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## Notes on Flowerpeckers (Aves, Dicaeidae) 2. The Primitive Species of the Genus *Dicaeum*

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In the first paper of the present series (1960, Amer. Mus. Novitates, no. 1990), the genera *Melanocharis*, *Rhamphocharis*, and *Prionochilus* were discussed. The present paper deals with the primitive species within the genus *Dicaeum*.

*DICAEUM* CUVIER, 1817

With 35 species, the genus *Dicaeum* is by far the largest genus within the flowerpeckers and forms the nucleus of the family. In spite of much variation, especially in coloration and in the form of the bill, all species appear to be comparatively close relatives, and it is not possible to subdivide the group into smaller natural units.

Formerly, a number of genera were accepted for the species which are now united in the genus *Dicaeum*, and no fewer than 10 generic names are available for persons who want to split this genus. However, even subgenera cannot be recognized, and the only alternative to the course followed here is to split the group into almost as many separate genera as there are species. There has been much discussion about the taxonomy of these birds, and no two authors have agreed on the delimitation of the different genera into which the present group of *Dicaeum* formerly was divided. The most important lists of genera and comments on the taxonomy have been made by Salvadori (1868, Atti R. Accad. Sci. Torino, vol. 3, p. 416), Oates (1890, The fauna of British

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India, Birds, vol. 2, p. 375), Hartert (1895, *Novitates Zool.*, vol. 2, p. 65; 1897, *ibid.*, vol. 4, p. 519), Oberholser (1923, *Ohio Jour. Sci.*, vol. 23, p. 291), McGregor (1927, *Philippine Jour. Sci.*, vol. 32, p. 525), Mayr (*in* Delacour and Mayr, 1945, *Zoologica*, vol. 30, p. 114), and Mayr and Amadon (1947, *Amer. Mus. Novitates*, no. 1360, p. 16).

The genus *Prionochilus* is very near *Dicaeum*, and *Dicaeum annae* forms the transition between the two genera. Still, *Prionochilus* forms a natural group, differing from *Dicaeum* in coloration, the form of the bill, and the presence of the outer primary, and very well deserves generic rank.

The type of the genus *Dicaeum* was stated by Gray (1840, A list of the genera of birds, p. 13) to be "*Certhia erythronotum* Gmelin," but there is no such bird. Gmelin (1788, *Systema naturae*, vol. 1, pt. 2, p. 478), in the synonymy of *Certhia cruentata*, mentions the Red-spotted Creeper of Latham (1781, A general synopsis of birds, vol. 1, pt. 2, p. 736, no. 40), and this bird was subsequently given the name *Certhia erythronotos* by Latham (1790, *Index ornithologicus*, p. 290). The proper designation is therefore *Certhia erythronotos* Latham.

Ticehurst (1927, *Jour. Bombay Nat. Hist. Soc.*, vol. 32, p. 356) has drawn attention to the fact that neuter generic names, such as *Dicaeum*, always accentuate the difficulty as to how specific names should be terminated. He pointed out that *Myzanthus ignipectus*, when transferred to *Dicaeum*, should not be called *ignipectum* and *Certhia erythrorhynchus* not *erythrorhynchum*, but the original spelling of the specific names should be maintained, as these must be regarded as substantives. I can add that for the same reason the original spelling should be retained also in the following specific names: *erythronotos* (not *erythronotum*), *flaviclunis* (not *flaviclune*), and *trigonostigma* (not *trigonostigmum*), in spite of the opposite view advocated by Oberholser (1917, *Bull. U. S. Natl. Mus.*, vol. 98, p. 67) concerning *trigonostigma*. In all these cases the name in parentheses must be regarded as invalid emendations.

The genus *Dicaeum* has its center of distribution in the Oriental region, where by far the greatest number of species are found. Some species are found in the Australian region, and two have penetrated into the Palearctic region. The Philippine Islands are richest in species, being inhabited by 11 species, of which nine are endemic; next come India and Burma with seven species, and the Malay States and Borneo each with six species. The members of this genus also display a considerable ecological variation; some species are inhabitants of lowland rain forests, others of gardens and open forests, and others again of mountain forests at high altitudes.

The sequence of species given by Mayr and Amadon (*loc. cit.*) appears to be very satisfactory and is followed here, with only a few alterations which are discussed in their proper places. The present notes deal with the most primitive species of *Dicaeum*, those which are mentioned as the first in the list prepared by Mayr and Amadon.

*Dicaeum annae*

This interesting species, distributed in the Lesser Sunda Islands, in many ways forms a transition between the genera *Prionochilus* and *Dicaeum*. The outer (tenth) primary is vestigial as in other species of *Dicaeum*, but in coloration *D. annae* markedly resembles *Prionochilus olivaceus* and *P. maculatus*, especially the latter, with which it shares the contrasting white malar streak. This streak is a typical *Prionochilus* character, whereas it occurs only in a few species of *Dicaeum*. Even the form of the bill is similar to that in *Prionochilus*, but it is matched also by that in several species of *Dicaeum*. A unique character is the bright yellow patch on the rump concealed by the long feathers of the lower back, but a yellow (visible, not concealed) rump patch is found in other species of *Dicaeum* as well as in two species of *Prionochilus*. The sexes in *D. annae* are alike, just as in *Prionochilus olivaceus* and *P. maculatus*.

*Dicaeum annae* inhabits gardens, cultivated land, and open forests in the lowlands at an elevation of about 1000 meters (cf. Hartert, 1897, *Novitates Zool.*, vol. 4, p. 518; and Rensch, 1931, *Mitt. Zool. Mus. Berlin*, vol. 17, p. 618). There are two very slightly different subspecies.

*Dicaeum annae sumbavense* (Rensch), 1931

TYPE LOCALITY: Sumbawa.

In the original description Rensch (*loc. cit.*) gives the differences from the nominate form as smaller size and duller coloration. The wing length is given as: males, 55–57 mm., females, 54–56 mm., in *sumbavense*, as compared with: males, 58–60 mm., females, 55–57 mm., in nominate *annae*.

I have examined Rensch's original material, including the type of *sumbavense* (borrowed from the Zoological Museum, Berlin), as well as the collections in the American Museum of Natural History and the British Museum, a total of 10 *annae* and three *sumbavense*, apart from immature specimens. The upper parts of *sumbavense* are virtually identical with those in *annae*, only a trifle more olive; the under parts are slightly paler, particularly the flanks, not so heavily marked with olive gray, but the difference is only slight. The wing length of the type of *sumbavense* (a male) is 56 mm.; two other specimens measure

56 mm. in the male and 56 mm. in the female. The corresponding measurements of *D. a. annae* from Flores are: males, 58, 58, 58, 58, 59.5, 60, 61, 62 mm.; females, 56, 57.5 mm. Thus, both in coloration and measurements this form is only very slightly different from nominate *annae*. It can be recognized but forms a poor subspecies. It is found only in Sumbawa.

*Dicaeum annae annae* Büttikofer, 1894

TYPE LOCALITY: Flores.

The nominate form is restricted to Flores. It was formerly recorded also from Alor and Sumba, but there are no skins in existence from these two islands and no recent records. Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, p. 17) are probably right in assuming that the early records were due to confusion with *Dicaeum agile*.

*Dicaeum agile*

This species is undoubtedly a near ally of *D. annae*. It resembles it in the general style of coloration and in the form of the bill, but it lacks the yellow rump, and the white malar streak is obscure or indistinct. The sexes are alike, just as in *D. annae*.

*Dicaeum agile* is associated with a number of related forms, with which in recent years it has been united into one species or super-species. Mayr (1944, Bull. Amer. Mus. Nat. Hist., vol. 83, p. 167) discussed the *obsoletum* group of the Lesser Sunda Islands and considered it to be conspecific with the Malaysian *modestum* and *finschi*. These latter forms have been united with the Indian *agile* by various authors, most recently by Deignan (1945, Bull. U. S. Natl. Mus., vol. 186, p. 550) and Delacour (1946, Zoologica, vol. 31, p. 4). Finally, Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, p. 17) linked even the Philippine *aeruginosum* with the *agile-modestum-obsoletum* assemblage. There is much to be said for this procedure. All the birds mentioned are brownish and nondescript, with thick, blunt bills. They are restricted to the lowlands, where they inhabit rain forests (although the Indian *agile* prefers cultivated country with open forest) and most of them are rare. Nevertheless, it is not possible to lump all these forms, first of all because two of them live side by side in Malaya. Chasen realized this (1935, Bull. Raffles Mus. no. 11, p. 272), but it was questioned by Deignan (*loc. cit.*) and by Mayr and Amadon (*loc. cit.*). The occurrence in Malaya of two sympatric species makes it necessary to reconsider the whole question. It is possible to distinguish between the following "groups" in the *Dicaeum agile* complex:

1. *Agile*: Outer two to four tail feathers tipped with white, upper parts pale and grayish, under parts only faintly streaked, bill thick, rather "parrot-like," at least 4 mm. in height.

2. *Obsoletum*: Similar to 1 in coloration of under parts, tail pattern, and bill form, but upper parts darker, more olive greenish.

3. *Modestum*: Tail pattern as in 1 and 2, only in *finschi* uniform blackish brown, upper parts olive greenish, similar to those in 2, under parts more heavily streaked, bill more slender, less than 4 mm. in height.

4. *Everetti*: Tail feathers uniform blackish brown, without white tips, upper parts dark earth-brown, bill as in 3.

5. *Aeruginosum*: Outer two tail feathers with white tips, but the white restricted and obscure, dark olive-brown upper parts and heavily streaked under parts, bill very swollen and "parrot-like," more robust than in the other groups, proportions larger, wing in adult males measuring at least 66 mm., a length that is never reached in any other group.

These five groups form natural units and could very well be treated as full species. Such a treatment, however, would not give the correct impression of the close relationship between some of the groups and would not take into consideration the fact that there are transitional forms, at least between *modestum* and *obsoletum*.

The two groups that occur together in Malaya are *modestum* and *everetti*, a fact that makes it impossible to treat them as conspecific. The *everetti* group must be regarded as a descendant of *modestum* which branched off in the Greater Sunda Islands and reoccupied Malaya, perhaps via the Natuna Islands. This makes the *modestum-everetti* group an interesting case of speciation. The dividing line between these two sibling species is difficult to draw, however, because the Java *finschi* can be connected with both. *Dicaeum finschi* resembles *everetti* in lacking the white tips to the tail feathers, but in its general coloration it is very similar to *modestum*. However, *D. atjehense* from Sumatra appears to bridge the differences between *modestum* and *finschi*. According to the description it has white tips on the tail feathers as does *modestum*, while the general coloration is said to be like that of *finschi*. I have not seen *atjehense*, which is known only from the type. On the basis of what is said above, it is most natural to connect *finschi* with *modestum* and restrict *everetti* to three very similar forms (*bungurenses*, *sordidum*, and nominate *everetti*). If the opposite view were held and *finschi* were attached to *everetti*, the distinct *obsoletum* group (*obsoletum* and *tinctum*), inhabiting the Lesser

Sunda Islands, would be geographically isolated from its nearest allies, the *agile-modestum* group, and would have to be left as a separate species or be attached to the *everetti* group together with *finschi*—a very unnatural classification. There is a character gradient in coloration in the series *finschi-tinctum-obsoletum* which indicates that these forms obviously should be grouped together, and as *finschi* must be considered a representative of *modestum*, as shown above, even the *obsoletum* group should be united with that species.

