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NEMOURIA

Occasional Papers of the Delaware Museum of Natural History

NUMBER 1 DECEMBER 30, 1970

NOTES ON PHILIPPINE BIRDS

Dean Amadon and John E. duPont

INTRODUCTION

Over the last 10 years the Delaware Museum of Natural History has received several small collections of birds from the Philippines. Some of the more interesting records are commented on here, including the description of one new subspecies, one new record for Luzon, four new records for Palawan, and one new record for Samar.

The number of interesting forms from the Dalton Pass area, which is only 180 miles northeast of Manila, is quite remarkable. They include: (1) *Turnix worcesteri*, a series of a species hitherto known from only a few specimens, all of which were destroyed in the second world war; (2) *Rallus mirificus*, still unknown elsewhere, although 20 or so specimens have now been collected, and at all seasons; (3) *Muscicapa latirostris*, new subspecies, a series of a bird known elsewhere from only an old skin from Negros; (4) the first Luzon specimens of *Zoothera andromedae*; (5) a series of *Zoothera cinerea*, hitherto known on Luzon from but a single specimen.

For their assistance, we wish to thank Mr. Ian Galbraith of the British Museum (Natural History), Dr. Austin L. Rand of the Chicago Museum of Natural History, Dr. C. G. Sibley of the Yale Peabody Museum, and Miss Mary LeCroy of the American Museum of Natural History.

FAMILY **TURNICIDAE** BUTTON-QUAIL

Turnix worcesteri McGregor, 1904

Turnix worcesteri was described by McGregor from four specimens purchased in a Manila market. Later, McGregor and Manuel (1936) mentioned a fifth specimen from rice fields a few kilometers south of Manila at Paranaque. All five skins were lost during the second world war. No others, apparently, came to light until duPont's collectors sent in a series.

Turnix worcesteri became something of a mystery; and Delacour and Mayr (1946) thought, for example, that it is a local race or even a variant of *Turnix sylvatica whiteheadi* Ogilvie-Grant, 1897.

Sutter (1949), in his penetrating study of some of the Indo-Australian button-quail, differed with these other authors, though he had not, of course, seen *worcesteri*. He concluded that *worcesteri*, of Luzon; *everetti* Hartert, 1898, of Sumba Island in the Lesser Sundas; and *pyrrhothorax* (Gould, 1841), of

	Wing ♂	Wing ♀	Bill length	Bill depth at nostril
T. worcesteri	67	73	9.5	.53
T. sylvatica whiteheadi	62	66	9	.35
T. everetti		70		

Australia, comprise a related group of thick-billed turnicids, not at all close to *T. sylvatica*. Sutter left open the question of whether these three forms are races of a single species or species comprising a superspecies.

We have compared *worcesteri*, *everetti* (type only available), and *pyrrhothorax*. There can be little doubt that Sutter was correct. The type of *everetti*, wing 70, sexed as a female, is similar indeed to *worcesteri*, but is a little darker, is more blackish above, and has fewer pale, buffy or fulvous tints. Below, it is more like the male of *worcesteri* in that the abdomen is white. The throat is white, too, but has a few scattered chestnut feathers along its edges. It is possible, of course, that the type of *everetti* was missexed and is a male.

The only other known specimens of *everetti* are a male and a female, believed to be juveniles. Sutter's measurements for these are: male wing 65, female 76. Compared with the type, supposed female adult, wing 70, this would suggest that the type is in fact a male.

The Australian *pyrrhothorax*, judging from two or three all in poor condition, is less similar, larger, and paler. Furthermore, as Sutter noted, two other thick-billed Australian species, *T. velox* (Gould, 1841) and *T. castanota* (Gould, 1840), may be related also.

It seems likely that *everetti* and *worcesteri* are conspecific, the former being the older name. However, until more is known of sexual differences in *everetti*, and until both are compared with adequate material of the Australian *pyrrhothorax*, which bears a still older name, it is preferable to retain all three as species. Furthermore, it is unlikely that this group of elusive button-quail is represented, to the north of Australia, on only two islands, Sumba and Luzon! Probably it remains to be discovered elsewhere.

The color plate illustrates the two sexes of *worcesteri* and *sylvatica*. Females of *worcesteri* differ from males in their larger size, as in all members of the genus. Further, the breast is darker chestnut, the throat (white in male) is washed with chestnut, and the abdomen (white in male) is washed with buff. Dorsally, the sexes are similar, if not identical.

Detailed comparison of *worcesteri* and *sylvatica whiteheadi* is hardly necessary, now that they are known to be perfectly distinct species. Aside from the much heavier bill of *worcesteri*, it is a larger species than *whiteheadi*, and the chestnut on the breast is paler, sex for sex. Moreover, as noted, the throat and belly are washed with chestnut and with rufous, respectively (white in both sexes of *whiteheadi*). On the other hand, *worcesteri* lacks the chestnut or rufous tints on shoulders and nape, as found in *whiteheadi*. In

Turnix worcesteri McGregor, 1904

Turnix sylvatica whiteheadi Ogilvie-Grant, 1897

what is perhaps our only female (among two or three) of *whiteheadi* in good feather, there is an interrupted chestnut collar across the nape, as in other races of *sylvatica*.

The fact that duPont's collectors sent in a small series of *worcesteri* but no *sylvatica* suggests that the latter may not get up to the elevation (3500 feet) where most of them were taken. On the other hand, earlier records from the Manila markets and environs of Manila would suggest that the two do occur together; and, indeed, the difference in general size and especially in bill thickness leaves no reason to doubt that such may be the case.

FAMILY **RALLIDAE** RAILS

***Rallus mirificus* Parkes and Amadon, 1959**

1 ♂, May 1969, Dalton Pass, Nueva Vizcaya, Luzon
1 ♂, 2 ♀, Nov. 1969, Dalton Pass, Nueva Vizcaya, Luzon
3 ♂, 5 ♀, Dec. 1969, Dalton Pass, Nueva Vizcaya, Luzon

No fewer than 12 specimens of this rail, which was described as recently as 1959 by Parkes and Amadon, were received; all were from the Dalton Pass area near the type locality on Luzon. This rail might yet prove to be a migrant to the Philippines, but from where?

Paynter (1963:1–2) recently concluded that *mirificus* is a race of *Rallus pectoralis* and suggested a cline: Australia, New Guinea, Flores, and Luzon! He may be correct, but we prefer to reserve judgment until more is known of *mirificus*.

The base of the bill is a brighter red than indicated in the original description or in the color plate that accompanied it. At least this is true of spring males. This color soon fades in specimens.

***Porzana tabuensis tabuensis* (Gmelin, 1789)**

3 ♂, 5 ♀, 1 o, Aug.–Nov. 1969, Dalton Pass, Nueva Vizcaya, Luzon
2 ♂, Dec. 1969; 1 ♀, Feb. 1970, Pangil, Laguna, Luzon

Our 12 specimens from central Luzon substantiate the earlier conclusion (Amadon and Jewett, 1946:550) that the race *filipina* Hachisuka (1932:234) is not valid and that Luzon birds should be assigned to *P. t. tabuensis*.

Curiously, the species is still apparently unknown elsewhere in the Philippines.

The specific name *tabuensis* has been used almost universally for this small, dark rail which has an enormous distribution covering Australia, New Guinea, Polynesia, and the Philippines. Mathews (1927:92) was an exception: he used the name *nigra* of J. F. Miller 1784, which antedates Gmelin's *tabuensis* by a few years. For a discussion of this case one may consult Lysaght (1956) and the included references. Miller's name was based on a drawing of a small rail, said to be from Tahiti, made by J. R. Forster when the latter was a member of Captain Cook's second journey to the Pacific.

Although it is not improbable that Forster's (and Miller's) bird was the

above species, this cannot be proved. Some, for example, have thought that the bird in question may have been another species of small, dark rail, *Nesophylax ater* (North, 1908), which is restricted to Henderson Island in the Tuamotus. In view of the preceding, it seems infinitely preferable to continue to call the Sooty Rail *Porzana tabuensis* (Gmelin) and to regard the name *Rallus nigra* Miller as unidentifiable. This will avoid much confusion.

***Poliolimnas cinereus ocularis* (Ingram, 1911)**

5 ♂, 2 ♀, May 1970, Iwahig, Palawan
3 ♂, 1 ♀, Feb. 1970, Iwahig, Palawan

Not previously recorded from Palawan.

***Gallinula chloropus luzanoi* Lletget, 1918**

1 ♀, May 1970, Iwahig, Palawan

Not previously recorded from Palawan.

***Gallicrex cinerea* (Gmelin, 1789)**

3 ♂, 3 ♀, May 1970, Iwahig, Palawan

Not previously recorded from Palawan.

FAMILY **STRIGIDAE** OWLS

***Otus scops longicornis* (Ogilvie-Grant, 1894)**

1 ♂, Dec. 1969, Ipo Dam, Bulacan, 1200 feet

A nice specimen of this rare owl, wing 147.

***Otus bakkamoena megalotis* Walden, 1875**

2 ♂, May and Sept. 1969, Dalton Pass, Nueva Vizcaya, Luzon; wing 181
1 ♀, Nov. 1968, Diman, Balian, Pangil, Laguna, Luzon; wing 187
1 ♀, Dec. 1969, Ipo Dam, Bulacan, Luzon; wing 193
1 imm. ♀, April 1970, Silang, Cavite, Luzon

The Luzon race of this owl is generally known as *Otus bakkamoena whiteheadi* Ogilvie-Grant (1895). We do not here express an opinion as to whether it is properly a race of *bakkamoena* (type locality Ceylon), or even whether it is conspecific with the other supposed races in the Philippines, which are comprised of birds of smaller size.

Ogilvie-Grant's type of *whiteheadi* was from the mountains of northern Luzon, so Delacour and Mayr (1946:115), gave "mountains of northern Luzon" as the range. However, Hachisuka (1934:54) had earlier mentioned a specimen taken by Steere in the lowlands at "Laguna, near Manila." That this was based on a correct identification was made likely by a specimen later acquired at sea level on the Bataan Peninsula by Gilliard (1950:485). This last has remained the only specimen in the American Museum of Natural History; like so many owls, this is an uncommon bird in collections. Five recent specimens in the Delaware Museum of Natural History are marked as from 1200 to 3500 feet. Thus it is probable that this owl is of general distribution on Luzon, where it extends from sea level well up into the mountains.

NOMENCLATURE: An *Otus megalotis* based on a specimen collected by Cuming at "Manila" is listed by G. R. Gray in his list of the Accipitres in the British Museum (1844:45), again in the second edition of that little work (1848:98), and in his "Hand-list" (1869:46), but without a word of description. The name is a *nomen nudum* in all three places. Hachisuka (1934:53) listed *megalotis* (though it is an older name) in the synonymy of *whiteheadi* with citation to Gray, 1844. In a footnote he described the type specimen and stated that it is apparently the "hepatic" (rufous) phase of *whiteheadi*. In the systematic notes published in conjunction with their handbook of Philippine birds, Delacour and Mayr (1945:107) stated: "It is very desirable that the type specimen and unique example of *megalotis* be re-examined in the British Museum. There is little doubt that the name must refer to one of the Philippine owls. However, it is highly unlikely that it refers to the mountain form *whiteheadi*, as maintained by Hachisuka. . . . The range of *whiteheadi* was inaccessible at the time (prior to 1840) at which *megalotis* was collected." As we remarked previously, however, Hachisuka had earlier listed a specimen of this owl collected at a low elevation. Rand (1950), in reviewing the Philippine races of *bakkamoena*, noted the desirability of having the type of *megalotis* compared, but he did not do so.

We wrote to Mr. Galbraith of the British Museum about Cuming's bird and quote from his reply of March 4, 1970, as follows: "We have the Cuming specimen, type of *Lempijuis megalotis* Walden 1875 (which we regard as the first valid publication of *Scops megalotis* Gray 1844) and also the type of *S. whiteheadi* Ogilvie-Grant 1895 and other specimens of *Otus bakkamoena* "*whiteheadi*." The former seems to be the red-phase juvenile of the latter, though it is by far the reddest we have."

Reference to Viscount Walden's report shows that he described and figured in color (!) the type of *megalotis*. Incidentally, he remarked that the specimen appears "fully adult," although G. R. Gray and, as just noted, Mr. Galbraith considered it immature. At any rate, it is presumably mature enough to show, along with other characteristics (such as the more fully feathered tarsi and larger size), that it is the same form as *whiteheadi* and not the much smaller *Otus scops*, a species that is also represented on Luzon.

One of the five skins of "*whiteheadi*" at hand is as rufous as Smit's painting of the type of *megalotis* in Walden's monograph. The pattern is somewhat different in that the bird on the plate has the body plumage with narrow blackish barring, whereas all of ours (including the rufous one mentioned) have prominent, if scattered, irregular, blackish, longitudinal markings; and there is (in all five) much irregular dusky mottling, rather than the quite regular barring as in the plate. Nevertheless, assuming that the bird in London was in fact collected on Luzon, there seems little doubt that it is the form later named *whiteheadi*. As Mr. Galbraith pointed out, the name *megalotis* should apparently be attributed to Walden, all the earlier uses of the name as far as known being without description. Walden's description is a few months earlier than that of Sharpe (1875), who also

described the type specimen; and it is 20 years earlier than Ogilvie-Grant's *whiteheadi*. Ogilvie-Grant did not mention *megalotis*. The correct name of this owl thus becomes *Otus bakkamoena megalotis* Walden.

In his more general account, Ogilvie-Grant (1895:440) stated that Whitehead secured a small series of both the gray and rufous phases. Our five skins do not suggest a very clear division into phases. They might be described as follows: one rufous, one tending to rufous, one gray, and two gray with some rufous and buffy tints. Even the two extremes, the one here called "rufous" and the one called "gray," are not as bright rufous or as clear gray as found, for example, in the two phases of the eastern North American Screech Owl, *Otus asio asio* (Linnaeus, 1758); in addition, all five are more finely mottled and vermiculated with dusky than is usual in the Screech Owl (with which *bakkamoena* is sometimes considered conspecific).

FAMILY **CAPRIMULGIDAE** NIGHTJARS

***Eurostopodus m. macrotis* (Vigors, 1831)**

1 ♂, May 1970, Nabaluto Mt., Bario Borak, Llorente, east Samar

First specimen from Samar. Rand and Rabor (1960:388) state they saw birds flying over densely forested areas but did not collect any specimens.

FAMILY **PARIDAE** TITMICE

***Parus elegans mindanensis* (Mearns, 1905)**

1 ♀, May 1970, San Rafael, Taft, east Samar

Delacour and Mayr (1946:218) stated that this bird is not found on Samar and Leyte. However, McGregor (1920:427) recorded specimens from this group. Parkes (1958:96) states that during his revision of this species he was unable to find any specimens in any collections. Our bird seems to be the only existing specimen from Samar. The well-worn specimen agrees with those from Mindanao, but better material may reveal differences.

FAMILY **TURDIDAE** THRUSHES

***Monticola solitarius philippensis* (Muller, 1776)**

1 ♀, May 1970, Bario Yusinca, Salcedo, south Samar

Not previously recorded from Samar.

