44, 44, 49; *javanica* (Sunda Strait) : 40; *javanica* (Karimundjawa) : 42; *javanica* (Kangean) : 40; *frontalis* (Moluccas and Lesser Sunda Islands) 41, 44, 45, 47, 48;

Culmen; *javanica* (Java) : 8, 8.7, 8.8, 8.8, 9; *javanica* (Sunda Strait) : 7.1; *javanica* (Karimundjawa) : 6.9; *javanica* (Kangean) : 9; *frontalis* (Moluccas and Lesser Sunda Islands) : 8, 8, 8.2, 8.5, 9.3;

Max., min. and average measurements:

	javanica Java	*javanica* Sunda Strait	*javanica* Karimundj.	*javanica* Kangean	*frontalis* Moluccas, Lesser S. I.
Wing:	103 - 106 / 104	102	103	100	103 - 110 / 106.60
Tail	41 - 49 / 44.20	40	42	40	41 - 48 / 45
Culmen:	8 - 9 / 8.66	7.1	6.9	9	8 - 9.3 / 8.4

♀ ♀ Wing; *javanica* (Java) : 100, 102, 104, 104, 105; *javanica* (Sunda Strait area) : 101; *javanica* (Karimundjawa Islands) : 102; *frontalis* (Moluccas and Lesser Sunda Islands) : 96, 104, 105, 107; *abbotti:* 104;

Tail; *javanica* (Java) : 43, 44, 45, 47, 47; *javanica* (Sunda Strait) : 39; *javanica* (Karimundjawa) : 43; *frontalis* (Moluccas, Lesser Sunda Islands) : 44, 46, 47, 50; *abbotti*: 49;

Culmen; *javanica* (Java) : 8, 8.1, 8.8, 8.9; *javanica* (Sunda Strait) : 9.1; *javanica* (Karimundjawa) : not measured; *frontalis* (Moluccas, Lesser Sunda Islands) : 8, 8.1, 8.7, 9.2; *abbotti*: 8.8;

Max., min. and average measurements:

	javanica Java	*javanica* Sunda Strait	*javanica* Karimundjawa	*frontalis* Moluccas, etc.	*abbotti*
Wing:	100 - 105 / 103	101	102	96 - 107 / 103	104
Tail:	43 - 47 / 45.20	39	43	44 - 50 / 46.75	49
Culmen:	8 - 8.9 / 8.45	9.1		8 - 9.2 / 8.50	8.8

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18. Some notes on the validity of the subspecies *criniger* of the Fairy Bluebird, *Irena puella* (LATH.)

ROBINSON and BODEN KLOSS [5]) had the opinion that representatives of the genus occurring outside the Philippines are extremely closely related and constitute but slightly differentiated races. They thought it impossible to separate on account of differences in the tint of the blue on the upper surface of the male, specimens of *puella, cyanea* (=*malayensis*) and *criniger* when sufficient large series of these forms were mixed. This similarity is also evident from the fact that Sumatran birds have at different times been referred to each of these races as shown by the synonymy. These authors supposed the length of the upper and lower tailcoverts being the only character by which Sumatra birds can be separated from the subspecies *puella* and *malayensis*; in fully adult males from West Sumatra the tailcoverts should always reach the extreme tip of the tail.

Due to the fact that ROBINSON and BODEN KLOSS at that time could not compare their Sumatra material with representatives of the species from Java, they did not discuss the differences between these two populations.

Later the same authors [6]) remarked that Sumatran birds are only distinguishable from *turcosa* of Java by a slight purplish tinge in the blue of the males and possibly by a somewhat smaller size.

According to SNOUCKAERT VON SCHAUBURG [8]) PARROT tried to prove that there does not exist any difference between representatives of the species from Java and those originating from Sumatra and therefore he included the latter island into the range of *turcosa*. In recent literature *criniger* and *turcosa* are recognized again as two different subspecies, may be on account of BODEN KLOSS' [1]) opinion that birds from Sumatra differ from those living in Java in having the blue slightly tinged with violet or purplish in the males.

The few skins of male birds originating from Java, present in the Bogor Museum, *viz.* three adult specimens of old date and three recently obtained ones from Java's most western peninsula Udjung Kulon, make it rather difficult to have a reliable opinion about the validity of Sumatra's *criniger*. I suppose this race may be best considered a very thin one because Sumatran birds indeed show some violet in the blue of the upper parts instead of a faint greenish gloss like in *turcosa*; but this character may be considered a very poor one. When looking upon the latter character, four skins out of a series of 14, belong to *turcosa*. I therefore think it right that two birds in the Bogor museum which should originate from Java have been classified as *turcosa* though the locality of origin is indicated with a query on the labels. But it may be pointed out that this difference in plumage is far from being conspicuous and probably even not observable under all circumstances. Therefore, it is quite logical that the validity of *criniger* was repeatedly doubted.

I failed to discover any subspecific difference in the length of the blue tailcoverts in the examined series of *turcosa* and *criniger*. In adult males belonging to the two races the tailcoverts may reach the tip of the tail or they are only a trifle shorter on both the upper and undertail. There is also no other than an individual difference in the extensiveness of the blue and black portions in the plumage which certainly has no subspecific value.

There is apparently little change because of long storage but in some freshly obtained birds from Java the remiges and wingcoverts are darker than in old material. When comparing a freshly obtained female from Udjung Kulon with a badly developed ovary with another one from the same locality with well granular ovary (ovum 2 mm), there is some colour difference in the wingcoverts, which are darker in the latter bird

and have distinct green edges which are absent in the former. All three Udjung Kulon male birds had large gonads (6 - 12 mm).

Looking at the measurements given below there exist no subspecific size differences between *turcosa* from Java and *criniger* from Borneo and Sumatra but the bill in Sumatran males is a trifle heavier due to its being shorter and somewhat deeper at its base.

The subspecies *megacyanea* from Banjak islands and *bondi* from the Batu islands are separated because of their large wing measurements. Both are rejected by RIPLEY [4]) and synonymized with *criniger*. Though it is evident from the figures given below that *bondi* must be a large bird when compared with *turcosa* or *criniger* I agree that size differences are not important enough for subspecific separation.

Because CHASEN's Handlist [2]) states that *Irena puella* is not yet known from East Java, it may be noted that in the Bogor collection there are two birds (♂ ♀) secured at Wonosalam (East Java) by VORDERMAN so far back as 1892. More recently KOOIMAN [3]) mentioned the occurrence of the same species again for that part of Java, so that it is quite justifiable to include East Java within the range of the subspecies *turcosa*.

Measurements (in mm.):

♂ ♂ Wing; *turcosa* (Java): 120, 121, 122, 122, 123, 123; *criniger* (Sumatra): 117, 118, 120, 121, 121, 121, 122, 122, 123, 123;

Tail; *turcosa* (Java): 82, 88, 89, 90, 90; *criniger* (Sumatra): 80, 83, 84, 84, 85, 85, 86, 87, 88, 92;

Culmen; *turcosa* (Java): 21.5, 21.7, 22, 22.3, 24, 24.7; *criniger* (Sumatra): 20, 20, 21.1, 21.5, 22, 22, 22.2, 22.2, 22.7, 23.2;

Max., min. and average measurements:

	turcosa Java	*criniger* Sumatra
Wing:	120 - 123 / 121.83	117 - 123 / 120.80
Tail:	82 - 90 / 87.80	80 - 92 / 85.40
Culmen:	21.5 - 24.7 / 22.70	20 - 23.2 / 21.69

♀ ♀ Wing; *turcosa* (Java): 113, 116, 117, 118, 118; *criniger* (Sumatra): 115, 116, 117, 118, 120, 120, 122, 123, 123, 125;

Tail; *turcosa* (Java) : 81 : 85, 85, 86, 88; *criniger* (Sumatra) : 83, 85, 85, 85, 86, 87, 88, 91, 91;

Culmen; *turcosa* (Java) : 21, 21, 21.6, 22.5, 23.1; *criniger* (Sumatra) : 21, 21.5, 22.6, 23, 23, 23, 23.3, 24, 24;

Max., min. and average measurements:

	turcosa Java	*criniger* Sumatra
Wing:	113 - 118 / 116.40	115 - 125 / 119.90
Tail:	81 - 88 / 80.50	83 - 91 / 86.78
Culmen:	21 - 23.1 / 21.84	21 - 24 / 22.82

Some measurements compiled from literature:

RIPLEY [4])					
bondi & *megacyanea* Islands off West Sumatra	15 ♂	121 - 134 / 124.20	11 ♀	115 - 128 / 122.50
bondi Batu Islands	♂ ♂	121 - 134 / 124.10	♀ ♀	120 - 128 / 123.90
criniger Borneo, Bangka, Sumatra	10 ♂	117 - 126 / 120.70		
DE SCHAUENSEE [7])					
bondi Batu Islands	6 ♂	123.5 - 132 / 127.67	6 ♀	121 - 125 / 123.42
megacyanea Banjak Islands	♂ ♂	115 - 124 / 119.90	6 ♀	118 - 119 / 118.50
criniger Borneo	13 ♂	113.5 - 124 / 118.55	6 ♀	112.5 - 117.5 / 114.67
criniger Sumatra	8 ♂	115.5 - 124 / 120.19	8 ♀	115 - 123 / 118.31
VOOUS [9])					
criniger Borneo	5 ♂	120 - 124 / 121.40	4 ♀	113.5 - 118 / 115.38

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19. The Swallow-Shrike, *Artamus leucorhynchus* (LINN.) especially on the population inhabiting the Karimundjawa Archipelago.

Rather striking differences in size and plumage are observed in representatives of the species obtained from the small islands surrounding Java. These facts induced me to compare some freshly secured material with large series of old skins present in the Bogor museum originating from divergent parts of the range of the subspecies *amydrus* and with *celebensis*. Hereunder is the result of this study.

When studying skins of this species obtained 20 to 30 years or still longer ago, those originating from Sumatra are darker on the upper parts, especially on the crown and lores, than specimens secured from Java. On this point those from Java seem much closer to (old) *celebensis*, which was separated because of the paler tinge of the dark parties in the plumage.

Material from the Karimundjawa Archipelago, collected 26 to 30 years ago, seems again much closer related to Sumatran birds than to those from the island of Java, but is still somewhat darker on the crown than Sumatran birds obtained at about the same time. The only skin from Kangean, however, collected by VORDERMAN so far back as 1892, resembles much more the pale birds from Java. If 10 old skins from Sumatra, 9 from Java and 6 from Karimundjawa are laid out belly downwards it is rather easy to separate all Javan specimens on account of their paler upper parts.