The distribution of the species *everetti*, as defined above, covers Borneo and Malaya. This is not a common type of distribution, but it is matched by that of *Prionochilus thoracicus*. The complicated distribution of the Malaysian forms of *agile* and its allies is shown in figure 1.

It is noteworthy that *obsoletum*, particularly the form *tinctum*, and *agile*, which represent the two opposite end links in the long chain of forms in the *agile-modestum* group, show such a striking similarity in all characters, including general coloration, tail pattern, and bill form.

I hesitated to regard *agile* and *modestum* as conspecific, as they differ so strikingly in coloration and in the form of the bill as well as in life habits. No intermediates between these two forms are known; apparently there is a gap between their ranges (somewhere in eastern Bengal). However, the close resemblance of *agile* to *tinctum*, of which the latter must be attached to *modestum* for reasons given above, has convinced me that *agile* and *modestum* should be united into one species.

Finally, a few words must be said about the status of the Philippine *aeruginosum*. For geographical reasons it could be united only with *everetti* and not with *agile-modestum*. The color of the upper parts is similar to that in *everetti*, but in this respect the Palawan form (*affine*) differs, being farther removed from *everetti* in coloration than the Luzon population, although the opposite trend should be expected. The distinct and very heavy striation on the under parts, the presence of white tips on the outer tail feathers, the larger proportions, and the very strong, parrot-like bill make *aeruginosum* differ so considerably from *everetti* that I find it inadvisable to place these two birds in the same species. Still, *everetti* and *aeruginosum* can be regarded as forming a superspecies.

*Dicaeum agile agile* (Tickell), 1833

TYPE LOCALITY: Borabhúm and Dolbhúm, Bengal.

This form is distributed over the greater part of India and Pakistan,

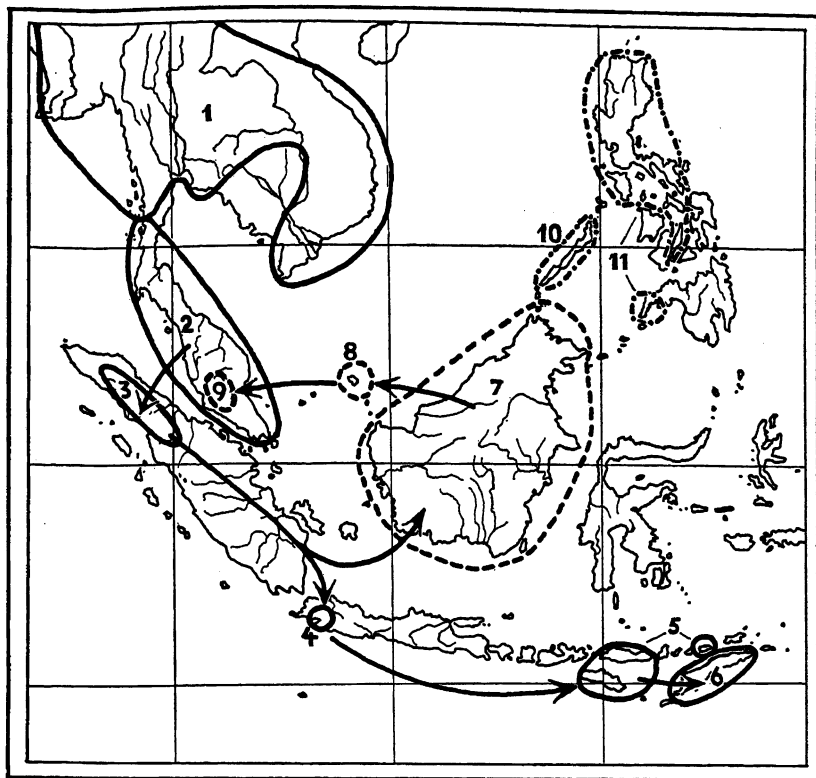


FIG. 1. The distribution of *Dicaeum agile* and its allies in the Malay Archipelago. Solid line: *D. agile* (1, *modestum*; 2, *remotum*; 3, *atjehense*; 4, *finschi*; 5, *tinctum*; 6, *obsoletum*). Dashed line: *D. everetti* (7, *everetti*; 8, *bungurensis*; 9, *sordidum*). Dot-and-dash line: *D. aeruginosum* (10, *affine*; 11, *aeruginosum*). Arrows indicate the probable routes of dispersal. The occurrence of *D. everetti sordidum* on Bintan Island (south of Singapore) is not shown.

except the northwestern provinces, Sind, and the drier parts of Rajputana. To the north it ranges to the foothills of the Himalaya, where it ascends to an altitude of 1500 meters, in Nepal apparently to less than 1000 meters. To the west it appears to be common as far as the Kangra district (Whistler, 1926, *Ibis*, p. 739), but then it disappears, although there is a sight record from Rawalpindi (Whistler, 1930, *Ibis*, p. 119). Farther south, the steppe country of Rajputana forms a barrier to its distribution, and it is absent in Kutch and the Kathiawar Peninsula, ranging westward only to the country around Ahmadabad (Ali,

1955, Jour. Bombay Nat. Hist. Soc., vol. 52, p. 786). The eastern limit is approximately a line from about Darjeeling in Sikkim to Midnapore in Bengal, but Stuart Baker (1926, The fauna of British India, Birds, ed. 2, vol. 3, p. 435) records it from as far east as Dacca. Farthest south, in Cochin and Travancore, *D. agile* appears to be rare and local, restricted to the mountains at 900 to 1100 meters in altitude (Ali and Whistler, 1936, Jour. Bombay Nat. Hist. Soc., vol. 38, p. 778; Ali, 1953, The birds of Travancore and Cochin, p. 194).

I have examined the huge series of this bird in the British Museum and cannot find any geographical variation in its extensive range. This uniformity has already been noticed by Whistler and Kinnear (1934, Jour. Bombay Nat. Hist. Soc., vol. 37, p. 285), who state that "the amount of grey or green in the upper plumage and the amount of streaking on the lower parts is purely a question of individual variation. There is only the one race throughout the range in the Indian Peninsula." However, Koelz (1939, Proc. Biol. Soc. Washington, vol. 52, p. 77) described *D. a. saturator*, with type locality Londa, Bombay Presidency, as differing from the nominate form in being darker and having stronger pectoral striping and on an average shorter wings, but Koelz added that Nilgiri birds were as dark. I have seen only a few birds from the Bombay Presidency, which do not appear to differ from the other specimens examined. It is very unlikely that a subspecies should have developed in the Bombay Presidency, but the status of *saturator* cannot be finally evaluated until topotypical material, which is not available to me, has been compared with typical nominate *agile*.

*Dicaeum agile* was formerly called *D. squalidum* (Burton), 1836, and this usage was maintained as late as in the second edition of "The fauna of British India" (Stuart Baker, *loc. cit.*), in spite of the fact that *D. agile* (Tickell) has three years' priority over *D. squalidum*.

*Dicaeum agile zeylonicum* (Whistler), 1944

TYPE LOCALITY: Ceylon.

Differs from the nominate form in having darker, more olive, upper parts and slightly heavier streaking on the upper parts. I have examined a good series in the British Museum of this slightly differentiated form. It is restricted to Ceylon, where it ranges up to an altitude of about 1200 meters.

*Dicaeum agile modestum* (Hume), 1875

TYPE LOCALITY: Mergui, Tenasserim.

Differs markedly from nominate *agile* in having upper parts bright



olive-green, not pale ashy brownish gray, under parts with a yellowish tinge, not pure white, and the streaks darker, heavier, and more distinct. The difference in the form of the bill is still more striking. In *modestum* the bill is comparatively slender and almost straight, while in *agile* it is large and swollen and the lower mandible is bent upward in the frontal part, giving the bill a "parrot-like" appearance. The three or four lateral tail feathers have white tips as in *agile*. The proportions are similar; the wing length of adult males is 60–63 mm., compared with 61–65 mm. in *agile*.

*Dicaeum agile modestum* ranges from Assam south through Burma, Siam, and Indo-China. This subspecies has often been discussed and has usually been confused with the next form, *D. a. remotum*, which replaces it to the south. The type specimen of *modestum*, which I have examined in the British Museum, was collected at Mergui by W. Davison and is a fine, fresh-molted, adult male. Unfortunately Hume in his original description (1875, *Stray Feathers*, vol. 3, p. 298) gave the type locality only as "S. Tenasserim," and, although he subsequently (1878, *Stray Feathers*, vol. 6, p. 200) stated that the area in which Davison collected was restricted to "Mergui and to the south of that place," the name *modestum* has been transferred by recent students to the distinct form that inhabits southernmost Tenasserim and southern peninsular Siam and that must be called *remotum*. Riley (1935, *Proc. Biol. Soc. Washington*, vol. 48, p. 148) described the population of eastern Siam as *pallascens*, comparing it with birds from Trang, peninsular Siam, which he held to be *modestum*, but which actually cannot be separated from *remotum*. Even Robinson and Kloss (1915, *Jour. Federated Malay States Mus.*, vol. 6, p. 29), when describing *remotum* from Negri Sembilan, held birds from Trang to be *modestum*. Delacour (1946, *Zoologica*, vol. 31, p. 4) made the same mistake, referring the Malay population to the subspecies *modestum*, "described after specimens from southern Tenasserim." Likewise, Deignan (1945, *Bull. U. S. Natl. Mus.*, vol. 186, p. 550), comparing birds from Trang with a series from Assam, called attention to the differences between the two populations and declared that, if it is granted that the birds from Trang are *modestum*, those from Assam must be separated as a new subspecies. This separation was subsequently undertaken by Ripley (1952, *Jour. Bombay Nat. Hist. Soc.*, vol. 50, p. 510), who called the Assam birds *D. a. deignani*.

I have examined large series in the British Museum (a total of more than 50 specimens) from Tenasserim (Mergui, "80 miles south of Mergui"), central parts of Burma (Pegu, Mandalay, Toungoo, at 3500

feet, Thunbia, Attarau River, Amherst), Assam (Cachar = Silchar), Southern Shan States (Taunggyi, Bampton), a number of localities in Siam, such as Lat Bua Kao, Mi Nam Kabren, Pak Chong (the type locality of *pallescens*), and Ok Yam (at the Indo-China frontier), and southern Annam (Djiring). In addition, I have examined good material from Assam (Cachar and Sylhet, the latter locality now in East Pakistan) in the American Museum of Natural History, and specimens from northern Siam (Koon Tan) and central Annam (Laobao) in Naturhistoriska Riksmuseet, Stockholm. All these birds are very similar and cannot be separated from the typical series from Mergui. Consequently, *D. a. deignani* and *D. a. pallescens* become synonyms of *modestum*. Deignan (*loc. cit.*) states that *pallescens* from eastern Siam and from Indo-China differ from Assam specimens in having the under parts whiter and the upper parts darker, more brownish, tending towards the Malay subspecies. I cannot distinguish birds from Siam and Burma, but specimens from Indo-China are perhaps a trifle paler on the under parts. They were recently separated by Deignan (1956, Proc. Biol. Soc. Washington, vol. 69, p. 211) as *D. a. separabile*, stated to be paler on both upper and under parts than *pallescens*. I have seen a series of 12 fine specimens from central Annam (Naturhistoriska Riksmuseet, Stockholm, collector Björkegren, 1938) and a single, worn specimen from southern Annam (the American Museum of Natural History, collectors Delacour and Lowe, 1927) and find the differences between them and Siam and Burma birds so slight and inconstant that I do not find it advisable to recognize any Indo-Chinese subspecies.