***Zoothera cinerea* (Bourns and Worcester, 1894)**

3 ♂, 2 ♀, 1 imm. ♀, April–Nov. 1969, Dalton Pass, Nueva Vizcaya, Luzon
2 ♂, 2 imm. ♂, 5 ♀, 1 imm. ♀, Dec. 1969, Ipo Dam, Bulacan, Luzon

Delacour and Mayr (1946:185) call the Ashy Ground Thrush "rare, peculiar to the mountains of Mindoro." The species was lacking in the collection of the American Museum of Natural History until 1966 when four were received as a result of a joint venture on Mindoro with the Philippine National Museum (two of the four will be returned to that institution).

In their major paper on the birds of Mindoro, Ripley and Rabor (1958:11) list this thrush as one of four species of bird endemic to Mindoro. A few years later, however, in his list of the thrush family, Ripley (1964:146) included northern Luzon in the range of *cinerea*.

Ripley's inclusion of Luzon was probably based on a specimen in the Yale University Museum collected by Rabor on May 19, 1959, at Sablan, Mountain Province, Luzon, elevation "1700–3000 feet," weight of specimen 59.7 grams (data courtesy of Dr. C. G. Sibley). Careful comparison with the four recent skins from Mindoro mentioned above reveals no differences, though we were at first inclined to think the Luzon birds a little purer, less brownish, and gray dorsally. Wing lengths for the Mindoro birds are ♂ 110, 115, 116, ♀ 112; for the Luzon birds: 5 ♂ 107–116, 7 ♀ 109–115.

***Zoothera andromedae* (Temminck, 1826)**

1 ♂, 1 ♀, Dec. 1969, Ipo Dam, Bulacan, Luzon
1 imm. ♂, 2 imm. ♀, Dec. 1969, Ipo Dam, Bulacan, Luzon
1 imm. ♀, Oct. 1969, Dalton Pass, Nueva Vizcaya, Luzon

Our immature birds differ from the adults by having the chest speckled with black and washed with orange. The feathers of the head and back differ by having light shaft streaks that tend to be more orange than white. However, the ends of the feathers are tipped with black as in the adults.

In their paper on the birds of Mindoro (1958:67), Ripley and Rabor recorded one specimen of *andromedae* from that island and wrote:

"First record on Mindoro for this rare species. . . . This is the fourth recorded specimen from the Philippines, the others having been obtained on Mindanao. . . . We are not certain whether this species is a breeding resident or only a migrant in the Philippines from the Indonesian Islands."

Perhaps the fact that geographical variation seems not to occur, though this is a passerine forest bird, prompted their remark.

However, it is our opinion that this secretive ground bird nests on Luzon. When these birds are compared with ones from the East Indies, we see no evidence of geographical variation. Further, the immature Luzon birds, while old enough to fly, would scarcely be expected to have immigrated from Mindoro or elsewhere. A pattern of rather disjunct distribution and variation seems "normal" in several species of the genus, such as, for example, the preceding one, *Zoothera cinerea*.

This species has not previously been recorded from Luzon.

***Zoothera dauma aurea* (Holandre, 1825)**

1 ♀, Feb. 1970, Iwahig, Palawan

Not previously recorded from Palawan.

FAMILY **MUSCICAPIDAE** OLD WORLD FLYCATCHERS

***Muscicapa mugimaki* Temminck, 1835**

1 ♂, Dec. 1969, Ipo Dam, Bulacan, Luzon; wing 76
1 ♀, Nov. 1969, Dalton Pass, Nueva Vizcaya, Luzon; wing 72

This species breeds in Japan and adjacent Asia. Known from northern Borneo, its presence as a migrant or winter visitant in the Philippines was to be expected.

First recorded by Ripley and Rabor (1961:10), one from Mindanao, one from Negros, taken in late December.

***Muscicapa latirostris* Raffles, 1822**

This flycatcher nests over an enormous area from Japan westward across parts of eastern Asia and India. One would expect geographic variation, but there is not very much, perhaps because the northern segments of the species, at least, are migratory and may become mixed in their winter quarters. Further, it is a plainly marked little bird, and one whose plumage tends to become "foxed" (brown) with age in museum specimens. As a result, although various names were applied to it in the early days "purely from ignorance," most recent authorities have treated *latirostris* as monotypic, *e.g.*, Vaurie (1959) in his Palearctic list and Ripley (1961) in his synopsis of the birds of India. This should be qualified by saying that the form *segregata* of Sumba, in the Lesser Sunda Islands, is recognized by everybody, but is usually regarded as a species. Sumba lies beyond the normal migration range of *latirostris*, and the presence there of a representative of *latirostris* (though not on the many other seemingly suitable islands) can only be accepted as one of the not infrequent accidents of dispersal.

The extent, if any, to which *latirostris* breeds in southeastern tropical Asia remains uncertain. Its status there is obscured by late migrants. There has long been some evidence that *latirostris* does breed, perhaps only in mountains or foothills in such areas as Siam, Malaya (see Glenister), and India.

The only recent author to believe that *latirostris* does have a number of races, if fresh material can be amassed to work them out, is Deignan (1957, 1963). Deignan recognized three races: two migrants, *M. latirostris cinereoalba* Temminck and Schlegel (believed to breed in Japan) and *M. l. latirostris* Raffles (believed to breed in northern China, etc., though based on a migrant from Sumatra), and one resident form, *M. l. siamensis* Glydenstolpe, found in the mountains of northern Thailand and adjacent countries. Deignan thought there was an additional race or two in India.

In addition, Deignan (1957) described a new species, *Muscicapa williamsoni*, from Siam which was presumably resident in southeast Asia and the East Indies. This species differs from *M. latirostris* in its rufescent coloration but is apparently exactly the same in size; at any rate the describer gave no measurements.

With this preamble, we may now discuss the presence of *Muscicapa latirostris* in the Philippines. Its presence there was based on an old record or two, doubtful enough so that Delacour and Mayr (1946) were not sure if it occurs at all. However, several specimens collected in August, 1959, at Dalton Pass, Nueva Vizcaya, Luzon, were sent to the junior author. These

specimens, both males and females in fresh plumage, are all very similar and differ from all of a long series of *latirostris* in the collection of the American Museum as follows: (a) shorter wing—about 65 versus about 70; (b) rounder wing—second primary about as long as sixth or a bit shorter, versus as long as seventh; (c) throat streaked with grayish, not clear dull white; (d) grayish-brown wash on breast more extensive; (e) upper wing coverts edged with rufous brown.

We sent two specimens to Dr. A. L. Rand for an opinion. Rand kindly wrote us as follows: "The first of this species I've seen from the Philippines. Deignan, 1957, Ibis, p. 342, comments on a specimen from Negros in the British Museum as possibly representing a tropical race. Hachisuka, 1935-(4):288–9, lists two other localities from the Philippines, *viz.*, Bongao and the Sulus, ex Sharpe, but was unable to find specimens to match. From what I've seen, I'd say yours are the only modern specimens, and the second and the third definite records for the Philippines."

In the 1957 paper to which Rand referred us, Deignan wrote as follows: "In the Philippine Islands, a specimen of this flycatcher has been reported by Tweeddale from Valencia, Negros (Proc. Zool. Soc. London, 1878: 284–285). The bird had not been seen by Hachisuka, who with hesitation listed the species as Philippine, and occurrence of the species in the archipelago was considered somewhat doubtful by Delacour and Mayr. The skin in question (B. M. Reg. No. 87.12.30.517) is now in my hands; it is a subadult female, still bearing traces of the maculated juvenal dress, collected in August 1877, and doubtless representative of an undescribed tropical race. In wing formula (2nd primary equal to 7th) it agrees with *segregata* of Sumba, thus differing from all specimens of the populations discussed above, in which the 2nd primary falls between the 5th and 6th; on the other hand, it disagrees with *segregata* by having the tip of the mandible dark horny (immaturity?) rather than horny black or black, and in its rather browner tone above and below. Allowing for its immaturity, it matches well enough the two summer-taken birds from Malacca discussed above, differing from them mainly in its different wing formula, which may or may not have importance, and its paler mandible tip."

On the basis of our 10 specimens and the one from Negros in the British Museum described above by Deignan, it now seems virtually certain that there is a resident race of *Muscicapa latirostris* in the Philippines, at least on Luzon and Negros. We name it:

***Muscicapa latirostris randi* new subspecies**

Type DMNH 3438, ♂ Dalton Pass, Nueva Vizcaya, Luzon, P. I., 3500′, Aug. 1969. Wing 65; tail 50; bill width 6.5; bill length 10.5.

Diagnosis: Differs from the northern, migratory race(s) as well as from Indian populations of the species, as noted previously, by being shorter and rounder winged, with a narrower and slightly longer bill and with the throat obscurely streaked with gray, the breast more extensively gray, and the

Figure 1 • Top: Four specimens of *Muscicapa latirostris randi*, new subspecies, from Luzon. Bottom: Four specimens of *Muscicapa latirostris latirostris* from various points of the breeding and wintering range.

upper wing coverts edged buffy (possibly an age character). In most of these characters it differs from *segregata* and from the little-known and also rare resident representative (*siamensis*) of this species in the mountains of the Indo-Malayan countries (Thailand, etc.). *Muscicapa latirostris segregata* and *siamensis* have a broad bill like the northern populations. *M. l. segregata*, like *randi*, has a short, round wing but in color it is more like the other races (throat whitish, unstreaked, less gray on breast).

Remarks: The inordinate rarity of the Brown Flycatcher in the Philippines suggests that it might be a migrant, but from where? Formosa (Taiwan) would seem to be the only possibility, but it is believed to be only a migrant there (an infrequent one). The rounded wing suggests that *randi* is a resident form; and, as noted, the Negros specimen examined by Deignan is young, perhaps too young to have migrated. That *randi* might be a migrant to the Philippines from some unknown nesting area is thus no more than an outside possibility. *Muscicapa latirostris* seems to be rare as a resident in Indo-Malaya too. Both there and in the Philippines this might reflect pressure from similar wintering flycatchers. It would not be surprising if an occasional migrant Brown Flycatcher reached the Philippines (they are known from Borneo and Taiwan). The vague old records from Bongoa and the Sulus might refer to such migrants.

Now that the Brown Flycatcher is believed to be resident in small numbers in the Philippines and southeastern Asia, it seems reasonable to regard *segregata*, segregated though it is, as a race of *latirostris*, and indeed some have already done so.

It is perhaps pretentious for us to evaluate Deignan's *Muscicapa williamsoni*, having seen only a much-battered immature specimen from Sumatra that Deignan thought was "probably" his new species and another from the same locality which looks very much the same to us. Our guess is that *williamsoni* is not a species; probably it is a rufescent variant of some form of *latirostris*, possibly *siamensis*.

In conclusion, it may be repeated that the narrower bill and grayer breast of *M. l. randi* are obvious at a glance, though the bill difference is not adequately expressed by the measurements.

FAMILY **NECTARINIDAE** SUNBIRDS

***Arachnothera clarae luzonensis* Alcasid and Gonzales, 1968**

2 ♂, Dec. 1969, Diman, Balian, Pangil, Luzon

Our two birds of this recently described race agree with the original description and differ from the Mindanao and Negros birds.

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NUMBER 2 MAY 15, 1971

THE SUMMER BIRDS OF THE GILA VALLEY, NEW MEXICO

*John P. Hubbard**

INTRODUCTION

The Gila River is a small stream that originates in the highlands of southwestern New Mexico and flows through the lowlands of that state for some 55 river miles before entering Arizona. Its passage through the usually brown lowland plains and hills is traced by verdant gallery woodland and other riparian habitats (see Figure 1), which combine with more arid types to support a diverse and interesting avifauna. This paper describes the lowland portion of this valley and its habitats, briefly summarizes biological exploration there, and places on record the summer birdlife. The species in the breeding avifauna are discussed in greater detail, including classification by habitat usage, a biogeographical analysis, and a discussion of some recent changes.

Perennial streams such as the Gila River are rare in the Southwest, and little has been published about the birdlife of such valleys *per se*. One aspect of these streams that makes them nearly unique in the region is the fact that they support woodlands dominated by trees that are both broadleaved and winter deciduous. This contrasts markedly with most Southwestern arboreal habitats, which are typically dominated by conifers and/or evergreen angiosperms. Unfortunately, the already limited extent of these riparian and associated habitats has been made even smaller as the result of man's activities, and the biota of lowland river valleys is endangered or has been destroyed in many areas. Hopefully, this report will stimulate a greater appreciation and interest in this diverse assemblage of plants and animals and perhaps will help reverse its decline.

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I wish to thank the curators who allowed me to examine and cite material under their care. In addition, I would like to thank the New Mexico Game and Fish Department, the individual landowners of the

* Curator of New World Birds, Delaware Museum of Natural History.

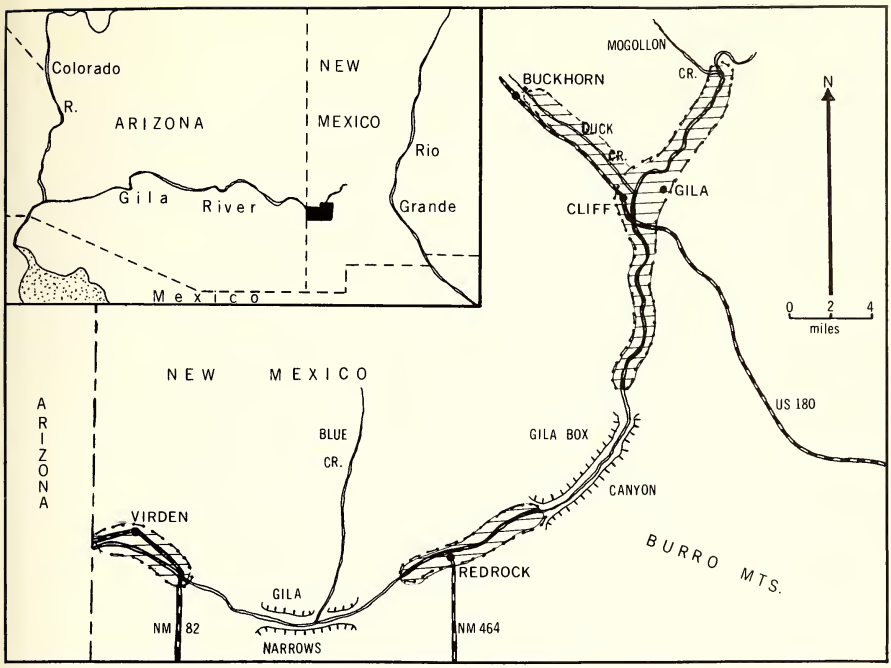
Figure 1: Aerial view of the Gila Valley, looking southward from the mouth of Mogollon Creek toward Cliff.

Gila Valley, and the following individuals, many of whom have contributed data to this study: D. Amadon, R. C. Banks, R. T. Dury, J. R. Fisher, R. A. Fisher, A. Ford, B. K. Harris, B. J. Hayward, G. Hightower, the late G. C. Hubbard, W. Huey, the D. McKnights, B. Ormond, Jr., K. F. Parker, K. C. Parkes, R. A. Paynter, A. R. Phillips, J. L. Sands, C. Tomoff, F. D. Trauber, L. L. Wolf, D. A. Zimmerman, and R. L. Zusi. I am very grateful to R. P. Balda, R. C. Banks, R. R. Johnston, G. Monson, R. J. Raitt, and H. M. Zeller for reading and commenting constructively on various drafts of this paper. The Sierra Club provided for an aerial survey of the Gila Valley in December 1967. Final thanks go to my wife Claudia.