Freshly collected material from the Sunda Strait area, including Panaitan island, and fresh skins from the Karimundjawa and Kangean islands are darker and less brownish above than old skins obtained from the same localities. Fresh material from the Sunda Strait is the lightest. The same holds good for the blackish tint on the chin, the throat and the breast; also in this respect birds from this region are lightest except some from Panaitan island. Out of the 11 freshly secured birds from Strait Sunda, 12 from Karimundjawa and 8 from Kangean ten individuals can be separated on the basis of the darkest upper surface of which six come from Karimundjawa, three from Kangean and one from Panaitan island. When selecting the ten specimens with the darkest throat among these specimens there are six from Karimundjawa, two from Kangean and two from Panaitan island.

In skins which have been stored for a long time the plumage is not only paler but also becomes more brown, especially on the mantle and the back, but darkest again in birds from the Karimundjawa islands.

On account of the resemblance in plumage in individuals from Panaitan island and those from Kangean, two localities so far apart, it seems rather dangerous to separate racially birds because of differences in tone of the dark parties of the plumage. This may be the reason that both Sumatra and Java are included into the range of the same subspecies. But it may be remarked that the population of this *Artamus* living in the Karimundjawa islands is darker than birds from Java, not only when looking at the mantle and the back but also when comparing the occiput and the lores. One of the birds from Karimundjawa has some pure white feathers on the crown which is not found in any other skin among the many examined.

The individual variation in size is important but the number of specimens belonging to the race *amydrus* with a winglength below 130 mm is very small in the examined series. Among the 48 males measured there are only five which have such a short wing and among the 46 females only seven. Birds with the largest wing originate from Sumatra; in six at random separated male birds from that island the smallest wing measured 134 mm and this length was only observed in one single specimen. Also in eigth females from Sumatra there are six which show a winglength of 134 mm or more. Among the ten males from Java, however, there are seven with a wing of less than 134 mm and among the ten females four. The wing of Sumatra birds averages more than 5 mm longer in the males and almost 2 mm in the females than in those originating from Java (6 ♂ and 8 ♀ from Sumatra average 137.67 and 135 mm against

132.60 and 133.30 mm in 10 ♂ and 10 ♀ from Java). When describing *amydrus* the two males mentioned by OBERHOLSER originating from Solombo Besar (Java sea) had wings of 132 and 133 mm. Also STRESEMANN [9]) gave attention to the large wings in birds from Sumatra, giving as winglength for nine specimens 135 - 140 mm against 126 - 138 mm for six Javan birds. The wingsize in males from the Kangean Archipelago seems closer to Sumatran than to Javan birds of the species, but the available series of Kangean material is too small to justify a difinite conclusion. Rather short in their wings are birds originating from the surrounding areas of the Sunda Strait, though there are still four among the 13 recently obtained specimens with a winglength exceeding 134 mm (135, 135, 137 and 140 mm).

Much smaller than all birds discussed above are the 16 specimens I measured from the Karimundjawa islands. From this locality there are only two which have a wing of over 132 mm and this could only be seen in one male and one female. Among the nine males there are even six with a wing of only 130 mm or less and among the seven females there are five with a wing below 130 mm. The males originating from these islands are almost 4.5 and the females 5 mm shorter in the wing than the Javan birds and when compared with Sumatran ones the differences are almost 8 and more than 6 mm respectively. When considering Javan and Sumatran birds as a unit together with a number of birds from other parts of the range of *amydrus*, I found as average winglength for 30 ♂ 133.57 mm and for 36 ♀ 133.15 mm against 129.89 mm for nine males and 128.71 mm for seven females from the Karimundjawa islands. Thus still showing differences of more than 3.5 mm for the males and more than 4 mm for the females. Some birds were moulting the large primaries but they have been excluded from my measuring.

The different populations do not show important constant differences in tail- and bill- measurements but the bill of the Karimundjawa birds is wider at the base of the upper mandible. And those obtained from the Kangean islands have a longer bill than all other examined *amydrus*. When ten birds are selected out of 40 specimens, of which 13 originate from the Sunda Strait, 18 from Karimundjawa islands and 9 from Kangean, there are five from Karimundjawa, two from the Sunda Strait and three from Kangean which show this character most distinctly.

STRESEMANN [9]) and more recently VAN BEMMEL and VOOUS [1]) included the Kangean Archipelago into the range of *celebensis* though CHASEN [3]) and DELACOUR [6]) considered Kangean's population to belong to *amydrus*. My material from these islands (5 ♂ 4 ♀) seems closer related to the

latter form, not only because the birds average distinctly smaller than the ten (5 ♂ 5 ♀) examined specimens of *celebensis* but also when compared with the many measurements of this race as given in literature. It seems also closer related on account of differences in the plumage.

On the upper parts as well as on the throat and the foreneck, the Kangean birds are clearly darker than *celebensis*, more resembling the average *amydrus*, though there are several old skins originating from Java and also one from Kangean which do not differ much from old material of *celebensis*.

It is evident from the particulars given above that representatives of the species living in the Karimundjawa islands differ from *amydrus* and *celebensis*, not only because of the difference in the measurements but also in their plumage. They show a shorter wing, average wider on the basal part of the upper mandible and are darker on the upper parts, the throat and the foreneck. These colour differences are more pronounced in fresh material but also distinct in old skins.

Though there is a combination of characters which seems important enough to separate the population living in the Karimundjawa Archipelago I do not consider those differences important enough to justify separation and I therefore included these islands into the range of *amydrus*, which is in accord with the present situation.

It seems worthwhile to draw attention to the important variation in wingsize I found which ranges from 127 to 143 mm in the (48) males and from 123 to 142 mm in the (46) female birds within the subspecies *amydrus*.

Though the species is a rather common one in Java and in most of its satellite islands, it is apparently absent on the island of Bawean.

Measurements (in mm) :

♂ ♂ Wing; *amydrus* (Sumatra, Billiton, Krakatau Islands) : 131, 132, 132, 132, 133, 133, 134, 134, 134, 134, 135, 135, 135, 136, 138, 138, 139, 140, 142, 143; *amydrus* (Java) : 131, 133, 133, 136, 138; *amydrus* (Java, measured by JUNGE) : 129, 130, 130, 131, 135; *amydrus* (Sunda Strait area) : 127, 128, 130, 130, 132, 135, 135, 137, 140; *amydrus* (Karimundjawa Islands) : 128, 128, 128, 130, 130, 130, 131, 131, 133; *amydrus* (Kangean Islands) : 130, 135, 136, 138, 140; *celebensis* (Celebes) : 136, 138, 142, 143, 145;

Tail; *amydrus* (Sumatra, etc.) : 56, 57, 57, 58, 58, 58, 60, 60, 61, 61, 62, 62, 62, 62, 63, 64, 64, 66, 67, 68; *amydrus* (Java) : 59, 60, 60, 61, 66; *amydrus* (Java, measured by JUNGE) : 57, 57, 57, 58, 58; *amydrus* (Sunda

Strait): 56, 57, 58, 59, 59, 61, 62, 62, 63; *amydrus* (Karimundjawa): 57, 59, 59, 59, 60, 60, 60, 60, 60, 61; *amydrus* (Kangean): 58, 59, 60, 60, 61; *celebensis* (Celebes): 61, 61, 62, 63, 65;

Culmen; *amydrus* (Sumatra, etc.): 17.5, 17.5, 18.2, 18.2, 18.8, 18.8, 18.9, 18.9, 18.9, 19, 19, 19, 19, 19.1, 19.2, 19.3, 19.3, 19.5, 20; *amydrus* (Java): 17, 18,2, 18.3, 18.5, 18.5; *amydrus* (Java, measured by JUNGE): 17, 17, 17, 18, 18; *amydrus* (Sunda Strait): 18.7, 18.9, 19, 19, 19, 19.2, 19.8, 20.2; *amydrus* (Karimundjawa): 18, 18.8, 19, 19.1, 19.1, 19.2, 19.3, 19.3, 19.5; *amydrus* (Kangean): 19.5, 20, 20, 20, 21; *celebensis* (Celebes): 18.9, 19.2, 19.6, 20.5, 20.9;

Width of bill; *amydrus* (Sumatra, etc.): 10.5, 10.5, 10.9, 11.2, 11.3; *amydrus* (Java): 9.8, 10.6, 10.9, 11, 11; *amydrus* (Sunda Strait): 10.6, 10.6, 10.9, 11, 11, 11.1, 11.1, 11.1; *amydrus* (Karimundjawa): 10.8, 10.9, 10.9, 11, 11, 11, 11, 11.1, 11.2, 11.5, 12.1; *amydrus* (Kangean): 9.8, 10, 11;

Max., min. and average measurements:

	amydrus Sumatra, etc.	*amydrus* Java	*amydrus* Java (Leiden Mus.)	*amydrus* Sunda Str.
Wing:	131 - 143 / 135.50	131 - 138 / 134.20	129 - 135 / 131	127 - 140 / 132.67
Tail:	56 - 68 / 61.30	59 - 66 / 61.20	57 - 58 / 57.40	56 - 63 / 59.67
Culmen:	17.5 - 20 / 18.85	17 - 18.5 / 18.10	17 - 18 / 17.40	18.7 - 20.2 / 19.23
Width of bill:	10.5 - 11.3 / 10.88	9.8 - 11 / 10.66		10.6 - 11.1 / 10.93
Weight:				3 ♂: 35, 42, 43 / 40 gr.

	amydrus Karimundjawa	*amydrus* Kangean	*celebensis* Celebes
Wing:	128 - 133 / 129.89	130 - 140 / 135.80	136 - 145 / 140.80
Tail:	57 - 61 / 59.50	58 - 61 / 59.80	61 - 65 / 62.40
Culmen:	18 - 19.5 / 19.03	19.5 - 21 / 20.10	18.9 - 20.9 / 19.82
Width of bill:	10.8 - 12.1 / 11.14	9.8 - 11 / 10.27	
Weight:	8 ♂: 34 - 44 / 39.38 gr.	3 ♂: 40, 40, 42 / 40.67 gr.	