*Dicaeum agile modestum* is distributed over the greater part of Assam, in the west to Sylhet (now in East Pakistan). In Burma it has been recorded from southern central Burma, Pegu, Southern Shan States, and Tenasserim, where the southernmost specimen has been collected "80 miles south of Mergui," which must be somewhere between Lenya and Bokpyin, at about latitude 12° 30' N. It appears to be absent from the northern parts of Burma, but probably occurs in the Chin Hills and the upper Chindwin. In Siam it is probably found over the greater part of the country, but it has not been recorded farther south than Bangkok. In Indo-China it is known only from central and southern Annam and from Cochin-China. As it is rare everywhere in its range, it has undoubtedly frequently been overlooked and has a more extensive distribution than is known at present.

*Dicaeum agile remotum* (Robinson and Kloss), 1915

TYPE LOCALITY: Negri Sembilan, Malay States.

This subspecies differs from *modestum* in being distinctly darker and more somber brownish olive-green on the upper parts and having much darker and heavier streaks on the upper parts. The extension of the white in the tail feathers, the general proportions, and the form of the bill are just as in *modestum*.

*Dicaeum agile remotum* replaces *modestum* in southernmost Tenasserim (the Pakchan estuary), peninsular Siam (north to Chumphon), and the Malay States. I have examined specimens in the British Museum from Malewoon in southern Tenasserim (three specimens), Pakchan, Tapli, and Chong (east of Trang) in peninsular Siam, and two specimens from Negri Sembilan, at an altitude of 450 meters, in the Malay States, including the type of *remotum*. In addition, I have examined one further specimen from Negri Sembilan and two from Gunung Tahan, in the American Museum of Natural History. Apparently, this form is rare in the Malay States, and Gibson-Hill (1949, Bull. Raffles Mus., no. 20, p. 245) states that it is known only from a single specimen taken at Johore and a trade skin from Malacca, apart from the specimens in the British Museum mentioned above. Gibson-Hill is not aware, however, of the presence of the three skins in the American Museum of Natural History.

Compared with specimens from southern Tenasserim and peninsular Siam the birds from the Malay States have slightly darker upper parts and slightly darker streaking on the under parts. The streaking is, further, not so distinct, more blurred. The differences are small, however, and not sufficient to give rise to subspecific separation. In their original description of *remotum* Robinson and Kloss (1915, Jour. Federated Malay States Mus., vol. 6, p. 29) actually compared specimens from Negri Sembilan with some from Trang, holding the latter to be *modestum*, and stating that the Negri Sembilan birds have the "upper surface duller and darker grey with less tinge of olive green" than those from Trang. Subsequently, Robinson and Kloss (1924, Jour. Nat. Hist. Soc. Siam, vol. 5, no. 3, p. 393) synonymized *remotum* with *finschi* from Java, a procedure that has been followed by all recent authors, such as Chasen, Riley, Deignan, and Gibson-Hill. Robinson and Kloss state that the specimens from the Malay States have "little or no white in the tail," which is probably the reason for their uniting *remotum* and *finschi*, as the latter is characterized by having no white in the tail. However, all the specimens of *remotum* examined by me had distinct white tips to the tail feathers, while, on the other hand, both the known specimens of *finschi* have the tail feathers uniform dark brown.

*Dicaeum agile atjehense* Delacour, 1946

TYPE LOCALITY: Atjeh, northern Sumatra.

The very brief description of this form is as follows: "A dark race, like *finschi* of West Java, but with the white tips of the tail-feathers larger and as in the typical race" (i.e., *modestum*). As the only essential distinction between *finschi* and *remotum* from Malaya is the lack of white tips on the tail feathers, *atjehense*, according to the description, must be very similar to *remotum* and may be indistinguishable from it.

Only the type specimen of this apparently exceedingly rare bird is known, and I have not examined it. This bird was originally described as *sumatranum* (*Piprisoma modestum sumatranum* Chasen, 1939, Treubia, vol. 17, p. 183), but as *sumatranum* was preoccupied, it was renamed *atjehense* by Delacour (1946, Zoologica, vol. 31, p. 4).

*Dicaeum agile finschi* Bartels, 1914

TYPE LOCALITY: Wynkoops Bay, west Java.

Very similar to *remotum* in coloration of both the upper and under parts and in the form of the bill, but the tail feathers are uniform dark brown, without any white tips.

This form, which must be very rare and local, is known only from the type locality. Apart from the type specimen, which I have not seen, only one specimen is known; it was collected at Wynkoops Bay in 1920 by Kloss and is now in the British Museum, where I have examined it. The type specimen has been well described by Bartels (1914, Ornith. Monatsber., vol. 22, p. 125), and according to this description the type appears to be very similar to the specimen in the British Museum.

*Dicaeum agile tinctum* (Mayr), 1944

TYPE LOCALITY: Sumba, Lesser Sunda Islands.

The upper parts are very similar to those in *remotum* and *finschi*; the under parts are much paler, creamy white, the streaking is much finer and lighter and reduced to the breast, and the flanks are paler, than in *remotum* and *finschi*. The outer tail feathers have white tips as in *remotum*. The bill is much more heavy and robust, shorter and thicker, than in the preceding forms of the *modestum* group (i.e., *modestum*, *remotum*, and *finschi*). It is noteworthy that the coloration of the under side in this form is very similar to that in nominate *agile*, and the robust and heavy bill is, likewise, common to *tinctum* and *agile*.

This distinct form is found on the islands of Sumba, Flores, and Alor in the Lesser Sunda Islands. I have examined good series in the British Museum and the American Museum of Natural History.

Sumbawa Island has been included in the range of this form by all authors, most recently by Rensch (1931, Mitt. Zool. Mus. Berlin, vol. 17, p. 618) and Mayr (1944, Bull. Amer. Mus. Nat. Hist., vol. 83, p. 167), based on specimens collected by Doherty and now belonging to the American Museum of Natural History. These specimens are, however, immatures of *Dicaeum annae*, as pointed out by Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, p. 17). There are evidently no definite records of *D. a. tinctum* from Sumbawa.

*Dicaeum agile obsoletum* (S. Müller), 1843

TYPE LOCALITY: Timor.

Differs strikingly from *tinctum* in having the under parts almost pure chalky white, virtually without streaking. The upper parts are slightly paler. In tail pattern and form of the bill *obsoletum* does not differ from *tinctum*.

This form is restricted to the island of Timor. A large series (12 specimens) in the American Museum of Natural History has been examined.

*Dicaeum everetti*

The relationship of this species to *D. agile* is discussed above (p. 5). *Dicaeum everetti* differs from the *modestum* group within *D. agile* in having the upper parts dark earth-brown, not olive greenish, the under parts uniform grayish dusky, virtually without striation, and the tail feathers uniform blackish brown without white tips. The form of the bill and the general proportions do not differ from those of *modestum*. The three subspecies that are acceptable differ only slightly.

Chasen (1935, Bull. Raffles Mus., no. 11, p. 272) in his arrangement of the Malaysian flowerpeckers is aware of the fact that it is necessary to separate the *everetti* group from the *modestum* group as a full species. He distinguishes between *Piprisoma* (= *Dicaeum*) *modestum*, with the races *modestum* and *finschi*, and *Piprisoma agile*, including the three forms of *everetti* (*sordidum*, *bungurensis*, and nominate *everetti*) and *agile*. The combination of the *everetti* group with the distant and very different *agile* is very strange.

*Dicaeum everetti everetti* (Sharpe), 1877

TYPE LOCALITY: Bintulu, western Borneo.

Nominate *everetti* is restricted to Borneo, including the island of Labuan, and is distributed in the lowlands and lower foothills to an altitude of at most 600 meters. It is apparently a rare bird, and I have

seen only four specimens, viz., two adult males (including the type) in the British Museum and two in the American Museum of Natural History.

Chasen (1935, Bull. Raffles Mus., no. 11, p. 272) gives the type locality of *everetti* as Labuan Island, but this is not correct. The type specimen was obtained on the mainland of Borneo, at Bintulu, situated halfway between Kuching and Labuan on the Brunei frontier.

*Dicaeum everetti bungurens* (Chasen), 1934

TYPE LOCALITY: Bunguran (=Great Natuna Island).

This form, inhabiting the Great Natuna Islands, differs from the two other subspecies of *D. everetti* only in being slightly larger. I have examined the type and only known specimen in the British Museum. It is an adult male with wing 63 mm. and bill, measured from skull, 12 mm. The type of *sordidum*, also an adult male, has a wing length of 61 mm. and a bill length of 10 mm. Four adult males of nominate *everetti* have a wing length of 59–61 mm. In coloration the specimen of *bungurens* examined exactly matches the type of *sordidum*, described below. In his original description Chasen (1934, Bull. Raffles Mus., no. 9, p. 96) correctly states that *bungurens* is "like *sordidum* of the Malay Peninsula, but larger." Chasen gave the wing length of the type as 63.5 mm. and compared it with that in a series of 10 males of *everetti*, in which the wing measured 56–60 mm., and in the four known specimens of *sordidum*, 59–60 mm.

*Dicaeum everetti sordidum* (Robinson and Kloss), 1918

TYPE LOCALITY: Selangor, Malay States.

Very similar to nominate *everetti*, but the gray throat is supplied with a slight longitudinal streaking produced by darker median feather parts.

I have examined the type in the British Museum, which is extraordinarily like the Borneo *everetti*. The upper parts are uniform dark earth-brown, without any olive tinge, the under parts are almost uniform dark grayish, with only a faint streaking, and the tail feathers are uniform dark brown, without white tips.

This is a rare bird, as are so many others in the *modestum-everetti-aeruginosum* group. It is found in the Malay States, but, apart from the type, which was collected at Rawang in central Selangor in 1913, only three other specimens are known. One was collected at Sungei Buloh in Selangor in 1924, and the two others were secured on Bintan Island, Rhio Archipelago, south of Singapore in 1930 by an unknown collector (Gibson-Hill, 1949, Bull. Raffles Mus., no. 20, p. 245).

*Dicaeum aeruginosum*

The reasons for regarding this Philippine bird as a separate species are given above. There are two rather distinct forms.

*Dicaeum aeruginosum affine* (Zimmer), 1918

TYPE LOCALITY: Palawan Island.

Differs from nominate *aeruginosum* in having more olive greenish, not so brownish, upper parts and having much less streaking on the under parts. This is the form of Palawan Island. Two specimens, one being the type, in the American Museum of Natural History have been examined.