ORNITHOLOGICAL HISTORY

The first naturalists to describe the Gila Valley in New Mexico were Lt. Col. W. H. Emory and Capt. A. R. Johnston (Emory, 1848), members of a U.S. Army party en route from Fort Leavenworth, Kansas to San Diego, California. Their party travelled westward from the Rio Grande Valley in southern New Mexico and struck the Gila River on 20 October 1846 at the mouth of Mangas Creek, south of the present town of Cliff. At that point they described the river and its vegetation much as these exist now in less-disturbed areas. Their ornithological observations are limited to the report of numerous "blue" or "California" quail (apparently *Lophortyx gambelii*) and signs of turkey.

The first collection of birds from the valley was made by H. W. Henshaw, who travelled along the river from the Arizona line to its headwaters in October and November 1873. The first collection of breeding birds was made in the valley in May and June of 1876 by Frank Stephens (erroneously spelled *Stevens* in the papers cited here); other observations on the breeding birdlife were obtained by R. W. Barrell in the summer of 1890 (Bailey, 1928).



Map 1: The Gila Valley in the southwestern United States (inset) and the study area in southwestern New Mexico (shaded sections).

After the turn of the century, the Gila Valley received the attention of the U.S. Biological Survey, but mainly outside the breeding season: F. M. and V. O. Bailey made collections of birds near Cliff in November 1906, and E. A. Goldman collected near Redrock and the town of Gila in September and October 1908 (Bailey, 1928). R. T. Kellogg, from 1912 through 1937, and J. S. Ligon, from the 1920's through the 1950's, both intermittently collected and recorded the birdlife of the area. Since the middle of this century the Gila Valley has received the increasing attention of ornithologists, many of whom have contributed to this study.

METHODS AND TERMINOLOGY

I engaged in at least limited field work in the Gila Valley in each year from 1957 through 1970, with the exception of 1962, 1966, and 1969. At least parts of 85 different days have been spent there, including 42 days in the main breeding season (May through August). The periods of most intensive work were from 1959 through spring 1962 and in the summer of 1968. Most intensively worked has been the Cliff area (65 dates), followed by the Redrock area (20 dates) and the Virden area (6 dates) (see Map 1). Field work included a complete aerial survey of the valley in December 1967. I have not worked in the Gila Narrows nor in the lower Gila Box Canyon because of the difficulty of access.

The study area is along the Gila River from the mouth of Mogollon

Creek in the north to the Arizona line in the south (Map 1). Habitats and their birdlife were studied from the river and flood plain to the crest of the valley slopes, including the cliffs which front the river near Mogollon Creek and between Cliff and Redrock. The emphasis of study of the birds was to determine what species were present, whether or not they were breeding locally, and what their abundance and frequency of occurrence were. Habitat usage, dates of arrival in spring (if migratory), and related aspects were also determined for breeding species. Abundance and frequency of occurrence are used here in the sense of Hubbard (1970), which is summarized as follows:

Scale of abundance (in order of increasing numbers): rare, uncommon, fairly common, common, abundant.

Frequency of occurrence (in order of increasing frequency): casual, occasional, irregular, regular.

Habitat usage by breeding birds is summarized in part by assignment to one of four categories. These categories are based on the degree of usage of riparian habitats in the breeding season, as determined by observations in the Gila Valley and its immediate vicinity. The categories are as follows (the abbreviations for these categories are used in the Annotated List of Species presented later in this paper):

Restricted riparian (RR)—occupying riparian habitats exclusively or nearly so in the breeding season.

Primary riparian (PR)—occupying primarily riparian habitats in the breeding season, but making varying use of adjacent nonriparian habitats.

Secondary riparian (SR)—occupying nonriparian habitats extensively in the breeding season, but making varying use of riparian habitats.

Nonriparian (NR)—occupying nonriparian habitats exclusively or nearly so in the breeding season, except for drinking and bathing.

Subspecific determinations are based on material examined and determined by me, with collections designated as follows (these abbreviations are used in the Annotated List of Species presented later):

CNH	Cincinnati Natural History Museum
MCZ	Museum of Comparative Zoology, Harvard University
MVZ	Museum of Vertebrate Zoology, University of California
PM	Peabody Museum, Yale University
SD	San Diego Natural History Museum
UA	University of Arizona
UM	University of Michigan, Museum of Zoology
US	National Museum of Natural History (United States)
WNM	Western New Mexico University

Plant names and ecological terms follow Castetter (1956), Kearney and Peebles (1960), and Little (1950). Map information is from the United States Geological Survey and the Forest Service.

DESCRIPTION OF THE VALLEY

The Gila River arises in the mountains of the Mogollon Plateau in southwestern New Mexico and flows (or flowed) westward through

southern Arizona to the Colorado River (see Map 1). The river emerges from the plateau at the mouth of Mogollon Creek (elevation 4700 feet) and flows southward for some 20 miles, then southwestward for 20 miles, and finally westward for 15 miles to enter Arizona (elevation 3700 feet). Over much distance the river traverses mainly rolling plains and low hills, but between Cliff and Redrock it penetrates the northwestern foothills of the Burro Mountains. For approximately 7 miles through this area the river has cut a narrow, steep-sided gorge, which is called the Gila Box Canyon. Between Redrock and Virden the river has cut a lesser canyon, which is called the Gila Narrows (F. D. Trauber, U.S. Geological Survey, pers. comm.).

Except for these two canyons, the valley of the Gila is a sunken trough varying from a few score to several hundred feet in depth, with slopes that vary from steep to gentle. On their floors the two canyons are 50 to 500 (occasionally 1000) feet wide, whereas elsewhere the valley is generally 500 to 2500 feet wide. Exceptionally wide areas are around Virden (5500 to 7000 feet), Cliff (4500 to 6000 feet), and Redrock (1500 to 4500 feet).

The river has been straightened and diked in agricultural areas, although elsewhere it has been allowed to meander. Its sandy or rocky channel is seldom more than 50 feet in width and 2 feet in depth, and it is usually only partly filled by the river. The channel banks are generally 3 feet high or less, except where the river has undercut the 8- to 12-foot-high retaining levees (e.g., near Cliff). There are several intermittent tributaries of the Gila in the study area, but only two need to be mentioned here: one is Mogollon Creek, about 7 miles northeast of Cliff, and the other is Duck Creek, which flows through Cliff (see Map 1). Mogollon Creek is notable because of its well-developed riparian woodland, especially stands of sycamores (*Platanus wrightii*). Duck Creek merges broadly with the Gila and has similar vegetation, and I include it within the study area.

In referring to the distribution of habitats and birds, I find designation of three general areas useful (see shaded sections of Map 1):

Virden area—western section of the study area, centered on the town of Virden; approximately 6 miles in length, extending from the Arizona line eastward.

Redrock area—central section of the study area, centered on the settlement of Redrock; 8 miles long, extending southward from the southern end of the Gila Box Canyon; includes Redrock Marsh.

Cliff area—northern section of the study area, centered on the town of Cliff; approximately 17 miles long, extending from the northern end of the Gila Box Canyon north to the mouth of Mogollon Creek; includes the towns of Gila and Buckhorn, as well as Buckhorn Marsh, Duck Creek, and Ormond's Pond. U.S. Highway 180 divides this area into northern and southern portions.

The defunct town of Carlisle, which was located 15 miles northeast of Redrock (Bailey, 1928), was apparently in or near the Gila Box Canyon.

DESCRIPTION OF HABITATS

Riparian habitats: These habitats appear to be dependent on the river for survival in the study area, and they are restricted to the valley floor.

Riparian shrubland. This habitat is dominated by the woody, evergreen shrub seepwillow (*Baccharis glutinosa*), which grows to heights of 6 to 8 feet and forms stands 5 to 50 or more feet in width (Figure 2). This habitat is the immediate associate of the river channel and is interposed between it and riparian woodland.

Riparian woodland. Beyond the riverside band of seepwillow on the mesic valley floor is riparian woodland (Figure 3), whose two constant and prominent members are Fremont cottonwood (*Populus fremontii*) and Goodding willow (*Salix gooddingii*). The cottonwoods grow to heights of 50 to 70 feet (Figure 4) and the willows reach 20 to 40 feet. Together they form an open (possibly because of grazing) to densely understoried woodland. Often associated with them is boxelder (*Acer negundo*), as well as a profusion of forbs, grasses, and some shrubs (e.g., *Amorpha fruticosa*). Other widespread tree species are Arizona walnut (*Juglans major*), netleaf hackberry (*Celtis reticulata*), desert-willow (*Chilopsis linearis*), and locally the Arizona sycamore (*Platanus wrightii*), all usually growing on sites peripheral to and more stable

Figure 2: The Gila River between Mogollon and Turkey Creeks, showing dense riparian shrubland dominated by seepwillow (left).

Figure 3: Riparian woodland in the Gila Valley, just below Mogollon Creek. Riparian shrubland visible along the river, with microphyll shrubland (slope mesquite type) in the foreground.

Figure 4: Fremont cottonwoods at the mouth of Mogollon Creek, with Goodding willow and seepwillow in the background.

than those of the cottonwood-willow association. Other scarcer trees and shrubs include Texas mulberry (*Morus microphylla*), squawberry (*Rhus trilobata*), and velvet ash (*Fraxinus velutina*), while generally rare are California buckthorn (*Rhamnus californica*), Arizona alder (*Alnus oblongifolia*), wavy willow (*Salix irrorata*), western soapberry (*Sapindus drummondii*), and the introduced Russian olive (*Eleagnus angustifolia*), honeylocust (*Gleditsia triacanthos*), and tamarisk (*Tamarix gallica*).

The extent of riparian woodland appears correlated, under natural conditions, with the width of the flood plain. Where the valley floor is narrow, the action of erosion, flooding, and channel shifting results in an unstable substrate, which apparently prevents trees from becoming established except in sheltered or otherwise stable sites. As a consequence, riparian woodland is absent or poorly developed in canyons; instead, riparian shrubland dominates (see Figure 2). On the broader valley floor, where the action of these forces is less detrimental and the substrate less disturbed, trees grow abundantly (see Figures 1 and 3) and riparian shrubland is usually confined to a narrow fringe along the river.

While the development of riparian woodland is favored on broad valley floors, these are also the areas selected by man for clearing and agricultural activity. As a result, woodland has been removed from all but limited portions of the broader floors, usually remaining only as a stabilizing strip a few hundred feet wide or less along the river (Figures 5 and 6). Additional areas occupied by cottonwoods and willows are irrigation ditch banks, where trees are planted to stabilize the substrate.

It is now difficult to judge how extensive riparian woodland was on broader valley floors in primeval times, but some of the older residents of the Cliff area claim that in the early days cottonwoods occurred there solidly from slope to slope. This would have constituted a woodland over 1 mile wide. At present the maximum width of riparian woodland rarely reaches 2000 feet in the valley (e.g., below the mouth of Mogollon Creek); at most, 30 per cent of the broader valley floors is occupied near Cliff (see Figure 5) and Redrock, and only 5 to 10 per cent near Virden. In spite of these drastic reductions, riparian woodland is still fairly extensive in the Gila Valley, particularly north of Cliff and between Cliff and Redrock.

The Fremont cottonwood-Goodding willow association occurs northward in the Gila Valley to about the mouth of Turkey Creek, which is several miles north of Mogollon Creek. The cottonwood, along with the Arizona walnut and Arizona sycamore, is characteristically a Sonoran species, which is limited in New Mexico to the southwestern portion of the state; and the Gila Valley is one of their major areas of occupancy.

Marshland. Whether natural marshes existed in the Gila Valley in earlier times is not known, but at present few if any exist that do not

Figure 5: Broad flood plain of the Gila Valley in the Cliff area, with riparian fields and woodland interspersed. Town of Gila is visible beyond.

Figure 6: Broad flood plain of the Gila Valley in the Cliff area, with riparian fields and tree-lined ditch banks in the foreground and riparian woodland in the background.

appear to result from man's activities. In primeval times, marshes may have formed around sloughs that became cut off from the river as the channel shifted, particularly if riparian woodland also shifted. At present, sloughs exist in several areas (Figure 7), but these are heavily shaded by riparian woodland and support little emergent vegetation. With continued felling of trees by beavers *(Castor canadensis)*, however, shade may disappear over some of these areas and marshes may develop.

The largest marshland in the valley now is Redrock Marsh, northeast of Redrock on the west side of the river. This marsh varies in extent from perhaps 2 to 10 acres, depending on winter and spring moisture conditions. It is formed by the impoundment of an arroyo to protect agricultural lands from runoff (W. Huey, N. M. Game and Fish Department, pers. comm.). In June 1967 the marsh was very small, but in June 1968 it was large and thriving, consisting predominantly of sedges (*Scirpus californicus, Eleocharis palustris*), with patches of cattails (*Typha* sp.) and a few thickets of tamarisk. Other smaller marshes are at Ormond's Pond, near Cliff (Figure 8), and Buckhorn Marsh, near Buckhorn (7 miles northwest of Cliff); both are dominated by cattails.

Riparian fields. In the Cliff, Redrock, and Virden areas, extensive areas of the valley floor have been cleared for irrigated agriculture (see Figures 5 and 6). Most of the fields are used for forage crops and pasture, but at Virden, especially, various row crops are raised and cotton farming has been carried out in past years. Grazing is not restricted to pastures but occurs to some extent in all habitats. Over-

Figure 7: Slough in the Cliff area, separated from the Gila River by an earthen dike. Trees killed by water and felled by beavers can be seen.

grazing has doubtlessly aided the spread of mesquite, yuccas, and cacti into grasslands; and it is probably also deterring reproduction of riparian woodland.

Semiriparian habitat: This habitat exists in two formations: a valley type, apparently dependent on the river, and a slope type, apparently independent of the river.

Microphyll shrubland. This widespread habitat type occurs northward to Turkey Creek (Figure 9) and is dominated by mesquite (*Prosopis juliflora*), often with catclaw (*Acacia greggii*), burrobush (*Hymenoclea monogyra*), soapweed (*Yucca elata*), and various cacti (*Opuntia* spp.). From the Gila Box Canyon southward, creosotebush (*Larrea divaricata*) also occurs commonly, and on some eroded slopes and gravel-covered flats it is the dominant shrubby species.

On the floor of the valley and in arroyo bottoms, microphyll shrubland is dominated by mesquites in the form of large shrubs and small trees (up to 15 feet) in a relatively dense growth which I call *valley mesquite* (Figure 9). On slopes and elsewhere beyond the valley floor the mesquites of microphyll shrubland form a more open habitat composed of low (5 feet or less) shrubby growth which I call *slope mesquite* (Figure 10). The distinction between these two types is reflected in avian habitat preferences, as well as in the structure and growth form of the shrubland.

Nonriparian habitats: These habitats are seemingly independent of the river for their survival in the study area. Although growing mainly on the slopes and beyond, one type (evergreen woodland) also occurs on the floor of the valley; unlike microphyll shrubland, its structure and growth form are not markedly different between the valley floor and the slopes.

Figure 8: Ormond's Pond, near Cliff, an artificial cattail marsh.