♀ ♀ Wing; *amydrus* (Sumatra, Billiton, Bali) : 128, 128, 130, 130, 130, 130, 131, 132, 132, 132, 132, 132, 132, 132, 133, 133, 133, 133, 134, 134, 135, 135, 136, 136, 139, 142; *amydrus* (Java) : 131, 134, 134, 134, 135; *amydrus* (Java, measured by JUNGE) : 130, 132, 133, 135, 135; *amydrus* (Sunda Strait) : 130, 130, 130, 133; *amydrus* (Karimundjawa) : 123, 127, 129, 129, 129, 131, 133; *amydrus* (Kangean) : 132, 133, 137, 140; *celebensis* (Celebes) : 133, 136, 137, 143, 145;

Tail; *amydrus* (Sumatra, Billiton, Bali) : 55, 57, 57, 58, 58, 59, 59, 59, 59, 60, 60, 60, 60, 60, 61, 61, 62, 62, 62, 62, 63, 63, 64, 64, 65; *amydrus* (Java) : 60, 62, 63, 63, 63; *amydrus* (Java, measured by JUNGE) : 54, 58, 58, 58, 62; *amydrus* (Sunda Strait) : 56, 67, 59, 60; *amydrus* (Karimundjawa) : 55, 59, 59, 60, 61, 62, 64; *amydrus* (Kangean) : 58, 60, 61, 62; *celebensis* (Celebes) : 65, 65, 66, 67, 68;

Culmen; *amydrus* (Sumatra, etc.) : 16.2, 16.7, 17.1, 17.5, 17.7, 17.8, 17.9, 17.9, 18, 18, 18, 18, 18.1, 18.2, 18.2, 18.7, 18.9, 19, 19.2, 19.3, 19.3, 19.6, 19.8, 20, 20.1; *amydrus* (Java) : 16.7, 17, 17.6, 18, 19; *amydrus* (Java, measured by JUNGE) : 17, 18, 18, 18, 18; *amydrus* (Sunda Strait) : 18, 18.8, 19, 19; *amydrus* (Karimundjawa) : 17.5 18.8, 19, 19.2, 19.8, 20, 20; *amydrus* (Kangean) : 19, 19.5, 19.7, 21; *celebensis* (Celebes) : 19, 19, 19.5, 19.5, 19.8;

Width of bill; *amydrus* (Sumatra, etc.) : 9.5, 10.8, 10.9, 10.9, 11; *amydrus* (Java) : 9.1, 10, 10.2, 10.9, 11; *amydrus* (Sunda Strait) : 10.8, 11, 11; *amydrus* (Karimundjawa) : 10.8, 11, 11, 11.3, 11.5, 11.6, 12; *amydrus* (Kangean) : 10.6, 10.8, 11, 11.1;

Max., min. and average measurements:

	amydrus Sumatra, etc.	*amydrus* Java	*amydrus* Java (Leiden Mus.)	*amydrus* Sunda Str.
Wing:	128 - 142 / 132.85	131 - 135 / 133.60	130 - 135 / 133	130 - 133 / 130.75
Tail:	55 - 65 / 58.08	60 - 63 / 62.20	54 - 62 / 58	56 - 60 / 58
Culmen:	16.2 - 201 / 18.37	16.7 - 19 / 17.66	17 - 18 / 17.80	18 - 19 / 18.70
Width of bill:	9.5 - 11 / 10.62	9.1 - 11 / 10.24		10.8 - 11 / 10.93
Weight:				3 ♀ : 40, 40, 43 / 41 gr.

	amydrus Karimundjawa	*amydrus* Kangean	*celebensis* Celebes
Wing:	123 - 133 / 128.71	132 - 140 / 135.50	133 - 145 / 138.80
Tail:	55 - 64 / 60	58 - 62 / 60.25	65 - 68 / 66.20
Culmen:	17.5 - 20 / 19.19	19 - 21 / 19.80	19 - 19.8 / 19.36
Width of bill:	10.8 - 12 / 11.31	10.6 - 11.1 / 10.88	
Weight:	4 ♀ : 38 - 43 / 40.75 gr.	5 ♀ : 40 - 50 / 43 gr.	

Some measurements compiled from literature:

Winglength

CHASEN & HOOGERWERF [5])
amydrus 5 ♂ 135 - 143 5 ♀ 134 - 140
Sumatra

BODEN KLOSS [2])
amydrus 2 ♂ 131, 134 3 ♀ 128, 135, 138
Sumatra

CHASEN [4])
amydrus 1 ♂ 135 1 ♀ 131
Billiton

ROBINSON & BODEN KLOSS [8])
amydrus 3 ♂ 134, 136, 140 3 ♀ 134, 137, 141
Sumatra

STRESEMANN [9])
celebensis ♂ ♀ 129 - 146, generally above 135 mm.
Celebes, Buton,
Kangean, Flores, etc.

RENSCH [7])
celebensis 7 ♂ 133 - 142 / 136.43 2 ♀ 138, 140 / 139

VAN BEMMEL & VOOUS [1])
celebensis 23 ♂ 131 - 147 / 138.77 2 ♀ 134 - 146 / 141.45
Celebes & Buton

STRESEMANN [9])

leucorhynchus	average of 50 ♀ ♂ 134.90 mm.
Philippines, Sulu, Borneo, etc.	
mussenbroeki	♂ ♀ 130 - 140
Tanimbar, etc.	
humei	♂ ♀ 127 - 134
Andaman Isl.	
leucopygialis	average of 70 ♀ ♂ 128.90 mm.
New Guinea	
papuensis	♂ ♀ 128 - 140
Aru, Kei Isl., Ceram, Ambon etc.	

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20. A note on the Indonesian subspecies of the Velvet-fronted Nuthatch, *Sitta frontalis* (SWAINS).

A specimen recently obtained from West Java which show a close resemblance to representatives of the Sumatran race *saturatior* induced me to study the value of the subspecific characters attributed to this race and *frontalis*.

The colour differences in the plumage as mentioned in the diagnosis between birds belonging to the nominate race and those of *saturatior* are well distinguishable in the material present in the Bogor Museum

but some old specimens of the latter subspecies lost the lilac tint of the underparts almost completely, turning to light brown. Apparently not all skins are liable to such discolouration; this is evident from individuals collected in Acheen (North Sumatra) some 26 years ago which still show much lilac below. Also the three examined specimens of *corallipes*, known from Borneo, have a brownish instead of a lilac under surface but, like *saturatior* those parts are darker than in representatives of the nominate race.

Comparison with material in the Leiden Museum, however, makes it rather doubtful whether the lilac or vinaceous tinge on the under parts may be accepted as a subspecific character because many skins from Java belonging to the range of *frontalis* show the same colour below as do the average *saturatior*. This is obvious in some birds in the Leiden collection, obtained from East Java which on this point show a striking similarity to the latter race. JUNGE [6]) had the opinion that juvenile specimens are more brownish, less lilac and he found that in birds obtained in July the lilac colour was less pronounced than in those obtained in February.

A recently obtained male bird from Java's most western peninsula, Udjung Kulon seems somewhat intermediate between those two subspecies because the underparts contain much lilac grey which is very dark on the belly and undertail-coverts, even darker than the darkest *saturatior*. This specimen, also on account of its larger measurements, seems closer to birds from North Sumatra than to *frontalis* known from Java as well as from South Sumatra. However, the light chin, throat and foreneck make it again more resembling *frontalis*. A female shot at the same place and on the same date fits well in our series of *frontalis*.

That *corallipes* is darker underneath than *saturatior* as indicated by HARTERT [5]) is not corroborated in the three skins I examined, but two of them were preserved in alcohol which makes them not very suitable for comparison. Birds of this subspecies, however, have red feet instead of brown or dark grey like in the other races, a character which is of outstanding significance.

I cannot discover any subspecific difference in the upper surface between birds belonging to the races mentioned above. The only examined male of *corallipes* shows only a rather indistinct dark streak along the sides of the head and the neck which should be characteristic for this race. Also in the males of the two other subspecies this streak is not always very strikingly present and there is also some variation in the extensiveness of the black patch on the forehead in all three subspecies.

Judging from the measurements I took, *saturatior* males are larger than *frontalis* though BODEN KLOSS [1]) gave as winglength for birds of the nominal race 71 - 81 mm. This should eliminate such a difference, but because nothing is known about the origin and the number of specimens measured, it seems wise to consider such a long wing as 81 mm as an exception for the nominate race. May be size differences between these two subspecies, especially in the males, are more important as racial characters than differences in plumage. When the latter have no real subspecific value it is perhaps better to follow DELACOUR [4]) to include Java and South Sumatra within the range of *saturatior*.

A small series from Simalur Island (West Sumatra) are extremely large in size, considerably larger than most *saturatior* skins I have ever seen though JUNGE [6]) united them with this race.

Measurements (in mm):

♂ ♂ Wing; *frontalis* (Java): 72, 75, 77, 77, 77; *frontalis* (Udjung Kulon, West Java): 79; *saturatior* (Sumatra): 77, 79, 79, 79; *corallipes* (Borneo): 76;

Tail; *frontalis* (Java): 40, 40, 41, 41, 43; *frontalis* (Udjung Kulon): 40; *saturatior* (Sumatra): 40, 42, 43, 46; *corallipes* (Borneo): 42;

Culmen; *frontalis* (Java): 12.2, 12.6, 12.7, 13.1, 14; *frontalis* (Udjung Kulon): 12.1; *saturatior* (Sumatra): 12.2, 12.6, 13.2, 14; *corallipes* (Borneo): 13.5;

Max., min. and average measurements:

	frontalis Java	*frontalis* Udjung Kulon	*saturatior* North Sumatra	*corallipes* Borneo
Wing:	72 - 77 / 75.60	79	77 - 79 / 78.50	76
Tail:	40 - 43 / 41	40	40 - 46 / 42.75	42
Culmen:	12.2 - 14 / 12.92	12.10	12.2 - 14 / 13	13.50

♀ ♀ Wing; *frontalis* (Java): 74, 74, 75, 75, 77; *frontalis* (Udjung Kulon): juv. 72; *saturatior* (Sumatra): 72, 74, 75, 76; *corallipes* (Borneo): 71;

Tail; *frontalis* (Java): 38, 39, 39, 40, 41; *frontalis* (Udjung Kulon): juv. 37; *saturatior* (Sumatra): 39, 39, 41, 42; *corallipes* (Borneo): 37;

Culmen; *frontalis* (Java): 11.3, 11.9, 12.5, 12.7, 13; *frontalis* (Udjung Kulon): juv. 13.5; *saturatior* (Sumatra): 12.6, 13.2, 13.5, 13.5; *corallipes* (Borneo): 13;

Max., min. and average measurements:

	frontalis Java	*frontalis* juv. Udjung Kulon	*saturatior* North Sumatra	*corallipes* Borneo
Wing:	74 - 77 / 75	72	72 - 76 / 74.25	71
Tail:	38 - 41 / 39.40	37	39 - 42 / 40.25	37
Culmen:	11.3 - 13 / 12.28	13.50	12.6 - 13.5 / 13.20	13