*Piprisoma diversum* Riley (1936, Proc. Biol. Soc. Washington, vol. 49, p. 113) from Palawan is a synonym of *affine*, as appears from the description. The series of birds obtained by Bourns and Worcester on Palawan and identified as *Prionochilus modestus* Hume (cf. Bourns and Worcester, 1894, Occas. Papers Minnesota Acad. Nat. Sci., vol. 1, no. 1, p. 57) also belong to this form.

*Dicaeum aeruginosum aeruginosum* (Bourns and Worcester), 1894

TYPE LOCALITY: Cebu Island.

This form has been recorded from Luzon, Mindoro, Lubang, Romblon, Sibuyan, Cebu, and Mindanao, but it is such a rare bird, inhabiting deep forests, that it may have escaped notice on some of the other greater islands in the Philippine archipelago. Whitehead, during his expedition to northern Luzon, obtained only one specimen and states that "it is a rare bird and easily overlooked" (1899, Ibis, ser. 7, vol. 5, p. 235). In many of the above-mentioned islands, even in Mindanao, there is only one record of this species. The reason for including Mindanao in the range of *D. aeruginosum* rests solely on the statement made by Bourns and Worcester (1894, Occas. Papers Minnesota Acad. Nat. Sci., vol. 1, no. 1, p. 20) in the original description of the species, which gives the distribution as "Cebu, Mindanao." For a long time I doubted the presence of *D. aeruginosum* on Mindanao and believed that Bourns and Worcester's record was due to some mistake, as none of the many other expeditions to Mindanao succeeded in finding it. On the Danish Philippine Expedition, which spent almost a year in Mindanao, we hunted for this bird but without success. However, in the British Museum I discovered the specimen on which the Mindanao record is based. It is an adult male, obtained at Ayala (near Zamboanga) on December 2, probably in 1890, and it

carries Bourns and Worcester's original label. This removes all doubt about the occurrence of *D. aeruginosum* in Mindanao.

There are small series of this species from both Luzon and Mindoro in the American Museum of Natural History. The populations of these islands are quite similar. Apparently *D. a. aeruginosum* shows no geographical variation within its range.

*Dicaeum chrysorrheum*

This species is widely distributed in the Malaysian and Burmese subregion, just skirting the area of India and southern China. It is an inhabitant of open forest, occasionally also visiting gardens, in lowlands and hilly country, occurring to an altitude of 1500 meters, rarely 2000 meters.

*Dicaeum chrysorrheum* shares with *D. agile* and *D. aeruginosum* the streaked under parts, but the striation is much more accentuated than in the two other species. There is a well-marked white malar streak, a primitive character found also in *Prionochilus*, *Dicaeum annae*, and, though more indistinct, in *D. agile*. The bill is much finer and more pointed than in all the above-mentioned species. The contrasting yellow under tail coverts indicate a connection with some of the following species, although the relationship is probably remote. The sexes are alike.

There are two rather well-differentiated forms. Comments on the geographical variation have been rendered by Robinson and Kloss (1924, Jour. Nat. Hist. Soc. Siam, vol. 5, no. 3, p. 391), Ticehurst (1938, in Stanford and Ticehurst, Ibis, p. 636), Stresemann (1940, Mitt. Zool. Mus. Berlin, vol. 24, p. 175), Deignan (1945, Bull. U. S. Natl. Mus., vol. 186, p. 549), and others.

*Dicaeum chrysorrheum chrysochlore* Blyth, 1843

TYPE LOCALITY: Arakan.

This northern form ranges to the west to Sikkim, Bhutan, eastern Assam (Naga Hills, Manipur, Lushai Hills, Hill Tipperah) and Chittagong in eastern Bengal, now East Pakistan. Nepal is usually included in its range, but this is based exclusively on Hodgson's old record, and his skins may as well have been obtained in Sikkim (cf. Oates, 1890, The fauna of British India, Birds, vol. 2, p. 378). Because this species, which everywhere in its range appears to be a common lowland bird, has not been found in Nepal by any of the more recent expeditions to that country, it probably does not occur there.

*Dicaeum chrysorrheum chrysochlore* is common all over Burma, Siam, and Indo-China, wherever there are suitable habitats. In the



last-named country it has been recorded from scattered localities from Cochin-China to Tonkin. It has even crossed the border to Yunnan, where it was found at Hokow, on the Tonkin frontier, and at Tachouang, not much farther north, by La Touche (1923, Ibis, p. 644). The southern limit of this form runs on the Malay Peninsula at about latitude 10° N., where *chrysochlore* merges with the southern form.

Stuart Baker (1921, Bull. Brit. Ornith. Club, vol. 41, p. 108) separated the birds from Sikkim and Assam from those of Burma as *D. c. intensum*, stating that they were brighter, more yellow, on the upper parts and more strongly tinged with yellowish on the under parts, the under tail coverts being almost orange. I have examined the extensive material of this species in the British Museum, including series from Sikkim, Bhutan, Bengal, Assam, and Burma, and can find no difference between the populations of these countries. Consequently, I regard *intensum* as a synonym of *chrysochlore*. Ticehurst (*loc. cit.*) arrived at the same conclusion.

*Dicaeum chrysorrheum chrysorrheum* Temminck and Laugier, 1829

TYPE LOCALITY: Java.

Similar to *D. c. chrysochlore*, but differing in having the upper parts darker and more olive-green, not so bright citrine green, and under parts with paler, whitish, ground color, without the yellowish tinge of *chrysochlore* and with the streaks darker and bolder, and having the bill stronger and thicker (but not longer).

This is the form of Malaysia, distributed over Borneo, Java, Sumatra, the Malay States, and peninsular Siam, north to about latitude 10° N. I have examined the large series in the British Museum and found that a number of specimens from peninsular Siam are intermediate between *chrysochlore* and nominate *chrysorrheum*, but many birds collected at Trang and in the Pakchan Estuary (Malewoon in southernmost Tenasserim) belong to *chrysorrheum*. Probably the limit between the two forms runs through these areas. The intermediate character of many of the birds from southern Siam has probably been the reason why Robinson and Kloss (*loc. cit.*) were unable to distinguish between birds from the Malay States and a series from Siam. The two subspecies accepted here can be readily distinguished, but the differences are not striking.

*Dicaeum melanoxanthum* (Blyth), 1843

TYPE LOCALITY: Nepal.

This high-mountain species, distributed in the eastern Himalaya, from Nepal to Yunnan, differs remarkably from all other species

within *Dicaeum* in having long and pointed wings, with a considerable distance between the tips of the secondaries and those of the primaries, in possessing a tenth (outer) primary, although a minute one, and in attaining larger proportions; the wings in adult males measure 72–76 mm. This species has usually been kept in a special, monotypic genus (*Pachyglossa* Blyth, 1843), and not without reason. However, *D. melanoxanthum* is so similar to *D. vincens*, inhabiting Ceylon, in color pattern and bill form that it must indicate a close relationship. As *D. vincens* is a typical *Dicaeum* (with vestigial outer primary, rounded wings, and modest proportions), it appears most practical to attach also its near ally, *D. melanoxanthum*, to this genus, as proposed by Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, p. 18). There is a considerable sexual dimorphism in *D. melanoxanthum*, parallel to that found in *D. vincens*.

*Dicaeum melanoxanthum* inhabits the Himalaya from Nepal and Sikkim eastward to eastern Assam, including the Naga Hills. It ranges down at least to 1500 meters in altitude. In Burma it is known to breed in the Southern Shan States only, where it is not uncommon between 1600 meters and 2400 meters. It is strange that it has never been recorded from elsewhere in Burma, but it will probably turn up some day in northern Burma (cf. Smythies, 1953, Birds of Burma, p. 280). It is widely distributed in northern Yunnan, where it has been recorded from the Mekong-Yangtse divide, the Mekong-Salween divide, the Shweli-Salween divide, and from the Likiang Range up to 3600 meters; to the south it breeds as far as Tengyueh (=Tengchung) (cf. Rothschild, 1926, Novitates Zool., vol. 33, p. 319; Riley, 1931, Proc. U. S. Natl. Mus., vol. 80, p. 73). Finally, it breeds in southeastern Sikang, where it has been found at 3200 meters (cf. Stresemann, 1923, Abhandl. Ber. Mus. Tierk. Völk. Dresden, vol. 16, no. 2, p. 12; Riley, *loc. cit.*). Gee, Moffett, and Wilder (1948, Tentative list of Chinese birds, Peiping, p. 321) add east Tibet, but such an occurrence must have been based on the records mentioned above from Sikang.

Apparently, *D. melanoxanthum* is a partial migrant, as it has been found in winter in areas south of the known breeding range, namely, in northern Siam (Mt. Doi Chiang Dao) in January (De Schauensee, 1934, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, p. 244), in southeastern Yunnan (Tachouang, Milati) in January and February (La Touche, 1923, Ibis, p. 644), and in northern Tonkin (Mt. Fansipan in the province of Laokay) in November and December (Delacour, 1930, Ibis, p. 596). Cheng (1958, Distributional list of Chinese birds, vol. 2, p. 361) maps the southern parts of Yunnan as winter quarters only.

The fact that this species breeds in the Southern Shan States makes it probable that it also breeds in those places where it has been recorded only as a winter visitor, but there is no evidence as yet.

The material in the American Museum of Natural History and the British Museum has been examined.

*Dicaeum vincens* (Sclater), 1872

TYPE LOCALITY: Ceylon.

This monotypic species, a near ally of *D. melanoxanthum*, is restricted to Ceylon, where it inhabits the wet forests in the lowlands up to an elevation of about 1000 meters.

The series in the British Museum, including the type specimen, has been examined.

*Dicaeum aureolimbatus*

This is an endemic species for the Celebes region. In color pattern as well as in the form of the bill it somewhat resembles *D. melanoxanthum* and *D. vincens*, and it is a rather close relative of the following species (*D. nigrilore*). Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, p. 18) are of the opinion that these four species all have a relict distribution. It is possible that they constitute detached remnants of a single species which in a previous geological period had a wide and continuous distribution.

The sexes are alike in this species. There are two distinct subspecies.

*Dicaeum aureolimbatus aureolimbatus* (Wallace), 1865

TYPE LOCALITY: Minahassa, Celebes.

The nominate form inhabits Celebes and the islands of Muna and Buton (cf. Van Bemmelen and Voous, 1951, Treubia, vol. 21, p. 43). It is a common lowland bird, occurring in gardens and open forests as well as in deep rain forests, and ascending the hills to an altitude of about 1500 meters.

Good material in the American Museum of Natural History and the British Museum has been examined.

*Dicaeum aureolimbatus laterale*, new name

TYPE LOCALITY: Great Sangihe Island.

A distinct form, with the flanks and abdomen grayish olivaceous, which in nominate *aureolimbatus* are intense cadmium yellow. The under tail coverts and the sides of the breast are pale lemon yellow, distinctly paler than in nominate *aureolimbatus*. Restricted to Great

Sangihe Island in the Sangihe Islands. One specimen in the British Museum has been examined.

Salvadori (1876, Ann. Mus. Civ. Genova, vol. 9, p. 59) described this bird as *Prionochilus sanghirensis*, but when it is transferred to the genus *Dicaeum* the specific name becomes homonymous with *Dicaeum sanghirense* Salvadori, 1876, which was described in the same paper as *Prionochilus sanghirensis* (Salvadori, 1876, *ibid.*, p. 58). Because one of these names must be changed, I prefer to rename *Prionochilus sanghirensis* Salvadori, 1876, and call it *D. a. laterale*.