Evergreen woodland. This habitat type is dominated by live oaks (*Quercus emoryi, Q. grisea*) that occur as trees to 30 feet in height (Figure 11), often with such species as hackberry, walnut, sycamore, and juniper (*Juniperus* spp.). These woodlands are most prevalent from the Gila Box Canyon northward and occur mainly in the outer floor of narrower parts of the valley, in tributary canyons, and in arroyos on the slopes.

Figure 9: Microphyll shrubland (valley mesquite type) in the Gila Valley between Mogollon and Turkey Creeks. The large tree is a sycamore.

Figure 10: Microphyll shrubland (slope mesquite type) in the vicinity of Cliff. Prickly pear cactus is in the foreground.

Grassland. Over most of the level country, on many hills, and on gentle slopes of the valley, grass is the dominant vegetation, either in pure stands or often intermixed with various shrubby plants and forbs (Figure 12). The most important adventive plants in grassland are various cacti, soapweed, mesquite, catclaw, and various bushy composites.

Figure 11: Evergreen woodland dominated by oaks in the Gila Valley between Mogollon and Turkey Creeks. In the background are microphyll shrubland and riparian woodland.

Figure 12: Grassland in the vicinity of Cliff, with riparian woodland along Duck Creek in the background.

Evergreen shrubland. On steeper slopes from the Gila Box Canyon northward are shrublands consisting mainly of evergreen species, such as scrub oak (*Quercus turbinella*), squawbush, silk-tassel (*Garrya wrightii*), mountain-mahogany (*Cercocarpus* sp.), beargrass (*Nolina microcarpa*), datil (*Yucca baccata*), sotol (*Dasylirion wheeleri*), and others. This shrubland is often associated or mixed with evergreen woodland and microphyll shrubland elements, especially oaks, junipers, catclaw, mesquite, and cacti.

ANNOTATED LIST OF SPECIES

The following is a list of all species that have been recorded in the Gila Valley in June and the first half of July, plus those that have been found breeding at other times of the year. Breeding and probable breeding species are prefixed by an asterisk (*). The criteria for designating abundance and frequency of occurrence are discussed in the section on methods and terminology (see also Hubbard, 1970), where the reader will also find the key to the abbreviations. Habitats and localities are discussed in appropriate sections of this paper. Names of people in this list are those of observers and collectors of particular records. Taxonomy and sequence of species follow the A.O.U. Check-list (1957).

* **Pied-billed Grebe:** ***Podilymbus podiceps.*** (RR)—Casual in summer at Redrock Marsh, where a pair and an empty nest were found in June 1968.

* **Great Blue Heron:** ***Ardea herodias.*** (RR)—Regular resident throughout the valley; uncommon to fairly common, breeding in riparian woodland and feeding mainly along the river. Nesting colonies are known in the Cliff and Redrock areas.

* **Green Heron:** ***Butorides virescens.*** (RR)—Occasional resident; rare along the river and in adjacent shrubland and riparian woodland. Summer occurrences are of an adult at a nest near Cliff in 1959 (D. A. Zimmerman) and an adult at Redrock Marsh on 27 June 1968.

Common Egret: ***Casmerodius albus.*** Casual in summer at Redrock Marsh, where two adults were seen on 17 July 1962 (J. L. Sands); these were probably migrants.

* **Black-crowned Night Heron:** ***Nycticorax nycticorax.*** (RR)—Casual in summer at Buckhorn Marsh, where an immature was seen on 22 and 25 June 1968; the bird, which was molting and not able to fly well, was presumably hatched locally.

Least Bittern: ***Ixobrychus exilis.*** Casual in summer at Redrock Marsh, where a female was seen on 27 June 1968; probably a vagrant, but this species may be a rare summer resident in the area.

Black-bellied Tree Duck: ***Dendrocygna autumnalis.*** Casual at Redrock Marsh, where two adults were seen on 27 June 1968; earlier in 1968, three ducks were flushed from trees at their marsh (G. Hightower), and these may have been this species.

* **Mallard:** ***Anas platyrhynchos.*** (RR)—Irregular to regular resident in the Cliff area; rare to uncommon and local in summer near water. Occurs in summer and may also breed south to Redrock Marsh, but this requires confirmation.

* **Mexican Duck:** ***Anas diazi.*** (RR)—Occasional to irregular in summer at Redrock Marsh, where definitely recorded in 1965 (B. K. Harris), 1967, and 1968. A brood of this or the species just mentioned was seen there in June 1968 (G. Hightower). Johnsgard (1961) maps a "breeding" specimen near Virden but gives no other details concerning the record.

Gadwall: ***Anas strepera.*** Casual in summer at Redrock Marsh, where a female was seen on 27 June 1968.

Green-winged Teal: ***Anas carolinensis.*** Casual in summer at Redrock Marsh, where a male was seen on 14 June 1968.

* **Blue-winged Teal:** ***Anas discors.*** (RR)—Casual in summer at Redrock Marsh, where a pair was present and a nest was found in 1968. The nest contained nine eggs which hatched successfully; identification was made by personnel of the New Mexico Game and Fish Department (G. Hightower).

* **Cinnamon Teal:** ***Anas cyanoptera.*** (RR)—Occasional in summer at Redrock Marsh, where two to five pairs were seen in 1967 and 1968.

American Widgeon: ***Anas americana.*** Casual in summer at Redrock Marsh, where a male was seen on 27 June 1968.

* **Common Merganser:** ***Mergus merganser.*** (RR)—Irregular resident in the Cliff area (south to the Gila Box Canyon); rare to uncommon and local in summer in the river and its immediate vicinity, especially where there are cliffs.

Ruddy Duck: ***Oxyura jamaicensis.*** Casual in summer at Redrock Marsh, where a male was seen on 14 June 1968.

* **Turkey Vulture:** ***Cathartes aura.*** (SR)—Regular in summer throughout the valley; fairly common over all habitats. Early dates: 15 March 1959 (Redrock); 12 March 1960 and 25 March 1961 (Cliff).

Sharp-shinned Hawk: ***Accipiter striatus.*** Occasional in summer near Mogollon Creek, where one was seen several times in June and July 1969 (D. A. Zimmerman); possibly breeds.

* **Cooper's Hawk:** ***Accipiter cooperii.*** (PR)—Irregular to regular resident in the Cliff and Redrock areas; rare to uncommon and local in the summer in riparian woodland and adjacent habitats.

* **Red-tailed Hawk:** ***Buteo jamaicensis.*** (SR)—Regular resident throughout the valley; rare to uncommon and local in summer over most habitats, breeding on cliffs and in trees.

* **Swainson's Hawk:** ***Buteo swainsoni.*** (SR)—Regular summer resident throughout the valley; rare to fairly common in riparian woodland and open habitats. Rarely seen in concentrations when migrating, although 10 to 12 circled over Gila on 2 September 1959. Early dates: 9 April 1960 and 22 April 1961 (Cliff).

* **Zone-tailed Hawk:** ***Buteo albonotatus.*** (PR)—Occasional in summer through the valley; rare in riparian woodland and adjacent habitats. A nest with eggs was found and an adult collected in the Virden area on 28 May 1876 (SD). Casual in winter near Redrock, where three adults were seen on 13 February 1960; two of these seemed to be engaged in a courtship flight, which consisted of the locking of feet and tumbling earthward to release just above the ground. Early date: 9 April 1959 (Silver City).

* **Gray Hawk:** ***Buteo nitidus.*** (RR?)—Casual near Cliff, where an adult and an immature were reported on 24 July 1953 (Ligon, 1961). The only other state records are of two sets of eggs taken at Fort Bayard, 50 miles east of the Gila Valley, by Frank Stephens in 1876 (Bailey, 1928); one set of eggs is at the American Museum of Natural History and its identity has been verified by Dean Amadon *(in litt.).*

* **Black Hawk:** ***Buteogallus anthracinus.*** (RR)—Regular summer resident in the Cliff and Redrock (formerly?) areas; rare to uncommon and local in riparian woodland. In addition, an adult was seen at a nest near Virden on 23 June 1968, and the species may summer there. Early dates: 19 March 1960 (Redrock) and 22 March 1964 (Redrock—B. K. Harris).

* **Golden Eagle:** ***Aquila chrysaetos.*** (NR)—Regular resident in the Cliff and Redrock areas; rare to uncommon and local in open habitats, nesting on cliffs.

Peregrine Falcon: ***Falco peregrinus.*** Casual in summer at Redrock Marsh, where an adult was seen on 25 July 1964.

* **Sparrow Hawk:** ***Falco sparverius sparverius.*** (SR)—Regular resident throughout the valley; uncommon to common in riparian woodland and adjacent habitats.

* **Scaled Quail:** ***Callipepla squamata pallida.*** (NR)—Occasional resident in the Redrock area; rare to uncommon in grassland and grassy shrubland.

* **Gambel's Quail:** ***Lophortyx gambelii gambelii.*** (SR)—Regular resident throughout the valley; uncommon to common in microphyll shrubland and other open habitats.

* **Harlequin Quail:** ***Cyrtonyx montezumae mearnsi.*** (NR)—Occasional resident in the Cliff area; rare to uncommon in evergreen shrubland/woodland and adjacent habitats. Records include two molting juveniles taken on 26 October 1873 by H. W. Henshaw (US) and a male taken on 6 March 1933 by A. Brooks (MVZ).

* **Ring-necked Pheasant:** ***Phasianus colchicus.*** (RR)—Introduced resident in the Cliff and Redrock areas; rare to fairly common in riparian fields and adjacent habitats. The species seems to maintain itself in the wild, but it is restricted in its ability to use native habitats. A white-winged form *(P. c. bianchii)* has been introduced in recent years.

Chukar: ***Alectoris chukar.*** Unsuccessful introduction in Gila Valley.

Black Francolin: ***Francolinus francolinus.*** Unsuccessful introduction in the Gila Valley.

*** Sora:** ***Porzana carolina.*** (RR) —Occasional in summer in Redrock Marsh and casual near Cliff, where one was heard on 18 June 1968; rare in marshland and adjacent habitats.

*** American Coot:** ***Fulica americana.*** (RR) —Occasional to irregular summer resident in the Cliff area (Buckhorn Marsh, Ormond's Pond) and at Redrock Marsh; rare to common in marshland.

Common Gallinule: ***Gallinula chloropus.*** Occasional in summer at Buckhorn Marsh, where one or two were seen in 1970 (R. A. Fisher).

*** Killdeer:** ***Charadrius vociferus vociferus.*** (PR) —Regular resident throughout the valley; rare to common in open habitats near water.

*** Spotted Sandpiper:** ***Actitis macularia.*** (RR) —Occasional to irregular summer resident in the Cliff area (south to the Gila Box Canyon); rare to uncommon along the river. A pair and three grown young were seen near Gila on 26 July 1959. Early dates: 4 April 1959, 12 March 1960, and 24 March 1961 (Cliff); occasional in winter.

*** Band-tailed Pigeon:** ***Columba fasciata fasciata.*** (NR) —Occasional to irregular summer resident in the Cliff area (south to the Gila Box Canyon); rare to common in evergreen woodland and adjacent habitats. Reported nesting in live oaks near Cliff by Bailey (1928). Early dates: 19 April 1959 and 4 March 1960 (Silver City area).

*** White-winged Dove:** ***Zenaida asiatica mearnsi.*** (PR) —Regular resident in the Redrock and Virden areas, irregularly north to the southern Cliff area; rare to fairly common in valley mesquite, riparian woodland, and adjacent habitats. Early dates: 15 May 1959 (Silver City) and 21 May 1960 (Cliff).

This species seems to vary in abundance and, perhaps, areas of occurrence from year to year. Its early status in the Gila Valley is not clear, but occupancy of the area may be relatively recent (Phillips, 1968).

*** Mourning Dove:** ***Zenaidura macroura.*** (SR) —Regular resident throughout the valley; fairly common to common in wooded and shrubby habitats. Eggs laid from early April to early October (C. Hill).

Ground Dove: ***Columbigallina passerina pallescens.*** There are several sight records from the Gila Valley and a specimen was taken at Redrock on 30 December 1928 (R. T. Kellogg, CNH), but no evidence of breeding has been obtained. A report of one at Redrock on 25 July 1964 (McKnight and Niles, 1964) is erroneous and refers to two seen near Rodeo, Hidalgo County, May 1964.

*** Inca Dove:** ***Scardafella inca.*** (NR) —Regular resident near Virden, where first recorded in 1947 (Ligon, 1961); rare to uncommon near habitations. Casual near Redrock, where a specimen was taken on 17 June 1926 (J. S. Ligon, PM).

*** Yellow-billed Cuckoo:** ***Coccyzus americanus.*** (RR) —Regular summer resident in the Cliff and Redrock areas; rare to uncommon in ripar-

ian woodland. Early dates: 4 June 1958 (Silver City area); 4 June 1967 and 12 June 1968 (Redrock).

* **Roadrunner:** ***Geococcyx californianus.*** (NR)—Irregular to regular resident throughout the valley; rare to uncommon in microphyll shrubland and other shrubby habitats.

* **Barn Owl:** ***Tyto alba pratincola.*** (SR)—Occasional to irregular resident in the Cliff and Redrock areas; rare to uncommon in riparian woodlands and adjacent habitats. This owl is probably overlooked to some degree and can be expected to occur in the Virden area as well.

* **Screech Owl:** ***Otus asio cinerascens.*** (PR)—Irregular to regular resident in the Cliff and Redrock areas (casual near Virden, June 1968); rare to uncommon in riparian and evergreen woodland.

* **Great Horned Owl:** ***Bubo virginianus pallescens.*** (SR)—Regular resident in the Cliff and Redrock areas (occasional near Virden); rare to uncommon in wooded habitats.

* **Elf Owl:** ***Micrathene whitneyi whitneyi.*** (PR)—Regular summer resident in the Cliff and Redrock areas; uncommon to common in riparian woodland (particularly sycamores) and locally in adjacent oak woodland. Early dates: 1 April 1960 (Redrock) and 3 April 1961 (Silver City area).

* **Poor-will:** ***Phalaenoptilus nuttallii nuttallii.*** (NR)—Irregular to to regular summer resident throughout the valley; uncommon in semiopen, nonriparian habitats. Early dates: 25 April 1958 and 22 April 1959 (Silver City area); 1 April 1960 (Redrock); 22 April 1961 (Cliff).

* **Common Nighthawk:** ***Chordeiles minor henryi.*** (NR)—Irregular in summer in the Cliff area and occasionally near Redrock; uncommon over all habitats, probably breeding in evergreen shrubland/woodland. Early dates: 13 May 1959 and 27 May 1961 (Silver City).

* **Lesser Nighthawk:** ***Chordeiles acutipennis texensis.*** (NR)—Regular summer resident in the Redrock and Virden areas, irregular in the southern Cliff area; rare to common over all habitats, probably breeding in microphyll shrubland. Casual at Mogollon Creek, where one was seen on 23 April 1960.

Black Swift: ***Cypseloides niger borealis.*** Occasional in the southern Cliff area, where recorded on 31 May 1967 (UA, US), and in early June of 1967 and 1969 (D. A. Zimmerman). These appear to have been migrants.

* **White-throated Swift:** ***Aeronautes saxatalis.*** (NR)—Irregular summer resident in the Cliff area (south to the Gila Box Canyon), occasionally near Redrock; rare to uncommon over all habitats, probably breeding in nearby cliffs. Early dates: 17 April 1958 and 14 March 1959 (Silver City area); 13 February 1960 (Redrock); 25 March 1961 (Cliff).