Some measurements compiled from literature:

CHASEN & HOOGERWERF [3])

saturatior North Sumatra — 3 ♂ Wing: 77, 78, 79 / 78 ; Tail: 45

2 ♀ Wing: 71, 75 / 73 ; Tail: 40

BODEN KLOSS [1])

frontalis South Sumatra — 3 ♂ Wing: 74, 77, 77 / 76

saturatior North Sumatra — 1 ♂ „ 73; 1 ♀ „ 75

JUNGE [6])

saturatior Simalur — ♂ ♂ Wing: 79 - 81; Tail: 45 - 47; Culmen: 13 - 14

♀ ♀ „ 78, 78; „ 43, 45; „ 13.50

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21. On *Dicaeum trochileum* (SPARRM.) with special reference to the representatives of the species from the island of Bawean (Java Sea)

When comparing a small series (8 ♂, 4 ♀) for the greater part freshly collected Flowerpeckers originating from the island of Bawean with about 90 male birds of the nominate form obtained from different localities, but mostly from Java, there is a rather conspicuous difference because birds from Bawean are darker on the underparts. Not only because of the grey being darker but also on account of the smaller extension of the light parties on the lower under surface. This difference is not only observable when comparing fresh Bawean skins with large series of old material but also — and in some skins even more strikingly — when recently secured specimens from the Karimundjawa Archipelago and from the Sunda Strait area are compared. These two areas are parts of the range of the nominal subspecies.

Also the red in the plumage averages a trifle darker in material form Bawean island which holds good for the under as well as for the upper parts. Though tail and wings average in being somewhat darker too than in most other birds, material from Karimundjawa does not differ much in this respect from Bawean's population as is the case with the bluish metallic gloss on the wings. Especially on the wingcoverts Bawean birds show more resemblance with individuals from Karimundjawa than with freshly collected birds from the Sunda Strait region, though Bawean skins still seem a trifle more bluish than specimens from the Karimundjawa islands.

There is perhaps only a little or no difference in the plumage of the females but we have not enough material from Bawean to draw a definite conclusion. They are apparently somewhat darker on the sides of the head and a trifle lighter on the under surface when compared with freshly obtained birds from the nominal form. Though there is rather much individual variation in the colour of the upper parts, the two Bawean birds average somewhat darker than most fresh *trochileum* females.

Two female birds from Bawean secured so far back as 1928 show more olive on the cheeks and earcoverts than fresh ones. They also average a trifle clearer green on the upper surface and have less red in the feathers of the lower back and uppertail coverts, also when compared with old material from Karimundjawa. But two freshly obtained Bawean females — on the contrary — have decidedly more red on those parts so that there are certain indications that in this species too a comparison of fresh skins with material of old date is not well justifiable. This is also evident when considering three males collected in Bawean about

) years ago and the small series of fresh material: only one old skin distinctly darker than the average *trochileum*, the two other ones being milar.

Besides colour differences in plumage of representatives of this ɔecies living in Bawean island and those originating from other calities there is also a distinct difference in billsize. The bill is not ıly shorter in Bawean specimens but also, relatively, wider at its base ıan is the case in birds of the nominate race. Owing to this shorter ill they may show some resemblance with *stresemanni* from Lombok hich, however, differs in other respects from the Bawean population. n *stresemanni* it seems to be only the female which shows the subspecific ifferences in plumage (RENSCH[2]) and they are not the same as those bserved in the females from Bawean when compared with representatives f the nominate subspecies. The flanks of the head and the upper parts re *not* lighter in birds from Bawean but on the contrary are darker han the typical *trochileum*. I did not see any bird belonging to *strese-ıanni* but I examined a male from the island of Bali which may belong o this race on account of its very short bill (in both sexes 9.2 mm) ; RENSCH insidered Bali's population *Dicaeum t. trochileum* $\geqslant$ *stresemanni*. This pecimen is extremely light below, resembling the lightest *trochileum* have seen, much lighter than Bawean males secured in the same year 1928). As no difference in the plumage of the male birds are mentioned n the diagnosis, it seems logical to suppose that males of *stresemanni* do ıot differ from representatives of the nominate form.

The only three males from Kangean fit well in the series of Bawean ɔirds; they are dark on the under surface having the black and red more ɔrilliant and are similar in billsize.

Birds originating from the Sunda Strait area (Udjung Kulon, Panaitan sland, Sangiang and Legundi) agree well with representatives of the ıominal race and they also show the large bill. Two females from Panaitan sland seem extremely heavy in their bills but a female from Sangiang sland, not so far away from Panaitan island, has a somewhat smaller ɔill while a specimen obtained from Legundi island shows a very slender bill as is the case with a juvenile male. A male bird recently secured in Udjung Kulon has the normal bill of *trochileum*, similar to two individuals ɔbtained there 15 and 25 years earlier. They resemble each other also in other respects but the fresh skin is a trifle darker below, though very distinctly different from the average male bird from Bawean. This is also the case with a fresh skin obtained from the neigbourhood of Bogor (West Java).

The gonads of all birds from the Karimundjawa islands, obtained in October and November, were small or very small; about the same picture is shown by the females from Bawean secured in May and June and those obtained in August and September in the Kangean Archipelago, but the male birds from the two latter groups of islands had rather well developed testicles (2 - 3, 3 - 4 and one of 10 mm). With a view on the fact that a male from Udjung Kulon also had testicles of about 4 mm and the plumage shows similar differencces as in birds with small reproductive organs, it is evident that the dissimilarities between birds of the nominal race and those from Bawean can not be attribited to differences in the development of the gonads. Specimens obtained in September in Panaitan island had these organs poorly developed and this was also the case with a female shot in Legundi island in June. In the same month two juveniles were obtained on the latter island.

Summarizing, it seems worth to call attention for the following differences between the Bawean population and representatives of the nominate form. The size is not different from birds belonging to *D. t. trochileum* but the bill averages shorter and is somewhat broader at its base, distinctly smaller than in *stresemanni*. In the male bird the grey on the underparts is darker and is more extensive than in *trochileum* or *stresemanni*. The red and black portions in the plumage average darker too, showing the metallic blue gloss more strikingly, especially on the wing-coverts. There are perhaps no differences in the females but they may average darker above and on the cheeks and body flanks.

Freshly obtained birds from the Karimundjawa Archipelago show more similarity with the Bawean material on account of the dark, more bluish tinge in the wing and tail, but because of their light under surface and longer bill they exactly fit into that of fresh *trochileum*. When comparing 10 fresh males from Karimundjawa with 5 skins secured there 25 years earlier, the remarkable fact that can be established is that the fresly obtained specimens average in being smaller in their bill than the old ones, though they are narrower at their base than birds from Bawean. These differences were established after comparing five fresh and three old male birds from Bawean island with 90 old dated males of the nominal race and 15 freshly obtained skins from the Sunda Strait area, Karimundjawa islands, the Kangean Archipelago and from Bogor. Special attention has been given to birds in which the reproductive system had reached the same stage of development.

Though there seem reasons to separate Bawean's population of this Flowerpecker, we do not think it fully justifiable if no more fresh material

from Java itself and no more skins from Bawean and Kangean islands can be seen; the difference in billsize and the structure of this organ are perhaps not sufficient as to be of subspecific significance.

On account of the somewhat aberrant tint of the red, the more metallic blue gloss on the wings and tail, Bawean males apparently show some resemblance with a supposed hybrid between *trochileum* and *Dicaeum cruentatum* originating from Samarinda (east Borneo) as described by VOOUS and VAN BEMMEL[3]; of this specimen it is also said that the bill is relatively shorter and less thinly pointed. But *Dicaeum cruentatum* is not known from Bawean island which makes it rather difficult to believe in hybrids in this case.

Measurements (in mm.) of *Dicaeum trochileum trochileum:*

♂ ♂ Wing; Java: 51, 52, 52, 52, 52, 52, 53, 53, 54, 55; Sunda Strait area: 52, 53, 53, 55, 55, 55; Karimundjawa Archipelago: 51, 52, 52, 52, 52, 52, 52, 52, 52, 53, 53, 53, 54, 54, 54; Bawean Island: 52, 52, 52, 53, 53, 54, 54; Kangean Archipelago: 52, 53, 54;

Tail; Java: 26, 27, 28, 28, 28, 28, 30, 30, 30, 30; Sunda Strait: 26, 28, 29, 29, 30, 31; Karimundjawa: 23, 25, 27, 27, 27, 28, 28, 28, 28, 28, 29, 29, 30, 30, 31; Bawean: 24, 26, 27, 28, 28, 30, 31; Kangean: 26, 28;

Culmen; Java: 10, 10.1, 10.3, 10.5, 10.7, 10.8, 10.8, 10.9, 11, 11.1; Sunda Strait: 9.5, 10, 10, 10.2, 10.6, 11.1; Karimundjawa: 9.5, 9.6, 9.8, 9.8, 9.9, 10, 10.5, 10.5, 10.6, 10.7, 11, 11, 11; Bawean: 8.5, 8.7, 9.2, 9.2, 9.3, 9.5, 9.7; Kangean: 7.5, 8.2, 8.5;

Max., min. and average measurements:

	Java	Sunda Strait	Karimundjawa	Bawean	Kangean
Wing:	51 - 55 / 52.60	52 - 55 / 53.83	51 - 54 / 52.53	52 - 54 / 52.86	52 - 54 / 53
Tail:	26 - 30 / 28.50	26 - 31 / 28.83	23 - 31 / 27.87	24 - 31 / 27.71	26, 28 / 27
Culmen:	10 - 11.1 / 10.62	9.5 - 11.1 / 10.23	9.5 - 11 / 10.30	8.5 -9.7 / 9.16	7.5 - 8.5 / 8.07

♀ ♀ Wing; Java: 48, 48, 49, 49, 49, 50, 50, 50, 50, 51; Sunda Strait: 48, 49, 51; Karimundjawa: 47, 49, 50, 50, 51, 52, 53, 55; Bawean: 48, 49, 49, 50; Karimundjawa: 49;

Tail; Java: 23, 25, 25, 25, 26, 27, 27, 28, 28, 29; Sunda Strait: 25, 29, 29; Karimundjawa: 25, 25, 26, 27, 28, 28, 28, 28; Bawean: 25, 25, 27, 27; Kangean: 25;

Culmen; Java: 9, 10.2, 10.6, 10.6, 10.7, 10.9, 11, 11, 11.2, 11.3; Sunda Strait: 9.5, 9.5, 9.8; Karimundjawa: 9, 9.8, 10, 10, 10.1, 10.6, 10.8, 10.8; Bawean: 8.9, 9.5, 9.5; Kangean: not measured.