*Dicaeum nigrilore*

The close relationship between this species and *D. aureolimbatus* is demonstrated by the color pattern, especially the yellow flanks and under tail coverts and the color of the head (gray throat, black lores and ear coverts, olive greenish front and crown). The bill of *D. nigrilore* is very different, however, being much longer and much more slender. The sexes are alike, as in *D. aureolimbatus*.

This little-known species is restricted to Mindanao, where it inhabits the mountain forests down to an altitude of about 1000 meters. There are two distinct subspecies.

*Dicaeum nigrilore nigrilore* Hartert, 1904

TYPE LOCALITY: Mt. Apo, Mindanao.

The nominate form has been recorded from Mt. Apo and Mt. McKinley in Davao Province, Mt. Katanglad in Bukidnon Province, and Mt. Malindang in Misamis Occidental Province. The birds from these three mountain ranges are alike in coloration, but the specimens from Mt. Malindang appear to be slightly larger, with a wing length in adult males of 58.5–59 mm., compared with 54–57.5 mm. in the other populations (cf. Salomonsen, 1953, Vidensk. Meddel. Dansk Nat. Hist. For., vol. 115, p. 275). This difference is too slight to form the basis for subspecific separation.

*Dicaeum isag* Hachisuka (1941, Bull. Biogeogr. Soc. Japan, vol. 11, no. 1, p. 1) from Mt. Apo is evidently a synonym (cf. Ripley, 1950, Condor, vol. 52, p. 165).

A total of 23 specimens, belonging to the American Museum of Natural History, the United States National Museum, the Philippine National Museum, Manila, and the Zoological Museum, Copenhagen, have been examined.

*Dicaeum nigrilore diuatae* Salomonsen, 1953

TYPE LOCALITY: Diuata Mountains, northeastern Mindanao.

Differs strikingly from nominate *nigrilore* in its much duller coloration in which olive-green predominates. The flanks and under tail coverts are olive greenish, not yellow, the abdomen is suffused with yellow, not white, the upper parts of the head are darker and duller green, the mantle is darker blackish brown, the back green like the rump (not brown), and the wing coverts and the secondaries have much broader green edges on the outer webs. The proportions are similar to those of nominate *nigrilore*.

This distinct form is restricted to the Diuata Mountains in Agusan Province. The original series of nine specimens, including the type, in the Zoological Museum, Copenhagen, has been examined.

*Dicaeum anthonyi*

This is a rare and little-known species inhabiting the mossy forests of the Philippine mountains, where it has been collected at altitudes between 900 meters and 2000 meters. The males are characterized by having glossy bluish black upper parts, with a contrasting yellow or brick red patch on the crown and occiput. There is a very pronounced sexual dimorphism. The females have the upper parts olive-green and the under parts grayish, with a yellow tinge. Judging from the measurements of the very few specimens known, it appears that the females are larger than the males, as in the species belonging to *Melanocharis* and *Rhamphocharis*. The bill of *D. anthonyi* is very robust and thick, more heavy than in its near ally *D. bicolor*, and it is reminiscent of the one in the species of *Prionochilus*, with which *D. anthonyi* also share the contrasting lipochromatic crown patch. The yellow or reddish color of the under tail coverts in *D. anthonyi* suggests relationship, although probably a very remote one, to the above-mentioned species belonging to the *melanoxanthum-nigrilore* group.

The Luzon representative (nominate *anthonyi*) has a yellow crown patch, while in the Mindanao races (*kampalili* and *masawan*) the patch is red. In their description of *rubricapilla* (= *kampalili*) Manu and Gilliard (1952, Amer. Mus. Novitates, no. 1545, p. 6) pointed out the close relationship of this species to *anthonyi* and united them into a superspecies. Subsequently Rand and Rabor (1957, Fieldiana, Zool., vol. 42, no. 2, p. 16) in their description of *masawan*, which in some respects is intermediate between *anthonyi* and *kampalili*, regarded them as conspecific, especially in view of their similarity in size, bill form, and color pattern. I quite agree with this conclusion.

*Dicaeum anthonyi anthonyi* (McGregor), 1914

TYPE LOCALITY: Polis Mountain, Ifugao, Luzon.

The male has a conspicuous yellow patch on the crown and occiput, the chin and throat white, the breast and abdomen yellow, the under tail coverts more intensely colored, almost orange yellow, and the flanks olive greenish. The wing of the type measures 56 mm. The female has a strong yellow tinge on the under parts and has a wing length of 58 mm.

*Dicaeum anthonyi anthonyi* is known only from Polis Mountain, Ifugao Subprovince, in northern Luzon, where the typical series was collected in 1913 in the mossy forest near the trail between Banaue and Bontoc at an elevation of 2000 meters. This material, kept in the Philippine National Museum, Manila, was destroyed in World War II during the bombardment of Manila. In 1948 a female was collected at the type locality by M. Celestino and is now in the Philippine National Museum, where I have examined it. This specimen is at present the only one in existence.

*Dicaeum anthonyi kampalili* Manuel and Gilliard, 1953

TYPE LOCALITY: Mt. Kampalili, Davao, Mindanao.

The male differs strikingly from that of *anthonyi* in having the patch on the crown and occiput brick-red, under parts white, with flanks and sides of breast pale grayish and under tail coverts red. The wings of the type and another topotypical male measure 52 and 53 mm., respectively. The female differs from that of *anthonyi* in having the under parts pale gray, with only a slight olive-yellow tinge. The wing of the only known female measures 57 mm.

This form inhabits the mountains of Davao Province, Mindanao, and is known from three specimens, viz., two adult males, collected on Mt. Kampalili at an altitude of 900 meters, and a female from Mt. McKinley, collected at the same altitude. One of the males (the type) and the female, kept in the Philippine National Museum, Manila, as well as the other male, kept in the American Museum of Natural History, have been examined by me.

The Danish Philippine Expedition of 1951–1952 collected in November, 1951, two males of this form (at that time undescribed) on Mt. Katanglad, Bukidnon Province, at an elevation between 1200 meters and 1300 meters. These specimens do not differ in coloration from the two topotypical males, but are slightly larger, the wings measuring 57, 57 mm. In this way the Katanglad population combines the characters of the two Mindanao subspecies, matching topotypical *kampalili* in

coloration, but possessing the larger measurements of *masawan*. If future collecting proves the difference in size between topotypical *kampalili* and Katanglad birds to be constant, the latter may be separated as a new subspecies, but at present I prefer to unite them with *kampalili*.

Manuel and Gilliard (*loc. cit.*) described this bird as *D. rubricapilla*, but, as this name was preoccupied, they renamed it *D. kampalili* (1953, Auk, vol. 70, p. 90).

*Dicaeum anthonyi masawan* Rand and Rabor, 1957

TYPE LOCALITY: Mt. Malindang, Misamis Occidental, Mindanao.

Similar to *kampalili*, but the males differ in having a distinct yellowish tinge over the gray color of the breast and flanks, and having the center of the abdomen yellow, not white. The female is unknown. The wings in two males measure 57 and 57 mm., exactly as in the Katanglad population of *kampalili* and similar to measurements in *anthonyi*. The yellow color of the under parts approaches the coloration of nominate *anthonyi* and makes *masawan* a connecting link between *anthonyi* and *kampalili*, although it is much closer to the latter. *Dicaeum a. masawan* is restricted to Mt. Malindang, Misamis Occidental Province, where the two only known specimens were collected at an altitude between 1050 meters and 1350 meters. I was able to examine one of these specimens through the courtesy of Dr. A. L. Rand of the Chicago Natural History Museum.

*Dicaeum bicolor*

Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, pp. 17-18) place *D. anthonyi* before the four species of the *melanoxanthum-nigrilore* group, and *D. bicolor* after these (and a few other) species. It is a matter of opinion whether *D. anthonyi* and *D. bicolor* should be placed before or after the *melanoxanthum-nigrilore* group, but they should, at any rate, be placed together, for they are rather closely related. Both these Philippine species have males with white under parts, gray flanks (not in all races of *anthonyi*), glossy bluish black upper parts, and a similar heavy and strong bill. The differences between the two species concerning the presence or absence of red and yellow color patches are not very important. The geographical variation within *D. anthonyi* and the development of red color on the upper parts of *D. quadricolor*, which is a close relative of *D. bicolor*, demonstrate how easily contrasting lipochromatic color patches are acquired or lost in this group of species.

In addition, *D. anthonyi* and *D. bicolor* (and also *D. quadricolor*)

display a similar, very pronounced, sexual dimorphism, the females being olive greenish on the upper parts and grayish with an olivaceous tinge on the under parts.

*Dicaeum bicolor* has a still closer ally than *D. anthonyi*, viz., *D. quadricolor*, which in all relevant details agrees with *bicolor*, but has a strikingly different coloration of the upper parts in the males. While the adult males of *D. bicolor* have the upper parts uniform glossy bluish black, those of *D. quadricolor* have the back scarlet and the rump yellowish olive-green. It is natural to unite *D. bicolor* and *D. quadricolor* into one superspecies, as proposed by Mayr and Amadon (*loc. cit.*).

*Dicaeum bicolor* inhabits the lowlands and hill forests in the greater part of the Philippine Islands, ascending the mountains in Luzon and Mindoro to an altitude of 1500 meters, i.e., well above the lowland dipterocarp forests (cf. Whitehead, 1899, *Ibis*, ser. 7, vol. 5, p. 235; Rabor, 1955, *Silliman Jour.*, vol. 2, p. 300). In Mindanao the Danish Philippine Expedition of 1951–1952 made similar observations and recorded *D. bicolor* from almost sea level up to an altitude of 1300 meters on Mt. Katanglad. In the latter place it lived side by side with its near ally, the mountain species *D. anthonyi kampalili*. In Leyte *D. bicolor* has been found up to an altitude of 1250 meters (Rabor, 1938, *Philippine Jour. Sci.*, vol. 66, p. 31).

Two slightly different subspecies can be distinguished.

*Dicaeum bicolor inexpectatum* (Hartert), 1895

TYPE LOCALITY: LUZON.

Very similar to nominate *bicolor*, but adult males differing in having a duller and more bluish green gloss on the upper parts. In typical *D. b. bicolor* the upper parts are dark bluish violet, with a stronger gloss. The difference between the two subspecies is easily recognizable when a comparison is made between specimens in fresh plumage, collected between September and March, but is only slight in birds with worn and faded plumage.

This form inhabits Luzon, Catanduanes (cf. Manuel, 1937, *Philippine Jour. Sci.*, vol. 63, p. 185), Mindoro, Negros, Bohol, Leyte, and Samar.

In his original description Hartert (1895, *Novitates Zool.*, vol. 2, p. 34) states that *inexpectatum* differs from *bicolor* in having a longer wing and delicate gray flanks, while *bicolor* is quite white below. I cannot find any differences whatsoever in the color of the under parts, and the proportions of the two subspecies are quite similar. Measurements taken by me are given in table 1.