* **Black-chinned Hummingbird:** ***Archilochus alexandri.*** (PR)—Irregular to regular summer resident in the Cliff and Redrock areas, and probably near Virden; rare to uncommon and local in valley mes-

quite, riparian woodland, and adjacent habitats. Early date: 23 April 1960 (Cliff).

* **Costa's Hummingbird:** ***Calypte costae.*** (NR?) —Casual near Cliff, where a male was seen at a nest in May 1876, by F. Stephens (Bendire, 1895). This record seems satisfactory on the basis of the distinctiveness of the male of this species and Stephens' field ability. He took a male Black-chinned Hummingbird in the area on 7 June 1876 (SD), which indicates that he would have been aware of that species' presence.

Broad-tailed Hummingbird: ***Selasphorus platycercus.*** Occasional to irregular in summer in the Cliff and Redrock areas; rare to uncommon. These are presumably migrants rather than breeders.

* **Red-shafted Flicker:** ***Colaptes auratus collaris.*** (PR) —Irregular to regular resident in the Cliff and Redrock areas, occasional near Virden; rare to uncommon in summer in riparian woodland.

* **Gila Woodpecker:** ***Centurus uropygialis uropygialis.*** (RR) —Regular resident throughout the valley, more local in the northern Cliff area (north to Mogollon Creek); rare to fairly common in riparian woodland.

This species was not recorded in the Gila Valley until 1908 (US), which suggests a recent occupancy of the area.

* **Acorn Woodpecker:** ***Melanerpes formicivorus formicivorus.*** (SR) —Irregular resident in the Cliff area (south to the Gila Box Canyon); rare to uncommon and local in riparian and oak woodlands.

* **Hairy Woodpecker:** ***Dendrocopos villosus leucothorectis.*** (RR) — Occasional to irregular resident in the Cliff area; rare and local in riparian woodland. A female (UM), taken on 29 April 1964 at Mogollon Creek, had an egg in her oviduct.

* **Ladder-backed Woodpecker:** ***Dendrocopos scalaris cactophilus.*** —Regular resident throughout the valley; uncommon to fairly common in wooded and shrubby habitats.

* **Western Kingbird:** ***Tyrannus verticalis.*** (SR) —Regular summer resident throughout the valley; fairly common to common in wooded and shrubby habitats. Early dates: 4 April 1959 (Cliff), 2 April 1960 (Redrock), and 13 April 1961 (Silver City).

* **Cassin's Kingbird:** ***Tyrannus vociferans.*** (SR)—Regular summer resident in the Cliff and Redrock areas, and locally near Virden; rare to common in wooded habitats. Early dates: 29 April 1958 and 17 April 1961 (Silver City area); 18 April 1959 (Cliff); 2 April 1960 (Redrock).

* **Wied's Crested Flycatcher:** ***Myiarchus tyrannulus magister.*** (RR)— Irregular to regular summer resident throughout the valley; rare to fairly common and generally local in riparian woodland. Numbers seem to vary from year to year and the species may be absent from some areas at intervals.

For many years the only record from the valley was of a specimen taken on 12 June 1876 by F. Stephens (SD), but the species may have

generally been overlooked in subsequent years, especially in view of annual fluctuations in numbers.

* **Ash-throated Flycatcher:** ***Myiarchus cinerascens cinerascens.*** (SR) — Irregular to regular summer resident throughout the valley; rare to common in wooded and shrubby habitats. Early dates: 26 April 1958 and 22 April 1961 (Silver City area); 4 April 1959 and 9 April 1960 (Cliff).

* **Black Phoebe:** ***Sayornis nigricans semiatra.*** (RR) —Irregular to regular resident throughout the valley; uncommon to common, mainly near water, and breeding on bridges, banks, and cliffs.

* **Say's Phoebe:** ***Sayornis saya saya.*** (NR) —Irregular to regular resident throughout the valley; rare to uncommon in open, nonriparian habitats, breeding on buildings and other structures. Less numerous and more local in winter.

* **Traill's Flycatcher:** ***Empidonax traillii brewsteri.*** (RR) —Irregular to regular summer resident in the Cliff and Redrock areas (occasional near Virden); rare to fairly common in riparian woodland, especially willows near standing water. Early dates: 6 May 1960 and 1961 (Cliff).

Western Flycatcher: ***Empidonax difficilis.*** Occasional to irregular in June in the valley as a rare to uncommon migrant.

* **Western Wood Pewee:** ***Contopus sordidulus veliei.*** (PR) —Regular summer resident throughout the valley; uncommon to common in riparian woodland and adjacent habitats. Early dates: 1 May 1958, 7 May 1959, and 3 May 1961 (Silver City area); 30 April 1960 (Cliff).

Olive-sided Flycatcher: ***Contopus borealis.*** Occasional in June in the Cliff and Redrock areas, as a rare to uncommon late spring migrant.

* **Vermilion Flycatcher:** ***Pyrocephalus rubinus flammeus.*** (PR) — Regular summer resident throughout the valley; uncommon to fairly common in riparian woodland and adjacent habitats, generally near water. Occasional and rare in winter, mainly in the form of single immature males. Early dates: 8 March 1959 (Redrock); 21 March 1960 and 24 March 1961 (Cliff).

* **Horned Lark:** ***Eremophila alpestris occidentalis.*** (NR) —Irregular resident in the Cliff area; rare to fairly common in summer in grassland.

Violet-green Swallow: ***Tachycineta thalassina lepida.*** Occasional in summer in the Cliff area, where recorded in 1968 and in 1969 (D. A. Zimmerman); possibly breeds in the study area.

* **Tree Swallow:** ***Iridoprocne bicolor.*** (RR) —Casual in summer near Cliff, where a nesting pair was found in June 1968. The nest was in a willow at Ormond's Pond and contained six eggs when photographed on 27 June. Early dates: 18 April 1959, 19 March 1960, and 24 March 1961 (Cliff).

* **Rough-winged Swallow:** ***Stelgidopteryx ruficollis.*** (PR) —Irregular to regular summer resident throughout the valley; uncommon to common along the river and adjacent habitats, breeding in holes in the banks. Early dates: 21 March 1959, 12 March 1960, and 24 March 1961

(Cliff); 8 March 1964 and 21 March 1965 (Cliff—B. K. Harris).

Specimens (US) appear to be intergrades between *S. r. serripennis* and the weakly characterized *S. r. psammochrous.*

*** Barn Swallow:** ***Hirundo rustica erythrogaster.*** (SR)—In 1968 occurred as a local summer resident in the Cliff and Virden areas (casual at Redrock); uncommon to fairly common, breeding on bridges, on habitations, and in road culverts. Absence of summer records in other years may be due to sampling error rather than the absence of this species as a breeding bird. Early dates: 2 April 1960 (Redrock) and 24 March 1961 (Cliff).

*** Cliff Swallow:** ***Hirundo pyrrhonota.*** (SR)—Irregular to regular summer resident throughout the valley; uncommon to fairly common and local, breeding on bridges and cliffs. Early dates: 8 March 1959 (Redrock), 27 April 1960 (near Silver City), and 24 March 1961 (Cliff).

Forehead color in summer birds from the general area varies from whitish to chestnut, suggesting an intergrade area between *H. p. tachina* and *H. p. melanogaster* (UM).

*** Scrub Jay:** ***Aphelocoma coerulescens woodhousei.*** (NR)—Occasional to irregular resident in the Cliff and Redrock areas; rare to uncommon and local in summer in evergreen woodland/shrubland. Reported breeding at Carlisle in the summer of 1890 (Bailey, 1928).

*** Mexican Jay:** ***Aphelocoma ultramarina arizonae.*** (SR)—Regular resident in the Cliff area (south to the Gila Box Canyon); uncommon to fairly common and local in evergreen and adjacent riparian woodland.

*** Common Raven:** ***Corvus corax.*** (SR)—Regular resident throughout the valley; rare to fairly common in and over all habitats. A nest in riparian woodland near Cliff contained large young on 27 June 1968.

*** White-necked Raven:** ***Corvus cryptoleucus.*** (NR)—Irregular to regular resident in the Cliff and Redrock areas; rare to uncommon and local in summer in grassland. Outside the breeding season it invades other habitats, including riparian fields, sometimes in large numbers.

*** Common Crow:** ***Corvus brachyrhynchos hesperis.*** (PR)—Occasional in summer in the Cliff area, where a presumed pair and three large young were present at Mogollon Creek in June 1968 (US). In 1969 one or more crows summered between Cliff and Redrock (D. A. Zimmerman).

The specimen is an adult male with worn wings which, even if intact, would not exceed 305 mm.; thus the specimen is referred to *C. b. hesperis* rather than the larger *C. b. hargravei,* described by Phillips (1942).

*** Plain Titmouse:** ***Parus inornatus plumbescens.*** (NR)—Casual in the Cliff area (Mogollon Creek), where a juvenile was collected from a family group on 20 June 1968 (US).

*** Bridled Titmouse:** ***Parus wollweberi phillipsi.*** (SR)—Regular resident in the Cliff area (south to the Gila Box Canyon); rare to uncom-

mon and local in riparian and evergreen woodlands.

* **Verdin:** ***Auriparus flaviceps ornatus.*** (NR)—Regular resident in the Redrock and Virden areas, and northward irregularly to the southern Cliff area; uncommon to fairly common in valley mesquite and adjacent habitats.

* **Common Bushtit:** ***Psaltriparus minimus plumbeus.*** (NR)—Occasional resident in the Cliff area (casually to Redrock); rare to uncommon and local in evergreen woodland/shrubland.

* **White-breasted Nuthatch:** ***Sitta carolinensis nelsoni.*** (RR)—Irregular to regular resident in the Cliff and Redrock areas; uncommon in riparian woodland.

* **Bewick's Wren:** ***Thryomanes bewickii eremophilus.*** (SR)—Regular resident throughout the valley; fairly common to common in riparian and evergreen woodlands.

* **Cactus Wren:** ***Campylorhynchus brunneicapillus couesi.*** (NR)—Irregular to regular resident throughout the valley; uncommon to fairly common and local in microphyll shrubland and other habitats containing cacti.

* **Canyon Wren:** ***Catherpes mexicanus conspersus.*** (NR)—Occasional to irregular resident in the Cliff and Redrock areas; rare to uncommon and local on cliffs.

* **Rock Wren:** ***Salpinctes obsoletus obsoletus.*** (NR)—Occasional to irregular resident throughout the valley; rare to uncommon in rocky areas and cliffs.

* **Mockingbird:** ***Mimus polyglottos leucopterus.*** (NR)—Regular summer resident (occasional resident) throughout the valley; uncommon to fairly common in shrubby nonriparian habitats. Early dates: 21 March 1959 and 19 March 1960 (Cliff area).

* **Bendire's Thrasher:** ***Toxostoma bendirei.*** (NR)—Occasional summer resident near Cliff: a brooding female was taken near Gila on 9 April 1960 (WNM) and three pairs summered near Cliff in 1969, with a fledgling collected on 18 June (D. A. Zimmerman). This species may be overlooked in the study area because of confusion with other species and because of its shyness.

* **Curve-billed Thrasher:** ***Toxostoma curvirostre celsum.*** (NR)—Regular resident in the Cliff and Redrock areas; rare to fairly common in microphyll shrubland and other habitats containing cholla cacti.

* **Crissal Thrasher:** ***Toxostoma crissale crissale.*** (SR)—Occasional to irregular resident in the Redrock and Virden areas; rare to uncommon and local in dense microphyll and adjacent shrublands. This shy, easily overlooked species may be more widespread and numerous than present data indicate.

* **American Robin:** ***Turdus migratorius propinquus.*** (RR)—Irregular to regular resident in the Cliff and Redrock areas; rare to uncommon and local in summer in riparian woodland.

Blue-gray Gnatcatcher: ***Polioptila caerulea amoenissima.*** Casual near Redrock, where a very worn adult female was taken on 24 July 1964 (UM). *P. melanura* would also be expected to occur in summer in the Gila Valley, but the only record is of two seen at Redrock on 3 February 1962 (D. A. Zimmerman).

*** Phainopepla:** ***Phainopepla nitens lepida.*** (SR)—Occasional to irregular resident throughout the valley, but variable as to numbers and areas of occurrence; rare to common in valley mesquite, riparian and evergreen woodlands. In June 1968 it was common at Virden, where old nests and fledglings were seen; a grown young was also taken near Cliff on 9 June 1968 (US).

*** Loggerhead Shrike:** ***Lanius ludovicianus sonoriensis.*** (NR)—Regular resident throughout the valley; rare to uncommon in shrubby grassland and other open, nonriparian habitats.

*** Common Starling:** ***Sturnus vulgaris vulgaris.*** (RR)—Regular resident throughout the valley; uncommon to common and generally local in summer in riparian woodlands and fields. First recorded breeding in May 1960 near Cliff, and by 1968 definitely bred at Redrock and Virden as well. In the decade since 1960 it has increased notably as a summer bird. Possible adverse effects may occur to such native species as Elf Owls, Gila Woodpeckers, and Wied's Crested Flycatcher as competition develops with Starlings for nest holes.

*** Bell's Vireo:** ***Vireo bellii arizonae.*** (PR)—Irregular to regular summer resident in the Redrock area and occasional in the Cliff (north to Mogollon Creek) and Virden areas; rare to uncommon in riparian woodland and valley mesquite. Early date: 2 April 1960 (Redrock).

*** Gray Vireo:** ***Vireo vicinior.*** (NR)—Formerly a local and rare summer resident; uncommon. A specimen was taken near Redrock by F. Stephens in June 1876 (SD). Reported breeding at Carlisle in summer 1890 (Bailey, 1928). Now only an occasional migrant in the Gila Valley and vicinity. Early dates: 6 May 1933 (Redrock—A. Brooks, MVZ); 9 May 1960 and 7 May 1961 (Silver City area).

This vireo seems to have been a regular breeder in the past near Silver City and perhaps elsewhere in southwestern New Mexico, but it has seemingly declined in numbers and is rare in the area and very local.

Solitary Vireo: ***Vireo solitarius.*** Occasional in summer in the Cliff area, where recorded in 1968 and in 1969 (D. A. Zimmerman); possibly breeds in the area.

Warbling Vireo: ***Vireo gilvus.*** Occasional and uncommon in June in the Cliff and Redrock areas, presumably as a late migrant.

*** Lucy's Warbler:** ***Vermivora luciae.*** (PR)—Regular summer resident throughout the valley; uncommon to common in riparian woodland/shrubland and valley mesquite. Early dates: 4 April 1959 and 24 March 1961 (Cliff); 2 April 1960 (Redrock); 28 March 1965 (Redrock—B. K. Harris).

In spite of the previous work of Stephens, Barrell, and others, this species was not recorded in the Gila Valley until 4 May 1928, when J. S. Ligon found it nesting at Redrock (Bailey, 1928). In the nearby San Francisco Valley the first records are those of H. H. Kimball, who took three specimens in April 1927 (UM), probably near Alma. These data suggest a rather recent occupancy of these valleys by this species. Occupancy of the Rio Grande Valley in New Mexico occurred by 1939–1942; the earliest record, a specimen taken at Las Cruces on 28 August 1920 (MCZ), probably represents a vagrant.