Max., min. and average measurements:

	Java	Sunda Strait	Karimundjawa	Bawean	Kangean
Wing:	48 - 51 / 49.40	48 - 51 / 49.33	47 - 55 / 50.88	48 - 50 / 49	49
Tail:	23 - 29 / 26.30	25 - 29 / 27.67	25 - 28 / 26.88	25 - 27 / 26	25
Culmen:	9 - 11.3 / 10.65	9.5 - 9.8 / 9.60	9 - 10.8 / 10.14	8.9 - 9.5 / 9.3	

Some measurements compiled from literature:

	♂♂:	Wing:	Tail:	Culmen:	♀♀:	Wing:	Tail:
RENSCH[2])							
stresemanni Lombok	1:	55	28		3:	52 - 52.5 / 52.17	26.5 - 27 / 26.83
CHASEN[1])							
trochileum Karimundjawa	6:	52 - 53.5 / 52.58			2:	50; 50.5 / 50.25	
VOOUS & v. BEMMEL[3])							
trochileum Java	49:	53.50	27.60	12.20 (culmen measured from its base)			
trochileum Borneo	7:	50 - 55 / 52.90	25.5 - 28.5 / 27.90	12 - 13 / 12.20			

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22. Some notes on the Macklot's Sunbird, *Nectarinia calcostetha* JARDINE.

When comparing eight freshly obtained adult male birds of this Sunbird from the Karimundjawa islands with a similar series of old material originating from other localities (Java, Sumatra, the Rhio Archipelago and the Karimata islands) all belonging to the nominate race, the

individual variations observed in the colour of the underparts inclusive those caused by discolouration as a consequence of long storage are rather important. Fresh birds may average more purplish instead of violet blue on the chest and abdominal region, the bronzy brown on the throat and chest is washed a trifle more with violet and the black on the belly and undertail coverts is perhaps somewhat purer. There is furthermore some variation in the extent of the bronzy brown on the chin, throat and foreneck, in the metallic blue on the lower underparts and in the development of the yellow plumelets on the breast flanks, apparently most beautifully developed in birds in their nuptial dress.

The most important variations in the upper surface may be attributed to the difference in the extensiveness of the metallic green. *Post mortem* discolouration on those parts is perhaps still more important than it is on the underparts; in old skins there is no difference in tint of the metallic gloss on the pileum and remaining upper parts but in such material only the pileum and nape keep the colour of fresh skins. In fresh birds the sheen on the lower back shows a purplish blue gloss, distinctly differing from old material when viewed under similar light conditions. In freshly obtained birds the black on the mantle and sides of the neck is also much deeper than it is in old ones whose colour becomes washed with brown.

Individual variation in the females is extremely small but still exists in the quantity and the tint of the yellow of the underparts. Fresh skins average considerably darker yellow than old ones and they also average darker above, distinctly olive green, except on the wings which seem greener in old skins. This is evident when considering three females secured in the Karimundjawa islands in 1930 and 1955, thus collected with an interval of 25 years. Some individual variations are perhaps also present in the white edges above the eyes, sometimes very distinct but almost failing or completely absent in other specimens.

Juvenile males resemble adult females but they can be separated at a glance on account of the darker, more olive yellow below and because of the absence of white on these parts. Moreover the purplish blue moustachal stripe appears rather soon in the juvenile males.

There is not much *post mortem* discolouration in the juveniles but freshly obtained ones average a trifle more olive. On the upper surface the young males do not differ from the adult female bird but they average in showing a trifle less green; some metallic blue appears very soon on the mantle and wing-coverts which is of course unknown in the female plumage. Because all examined juvenile males are somewhat smaller

than the adult females, I do not suppose the species having an eclipse plumage.

The males secured in Karimundjawa had small and medium sized gonads (largest testicles in two males: 2 - 3 mm) and the females had the ovaries not or hardly granular. Both young males had small testicles, which were round and white and in one of them the plumage showed traces of a male bird.

Though birds originating from Tana Massa island (Batu islands, off west Sumatra) must be seen as *pagicola* in accordance with DE SCHAUENSEE [8], I fail to discover any difference in plumage or size of some subspecific value in a male and a female bird secured in Sipora island (Mentawei Group) which should belong to the range of this race. OBERHOLSER[5]) separated this subspecies on account of the smaller dimensions and the more grayish back, scarcely tinged with olive green in the females, but I failed to discover even a trace of these characters.

Regarding the subspecies *heliomarpta*, JUNGE[4]) remarked that in this case too he could not find any difference in plumage when comparing birds of this form with those belonging to the nominate race. But, after some hesitation, he did recognize *heliomarpta* because of perhaps the somewhat longer bill and wings. He stated that STUART BAKER gave as billsize in birds belonging to the typical subspecies 17 - 19 mm and a winglength of 59 - 62 mm, so that actually the somewhat longer wing should be the only difference observed between *heliomarpta* and representatives of the nominate race. JUNGE measured in six males and three females of this subspecies a bill of 18 - 19 mm (♂) and 17.5 - 18.5 (♀) and wings of 59 - 64 (♂) and 57 (♀) mm. If these figures indeed represent good average measurements for birds of this race, there seems no reason whatsoever to recognize *heliomarpta* any longer, for among the 17 male birds of the nominal form measured by me, only three have a wing of 60 mm and 14 other specimens surpass this size. Among these latter, five have winglengths of 62, two of 63 and another two of 64 mm. The bill varies in size from 17 - 19.5 mm, among which five specimens measure 19 mm and longer, thus showing even larger maxima than those mentioned by STUART BAKER. Among the six females of the nominal form there are three with wings of 57 and two of 56 mm, whereas the largest bills measured 17.6 and 18 mm.

Other authors have already pointed out that certain Sunbirds originating from the Indo-Australian region show rather plastic bills. I suppose it right justifying a separation of populations on account of differences in size or structure of the bill after comparing large series only.

On account of the above I am of the opinion that *pagicola* as well as *heliomarpta* may be considered synonyms of *calcostetha* which is in agreement with RIPLEY[6]). I could not study material belonging to the subspecies *proxima*, considered a dubious one by SMYTHIES[11]), known from east Borneo and the Natuna islands because no skins are available in the Bogor Museum. This makes it impossible to have an idea of the value of this race.

The field particulars as given by DELACOUR[2]) need, as in many other cases, some corrections so far it concerns Indonesia. It is perhaps true that this bird prefers coconut palms and mangroves but in a majority of cases it cannot be called of common appearence. In many regions where both types of vegetation are plentiful, this species apparently fails completely as is evident from my paper about the distribution of Birds of Java (HOOGERWERF [3])). It was not secured by me during our collecting trips to the Sunda Strait area, to Bawean island and the Kangean Archipelago where we almost daily visited areas which may be considered beloved habitats for the species. But it was rather common in the Karimundjawa islands where 13 were collected within a short time and many more could have been obtained.

This Sunbird is also not mentioned by ROBINSON and BODEN KLOSS[7]) when discussing a large collection of birds from west Sumatra. Nor did DE SCHAUENSEE and RIPLEY[10]) and DE SCHAUENSEE[9]) mention it in their papers on the birds of the islands of Nias and Bangka. Only one specimen is mentioned when the birds of the Batu islands are discussed[8]) though certainly also on all those islands the bird's habitat is plentifully available. Finally, it is not mentioned in the paper of VAN BEMMEL and VOOUS[1]) either on the birds from the islands of Muna and Buton (South-east Celebes) though the species may, according to DELACOUR, reach Celebes as well.

Measurements (in mm.):

♂ ♂ Wing; *calcostetha* (Java): 60, 60, 61, 61, 61, 62, 62, 63, 64, 64; *calcostetha* (Karimundjawa Archipelago): 60, 61, 61, 62, 62, 62, 63; *calcostetha*, juvenile specimens (Karimundjawa, Borneo): 55, 55, 56, 56, 57; *pagicola* (Sipora Island): 62;

Tail; *calcostetha* (Java): 45, 48, 49. 53, 53, 53, 53, 54, 55, 55; *calcostetha* (Karimundjawa): 50, 52, 53, 54, 54, 54; *calcostetha*, juv. (Karimundjawa, Borneo): 42, 42, 43, 45, 45; *pagicola* (Sipora): 52;

Culmen; *calcostetha* (Java): 17, 17.3, 17.5, 18.2, 18.7, 19, 19.1, 19.2, 19.2; *calcostetha* (Karimundjawa Islands): 17.8, 18, 18.1, 18.6, 18.6, 19.5;

calcostetha, juv. (Karimundjawa, Borneo): 13.5, 16.1, 16.5, 17; *pagicola* (Sipora): 16.8;

Max., min. and average measurements:

	calcostetha Java	*calcostetha* Karimundjawa	*calcostetha*, juv. Karimundj. Borneo	*pagicola* Sipora
Wing:	60 - 64 / 61.80	60 - 63 / 61.57	55 - 57 / 55.80	62
Tail:	45 - 55 / 51.80	50 - 54 / 52.83	42 - 45 / 43.40	52
Culmen:	17 - 19.2 / 18.36	17.8 - 19.5 / 18.43	13.5 - 17 / 15.78	16.80

♀ ♀ Wing; *calcostetha* (Java): 55, 57, 57; *calcostetha* (Karimundjawa) 56, 56, 57; *pagicola* (Sipora Island): 56;

Tail; *calcostetha* (Java); 42, 43, 44; *calcostetha* (Karimundjawa): 42, 45, 45; *pagicola* (Sipora): 44;

Culmen; *calcostetha* (Java): 13.8, 17.6, 18; *calcostetha* (Karimundjawa): 13.3, 15; *pagicola* (Sipora): 16.2;

Max. min. and average measurements:

	calcostetha Java	*calcostetha* Karimundjawa	*pagicola* Sipora
Wing:	55 - 57 / 56.33	56 - 57 / 56.33	56
Tail:	42 - 44 / 43	42 - 45 / 44	44
Culmen:	13.8 - 18 / 16.47	13.3; 15 / 14.15	16.20

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23. Notes on *Nectarinia jugularis* (LINN.) especially about the validity of the subspecies *microleuca*.