TABLE 1  
MEASUREMENTS (IN MILLIMETERS) OF *Dicaeum bicolor*  
FROM THE PHILIPPINE ISLANDS

	Males	No. of Specimens	Females	No. of Specimens
Luzon	51-53	9	49-50	3
Mindoro	49-52	5	49-51	6
Negros	51-54	9	49	1
Samar	46, 50	2	48	1
Mindanao	50-52	5	48	1

It is evident that the specimens of nominate *bicolor* from Mindanao are virtually identical with those of *inexpectatum* in regard to wing length. The specimens measured belong to the American Museum of Natural History (17 specimens), the British Museum (five), the Chicago Natural History Museum (six), the United States National Museum (six), and the Zoological Museum, Copenhagen (eight).

The distinctness of the subspecies *inexpectatum* has usually been doubted (cf. Ogilvie-Grant, 1896, *Ibis*, ser. 7, vol. 2, pp. 553-554; 1897, *ibid.*, ser. 7, vol. 3, p. 240; Whitehead, 1899, *Ibis*, ser. 7, vol. 5, p. 235), but it has been maintained by McGregor (1910, *A manual of Philippine birds*, pt. 2, p. 640), Hartert (1920, *Novitates Zool.*, vol. 27, p. 430), and Delacour and Mayr (1946, *Birds of the Philippines*, p. 224), without, however, an indication of any diagnosis.

*Dicaeum bicolor bicolor* (Bourns and Worcester), 1894

TYPE LOCALITY: Zamboanga, Mindanao.

The nominate form is restricted to Mindanao.

*Dicaeum quadricolor* (Tweeddale), 1877

TYPE LOCALITY: Cebu.

Of this rare species I have examined the type (an adult male) in the British Museum, and another male and an adult female in the United States National Museum. The last-mentioned specimen is very similar to the female of *bicolor*, but it is more brownish olive-green, not so clear grass-green, on the upper parts.

This species is restricted to Cebu Island, where it inhabits the forests of the lowlands and the hills. Like *D. bicolor*, it is never found in the open country. A few years after its discovery by Everett, Bourns and Worcester (1894, *Occas. Papers Minnesota Acad. Nat. Sci.*, vol. 1, no. 1, p. 57) stated: "... as the small amount of forest remaining in the island is rapidly being cleared away we fear that *D. quadricolor* will

become extinct before many years." It was still present in 1906, when McGregor remarked that it was "rare and strictly confined to the forest" (McGregor, 1907, Philippine Jour. Sci., vol. 2, p. 308). Since then the forests have been completely wiped out, with the inevitable result that *D. quadricolor* and most other forest species have disappeared. Rabor, who in recent years collected intensively in Cebu, sought in vain for *D. quadricolor*, and the species must now be considered extinct (Rabor, 1959, Auk, vol. 76, p. 39).

### *Dicaeum australe*

This species and its two relatives (*D. retrocinctum* and *D. trigonostigma*) are placed here following the superspecies *D. bicolor-quadricolor*, to which they are no doubt rather closely related. They represent, however, more advanced evolutionary stages, partly by having a much more complicated color pattern, partly by having acquired a much thinner and finer bill, and by the fact that the females (in *australe* and *retrocinctum*) have reached the same colorful stage as the males. The two species mentioned are the only ones among the more advanced, brightly colored species of *Dicaeum* in which the females have reached the coloristic level of the males.

The three species belonging to this group have reached a higher phylogenetic stage than the dull-colored ones belonging to the *concolor* group, which will be discussed in a later paper, but being relatives of *D. bicolor* they are best placed near this species, as has already been done by Mayr and Amadon (1947, Amer. Mus. Novitates, no. 1360, pp. 18-19). After all, in a linear sequence it is impossible to express the proper connection between elements actually belonging to a three-dimensional system.

*Dicaeum australe* and *D. retrocinctum*, which form a superspecies, as well as *D. trigonostigma*, are Philippine species, but the last-named has spread to more western regions.

*Dicaeum australe* resembles, in the coloration of the male, *D. bicolor*, but the upper parts are not so glossy, the under parts are supplied with a crimson longitudinal patch on the center of the breast and abdomen, and the bill is longer and not nearly so heavy.

It is a common and widespread bird of gardens, coconut groves, and forest edges in the lowlands, ascending the hillsides only to 500 meters at the most.

It is necessary to add some remarks on the name of this bird. It was formerly known as *Dicaeum rubriventer* Lesson, 1831, and was still listed under this name in 1909 by Sharpe (1909, A hand-list of the

genera and species of birds, vol. 5, p. 25). However, Salvadori (1876, Ann. Mus. Civ. Genova, vol. 8, p. 509) had pointed out long before that *Pipra papuensis* Gmelin (1789, Systema naturae, vol. 1, pt. 2, p. 1004) was an earlier name for this species, but it was not accepted because it was misleading (Sharpe, 1885, Catalogue of the birds in the British Museum, vol. 10, p. 36, note). Still, in the last 50 years the species has been called *D. papuense*, but as early as 1920 Stresemann (1920, Novitates Zool., vol. 27, p. 328)<sup>1</sup> demonstrated that this name was antedated by *Pipra australis* Hermann (1783, Tabula affinitatum animalium, p. 223). Both Gmelin's and Hermann's names were based on "*le Manikor de la Nouvelle Guinée*" of Buffon (1778, Histoire naturelle des oiseaux, 4<sup>o</sup> ed., vol. 4, p. 431, figured in Daubenton, Planches enluminées, vol. 8, pl. 707, fig. 2). This citation refers to the quarto edition of Buffon's great work, but, according to Mayaud (1939, Alauda, vol. 11, p. 20), who has collated the different editions, the folio editions are the proper editions. In the edition in large folio and the one in small folio, which have identical collation, "*le Manikor*" is described in 1778 (vol. 5, p. 156) and in the duodecimo edition in 1779 (vol. 8, p. 145). The "*Manikor*" was said to originate from New Guinea and was collected by Sonnerat. As he obtained specimens from the Philippines as well as from New Guinea, a confusion of these localities could easily take place. The figure in the "Planches enluminées" is easily recognizable and obviously represents the species in question.

Other synonyms of *australe* are: *Dicaeum schistaceum* Tweeddale, 1877, as first pointed out by Sharpe (1884, Proc. Zool. Soc. London, for 1883, p. 580), and *Dicaeum flaviventer* A. B. Meyer, 1894, as shown by Mayr and Amadon (*loc. cit.*).

*Dicaeum australe australe* (Hermann), 1783

TYPE LOCALITY: Philippine Islands, restricted here to Luzon.

The nominate form inhabits the eastern islands in the Philippines, north to Luzon and Camiguin North, south to Mindanao and Basilan. Long series in the American Museum of Natural History and the Zoological Museum, Copenhagen, were examined.

*Dicaeum australe haematostictum* Sharpe, 1876

TYPE LOCALITY: Guimaras.

Differs strikingly from nominate *australe* in having the crimson patch on the under parts much broader and encircled by a black,

<sup>1</sup> I am indebted to Dr. A. L. Rand for this reference.

U-shaped band frontally and laterally. The slate-blue color of the upper parts has a stronger metallic gloss. This distinct form inhabits Panay, Guimaras, and Negros. Hachisuka (1926, Bull. Brit. Ornith. Club, vol. 47, p. 55) separated the Negros birds as *whiteheadi*, stating that they had a stronger metallic blue gloss on the upper parts and the black, U-shaped figure on the under parts more strongly developed than in topotypical *haematostictum*. I have examined the type of *whiteheadi* in the British Museum and have seen large series of this common lowland bird from all three islands in various museums. It is not possible to separate the Negros birds, which are virtually identical with those from Guimaras and Panay. There are small local differences, and some Negros specimens have apparently a slightly broader and more conspicuous black figure on the under side, but this varies, and males have, on an average, more black than females. The difference in gloss on the upper parts is extremely slight, if it exists at all.

*Dicaeum retrocinctum* Gould, 1872

TYPE LOCALITY: Mindoro.

This species represents *australe* in Mindoro, but differs so strikingly in its much more variegated color pattern and in its much thinner and longer, sunbird-like bill that it is with hesitation that I unite it with *australe* in a superspecies. Nevertheless, I find it practical to unite the two species in this way in order to point out their close relationship.

The *D. australe-retrocinctum* superspecies ranges over virtually all the major islands in the Philippine subregion and is unrepresented only in the Bataan and Babuyan Islands and in the Sulu Islands.

*Dicaeum trigonostigma*

This species is one of the most colorful in the genus *Dicaeum*, with a color pattern that bears a remote resemblance to that of *D. retrocinctum*, as pointed out by Mayr and Amadon (*loc. cit.*). It has a thin bill and very pronounced sexual dimorphism. From an evolutionary point of view it has obviously reached a very advanced stage.

*Dicaeum trigonostigma* ranges from Assam and Burma over Malaysia to the Philippine Islands. Its Philippine origin is indicated not only by its resemblance to *D. retrocinctum*, but also by the fact that no fewer than nine subspecies, usually with striking and clear-cut characters, can be recognized in the Philippine Islands, while in the remaining much larger range only five subspecies, most of them with rather trivial characters, have developed. A further point is that the Philippine forms exhibit more primitive characters than do the

Malaysian ones. All this tends to show that *D. trigonostigma* spent a long period in the Philippines before it occupied Malaysia. The route of dispersal is easy to follow, via the Sulu Islands to Borneo. The westernmost Philippine form, inhabiting Sibutu Island, forms a transition between the Philippine and the Malaysian groups. The species is completely absent from Palawan Province, which forms the other land bridge between the Philippines and Borneo.

Much has been written about the Malaysian forms of this species, and the problems concerning geographical variation have not yet been completely settled. The most important notes have been issued by Hartert (1918, Bull. Brit. Ornith. Club, vol. 38, p. 73) and Chasen and Kloss (1929, Jour. Ornith., vol. 77, suppl. 2, p. 121; 1930, Bull. Raffles Mus., no. 4, p. 110). A check list of all described Malaysian forms has been given by Oberholser (1932, Bull. U. S. Natl. Mus., vol. 159, p. 118). Further references concerning the forms described from the islands west of Sumatra are given below (p. 32). Reviews of the Philippine forms have been given by Bourns and Worcester (1894, Occas. Papers Minnesota Acad. Nat. Sci., vol. 1, no. 1, p. 55) and McGregor (1910, A manual of Philippine birds, pt. 2, p. 628).

*Dicaeum trigonostigma* inhabits edges and clearings in old forests and secondary growth in the lowlands and hilly country to an altitude of about 900 meters, exceptionally reaching 1200 meters. In the lowlands proper it is usually a rather common bird.

The Malaysian and Philippine forms differ so much that it is convenient to separate them as two "subspecies groups." The following review starts with the northern and western forms and moves to the southeast (to the Philippines), for purely geographical reasons; actually the Philippine forms are more primitive. Figure 2 shows the ranges of all the acceptable forms. Unless stated otherwise, the descriptions refer to adult males.

#### *Trigonostigma* GROUP

The orange-red color on the mantle in adult males continues over the back and grades into the yellow color of the rump.

*Dicaeum trigonostigma rubropygium* Stuart Baker, 1921

TYPE LOCALITY: Mergui, Tenasserim.