* **Yellow Warbler:** ***Dendroica petechia sonorana.*** (RR)—Regular summer resident throughout the valley; fairly common to common in riparian woodland. Early dates: 14 April 1933 (Cliff—R. T. Kellogg, CNH); 18 April 1959 and 22 April 1961 (Cliff); 2 April 1960 (Redrock).

Two breeding specimens taken in June 1968 (US) are closest to this race, but an approach is shown toward *D. p. morcomi* in their being somewhat deeper yellow and heavier streaked than Arizona *D. p. sonorana.*

Audubon's Warbler: ***Dendroica coronata auduboni.*** Occasional in early June in the Cliff and Redrock areas, as a rare to uncommon migrant.

* **Yellowthroat:** ***Geothlypis trichas.*** (RR)—Irregular to regular summer resident throughout; rare to uncommon and local in marshland, riparian shrubland, and riparian fields. Casual in winter near Cliff, where one was seen in November 1960 and on 21 January 1961. Early dates: 4 April 1959 and 22 April 1961 (Cliff); 2 April 1960 (Redrock).

Wilson's Warbler: ***Wilsonia pusilla.*** Occasional in June in the Cliff and Redrock areas, as a rare to uncommon migrant.

* **Yellow-breasted Chat:** ***Icteria virens auricollis.*** (PR)—Regular summer resident throughout the valley; fairly common to common in riparian shrubland and adjacent valley mesquite. Early dates: 8 May 1959 (Silver City) and 30 April 1960 (Cliff).

* **House Sparrow:** ***Passer domesticus domesticus.*** (SR)—Regular resident throughout the valley; uncommon and local; mainly nests near habitations but also constructs its globular nest in native habitats.

* **Eastern Meadowlark:** ***Sturnella magna lilianae.*** (SR)—Occasional to irregular summer resident (resident?) in the Cliff and Redrock areas; rare to uncommon and local in grassland. Also bred in a riparian field near Cliff in June 1969 (D. A. Zimmerman).

* **Western Meadowlark:** ***Sturnella neglecta neglecta.*** (PR)—Regular resident in the Cliff area and occasionally near Redrock; rare to fairly common in riparian fields. Also bred in grassland near Gila in June 1968 (US).

Yellow-headed Blackbird: ***Xanthocephalus xanthocephalus.*** Two summer records: two males near Redrock on 17 July 1959; three males and two females at Redrock Marsh on 27 June 1968. These were presumably early postbreeding migrants.

*** Red-winged Blackbird:** ***Agelaius phoeniceus fortis.*** (RR)—Irregular to regular resident throughout the valley; uncommon to fairly common and local in summer, breeding in marshland and apparently other dense habitats near water.

Orchard Oriole: ***Icterus spurius.*** Casual near Cliff, where a male was seen on 27 June 1967 (R. A. Fisher).

*** Hooded Oriole:** ***Icterus cucullatus nelsoni.*** (PR)—Regular summer resident throughout the valley, locally in the Cliff area north to Mogollon Creek; uncommon to fairly common in riparian woodland and valley mesquite. Early dates: 13 May 1959 and 8 May 1961 (Silver City area); 9 April 1960 (Cliff).

*** Scott's Oriole:** ***Icterus parisorum.*** (NR)—Occasional to irregular summer resident in the Cliff and Redrock areas; rare to uncommon in grassland and shrubland containing soapweed *(Yucca elata).* Early dates: 9 April 1960 and 25 March 1961 (Cliff).

*** Bullock's Oriole:** ***Icterus bullockii bullockii.*** (PR)—Regular summer resident throughout the valley; fairly common to common in riparian and adjacent woodlands. Early dates: 6 April 1959 and 22 April 1961 (Silver City); 9 April 1960 (Cliff).

*** Boat-tailed Grackle:** ***Quiscalus mexicanus.*** (PR)—Bred at Buckhorn Marsh in 1968 and present there in the summers of 1967 (J. R. Fisher) and 1970 (R. A. Fisher); in 1968 at least 11 adults, eight fledglings, and five nests were found in the area. Also present near Cliff in the summer of 1970 (R. A. Fisher). The nearest breeding colonies to the study area previously known are at Lordsburg, New Mexico and Duncan, Arizona.

An adult female specimen (US) taken in June 1968 is intermediate in size and color between *C. m. monsoni* and *C. m. nelsoni.*

*** Brown-headed Cowbird:** ***Molothrus ater obscurus.*** (SR)—Regular summer resident throughout the valley; uncommon to common in shrubby and wooded habitats. Early dates: 8 May 1958, 22 April 1959, and 15 March 1960 (Silver City area); 22 April 1961 (Cliff).

Nest hosts used by this cowbird include: Vermilion Flycatcher, male feeding fledgling cowbird (US) at Redrock on 13 June 1968; Lucy's Warbler, nest with one warbler egg, one warbler hatchling, and one cowbird egg near Cliff on 20 June 1968; Yellow-breasted Chat, nest with three chat eggs and two cowbird eggs near Cliff on 2 June 1967.

*** Bronzed Cowbird:** ***Molothrus aeneus loyei.*** (PR)—Occasional to irregular summer resident in the Cliff and Redrock areas (perhaps now regular); rare to uncommon in riparian woodland and adjacent habitats. First recorded in the valley near Redrock, where one was seen on 6 June 1962 (J. L. Sands). By 1968 it had reached the southern Cliff area (US), and it was present in June and July of 1969 in the northern Cliff area, where it was found breeding at Mogollon Creek (D. A. Zimmerman).

Western Tanager: ***Piranga ludoviciana.*** Irregular in June and July throughout the valley, as a rare to fairly common migrant.

* **Summer Tanager:** ***Piranga rubra cooperi.*** (RR)—Irregular to regular summer resident throughout the valley; uncommon to fairly common in riparian woodland. Early dates: 18 April 1959, 23 April 1960, and 22 April 1961 (Cliff).

* **Cardinal:** ***Cardinalis cardinalis superbus.*** (PR)—Regular resident throughout the valley, more local in the northern Cliff area (north to Turkey Creek); rare to common in riparian shrubland and valley mesquite (seepwillow seems to be nearly essential for the occurrence of this species, although dense microphyll shrubland may also suffice).

This species was not recorded from the Gila Valley until 1908 (US), in spite of work there by Henshaw, Stephens, and Barrell in the period 1873 to 1890. This suggests that this conspicuous bird spread into the study area within this century. In the nearby San Francisco Valley, it was unrecorded by various workers as late as the 1920's (and probably 1939), but now occurs fairly commonly in the Glenwood area.

Pyrrhuloxia: ***Cardinalis sinuatus sinuatus.*** There is one definite record, a specimen taken near Gila on 22 February 1932 (R. T. Kellogg, CNH), plus several sight records; but the status of this species is unclear in the study area. It is probably an occasional to irregular, rare winter resident, although possibly resident.

* **Black-headed Grosbeak:** ***Pheucticus melanocephalus melanocephalus.*** (PR)—Irregular to regular resident in the Cliff and Gila areas; uncommon in riparian and adjacent woodlands. Early dates: 30 April 1958, 22 April 1959, and 3 May 1961 (Silver City area); 23 April 1960 (near Cliff).

* **Blue Grosbeak:** ***Guiraca caerulea interfusa.*** (PR)—Regular summer resident throughout the valley, fairly common to common in valley mesquite and adjacent shrubland, in weedy riparian fields, and at the edges of riparian woodland. Early dates: 9 May 1959 (Silver City) and 6 May 1960 (Mangas Springs).

* **Indigo Bunting:** ***Passerina cyanea.*** (PR)—Irregular to regular summer resident; rare to uncommon and local in valley mesquite and adjacent shrubland, in weedy riparian fields, and at the edges of riparian woodland. First recorded in the valley near Cliff in July 1962 (WNM), where it has been regular since and definitely bred by June 1969 (D. A. Zimmerman). In summer of 1968 also present fairly commonly in the nearby San Francisco Valley, and a nest containing eggs was found at Pleasanton.

Specimens taken in 1963 (UM), as well as birds trapped for banding or examination, appear to be "pure" *P. cyanea* with no approach to *P. amoena.*

Lazuli Bunting: ***Passerina amoena.*** One summer record: an adult male, testes measuring 3 x 6 mm., taken at Gila on 8 July 1927 (R. T.

Kellogg, CNH). Probably a vagrant, although a singing male was present near Pleasanton in the nearby San Francisco Valley in June 1968 and a female was taken on 4 July (US).

*** Brown Towhee:** ***Pipilo fuscus mesoleucus.*** (NR)—Occasional to irregular resident in the Cliff and Redrock areas; rare to fairly common and local in shrubby, nonriparian habitats. In winter occasionally occurs in riparian shrubland.

*** Abert's Towhee:** ***Pipilo aberti aberti.*** (PR)—Regular resident in the Cliff (locally north to Mogollon Creek) and Redrock areas; irregular near Virden; rare to fairly common in riparian shrubland/woodland and adjacent valley mesquite (seepwillow or dense willow thickets seem to be essential for the occurrence of this species, although dense mesquite is also occupied).

This species is unknown in the nearby San Francisco Valley, although ecological conditions seem satisfactory for it.

Lark Bunting: ***Calamospiza melanocorys.*** Occasional to irregular in July in the Cliff and Redrock areas, as a rare to uncommon, postbreeding migrant.

*** Lark Sparrow:** ***Chondestes grammacus strigatus.*** (NR)—Occasional to irregular summer resident throughout the valley; rare to fairly common and local in shrubby, nonriparian habitats. Early dates: 18 April 1959 and 23 April 1960 (Cliff); 16 April 1961 (near Silver City).

*** Rufous-crowned Sparrow:** ***Aimophila ruficeps scottii.*** (NR)—Occasional to irregular resident in the Cliff and Redrock areas; rare to fairly common and local on slopes in grassy evergreen and adjacent microphyll shrublands.

Cassin's Sparrow: ***Aimophila cassinii.*** Occasional in summer in the Cliff and Redrock areas: at least 20 present in the area between Redrock and Lordsburg on 8 July 1963 (MVZ, UM) and several were noted on 25 July 1964; one was present near Cliff on 17 June 1968 and two were near Buckhorn on 3 July 1968. This species may breed locally, but at present there is no supporting evidence of this; summer birds may be early, postbreeding migrants.

*** Black-throated Sparrow:** ***Amphispiza bilineata deserticola.*** (NR)—Regular resident throughout the valley; fairly common to common in shrubby, nonriparian habitats.

Chipping Sparrow: ***Spizella passerina arizonae.*** One summer record: grown juvenile taken at Mogollon Creek on 17 July 1957 (O. Milton, PM). This probably represents an early migrant rather than a locally hatched bird.

*** Black-chinned Sparrow:** ***Spizella atrogularis evura.*** (NR)— Occasional to irregular summer resident (resident?) in the northern Cliff area. Early dates: 18 May 1958, 3 May 1959, 8 May 1960, and 6 May 1961 (Silver City area).

*** House Finch:** ***Carpodacus mexicanus frontalis.*** (SR)—Regular resident throughout the valley; uncommon to common in shrubby and

wooded habitats, especially those containing cholla, soapweed, dense ornamental plantings, or habitations. Rarely breeds in riparian habitats, but on 15 June 1968 I found a pair at a nest in riparian woodland near Redrock.

*** Lesser Goldfinch:** ***Spinus psaltria hesperophilus.*** (PR) —Irregular to regular summer resident throughout the valley; rare to fairly common in riparian and adjacent evergreen woodland. Juveniles were seen as early as 14 June 1968 near Redrock, while a female was seen at a nest near Cliff on 23 July 1959 (D. A. Zimmerman). Occasional in winter near Cliff and Redrock, where recorded several times in 1959–1960. Early dates: 8 March 1959 (Redrock); 12 March 1960 and 25 March 1961 (Cliff).

DISCUSSION

To date, a total of 143 species of birds has been recorded in the Gila Valley in the height of the nesting season, which is centered on June and the first half of July. Of these 143 species, 31 are not thought to breed in the study area, whereas the other 112 definitely or probably have bred. Nonbreeders include several species which are only migrants in the area (e.g., Olive-sided Flycatcher, Audubon's Warbler, Wilson's Warbler, Western Tanager, and Lark Bunting), plus the unsuccessfully introduced Chukar and Black Francolin. Also included among the 31 are several species which may possibly breed but for which such evidence is lacking (e.g., Least bittern, Sharp-shinned Hawk, Ground Dove, Violet-green Swallow, Blue-gray Gnatcatcher, Solitary Vireo, Pyrrhuloxia, Cassin's Sparrow, and Chipping Sparrow).

Regularity of Occurrence of Breeding Species

As in many breeding avifaunas, there is variation between species in the regularity of their occurrence from year to year and place to place in the Gila Valley. Among the 112 breeding species, seven occur so infrequently as to be termed casual in the area (i.e., Pied-billed Grebe, Black-crowned Night Heron, Blue-winged Teal, Gray Hawk, Costa's Hummingbird, Tree Swallow, and Plain Titmouse). Ten others occur somewhat more frequently and are termed occasional (i.e., Green Heron, Cinnamon Teal, Zone-tailed Hawk, Scaled Quail, Harlequin Quail, Sora, Common Crow, Common Bushtit, Bendire's Thrasher, and Gray Vireo). Together the casual and occasional groups comprise 15.2 per cent of the avifauna, while the remaining, more frequently occurring species comprise 84.8 per cent, or 95 species. Twenty-five of the latter species are occasional to irregular or are irregular (e.g., Common Merganser, American Coot, Band-tailed Pigeon, Barn Owl, Hairy Woodpecker, Crissal Thrasher, Eastern Meadowlark, and Black-chinned Sparrow), while the remaining 70 species are irregular to regular or are

regular (e.g., Great Blue Heron, Turkey Vulture, Sparrow Hawk, Gambel's Quail, Killdeer, Mourning Dove, Gila Woodpecker, Western and Cassin's Kingbirds, Vermilion Flycatcher, Bewick's Wren, Mockingbird, Lucy's Warbler, Cardinal, Blue Grosbeak, House Finch, and Abert's Towhee).

While this scale of the frequency of occurrence implies a certain predictability in being able to find a given species in the valley, it should be understood that many variables exist. For example, some species are very local, some vary in occurrence with changes in habitat availability, while others are easily overlooked or are apt to be confused with similar species. Also, the regularity of occurrence is based on somewhat limited information, and the actual status may be incorrectly assessed (or it may change). Nevertheless, the values recorded here are thought to be useful guidelines and a fair assessment of the parameter concerned.

Habitat Utilization by Breeding Species

Habitats in the Gila Valley vary considerably and their utilization by breeding species varies as well. As indicated earlier, I have subdivided the breeding avifauna into four somewhat arbitrary categories, based on the use and apparent degree of dependency of given species on the range of available habitats. Viewed with an emphasis on the river and the habitats that it fosters, the most important categories of breeding birds are those which encompass the species that use primarily riparian habitats. These total 55 species, or 49.1 per cent of the breeding avifauna, and are subdivisible into two categories. The first category is *restricted riparian,* which consists of 28 species (25.0 per cent of the avifauna) that are essentially confined to riparian habitats in the breeding season (e.g., Great Blue Heron, Mallard, Common Merganser, Black Hawk, American Coot, Yellow-billed Cuckoo, Gila Woodpecker, Wied's Crested Flycatcher, Traill's Flycatcher, American Robin, Yellow Warbler, Red-winged Blackbird, and Summer Tanager). The second category is *primary riparian,* which consists of 27 species (24.1 per cent of the avifauna) that show a basic requirement for riparian habitats but that have varying degrees of usage of adjacent nonriparian habitats (e.g., Cooper's Hawk, Killdeer, White-winged Dove, Western Wood Pewee, Vermilion Flycatcher, Bell's Vireo, Lucy's Warbler, Bullock's and Hooded Orioles, Cardinal, Blue Grosbeak, and Abert's Towhee).