BODEN KLOSS[1]) and CHASEN[5]) included birds originating from South Sumatra and the Karimata islands into the subspecies *pectoralis**), apparently rejecting OBERHOLSER's *microleuca*. CHASEN[2]) was of the opinion that representatives of the species from Java, Sumatra, the Rhio Lingga islands, the Malay States, islands of the South China Sea and Borneo are inseparable, thus not recognizing *microleuca*. All these areas are considered again parts of the range of the latter subspecies in CHASEN's Handlist[3]) which appeared some years later. *Microleuca* is not recognized by DELACOUR[7]) who mentions only *pectoralis* and *polyclysta*. VOOUS[11]) does not reject *microleuca* though he thinks it very ill-defined and hardly maintainable. DE SCHAUENSEE[10]) also has the opinion that the slight difference between *pectoralis* and *microleuca* is at best only an average one and hardly warrants the separation of the latter race, rejecting at the same time *heliozeteta* described by OBERHOLSER from Bangka island.

A series of about 25 freshly collected birds from the Sunda Strait area, Bawean island and the Kangean Archipelago, each of them being represented by 8 specimens, enabled me to establish the individual variability in the colour of the under and upper parts. This fact again induced me to compare 50 old skins of this Sunbird present in the Bogor Museum, originating from divergent parts of the range of both *pectoralis* and *microleuca*.

When comparing all this material attention was focussed on the colour as well as on size differences. Though the species was found by me a rather common one in the Strait Sunda area and in the islands indicated above, I failed to see it in the Karimundjawa Archipelago. In

*) In accordance with HACHISUKA [8]), *ornata* (LESSON) replaces *pectoralis* Hsf.

these islands *Nectarinia calcostetha* was of common appearance from which 13 could be secured; this species, however, could not be obtained in any of the other groups of islands surrounding Java.

After comparing 13 old skins of male birds belonging to *microleuca* originating from Sumatra with ten of the subspecies *pectoralis* from Java and another 14 recently collected males from the Strait Sunda region, Bawean island and the Kangean Archipelago, it seems impossible to discover other differences in the colour of the underparts than individual ones oftenly present in males from exactly the same locality. There are not only some differences in the tone of the yellow underneath and in the light markings on the undertail but rather much difference also exists in the small tuft of orange feathers on the breast flanks. This is even observed in freshly obtained males which show equally developed gonads, as is the case in seven Bawean specimens.

There is apparently not much *post mortem* discolouration in the underparts in birds of this species though old skins seem to average somewhat paler in both sexes. Also in the upper parts colour differences are not very conspicuous between freshly obtained and old skins of males. But freshly obtained material averages somewhat darker above than old skins. When comparing the available skins of old date of both races, males of *pectoralis* average a trifle lighter above than those of *microleuca*. Among the 16 males of *pectoralis* there are six which have lighter green upper parts than any of he 13 examined *microleuca*, though several specimens of this latter race are very close to *pectoralis* in this respect. However, there is so much variation in fresh as well as in old material that it seems not justifiable to consider this character to be of subspecific value. The same holds good for the metallic bluish black frontal area, which shows rather much individual variation in colour and extensiveness in both subspecies originating from the same localities. The occiput too varies much in colour: sometimes there is no difference in tone between the crown, neck and mantle but it is not uncommon that the pileum is olivish grey; in the studied series of old skins of *microleuca* the latter phenemenon is of more common appearance than it is in *pectoralis*.

Among the 14 freshly obtained males originating from the Sunda Strait, Bawean and the Kangean Archipelago there are only two with poorly developed reproductive organs, the remaining specimens having well developed gonads (test.: 2-5 mm). The differences as indicated above do exist to the same extent as they do in old material though fresh skins may average in being darker on the upper parts. As apparently is the case in many birdspecies, large gonads need not to coincide with a

beautiful plumage, because there are four males in my series which had well developed gonads but show worn feathers.

There are two males in eclipse plumage; they originate from Legundi island (Sunda Strait) and Kangean and were obtained on June 19th and August 21st respectively.

Almost similar differences as indicated above for the males are present in the female birds. Among the 13 old skins of *pectoralis* there are five or six which average somewhat lighter above than the two lightest of the 12 examined skins of *microleuca.* In this case too there is much individual variation, which holds also good for the freshly collected females. The fact that VOOUS[11]) arrived at an opposite conclusion when comparing eight females of *microleuca* with six of *pectoralis* may clearly show the important individual variability on this point. The somewhat brighter golden yellow underparts in *microleuca* found by VOOUS is only partly present in my material, but four out of the 12 *microleuca* do not differ in this respect with clearest yellow *pectoralis.* Also on this point the individual variation is important; whether this coincides to some extent with the development of the reproductive organs could not be established in this series because among the freshly obtained female birds there was none which had a well developed ovary. In the freshly obtained material there was hardly any synchronization in the development of the gonads in both sexes, because the males had those organs well developed, almost without exception.

When considering the measurements as given below it is evident that birds originating from Sumatra, Bawean island and the Kangean Archipelago average heavier in their bill and have a longer wing in both sexes. But the population living in the Sunda Strait area is in size almost similar to birds from Java, so that it seems difficult to attach much value to size differences when looking for racial characters.

In my opinion there are no size differences at all beween representatives of *microleuca* and those of *pectoralis* and for these two subspecies the following measurements may count: Wing: 50 - 56 (♂), 47 - 52 (♀); Tail: 30 - 39 (♂), 27.5 - 36 (♀); Bill (exp. culmen): 15 - 18.9 (♂), 14.9 - 18.8 (♀). These figures are established after measuring 40 male birds and 25 females, combined with reliable figures compiled from the literature for 55 ♂ and 39 ♀. When looking at these measurements taken from 95 ♂ and 64 ♀, the extremely small range of variation in wingsize (6 mm in birds of both sexes) and the important individual variation in bill size (3.9 mm in both sexes) is conspicuous.

With a view on these measurements we cannot be very enthousiastic about OBERHOLSER's *polyclysta* so far it concerns size differences though it should be "much larger" than *pectoralis* on account of the diagnosis. The two males and the two females I measured exactly fit into our figures for this race as is the case in four ♂ and four ♀ mentioned by JUNGE[9]). Perhaps this race can be maintained on account of the darker yellow underparts in both sexes, which characters are also indicated in the diagnosis.

On account of the above I do not think it justifiable to consider neither colour differences of the plumage nor size differences to be of subspecific significance between representatives of *pectoralis* and birds hitherto considered to belong to *microleuca*. I suggest to reject definitively the latter race and to include its range within that of *pectoralis*.

Measurements (in mm):

♂ ♂ Wing; *pectoralis* (Java): 50, 51, 51, 52, 52, 52, 52, 53, 53, 54; *pectoralis* (Sunda Strait area): 50, 50, 51, 51, 52, 52, 53, 53; *pectoralis* (Bawean Island): 53, 53, 54, 54, 54, 55, 56; *pectoralis* (Kangean Archipelago): 52, 52, 53, 54; *microleuca* (Sumatra): 51, 51, 52, 53, 53, 53, 54, 54, 54, 55; *polyclysta* (Enggano Island): 52, 53;

Tail; *pectoralis* (Java): 35, 36, 36, 36, 37, 37, 37, 37, 38; *pectoralis* (Sunda Strait): 33, 33, 34, 34, 35, 36, 37; *pectoralis* (Bawean) :36, 36, 36, 37, 37, 37, 38; *pectoralis* (Kangean): 35, 35, 37, 38; *microleuca* (Sumatra): 34, 36, 37, 37, 37, 37, 38, 39, 39, 39; *polyclysta* (Enggano): 34, 36;

Culmen; *pectoralis* (Java): 15.9, 15.9, 16, 16.1, 16.6, 17, 17, 17.1, 17.2, 17.2; *pectoralis* (Sunda Strait): 15, 16, 16, 16.3, 16.3, 16.8, 17, 17.6; *pectoralis* (Bawean): 16.6, 17, 17.8, 17.8, 17.9, 18.8; *pectoralis* (Kangean): 16.3, 16.5, 17.4, 18; *microleuca* (Sumatra): 16, 17, 17.1, 17.1, 17.8, 18.2, 18.5, 18.6, 18.9, 18.9; *polyclysta* (Enggano): 17.6, 17.8;

Max., min. and average measurements:

	pectoralis Java	*pectoralis* Sunda Strait	*pectoralis* Bawean	*pectoralis* Kangean	*microleuca* Sumatra	*polyclysta* Enggano
Wing:	50 - 54 / 52	50 - 53 / 51.50	53 - 56 / 54.14	52 - 54 / 52.75	51 - 55 / 53	52; 53 / 52.50
Tail:	35 - 38 / 36.56	33 - 37 / 34.57	36 - 38 / 36.71	35 - 38 / 36.25	34 - 39 / 37.30	34; 36 / 35
Culmen:	15.9 - 17.2 / 16.60	15 - 17.6 / 16.38	16.6 - 18.8 / 17.65	16.3 - 18 / 17.05	16 - 18.9 / 17.81	17.6; 17.8 / 17.70

♀ ♀ Wing; *pectoralis* (Java): 47, 47, 48, 48, 48, 50, 50, 50, 51, 52; *pectoralis* (Sunda Strait): 48, 48, 49, 49; *pectoralis* (Bawean): 49, 50, 51, 51; *pectoralis* (Kangean): 48, 49, 52; *microleuca* (Sumatra): 50, 52, 52, 52; *polyclysta* (Enggano): 51, 52;

Tail; *pectoralis* (Java): 30, 30, 31, 31, 31, 32, 33, 33, 33, 34; *pectoralis* (Sunda Strait): 29, 30, 30, 31; *pectoralis* (Bawean): 31, 32, 33, 34; *pectoralis* (Kangean): 28, 31, 32; *microleuca* (Sumatra): 33, 33, 36; *polyclysta* (Enggano): 30, 31;

Culmen; *pectoralis* (Java): 14.9, 15, 15.2, 15.6, 15.8, 16, 16.2, 16.3; *pectoralis* (Sunda Strait): 15.5, 15.5, 17, 17.5; *pectoralis* (Bawean): 16.7; *pectoralis* (Kangean): 16.1, 16.6; *microleuca* (Sumatra): 15.5, 17.8, 18.8; *polyclysta* (Enggano) 17, 17.6;