Very similar to nominate *trigonostigma* but differs in having the rump more intensely orange-colored, not so yellow. This is a very slightly differentiated form, but, having examined the very fine material in the British Museum, I find it recognizable. To *rubropygium*

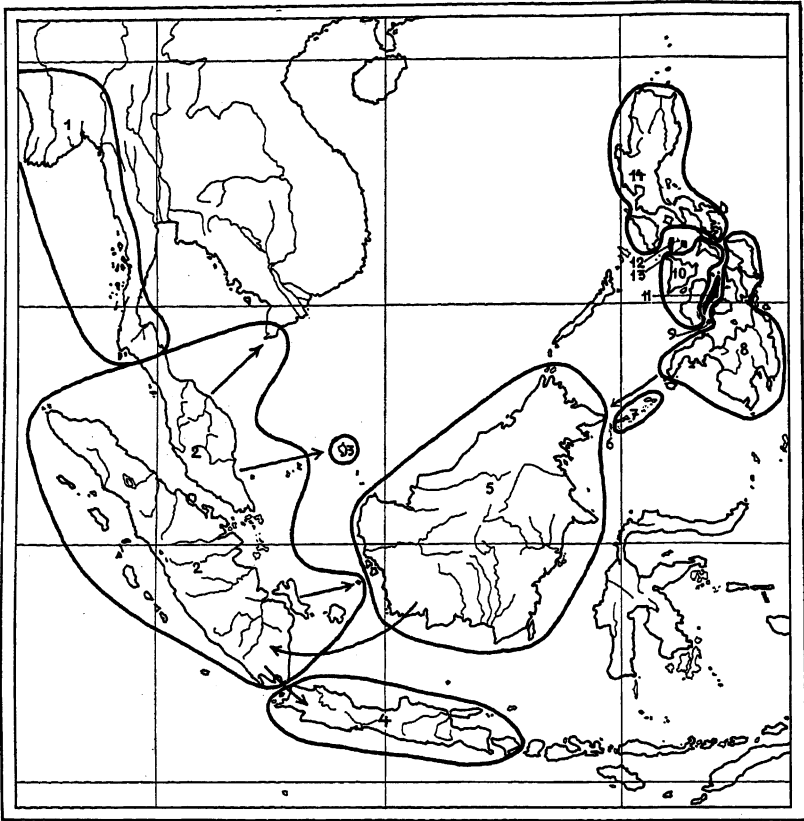


FIG. 2. The distribution of *Dicaeum trigonostigma* and its subspecies: 1, *rubropygium*; 2, *trigonostigma*; 3, *megastoma*; 4, *flaviclunis*; 5, *dayakanum*; 6, *sibutuense*; 7, *assimile*; 8, *cinereigulare*; 9, *besti*; 10, *dorsale*; 11, *pallidius*; 12, *intermedium*; 13, *sibuyanicum*; 14, *xanthopygium*. Arrows indicate probable routes of dispersal.

belongs a long series from various localities in southern Tenasserim, northward to Mergui, one specimen from the Karen Hills in Burma, and a very long series from many localities in the northern part of peninsular Siam (Naihoot near Langsuen, Khao Rum near Nakhon Sritamarat, Ghirbi, Kasoom, Pulo Panjang); a few specimens from the southernmost localities are intermediate between *rubropygium* and *trigonostigma*. Robinson and Kloss (1924, Jour. Nat. Hist. Soc. Siam, vol. 5, no. 3, p. 388) state that *rubropygium* ranges south to Junkseylon (=Puket), while specimens from Pattani agree with nominate *trigono-*

*stigma*. North of the regions mentioned, *D. t. rubropygium* rapidly becomes rare, but there are scattered records from Tenasserim as far north as Moulmein, the Karen Hills, Karenni, Pegu, and Arakan, and, according to Stuart Baker (1926, The fauna of British India, Birds, ed. 2, vol. 3, p. 425), from a restricted area near Dibrugarh in Lakhimpur, northern Assam, a locality far removed from the rest of the range. The species is quite unknown in Siam apart from the peninsular areas.

*Dicaeum trigonostigma trigonostigma* (Scopoli), 1786

TYPE LOCALITY: Malacca, Malay States.

Specimens in the British Museum from Chong (near Trang) in peninsular Siam belong to this form, but one (out of four) is nearest to *rubropygium*. This indicates that the transition between the two slightly different forms takes place in the area between Ghirbi and Trang. Specimens from Bangnara (=Narathiwat) in Pattani are typical *trigonostigma*, indistinguishable from a very long series from nearly all the Malay States and also from the Rhio Archipelago. Specimens have been collected on Gunung Tahan up to an altitude of 1000 meters and on Kedah Peak to 1050 meters.

This species has been recorded from southern Cochin-China by Tirant, who stated it to be rare (cf. Delacour and Jabouille, 1931, Les oiseaux de l'Indochine française, vol. 4, p. 165). No one has ever met with it there again, and it has undoubtedly disappeared, as has *Prionochilus thoracicus*, owing to the destruction of the forests. Delacour and Jabouille (*loc. cit.*) refer the former Cochin-China population to *rubropygium*, but I find it more probable that it belonged to nominate *trigonostigma*.

I cannot find any differences between topotypical *trigonostigma* and Sumatra specimens. This has already been noticed and commented on by Robinson and Kloss (1920, Jour. Straits Branch Roy. Asiatic Soc., no. 81, p. 115; 1924, Jour. Federated Malay States Mus., vol. 2, p. 336), Chasen (1929, Jour. Ornith., vol. 77, suppl. 2, p. 121), and Chasen and Kloss (1930, Bull. Raffles Mus., no. 4, p. 110). I give this list of references because Hartert (1918, Bull. Brit. Ornith. Club, vol. 38, p. 74) believed that the birds from Sumatra and those from Borneo were identical and, therefore, applied the name *croceoventre* Anon. (=Vigors and Horsfield), 1830 (type locality, Sumatra), to the distinct Borneo subspecies. Because the Sumatra birds belong to the Malay subspecies, *croceoventre* becomes a synonym of nominate *trigonostigma*.

The birds from Anambas Islands have been separated as *hypochlous*

Oberholser, 1917, stated to be paler gray on the throat and paler slate-blue on the upper parts. I have not seen specimens of this form, which all authors have relegated to the synonymy of nominate *trigonostigma*. The Malay form has been recorded also from Tioman Island (Gibson-Hill, 1949, Bull. Raffles Mus., no. 20, p. 243), Billiton, Banka, Lingga Archipelago, and the Karimata Islands, but I have not examined any specimens from these localities. Chasen and Kloss (1933, Treubia, vol. 14, p. 163) state that the population of the Karimata Islands is nearest to nominate *trigonostigma*, in spite of the close proximity of the islands to Borneo.

*Dicaeum trigonostigma* has been recorded from a number of the islands west of Sumatra and is probably found on them all except Enggano. The populations of these islands have been separated as the following subspecies:

*Dicaeum trigonostigma antioproctum* Oberholser, 1912; Simalur Island; said to have a more greenish, less orange, rump and to be not so deep orange on the abdomen.

*Dicaeum trigonostigma melanthe* Oberholser, 1912; Lasia Island; stated to differ from *antioproctum* in having the throat and upper parts decidedly darker.

*Dicaeum trigonostigma lyprum* Oberholser, 1912; Nias Island; said to be similar to nominate *trigonostigma*, but having darker upper parts.

*Dicaeum trigonostigma tanamassae* De Schauensee and Ripley, 1939; Tana Massa Island, Batu Islands; stated to differ from *trigonostigma* and *lyprum* in having lighter upper parts and throat and less orange on the under parts.

*Dicaeum trigonostigma pagense* Oberholser, 1926; South Pagi Island, Mentawi Islands; said to differ from *lyprum* by having paler upper parts and a more yellowish, less orange, rump.

A number of students have commented on all these forms, each author having reached different conclusions. Chasen and Kloss (1926, Ibis, p. 300) state that birds from Sipora and Siberut are similar to *antioproctum* from Simalur. Riley (1929, Proc. U. S. Natl. Mus., vol. 75, art. 4, p. 40) distinguishes *pagense* from Siberut, Sipora, and South Pagi, *lyprum* from Nias and Pini Island, and *antioproctum* from Simalur and Lasia, adding that the last-named is characterized by superior size and grayer, less yellow, under parts in the females, while the two other forms are hardly worthy of recognition, "if it were not for their insular habitat." Junge (1936, Temminckia, vol. 1, p. 73) recognizes *lyprum* on the basis of its darker throat and deeper orange abdomen, but cannot distinguish *antioproctum* from Sumatra specimens, adding that the characters of the females given by Riley (*loc. cit.*) are not con-



TABLE 2  
MEASUREMENTS (IN MILLIMETERS) OF *Dicaeum trigonostigma trigonostigma*  
FROM SUMATRA AND THE ISLANDS WEST OF SUMATRA  
(The means are given in parentheses.)

	Wing	Bill from Skull
Sumatra		
Ten males	48-51 (49.8)	12-13 (12.6)
Four females	46-50 (48.0)	11-12 (11.8)
Simalur		
Three males	51-52 (51.7)	12-12.5 (12.3)
Three females	48-50 (49.0)	11-13 (12.0)
Nias		
Six males	48-50 (49.0)	12-13 (12.7)
Two females	47, 48	12.5, 13
Batu Islands		
One male	50	12.8
North Pagi		
One male	51	13

stant. The Simalur birds are slightly larger, however, the wings in adult males measuring 50-53 mm., compared with 48-50 mm. in Sumatra birds and 46-52 mm. in Nias birds. De Schauensee and Ripley (1939, Proc. Acad. Nat. Sci. Philadelphia, vol. 91, p. 411) and De Schauensee (1940, Proc. Acad. Nat. Sci. Philadelphia, vol. 92, p. 39) discuss *tanamassae* and recognize *lyprum* on its thicker bill. Finally Ripley (1944, Bull. Mus. Comp. Zool., vol. 94, p. 412), having examined material of all five forms, including all the types, regards *melanolyprum*, *tanamassae*, and *pagense* as synonyms of *antioproctum*, noting that this form differs from nominate *trigonostigma* in size, being larger, and brighter, more orange-yellow, on the rump and abdomen in the females. He gives the wing length (in millimeters) in males as follows: Sumatra, 45-50.5; Simalur, 49.5-54; Lasia, 53; Nias, 49.5; Pini, 49.5; Mentawi Islands, 49.5-50.5.

I have examined three males and three females from Simalur, four males and two females from Nias, borrowed from the Leiden Museum, one male from Nias and one male from North Pagi Island in the American Museum of Natural History, and one male from Nias and one male from Batu Islands in the British Museum. All these birds are not distinguishable from nominate *trigonostigma*. I can find no differences in the coloration of the males examined other than those due to normal individual variation. The many subspecies descriptions have been based on individual variants or on very trivial and subtle

characters which are not evident in series. There are also no differences in the form of the bill or in the general proportions, other than a slight tendency in Simalur specimens to be larger. I agree with Ripley (*loc. cit.*) that the females of the island populations are slightly deeper yellow on the rump and abdomen than those of topotypical *trigonostigma*, but even this difference is slight and not constant. Consequently, I unite all the island forms mentioned with nominate *trigonostigma*. The measurements taken by me are given in table 2.