The restricted and primary riparian categories of birds constitute those species that would undoubtedly disappear from the study area in the absence of the river and its habitats. Such disappearance would variably affect the overall distribution of this segment of birds. For example, it would extirpate Abert's Towhee from New Mexico and seriously reduce the populations in the state of such species as the Black Hawk, Elf Owl, Gila Woodpecker, Wied's Crested Flycatcher,

Bell's Vireo, Lucy's Warbler, Bronzed Cowbird, and Cardinal. For such species as the Mexican Duck, White-winged Dove, Vermilion Flycatcher, Hooded Oriole, and Boat-tailed Grackle an important northern breeding locality would be lost, while a southern one would be lost for such species as the Mallard, Traill's Flycatcher, and Indigo Bunting. Lowland populations of such typically montane birds as the Red-shafted Flicker, Hairy Woodpecker, White-breasted Nuthatch, American Robin, and Black-headed Grosbeak would also disappear from the area. Obviously, an important segment of the birds breeding in the Gila Valley not only makes extensive use of riparian habitats, but depends on them for their survival in the area.

The remaining 57 species (50.9 per cent of the breeding avifauna) consist of birds that appear to be independent of the river and its habitats and would probably persist in the area even in the absence of such. This is not to say that riparian habitats are avoided, for the 25 species (22.3 per cent of the avifauna) in the *secondary riparian* category make some to extensive use of such habitats (e.g., Turkey Vulture, Swainson's Hawk, Great Horned Owl, Ash-throated Flycatcher, Mexican Jay, Bridled Titmouse, and Phainopepla). In fact, some secondary riparian species seem to reach their maximum abundance in riparian habitats (e.g., Mourning Dove, Western and Cassin's Kingbirds, Bewick's Wren, and Brown-headed Cowbird); for such species riparian habitats are important population centers. The final 32 species (28.6 per cent of the avifauna) are in the *nonriparian* category, which consists of birds that make little or no use of riparian habitats in the breeding season, except perhaps for drinking and bathing (e.g., Golden Eagle, Scaled Quail, Roadrunner, Horned Lark, Verdin, Mockingbird, Loggerhead Shrike, Brown Towhee, and Black-throated Sparrow). For nonriparian species the disappearance of the river and its habitats would probably be of minor importance, and populations in the area would probably be little affected.

Biogeographic Affinities of the Breeding Species

The biogeographic affinities of the breeding avifauna are predominantly with North America, with 79 of the 109 native species (72.5 per cent of the avifauna) confined to the continent. Twenty-two other species (20.2 per cent) range into South America, while eight species (7.3 per cent) range into the Old World as breeders. Of the latter, five are holarctic (i.e., Mallard, Common Merganser, Golden Eagle, Barn Swallow, and Common Raven). The Black-crowned Night Heron and the Barn Owl are cosmopolitan; the Horned Lark is holarctic plus northern South America in its breeding distribution. Besides native birds, there are three Eurasian species that have been introduced into North America and that breed in the Gila Valley (i.e., Common Pheasant, Common Starling, and House Sparrow).

While not unexpectedly lacking endemics, the Gila Valley shares a number of such, or near endemics, with the Sonoran lowland region to the west. These include the narrowly endemic Abert's Towhee and the somewhat more widely distributed Bendire's Thrasher and Lucy's Warbler, both of the last two breeding eastward to the Rio Grande Valley of New Mexico (at least the warbler is a recent invader). Gambel's Quail is also a near endemic, ranging to the Rio Grande Valley and also southward into the Sinaloan lowland region of western Mexico. (Costa's Hummingbird might be considered a Sonoran near endemic as well.) These four (or five) species give the Gila Valley a Sonoran aspect, which is further heightened by certain subspecific affinities (e.g., *Centurus uropygialis uropygialis, Myiarchus tyrannulus magister, Vireo bellii arizonae, Molothrus aeneus loyei, Icterus cucullatus nelsoni,* and *Cardinalis cardinalis superbus*).

A relationship also exists with what might be termed the Madrean or Mexican Plateau region (e.g., Mexican Duck, Harlequin Quail, Mexican Jay, and Bridled Titmouse) and, not unexpectedly, with the arid and semiarid regions of western North America in general. Forty of the species breeding in the Gila Valley fall in the latter category, which constitutes 36.7 per cent of the breeding avifauna (44.9 per cent with the addition of Sonoran and Madrean species). Seventeen of these are relatively widespread (e.g., Swainson's Hawk, Common Poor-will, Bullock's Oriole, and House Finch), although one, Bell's Vireo, is at a northern distributional point in New Mexico in the Gila Valley. Eighteen species of the arid and semiarid western North American element are more southerly (e.g., Scaled Quail, Ladder-backed Woodpecker, Curve-billed Thrasher, and Brown Towhee), including several of which reach one of their northern distributional limits in New Mexico in or near the Gila Valley (e.g., Inca Dove, Elf Owl, Verdin, Phainopepla, Hooded Oriole, and Bronzed Cowbird).

The remaining species breeding in the Gila Valley generally lack narrow enough distributions to represent biotic provinces or regions, although there are perhaps a few exceptions. For example, the Indigo Bunting is a species typical of seral stages of the eastern broadleaf forest region of North America, and its occurrence as a breeding bird in the Southwest appears to be relatively recent. No such recency seems to pertain to the range of the Summer Tanager, which is typical of xeric forests in the southeastern United States and reappears in riparian woodlands of the Southwest and adjacent Mexico (*Piranga rubra rubra* breeding in the east, *P. r. cooperi* in the west).

Additional reference should be made to species for which the Gila Valley is at or near the distribution limits in the breeding season, because this indicates the blending of biotas there plus the valley's import as an area of avian occupancy. Of the 10 breeding species with primarily neotropical distributions, the Gila Valley is a northern point of occurrence in New Mexico for four (i.e., Gray Hawk, White-winged

Dove, Lesser Nighthawk, and Boat-tailed Grackle) and near such a point for the five others (i.e., Zone-tailed Hawk, Black Hawk, Wied's Crested Flycatcher, Black Phoebe, and Vermilion Flycatcher); the Lesser Goldfinch ranges northward considerably farther in western New Mexico. In addition, the valley is at or near a southern limit in the breeding range of several northern species (e.g., Mallard, Blue-winged Teal, Sora, Spotted Sandpiper, Traill's Flycatcher, Tree Swallow, Common Crow, and Indigo Bunting).

Changes in the Breeding Avifauna in Historic Times

In spite of the scanty early record of the birdlife of the Gila Valley, certain changes in its composition have been detected or are suspected as having occurred in historic times. Perhaps the only species extirpated has been the Wild Turkey, signs of which were reported by Capt. A. R. Johnston along the river near the present town of Cliff in October 1846 (Emory, 1848). Assuming that this report is accurate and that the species does not occur in the Gila Box Canyon, the Wild Turkey would seem to have disappeared from the Gila Valley. There are other possible cases of extirpation, particularly among water birds, which may have left the area because of destruction of marshland and other aquatic habitats. For example, had suitable marshes existed, the American Bittern (*Botaurus lentiginosus*) may have occurred as a breeding bird in the Gila Valley, since it was reported as common in the summer of 1908 at nearby Mangas Springs (Bailey, 1928) where extensive marshes formerly existed (Emory, 1848).

More significant than possible extirpations have been the additions of species to the avifauna, at least based on the data presently available. Recent and definite newcomers as breeding birds in the Gila Valley are the Common Crow, Boat-tailed Grackle, Bronzed Cowbird, and Indigo Bunting, all probably within the last decade. Other species for which there is good evidence of arrival in historic times are the Gila Woodpecker and the Cardinal, both first detected in 1908, and Lucy's Warbler, which seems to have arrived in the late 1920's. In addition, the Inca Dove was established at Virden by 1947 (Ligon, 1961) and probably arrived there during the present century.

Much of the evidence of a recent invasion of the area by these and other species is negative, i.e., based on the failure of early workers to record them in the valley or its vicinity. In the case of conspicuous species, particularly those which are numerous at present, such evidence is probably valid. On the other hand, where a species is local, not numerous, and/or apt to be misidentified, the evidence is less secure. Thus, the lack of early records of such species as the Black Hawk may not actually reflect the absence of the bird.

Besides range extensions by native birds, there have also been incur-

sions by two Eurasian species into the Gila Valley, spreading westward from areas of introduction in the northeastern United States: the first is the House Sparrow, which apparently arrived early in this decade (Ligon, 1961), and the second is the Common Starling, which is first known to have bred in 1960. (The Common Pheasant was introduced directly into the valley, probably in the last 40 years.)

In most cases there is little evidence that suspected invasions of the Gila Valley by new breeding species have been triggered by such ecological factors as habitat changes. For example, the riparian woodland favored by the Gila Woodpecker and the shrublands inhabited by Lucy's Warbler and the Cardinal have long been features of the area. On the other hand, settlement and the building of habitations may account for the establishment of the Inca Dove in the valley, although these changes alone do not guarantee this event, as is evidenced by the species' general absence in southern New Mexico over a wide area seemingly suitable for it. Another species that may have responded to ecological change is the Western Meadowlark, although virtually nothing is known of its early status in the area. It is largely confined in the Gila Valley to riparian fields, into which it could have spread only after man's occupancy of the area. Other man-made or man-influenced changes have certainly affected the birdlife of the Gila Valley, although perhaps not to the point of allowing additional species to invade the area. A number of species have shifted, at least in part, to man-made structures for nesting (e.g., Say's and Black Phoebes, Barn and Cliff Swallows, and House Finch); others use pastures, fields, clearings, fences, communications lines, and other such habitats for nesting and/or foraging. No doubt also affecting the distribution and abundance of various species in the valley has been the spread of cacti, mesquite, and other shrubs because of overgrazing. Shrubland species (e.g., thrashers, Brown Towhee, and Black-throated Sparrow) have probably spread as a result, whereas grassland species (e.g., Horned Lark and Eastern Meadowlark) have probably contracted.

Although many of the man-induced habitat changes have probably been as beneficial as they have detrimental (except to marshland), the point will be reached where alteration of natural habitats will produce a decline in the diversity and perhaps abundance of species in the avifauna. Continued clearing of riparian woodland is perhaps the major threat, but all native habitats and the river itself are subject to alterations which will endanger not only the avifauna but the other elements of the biota as well. The perpetuation of this valley as a reservoir of diverse and interesting plants and animals is unquestionably justified. To do this, exploitation must be checked and extensive areas should be preserved for natural vegetation. Moreover, habitats should be restored, particularly riparian types and especially marshland.

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The Delaware Museum of Natural History, located on Kennett Pike in Greenville, just north of Wilmington, Delaware, is a nonprofit scientific and educational institution, founded in 1957 by Mr. John Eleuthère duPont. Its building was erected in 1970 and houses public exhibits and scientific research collections. The museum is largely devoted to the study of birds, mammals, and mollusks.

The name Nemouria *is taken from part of Mr. duPont's family name, duPont de Nemours, and is a contraction of the medieval French word meaning "woodland" or "of the forest."*

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NEMOURIA

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NOTES ON PHILIPPINE BIRDS (NO. 1)

John E. duPont

INTRODUCTION

In the last few years the Delaware Museum of Natural History (DMNH) has received several small collections of birds from the Philippines. In preparation for my book *Philippine Birds,* I have found several interesting new records, which are commented on here; these include the description of five new subspecies, retraction of a previously described subspecies, one new record for Palawan, one subspecies previously unrecorded from the Philippines, and the correction of a misidentification.

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FAMILY ANATIDAE DUCKS

***Anas crecca crecca* Linné, 1758**

1 ♂, Dec. 1970, Iwahig, Palawan
Not previously recorded from Palawan.

FAMILY ACCIPITRIDAE HAWKS

***Pernis ptilorhynchus philippensis* Mayr, 1939**

A specimen was recorded from Bataan, Luzon, by deSchauensee and duPont (1959:2), but reexamination of the specimen proves it to be *Pernis celebensis steerei* Sclater, 1919, a known inhabitant of Luzon.

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FAMILY STRIGIDAE OWLS

Ninox scutulata **(Raffles, 1822)**

In addition to the wintering race, *N. s. japonica* (Temminck and Schlegel, 1850), there is a resident race, *N. s. randi,* described by Deignan in 1951. He also suggested that *N. s. florensis* (Wallace, 1864) might reach the Philippines. Recent material confirms his suspicions.

Ninox scutulata randi **Deignan, 1951**

1 ♀, Oct. 5, 1958, Gapan, Nueva Ecija, Luzon, CM 139223
1 ♀, Nov. 29, 1958, Nueva Vizcaya, Luzon, DMNH 1280
1 ♂, March 1970, Boac, Marinduque, DMNH 4332

These are new records for this subspecies which was originally known from Mindoro, Cebu, Siquijor, Mindanao, and Basilan.

Ninox scutulata florensis **(Wallace, 1864)**

1 ♀, Oct. 3, 1958, San Jose, Nueva Ecija, Luzon, CM 139278
2 ♀, Dec. 1969, Ipo Dam, Bulacan, Luzon, DMNH 3949 and 3950

Not previously recorded from the Philippines.

FAMILY ALCEDINIDAE KINGFISHERS

Alcedo meninting **Horsfield, 1821**

Examination of the Philippine birds quite clearly shows that there are two races present. Peters (1945:174) states that "birds from Palawan and the Sulu group of the Philippine Islands are usually referred here (= *A. m. meninting*), perhaps erroneously." However, the Sulu birds match the Borneo birds and should be called *A. m. verreauxii* De La Berge, 1851. The Palawan birds differ and may be called:

Alcedo meninting amadoni **new subspecies**

Type DMNH 4663, ♂ Iwahig, Palawan, P. I., 100′, May 1970. Wing 67; tail 32; bill 41; tarsus 9.

Diagnosis: Differs from *A. m. verreauxii* De La Berge, 1851, of Borneo and the Sulu Archipelago (Bongao, Jolo, Tawi Tawi) by having the blue of the upperparts more azure-blue. In a series the rufous underparts are somewhat paler.

Range: Palawan.

Specimens examined: *verreauxii*—North Borneo 3 ♂, 3 ♀; Tawi Tawi 2 ♂, 1 ♀; Jolo 1 ♀; Bongao 1 ♀. *amadoni*—Palawan 6 ♂, 9 ♀.

Etymology: This new subspecies is named for Dr. Dean Amadon of the American Museum of Natural History.