Max., min. and average measurements:

	pectoralis Java	*pectoralis* Sunda Strait	*pectoralis* Bawean	*pectoralis* Kangean	*microleuca* Sumatra	*polyclysta* Enggano
Wing:	47 - 52 / 49.10	48 - 49 / 48.50	49 - 51 / 50.25	48 - 52 / 49.67	50 - 52 / 51.50	51; 52 / 51.50
Tail:	30 - 34 / 31.80	29 - 31 / 30	31 - 34 / 32.50	28 - 32 / 30.33	33 - 36 / 34	30; 31 / 30.50
Culmen:	14.9 - 16.3 / 15.63	15.5 - 17.5 / 16.38	16.70	16.1; 16.6 / 16.35	15.5 - 18.8 / 17.37	17; 17.6 / 17.30

Some measurements compiled from literature:

	♂ ♂ ; Wing:	Tail:	Culmen:	♀ ♀ ; Wing:	Tail:	Culmen:
OOUS[11])						
pectoralis Java	15: 50 - 53 / 51.30	12:	16 - 17 / 16.50	6: 48 - 49.5 / 48.90		15 - 17 / 15.80
UNGE[9])						
pectoralis Java	6: 51 - 53	30 - 35	16 - 17.5	11: 47 - 51	28 - 33	15 - 17
BODEN KLOSS[1])						
microleuca Sumatra	7: 50 - 54 / 52.43			2: 49; 50 / 49.50		
CHASEN and BODEN KLOSS[5])						
microleuca Karimata Isl.	4: 52 - 54 / 53.50			5: 49 - 53 / 50.60		

	♂ ♂ ;	Wing:	Tail:	Culmen:	♀ ♀ ;	Wing:	Tail:	Culmen:
VOOUS[11])								
microleuca	8:	50 - 55 / 52.30	7:	17 - 18 / 17.40	8:	46 - 52 / 48.80		16 - 17.5 / 16.50
Sumatra								
JUNGE[9])								
microleuca	11:	50 - 53	31 - 36	15 - 17	4:	47 - 50	27.5 - 32	15 - 16
Sumatra, Borneo								
CHASEN & HOOGERWERF[5])								
microleuca	4:	52 - 54 / 52.75			3:	51 - 52 / 51.67		
Sumatra								
JUNGE[9])								
polyclysta	4:	52 - 55	33 - 37	17 - 18	4:	51 - 52	30 - 32	17 - 18
Enggano								

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24. On some subspecies of Raffles' Sunbird, *Aethopyga siparaja* (RAFFLES)

As has been pointed out previously by several authors there exists a considerable variability in the grey colour of the under surface of this Sunbird. I confirmed this fact when studying 20 male birds of the nominate race, six belonging to *heliogona* and two of the subspecies *photina*. There

is a very striking difference in this respect between two male birds from Borneo, one of which originated from the central part and the other one from the central eastern part of that island. The first one is extremely dark grey, the second specimen belongs to the lightest of all skins examined by me, because it is dirty olive yellow washed with some grey, especially on the lower breast. Another skin is almost similar to the one which comes from east Borneo and a fourth specimen is on this point very close to two birds originating from the Rhio Archipelago. When studying *heliogona* there is a bird from Bogor (West Java) which is extremely dark grey underneath and another one secured at the nearby Djasinga have dirty olive yellow underparts. Among the two *photina* males, one specimen from the island of Sipora is very dark but the other one, originating from north Pagi, is again extremely light, rather pure grey than olivish. A recently obtained male bird from Panaitan island is darker than any of the 28 other birds examined, exactly agreeing with the dark *photina* skin. If such dark underparts were constant it should be justifiable to separate the population from Panaitan island, but since only a single male bird is available it becomes impossible to draw a definite conclusion.

In *siparaja* as well as in *heliogona* some individual variations also exist in the tint of the red on the chest, foreneck and throat and in the extent of this colour. This holds also good for the extensiveness of the metallic blue moustachal streak and the red stripe bordering this area, well developed in certain skins, rather thin in others and sometimes even interrupted. I also failed to discover any constant difference in the colour of the wings.

On the upper parts the individual variation is very large too, making it impossible to separate birds of the three different subspecies mentioned above on the basis of colour differences of the upper surface. There is much variation in the red on these parts and in the colour and extensiveness of the yellow of the lower back and in the metallic shield on the forehead. The yellow on the lower back averages in being less extensive in *heliogona* than in the two other races. Perhaps not much value may be attached to this "character".

I failed to discover the elongated central tailfeathers in *siparaja* as indicated by VAN OORT[4]) and KURODA[3]). The remarks on this point made by these two authors must be wrong as already pointed out by ROBINSON and BODEN KLOSS[5]). I could not find any other differences between *siparaja* and *heliogona* than their size.

In the few females I studied there is also rather much individual variation in the plumage of the under and upper surface, which makes

it impossible to separate them subspecifically without looking on the lables. The only female bird we obtained from Panaitan island almost exactly agrees with the one from Sumatra (Lampongs) and resembles also a female bird belonging to *photina*. It is darker above, in this respect agreeing with a female of *heliogona* secured in the neighbourhood of Bogor.

There is perhaps not much *post mortem* discolouration and the size variation within the same subspecies is rather unimportant too in my material. But it is evident from the figures given below that representatives of the nominate race average a trifle larger than those of *heliogona*. Though our material of *photina* is not sufficient to enable one to draw a definite conclusion, the subspecies *photina* still averages larger than *siparaja*. Both our skins from Panaitan island fit well in the measurements of Javan birds.

As remarked above it is a mystery to me at which birds VAN OORT[4]) aimed when mentioning *Aethopyga siparaja* with elongated central tailfeathers. He said the central tailfeathers having twice the length of the outher ones, which statement was repeated by KURODA.

The subspecies *natunae* described by CHASEN [1]) is said to have distinctly lighter underparts. Since he examined 12 male birds the validity of this race needs not be doubted. I could neither study specimens belonging to *casa* known from Nias island nor consult the diagnosis, which makes it impossible to have an idea about the value of this subspecies. The form *photina*, which I have discussed above, is considered a synonym of *siparaja* by DE SCHAUENSEE[6]) after having studied ten males and females from the Batu islands and the typical series of *photina* used by OBERHOLSER when describing this race. Five skins originating from Simalur are included into the nominal form by JUNGE[2]) which is in accordance with CHASEN who included Simalur into the range of *siparaja*. The measurements of male birds as given by JUNGE show also that representatives of the subspecies *siparaja* average somewhat longer in their wing than *heliogona* from Java and they may average in being larger in tail and bill-size too.

Measurements (in mm.):

♂ ♂ Wing; *heliogona* (Java): 48, 49, 49, 50, 51; *heliogona* (Panaitan-island): 51; *siparaja* (Borneo, Rhio Archipelago, Billiton): 50, 50, 51, 52, 53; *photina* (Sipora, north Pagi Islands): 52, 52;

Tail; *heliogona* (Java): 39, 40, 41, 43, 44; *heliogona* (Panaitan-island): 37; *siparaja* (Borneo, Rhio, Billiton): 40, 43, 45, 46, 47; *photina* (Sipora, north Pagi): 41, 45;

Culmen; *heliogona* (Java): 13.1, 13.8, 14, 14, 14; *heliogona* (Panaitan-island): 13.5; *siparaja* (Borneo, Rhio, Billiton): 14, 14.2, 14.5, 14.5, 15.2; *photina* (Sipora, north Pagi): 14.2, 14.5;

Max., min. and average measurements:

	heliogona Java	*heliogona* Panaitan-island	*siparaja* Borneo,etc.	*photina* Sipora, north Pagi
Wing:	48 - 51 / 49.40	51	50 - 53 / 51.20	52; 52 / 52
Tail:	39 - 44 / 41.40	37	40 - 47 / 44.20	41; 45 / 43
Culmen:	13.1 - 14 / 13.78	13.50	14 - 15.2 / 14.48	14.2; 14.5 / 14.35

♀ ♀ Wing; *heliogona* (Java): 47; *siparaja* (Borneo, Billiton): 47, 47, 50; *photina* (Sipora Island): 48;

Tail; *heliogona* (Java): 32; *siparaja* (Borneo, Billiton): 35, 35, 36; *photina* (Sipora): 39;

Culmen; *heliogona* (Java): 13.9; *siparaja* (Borneo, Billiton): 14, 14.3, 15; *photina* (Siporan): 14.1;

Max., min. and average measurements:

	heliogona Java	*siparaja* Borneo, Billiton	*photina* Sipora Isl.
Wing:	47	47 - 50 / 48	48
Tail:	32	35 - 36 / 35.33	39
Culmen:	13.90	14 - 15 / 14.43	14.10

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25. On the Indonesian Tree-Starling, *Aplonis panayensis* (SCOP.)

The rather large individual variations observed in some freshly obtained birds of the subspecies *strigatus* induced me to study all material of the species present in the Bogor Museum. Some particulars are given hereunder as result of this comparison.

Among the representatives of the subspecies *gusti, heterochlorus, pachystorhinus, enganensis, sangirensis, sulaensis* and *neglectus* there is none which can be confused with *strigatus* from Java and Sumatra owing to the distinct size differences of the bill, wings or tail. Except *gusti* known from the island of Bali, all these subspecies are decidedly larger than the race inhabiting Java and Sumatra and *gusti* is strikingly smaller in the bill though it does not differ much from *strigatus* in its wing and tail measurements.

Freshly collected material does not differ much on the under surface from old material, among which are specimens obtained about 35 years ago. They all originate from the Sunda Strait area. There are some individual variations in the metallic gloss on the plumage which are usually very obvious but can almost be absent in other skins, leading to a close resemblance found with the only available female of the subspecies *gusti*.

There is more individual variation on the upper parts, not only when looking at the intensity of the metallic greenish gloss but also on account of the different tone of it; certain individuals are bluish or violet bluish on the back and uppertail-coverts. Some old skins from Java and the island of Krakatau show this gloss on the upper parts, as is the case in several fresh skins from the islands Sangiang, Sebuku and Legundi. It is also observable in a bird from Udjung Kulon, though less strikingly. It is present in males and females and independent from the development of the reproductive organs. A male bird from Panaitan island with large testicles (7.5 mm) is clear green on the upper surface but a male bird from Sebuku island with equally developed gonads (test.: 10 mm) shows a bluish gloss on the mantle and back. With a view on the fact that such birds do not differ much from the only skin at hand of the subspecies *gusti*, which race was separated on account of the bluish tint, it may be supposed that *gusti* differs from *strigatus* owing to its smaller bill. But the material of *gusti* I studied was too scanty to draw a definite conclusion on this point.

Among the 15 adult birds recently collected in the Sunda Strait region, the gonads of the males showed divergent stages of development. This is even observed in specimens originating from the same island, but all examined females had small, not or hardly granular ovaries. Two

juveniles were obtained in Sangiang island in June and a third one in August from Udjung Kulon.