Delacour (1947, *Birds of Malaysia*, p. 307) introduced the designation *D. t. melanostigma* for the populations of Malaya and Sumatra, but states (*in litt.*) that this *nomen nudum* was due to a *lapsus calami*.

*Dicaeum trigonostigma megastoma* Hartert, 1918

TYPE LOCALITY: Bunguran Island, Great Natuna Islands.

This form, restricted to the Great Natuna Islands, differs from nominate *trigonostigma* only in having a distinctly longer bill. Two males, one being the type, in the American Museum of Natural History were examined.

It is noteworthy that the birds of the Great Natuna Islands, as do those of the Karimata Islands, agree in coloration with *trigonostigma* and not with *dayakanum* from Borneo. This shows that the populations of these island groups have immigrated from Malaya-Sumatra and not, as would be expected, from nearby Borneo.

*Dicaeum trigonostigma flaviclunis* Hartert, 1918

TYPE LOCALITY: Java.

Differs from nominate *trigonostigma* in having the rump pure yellow, without any orange, and the under parts below the throat paler, with distinctly less orange, tending towards pure yellow. This form inhabits Java and Bali and, according to Chasen (1937, *Treubia*, vol. 16, p. 252), also Krakatau. A good series in the British Museum has been examined.

*Dicaeum trigonostigma dayakanum* Chasen and Kloss, 1929

TYPE LOCALITY: Borneo.

Differs from nominate *trigonostigma* in having the chin and usually the throat also much darker gray, in some specimens almost as dark bluish slate color as the upper parts. This is the form of Borneo, including the adjacent islands of Bolembangan and Banggi. A long series in the British Museum and the American Museum of Natural History have been examined.

*Dorsale* GROUP

The orange-red color of the mantle in adult males is restricted to a triangular patch, widely separated from the rump by the dark slate-blue color of the back. The rump varies in coloration, but it is usually of about the same color as the back, save that it has a slight olive-green tinge. The orange color of the under parts is usually not so bright as in the members of the *trigonostigma* group.

*Dicaeum trigonostigma sibuense* Sharpe, 1893

TYPE LOCALITY: Sibutu Island, Sulu Islands.

Chin and throat dark bluish gray, of the same color as the upper parts; rump with a dull olive tinge. Restricted to Sibutu Island. The dark throat, uniform with the rest of the head, a character not found in any other Philippine form, indicates a close relationship with *dayakanum* of Borneo. Two males in the American Museum of Natural History and one (the type specimen) in the British Museum were examined.

*Dicaeum trigonostigma assimile* Bourns and Worcester, 1894

TYPE LOCALITY: Jolo Island, Sulu Islands.

Differs from *sibuense* in having the throat gray, of about the same color as in nominate *trigonostigma*. This is the form of the islands Tawitawi, Siasi, and Jolo in the Sulu Islands.

*Dicaeum trigonostigma assimile* is a rare bird in collections, and I have seen only one specimen, an adult male from Siasi Island in the British Museum. This specimen is the type of *Dicaeum dorsale hanadori* Hachisuka (1941, *Tori*, vol. 11, nos. 51-52, p. 87), which is based on this single specimen and described without any comparison with *assimile* or *sibuense*, the two neighboring forms. According to the description, *hanadori* is similar to *sibuyanicum*, but smaller, with a shorter bill and with brighter orange color on the under parts. These characters also serve to distinguish *assimile* from the distant *sibuyanicum*, and there is no reason to expect the Siasi birds to differ from topotypical *assimile*.

*Dicaeum trigonostigma cinereigulare* Tweeddale, 1877

TYPE LOCALITY: Mindanao.

Differs from *assimile* and *sibuense* in having the chin and upper throat yellow, contrasting with the lower throat and the sides of the throat, which are gray washed with yellow. Inhabits the islands of

Mindanao, Samar, Leyte, and Bohol. I have examined large series of this common bird from Samar, Leyte, and various localities in Mindanao (in the American Museum of Natural History, the British Museum, the Philippine National Museum in Manila, and the Zoological Museum, Copenhagen) and could find no differences among the populations inhabiting these islands. I have not seen specimens from Bohol, but McGregor (1909, Philippine Jour. Sci., vol. 4, p. 75) expressly states that specimens from Bohol "seem to belong to this species (i.e., *cinereigulare*) and not to *D. besti*." Apparently the islands of Basilan and Dinagat are not inhabited by any form of *D. trigonostigma*.

*Dicaeum trigonostigma besti* Steere, 1890

TYPE LOCALITY: Siquijor.

Similar to *cinereigulare*, but differs in having the lower throat clear gray, without any yellow tinge, and in having slightly larger proportions. Restricted to Siquijor Island. A series in the American Museum of Natural History and the type in the British Museum were examined.

*Dicaeum trigonostigma dorsale* Sharpe, 1876

TYPE LOCALITY: Panay.

Differs strikingly from the above-mentioned forms of *trigonostigma* in having the chin and throat yellow, grading into the orange color on the breast. Upper parts as in the preceding forms. The females have a dull yellow throat, while all the allied forms mentioned above have a grayish lower throat and fore breast. Inhabits Panay, Negros, and Masbate. Ample material from all three islands has been examined in the British Museum, as well as smaller series in the American Museum of Natural History, and the Zoological Museum, Copenhagen. The three populations do not differ.

*Dicaeum trigonostigma pallidius* Bourns and Worcester, 1894

TYPE LOCALITY: Cebu.

Similar to *dorsale*, differing only in having the under parts paler yellow, with less orange, and the upper parts perhaps slightly paler bluish slate color. This form, restricted to Cebu, is now extinct. It has not been found since McGregor collected it in 1906, when it was the most common species of flowerpecker on the island (cf. Rabor, 1959, Auk, vol. 76, p. 39). Its extermination is due to the wholesale destruction of the forests in Cebu, which also wiped out *Dicaeum quadricolor*. I have examined one adult male in the British Museum and another in Naturhistoriska Riksmuseet, Stockholm.

*Dicaeum trigonostigma intermedium* Bourns and Worcester, 1894

TYPE LOCALITY: Romblon.

Chin and throat uniform gray, with a yellow wash, in all other particulars similar to *cinereigulare*. Inhabits Romblon and Tablas. One adult male in the American Museum of Natural History was examined.

*Dicaeum trigonostigma sibuyanicum* Bourns and Worcester, 1894

TYPE LOCALITY: Sibuyan.

Differs from *intermedium* in having chin and throat uniform bluish gray, without any yellow tinge, and under parts paler orange, and in attaining greater proportions. The color of the throat is about the same as in *assimile*, but slightly paler, and *sibuyanicum* differs from *assimile* further in its paler orange under parts and the greater proportions. The wing length in adult males is 54 mm., bill length (from skull) 15 mm., while in other Philippine forms the wing measures 48–53 mm. and the bill 12–13 mm. in adult males.

This form, restricted to the island of Sibuyan, is the largest representative of *D. trigonostigma*. Only one adult male in the British Museum and one in the American Museum of Natural History were examined.

*Dicaeum trigonostigma xanthopygium* Tweeddale, 1877

TYPE LOCALITY: Luzon.

Differs strikingly from all other forms in having the rump yellow, contrasting with the slate-blue color of the back. The throat is yellow as in *dorsale*, and the under parts are about the same pale color as in *sibuyanicum*, or even with still less orange, being yellow, with only an orange wash on the breast. Also, the females have a yellow band across the rump. This is the most aberrant form in the species *D. trigonostigma*. It inhabits Luzon, Mindoro, Polillo, and Marinduque. Long series from Luzon and Mindoro in the British Museum and in the American Museum of Natural History have been examined. There are no representatives of *D. trigonostigma* on the islands north of Luzon.

#### TYPE SPECIMENS EXAMINED

*Acmonorhynchus annae sumbavensis* Rensch, 1931 = *Dicaeum annae sumbavense*. In the Zoological Museum, Berlin.

*Prionochilus modestus* Hume, 1875 = *Dicaeum agile modestum*. In the British Museum.

*Piprisoma modestum remotum* Robinson and Kloss, 1915 = *Dicaeum agile remotum*. In the British Museum.

*Piprisoma obsoletum tinctum* Mayr, 1944 = *Dicaeum agile tinctum*. In the American Museum of Natural History.

*Prionochilus everetti* Sharpe, 1877 = *Dicaeum everetti everetti*. In the British Museum.

*Piprisoma agile bungurensense* Chasen, 1934 = *Dicaeum everetti bungurensense*. In the British Museum.

*Piprisoma sordidum* Robinson and Kloss, 1918 = *Dicaeum everetti sordidum*. In the British Museum.

*Acmonorhynchus affinis* Zimmer, 1918 = *Dicaeum aeruginosum affine*. In the American Museum of Natural History.

*Dicaeum chrysorrheum intensum* Stuart Baker, 1921 = *D. c. chrysochlore*. In the British Museum.

*Pachyglossa melanoxantha* Blyth, 1843 = *Dicaeum melanoxanthum*. In the British Museum.

*Prionochilus vincens* P. L. Sclater, 1872 = *Dicaeum vincens*. In the British Museum.

*Prionochilus aureolimbatus* Wallace, 1865 = *Dicaeum aureolimbatus aureolimbatus*. In the British Museum.

*Dicaeum nigrilore* Hartert, 1904 = *D. nigrilore nigrilore*. In the American Museum of Natural History.

*Dicaeum nigrilore diuatae* Salomonsen, 1953 = *D. n. diuatae*. In the Zoological Museum, Copenhagen.

*Dicaeum rubricapilla* Manuel and Gilliard, 1952 = *D. anthonyi kampalili*. In the Philippine National Museum, Manila.

*Prionochilus bicolor* Bourns and Worcester, 1894 = *Dicaeum bicolor bicolor*. In the United States National Museum.

*Prionochilus inexpectatus* Hartert, 1895 = *Dicaeum bicolor inexpectatum*. In the American Museum of Natural History.

*Prionochilus quadricolor* Tweeddale 1877 = *Dicaeum quadricolor*. In the British Museum.

*Dicaeum schistaceum* Tweeddale, 1877 = *D. australe australe*. In the British Museum.

*Dicaeum haematostictum whiteheadi* Hachisuka, 1926 = *D. australe haematostictum*. In the British Museum.

*Dicaeum retrocinctum* Gould, 1872 = *D. retrocinctum*. In the British Museum.

*Dicaeum trigonostigma rubropygium* Stuart Baker, 1921 = *D. t. rubropygium*. In the British Museum.

*Dicaeum trigonostigma megastoma* Hartert, 1918 = *D. t. megastoma*. In the American Museum of Natural History.

*Dicaeum trigonostigma flaviclunis* Hartert, 1918 = *D. t. flaviclunis*. In the American Museum of Natural History.

*Dicaeum sibuense* Sharpe, 1893 = *D. trigonostigma sibuense*. In the British Museum.

*Dicaeum dorsale hanadori* Hachisuka, 1941 = *D. trigonostigma assimile*. In the British Museum.

*Dicaeum besti* Steere, 1890 = *D. trigonostigma besti*. In the British Museum.

*Dicaeum xanthopygium* Tweeddale, 1877 = *D. trigonostigma xanthopygium*. In the British Museum.