The examined birds do not show very much individual variation in their wing and tail measurements but there is rather considerable variation in bill-size, not only in the length but also in the height of this organ, causing a rather striking difference in bill structure. The females average somewhat smaller than the male birds but there is no sexual dimorphism observed in the plumage.

Our measurements taken on birds belonging to *strigatus* fit well into the figures given by other authors, f.i. by STRESEMANN[10]) and BODEN KLOSS[2]). The latter mentioned 89 - 102 mm as the winglength whereas I found 94 - 103 mm in 35 birds. My maximum of 103 mm was found in only one of the recently collected birds, a male from Sangiang island which also had a long tail; though the tail was very worn it still measured 70 mm. Also among the old material there is only one specimen which have such a long wing but it has a normal tail. The Sangiang bird also shows a rather heavy bill and it has much blue in the plumage. This complex of differences makes it possible that we have to do with a straggler or migrant though the reproductive organs were rather well developed (test. 5 - 7 mm). Two young birds from the same island are quite normal in appearance and size.

CHASEN[4]) studied three very large birds from the Malay Peninsula which is within the range of *strigatus:* they had wings of 108 - 115 mm. Because of these long wings he suggested these specimens to be migrants from elsewhere. My experiences show that the species is a strong flyer, often rare or completely failing within areas where it may be plentiful at certain periods. That individuals belonging to one race may appear in the range of others is not to be excluded as is the case with *Aplonis minor* which may be considered a migrant so far it concerns the island of Java. In my opinion BARTELS and STRESEMANN[1]) were wrong when considering *Aplonis minor* a breeding species for this island: up until now there are no breeding records from Java. Interinsular migration may occur still more frequently among representatives of the genus inhabiting east Indonesia and certain parts of New Guinea.

DE SCHAUENSEE[9]) is of the opinion that birds from Batu islands which have wings of 104.5 - 111, average 108.38 (8 ♂) and 100 - 109, average 104.36 mm (7 ♀) may be considered *pachistorhinus* on account of the similarity in wingsize. Batu islands is the terra typica of *leptorrhynchus.* He therefore rejected *leptorrhynchus* as was also done by RIPLEY[8]) and DELACUOR[3]). However, STRESEMANN[10]) gives as winglength for *leptorrhyn-*

chus 111 - 116 mm which seems larger than in *pachistorhinus*. According to DE SCHAUENSEE, RILEY[7]) also established only 102 - 113 (av. 106.3 mm) for 14 ♂ and 100 - 105 (av. 102.4 mm) for 10 ♀, thus also smaller than STRESEMANN's birds which were perhaps an exception. But *leptorrhynchus* was separated not only because of its larger wing but also on account of a different bill- structure and its shorter tail. Therefore there seems no reason to follow DE SCHAUENSEE[9]) in synonymizing the latter race with *pachistorhinus* solong not enough material of both subspecies can be compared.

BODEN KLOSS[2]) thought it probable that *richmondi* from Taya island (between Singkep and Bangka) does not differ from *heterochlorus*, because these two subspecies apparently do not differ in wingsize. He also made it acceptable that *eustathis* from east Borneo is synonymous with *strigatus* and that *suggrandis* might be a synonym of *alipodis*. The latter race should average still larger in the wing (8 ♂ ♀, 107 - 115, av. 111.63 mm) than *heterochlorus* which is larger than *strigatus*, perhaps also in billsize (wing of *heterochlorus*: 47 ♂ ♀, 102 - 112, av. 105.76 mm). CHASEN[4]) synonymized *eutathis* with *strigatus*, *suggrandis* with *alipodis* and *rhadinorhamphus* with *altirostis*, but when the only difference between the latter race and *strigatus* consists of a difference in wingsize, there seems not so much reason for even upholding *altirostis*. STRESEMANN[10]) mentioned as wingsize 96 - 106 mm and RIPLEY[6]) gave 97 - 105.5 mm which does not differ much from that of *strigatus* as I found (94 - 103 mm).

It is evident from the figures given below that birds belonging to the subspecies *enganensis* average larger than *strigatus* in all their measurements and they are apparently also larger than *altirostis*, *heterochlorus*, *leptorrhynchus* and *pachistorhinus*. The large size of *enganensis* is also clearly demonstrated by the figures given by JUNGE[5]) who found the following measurements for six adult male birds: wing 110 - 116, av. 113.67 mm; tail 71 - 76, av. 73.67 mm and culmen 17 - 18, av. 17.58 mm. On account of its large size *enganensis* seems closer related to representatives of the east Bornean *alipodis* and to *sulaensis* and *sangirensis* from east Indonesia.

Measurements (in mm):

♂♂ Wing; *strigatus* (Java, Sumatra, Strait Sunda area, Billiton): 95, 96, 97, 97, 98, 98, 98, 98, 98, 99, 99, 99, 100, 100, 100, 100, 100, 100, 101, 102, 103, 103; *enganensis* (Enggano Island): 113, 113, 115; *heterochlorus* (Natuna Islands): 103, 110; *pachsitorhinus* (Sipora and Pagi Islands): 105, 115; *sulaensis* (Sula Islands): 110, 113, 115; *sangirensis* (Sangihe Islands): 120, 123;

Tail; *strigatus* (Java, etc.): 60, 60, 61, 61, 63, 63, 64, 64, 64, 65, 65, 66, 66, 66, 66, 67, 67, 68, 68, 70, 72; *enganensis* (Enggano): 75, 77, 79; *heterochlorus* (Natuna): 69, 69; *pachistorhinus* (Sipora, Pagi): 67, 75; *sulaensis* (Sula): 90, 96, 97; *sangirensis* (Sangihe): 90, 93;

Culmen; *strigatus* (Java, etc.): 14.2, 14.4, 15.1, 15.4, 15.5, 16, 16, 16, 16.1, 16.3, 16.6, 16.7, 16.8, 17, 17, 17.5, 17.7, 17.9; *enganensis* (Enggano): 17, 17.5, 18.1; *heterochlorus* (Natuna): 16.4, 17.5; *pachistorhinus* (Sipora, Pagi): 16.8, 19.3; *sulaensis* (Sula): 17.9, 18.7, 18.8; *sangirensis* (Sangihe): 22, 22.5;

Max., min. and average measurements:

	strigatus Java, etc.	*enganensis* Enggano	*heterochlorus* Natuna	*pachistorhinus* Sipora, Pagi	*sulaensis* Sula	*sangirensis* Sangihe
Wing:	95 - 103 / 99.14	113 - 115 / 113.67	103; 110 / 106.50	105; 115 / 110	110 - 115 / 112.67	120; 123 / 121.50
Tail:	60 - 72 / 65.05	75 - 79 / 77	69; 69 / 69	67; 75 / 71	90 - 97 / 94.33	90; 93 / 91.50
Culmen:	14.2 - 17.9 / 16.26	17 - 18.1 / 17.53	16.4; 17.5 / 16.95	16.8; 19.3 / 18.05	17.9 - 18.8 / 18.47	22; 22.5 / 22.25

♀♀ Wing; *strigatus* (Java, Sumatra, Sunda Strait, Billiton): 94, 95, 95, 95, 96, 96, 96, 96, 97, 97, 97, 97, 98, 100; *heterochlorus* (Natuna): 100, 104; *pachistorhinus* (Sipora): 105; *sulaensis* (Sula): 110; *sangirensis* (Sangihe): 116, 118, 120; *gusti* (Bali Island): 95; *neglectus*: 104, 107;

Tail; *strigatus* (Java, etc.): 56, 56, 59, 61, 62, 62, 62, 63, 64, 64, 64, 65, 66, 66; *heterochlorus* (Natuna): 64, 68; *pachistorhinus* (Sipora): 66; *sulaensis* (Sula): 92; *sangirensis* (Sangihe): 82, 89, 91; *gusti* (Bali): 58; *neglectus*: 64, 71;

Culmen; *strigatus* (Java, etc.) 13.9, 14.3, 14,3, 14.5, 14.9, 15, 15, 15.3, 15.5, 15.6, 15.8, 16, 16.1; *heterochlorus* (Natuna): 16.5, 18; *pachistorhinus* (Sipora): 18.8; *sulaensis* (Sula): 19; *sangirensis* (Sangihe): 21.5, 22,3. 22.9; *gusti* (Bali): 13.3; *neglectus*: 17, 18;

Max., min. and average measurements:

	strigatus Java, etc.	*heterochlorus* Natuna	*pachistorhinus* Sipora	*sulaensis* Sula	*sangirensis* Sangihe	*gusti* Bali	*neglectus*
Wing:	94 - 100 / 96.36	100; 104 / 102	105	110	116 - 120 / 118	95	104; 107 / 105.50
Tail:	56 - 66 / 62.14	64; 68 / 66	66	92	82 - 91 / 87.33	58	64; 71 / 67.50
Culmen:	13.9 - 16.1 / 15.09	16.5; 18 / 17.25	18.80	19	21.5 - 22.9 / 22.23	13.3	17; 18 / 17.50

Some measurements compiled from literature:

		Wing:	Tail:	Culmen:
RILEY[7])				
altirostris	3 ♂	96 - 103 / 99	62 - 64.5 / 63.80	19
	4 ♀	97 - 104 / 100	56 - 65.5 / 60	17 - 18 / 17.60
rhadinorhampus	1 ♂	101.50	60	17.50
Simalur, Pulo Babi				
	3 ♀	102 - 104	62 - 64	17 - 18
pachistorhinus	14 ♂	102 - 113 / 106.30	62 - 69.5 / 65	18.5 - 21.5 / 19.80
	10 ♀	100 - 105 / 102.40	61 - 67.5 / 63	17.5 - 20.5 / 19.30
enganensis	5 ♂	112 - 114 / 112.70	70 - 77 / 72.90	18 - 19 / 18.30
	3 ♀	105.5 - 114 / 109.50	67 - 74.5 / 70.50	18.5 - 19 / 18.70
RIPLEY[8])				
pachistorhinus	♂ ♂	105 - 112	64 - 69	19 - 21
	♀ ♀	100 - 107	60 - 64	18.5 - 21
altirostris	3 ♂	100.5 - 105.5	61, 61, 61	19, 19.50
	♀ ♀	97 - 104 / 101.50	57 - 63 / 60.20	17 - 18
JUNGE[5])				
altirostris	♂ ♂	103.5, 104, 105	67, 67.5, 68	16.5 - 18
	♀ ♀	97, 99, 100	62.5, 64, 66	16 - 17

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