FAMILY **TIMALIIDAE** BABBLERS

***Napothera rabori* Rand, 1960**

This genus of babbling thrushes was unknown in the Philippine Archipelago until Dr. Austin L. Rand described *Napothera rabori* from northern Luzon. Shortly thereafter, in 1967, Drs. Rand and Rabor described *Napothera sorsogonensis* from southern Luzon. It is most unfortunate that the only two known specimens of *rabori* are immatures; however, they do have enough adult feathers to show their subspecific relationship to *sorsogonensis,* especially with the discovery of a third population that is clearly intermediate. The latter may be called:

***Napothera rabori mesoluzonica* new subspecies**

Type DMNH 10800, ♂ Barrio Savay, Pakil, Laguna, Luzon, P. I., 1100′, April 1971. Wing 98; tail 84; bill 25; tarsus 32.

Diagnosis: Crown, hind neck, and back dark red-brown with black margins to feathers; elongated fluffy rump feathers and tail dark red-brown; primary wing-coverts black terminated with a white spot; rest of wing dark brown with outer red-brown margins to feathers; feathers of face gray with white shaft streaks; chin and throat white with a black jugular stripe on either side; breast dark gray; center of belly white; flanks chestnut; thighs and under tail-coverts dull red-brown. Differs from *N. r. rabori* to the north by having the black margins of the crown and back narrower and the chestnut and red-brown underparts lighter. Differs from *N. r. sorsogonensis* to the south by having the upperparts darker, with black margins to the feathers of the crown and back (these margins are almost completely lacking in *sorsogonensis*); gray breast band wider, flanks and under tail-coverts richer.

Range: Known only from type locality.

Etymology: The name of the new subspecies is derived from Greek: *meso,* meaning middle or center, and *luzonica,* for the island of Luzon.

FAMILY **NECTARINIIDAE** SUNBIRDS

***Nectarinia sperata* Linnaeus, 1766**

Specimens recently received from Marinduque show that there is an undescribed race there; it may be called:

***Nectarinia sperata marinduquensis* new subspecies**

Type DMNH 4400, ♀ Barrio Canat, Boac, Marinduque, P. I., 350′, March 1970. Wing 51; tail 28; bill 18; tarsus 13.5.

DIAGNOSIS: Female—differs from *N. s. sperata* by having the lower back, rump, and upper tail-coverts dark red instead of dark olive-green; outer margins to primaries and secondaries darker burnt orange. Males—similar to those of *N. s. sperata.*

RANGE: Marinduque.

ETYMOLOGY: This new subspecies is named for the island on which it was first discovered.

FAMILY ZOSTEROPIDAE WHITE-EYES

***Zosterops montana* Bonaparte, 1851**

The white-eyes of the Philippines are a very interesting but, for some, a difficult group of birds. I agree with Mayr's implication (Peters, 1945:301, footnote) that Mees overdid his lumping of the races of *montana,* at least in the Philippines.

Mees (1969:271) stated that "a certain amount of confusion between *Z. m. montana* and *Z. everetti basilanica* may also have taken place in the paper of these authors," deSchauensee and duPont (1962:171); however, reexamination of these specimens proves there was no misidentification of species.

Salomonsen (1962:131) was the first to report this species from Palawan but erred in saying that it did not differ from the Luzon population. Therefore, the Palawan birds may be called:

***Zosterops montana parkesi* new subspecies**

Type AMNH 788888, ♂ Mt. Mantalingajan, Palawan, P. I., 5500–6000′, April 14, 1962. Wing 58; tail 39; bill 12; tarsus 11.

DIAGNOSIS: Differs from *whiteheadi* of Luzon by having the upperparts much yellower green, forehead and face golden green, eye-ring bolder, chin and throat richer yellow and more extensive, flanks same whitish color of breast and belly, and under tail-coverts richer yellow. It is also larger: wing 6 ♂ 55–58 (av. 56.3); 4 ♀ 54–55 (av. 54.7) vs. *whiteheadi* 7 ♂ 49–53 (av. 50.1); 5 ♀ 46–49 (av. 47.4).

RANGE: Mountains of Palawan.

ETYMOLOGY: This new subspecies is named for Dr. Kenneth C. Parkes of the Carnegie Museum.

Specimens of Zosteropidae recently received from Marinduque not only are a new family record for the island but also prove to be a new race. It may be called:

***Zosterops montana gilli* new subspecies**

Type DMNH 11145, ♂ Matabang Bundok, Kilo-Kilo, Sta. Cruz, Marinduque, P. I., 1000–1500′, May 1971. Wing 52; tail 43; bill 14; tarsus 16.5.

DIAGNOSIS: Nearest to *Z. m. halconensis* of Mindoro but differs by having the upperparts brighter yellowish olive-green; yellow of chin, throat, and under tail-coverts brighter and more extensive.

RANGE: Marinduque.

SPECIMENS EXAMINED: *halconensis*—Mindoro 1 ♂, 2 ♀; *gilli*—Marinduque 6 ♂, 4 ♀.

ETYMOLOGY: This new subspecies is named for Dr. Frank Gill of the Academy of Natural Sciences of Philadelphia.

***Hypocryptadius cinnamomeus* Hartert, 1903**

In recent times two subspecies have been described: *H. c. malindangensis* Rand and Rabor, 1957, and *H. c. pallidigula* deSchauensee and duPont, 1962; but reexamination of the old material and recent material from the type localities proves that the races were described by comparing old, badly foxed specimens to fresh specimens. Moreover, the series of new material was too small to show color variation within the local population. Therefore, there is no variation on Mindanao and the species evidently has no geographical races, as suggested by Mayr (1967:326, footnote).

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TAXONOMIC AND DISTRIBUTIONAL NOTES ON PHILIPPINE BIRDS

*Kenneth C. Parkes**

INTRODUCTION

Ever since my visit to central Luzon in 1956, I have been studying the taxonomy and distribution of Philippine birds. Although this research has already resulted in the publication of some 40 papers, a large backlog of completed but unpublished notes remained in my files. The imminence of publication of John E. duPont's book *Philippine Birds* made it advisable to place these data on record. Most of the information in the present paper was made available to Dr. duPont during the writing of his book, including the new races to be described herein, although the decision as to whether to accept my findings for incorporation into *Philippine Birds* was, of course, his.

The notes in this paper include taxonomic revisions, new locality records, corrections of errors (some of which have been of long standing) in the literature of Philippine birds, and, in a few cases, information on plumages and molts. I hope eventually to publish a more extensive paper on plumages of Philippine birds.

All measurements of specimens in this paper are in millimeters. Wings were measured flat against the ruler. Bill measurements are various, and the method of measuring is specified in each case.

Acknowledgments

Specimens on which these studies were based are primarily those in the American Museum of Natural History and Carnegie Museum. Comparative material from many other museums has been used, either *in situ* or on loan, through the courtesy of a series of curators and directors; I list institutions here rather than individuals, as there has been much turnover of personnel since I began my work on Philippine birds. The following abbreviations are given for all collections I have utilized, even though these may not appear in the present paper.

*Curator of Birds
Carnegie Museum

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AMNH	American Museum of Natural History
ANSP	Academy of Natural Sciences of Philadelphia
BMNH	British Museum (Natural History)
CAS	California Academy of Sciences
CM	Carnegie Museum
CU	Cornell University
DMNH	Delaware Museum of Natural History
FMNH	Field Museum of Natural History
GMS	Collection of George Miksch Sutton
MCZ	Museum of Comparative Zoology, Harvard University
MMNH	James Ford Bell Museum, University of Minnesota
MVZ	Museum of Vertebrate Zoology, University of California
PNM	Philippine National Museum
ROM	Royal Ontario Museum
SDR	Collection of S. Dillon Ripley
UMMZ	Museum of Zoology, University of Michigan
USNM	United States National Museum of Natural History
YPM	Peabody Museum of Natural History, Yale University

I am especially indebted to certain individuals for assistance in obtaining specimens and information; some of the most helpful include the late H. G. Deignan; John E. duPont; I. C. J. Galbraith; the late E. Thomas Gilliard; Canuto G. Manuel; Austin L. Rand; S. Dillon Ripley; Finn Salomonsen; John Weske; Richard L. Zusi; and, above all, Dean Amadon, who made the facilities of the AMNH and his own counsel freely available to me during my innumerable visits to New York. Expenses for some of those visits were met through a grant from the Frank M. Chapman Memorial Fund of the AMNH. My field work in Luzon in 1956 was part of a project of the Graduate School of Public Health, University of Pittsburgh, under the sponsorship of the Commission on Viral Infections, Armed Forces Epidemiological Board, supported in part by the Office of the Surgeon General, U.S. Department of the Army. I am indebted to Dr. C. G. Manuel and Mr. Telesforo Oane for help in the field.

SPECIES ACCOUNTS

Butorides striatus (Linnaeus, 1766)

Current literature on Philippine birds lists two subspecies of this species: a resident form, *carcinophilus* Oberholser, 1924, and a winter visitor from northeastern Asia, *amurensis* Schrenck, 1860. Recognition of Oberholser's name for the resident Philippine population dates from Mayr (1943:11–12). I have examined essentially the same material in the AMNH of this species from southeastern Asia as was used by Mayr, supplemented by a much larger series of Philippine specimens. I fully

agree with Ripley (1969:102) that separation of *carcinophilus* from *B. s. javanicus* (Horsfield, 1821) is not warranted.

Ripley (*op. cit.*), in discussing Asian migratory populations, stated that *amurensis* migrates "south in winter to southern China, north Thailand (uncommon) and Taiwan." In this paper he did not mention the Philippines as part of the winter range of any migratory race. Earlier, however, he had listed Philippine records for *amurensis* as including the islands of Calayan, Cebu, Mindoro, Negros, and Samar (Ripley and Rabor, 1958:20). He overlooked the Luzon record published by Gilliard (1950:474); I have reexamined Gilliard's specimen and confirm its identification. In addition, I have examined other Luzon specimens of *amurensis* as follows:

ad. ♂, Baguio, Mountain Prov., January 1947, coll. John B. Thompson (GMS). Wing 200; exposed culmen 61.5.
im. ♂, Baguio, Mountain Prov., December 17, 1947, coll. John B. Thompson (GMS). Wing 203; exposed culmen 65.
im. ♂, Dalton Pass, Nueva Vizcaya Prov., November 19, 1958, coll. A. Concepcion (CM). Wing 202; exposed culmen 66.

In addition to its greater size, *amurensis* may be distinguished from resident Philippine birds by its decidedly whiter face, especially in the area below the eye.

***Pernis apivorus philippensis* Mayr, 1939**

This species does not appear to have been recorded from the island of Negros. A specimen now in the CAS (formerly in the Stanford University Museum) was collected at 3500 feet on the northwest slope of Mount Dayungan, Negros, April 8, 1958.

I have no strong opinions about species limits in this genus; so I follow Brown and Amadon (1968:221) in merging the Asian *ptilorhynchus* group with *apivorus*.

***Microhierax erythrogonys* (Vigors, 1831)**

Most recent writers on Philippine birds have denied recognition to the subspecies *M. e. meridionalis* Ogilvie-Grant, 1897. Rand and Rabor (1960:377) showed that none of the color characters that have been invoked for subspecific separation have any geographic correlation. Specimens I have measured, however, fully bear out Ogilvie-Grant's contention that Luzon birds are smaller than those from farther south in the Philippines. Rand and Rabor admitted that size in this species increases from north to south, but stated that "the difference does not

seem consistent enough to warrant recognizing two races." There is, indeed, some overlap in wing measurements, but I suspect that the very few real discrepancies are based on missexed specimens, a constant hazard in dealing with species having no sexual color dimorphism. When other measurements show a high degree of consistency, the taxonomist is justified in excluding specimens whose measurements suggest missexing. This would be true of Rand and Rabor's alleged female from Samar with a wing of 109 and an alleged female in CM from Samar with a wing of 110. With these two specimens removed, my wing measurements of specimens in AMNH, YPM, and CM accord well with the FMNH material. Combining my measurements with those of Rand and Rabor, we arrive at the following ranges for wing length:

18 Luzon ♂♂	100–110.5	18 non-Luzon ♂♂	109–120
8 Luzon ♀♀	106–117	12 non-Luzon ♀♀	114–125

The larger size of the bills of the southern birds is more striking than the wing-length difference. It is difficult to express in linear measurements the differences in such nearly globular objects as *Microhierax* bills, but the following figures will show the trends:

	Culmen from cere	Width at base
16 Luzon ♂♂	10–11.5	5.5–8
12 non-Luzon ♂♂	12–13.5	7.5–10
4 Luzon ♀♀	11.5–12	7–9.5
3 non-Luzon ♀♀	13–14	10.5–11

On the basis of these figures, I believe that *M. e. meridionalis* can be recognized for the birds of the central and southern Philippines. I have measured only one Mindoro specimen; its measurements (♂) place it with *M. e. erythrogonys*: wing 107, culmen 11.5, width of bill 7.

***Rallus philippensis* Linnaeus, 1766**

This species has been reported in the Philippines only from Batan, Luzon, and Mindoro (Parkes, 1949). Rand and Rabor (1960) do not mention it in their list of Samar birds. AMNH 348328 is a juvenile female of this species taken August 7, 1948, by A. P. Castro at Loquilocon, Samar. It and AMNH 10457, "Philippines," are remarkable in being very much paler than adults from the Philippines, with the underparts heavily washed with buff. I have been able to compare juveniles

with adults of the subspecies *R. p. chandleri, andrewsi, meyeri, australis, assimilis, goodsoni,* and *forsteri.* In none is the contrast between the color of adults and juveniles so marked as in *R. p. philippensis.*

***Rallus torquatus* Linnaeus, 1766**

Gilliard (1949a) divided Philippine populations of this species into three races. He considered the restricted type locality of *torquatus* to be the vicinity of Manila and considered birds from "central and northern Luzon" to represent the nominate race. He then described *R. t. quisumbingi* from Camarines Province, southern Luzon, and Marinduque; allotted one specimen from Mindoro to *torquatus*; and described *R. t. sanfordi* from the Zamboanga Peninsula of Mindanao. He made no attempt to allot names to the birds of other islands, although this species is widespread in the Philippines. Gilliard based *quisumbingi* on smaller size, but he also mentioned that all but one of the specimens he assigned to this new race had the outer edges of remiges, rump, and tail brighter, more brownish, and less olive. I have examined the same specimens, and this rufescence appears to me to be discoloration. DeSchauensee (1957) and deSchauensee and duPont (1959), on the basis of six specimens from various Luzon localities, doubted the validity of *quisumbingi* as based on measurements. A longer series that I have measured, together with published measurements, indicates that the smallest examples of *Rallus torquatus* in the Philippines do, indeed, occur in southern Luzon, but that the species as a whole is so variable in size that no clear-cut separation can be made. I therefore regard *quisumbingi* as a synonym of *torquatus.* Similarly, although the longest-billed individual examined did, indeed, come from Zamboanga, thus matching Gilliard's diagnosis of *sanfordi,* other specimens from the same area can be matched by birds from other islands. Gilliard also used for a character for *sanfordi* "black eye-stripe without a white dorsal emargination." This character is much too variable to be of any taxonomic use. The type specimen of *sanfordi* actually has a trace of white on one side. Two out of five specimens from northern Luzon lack any trace of white, and the other three have only a little. Of four adults in Gilliard's own Bataan series, two have a well-marked white emargination; whereas in the other two it is obsolete.

In reviewing this species, I found one character that has not been previously reported. Specimens from Mindanao, Bohol, Leyte, and Sibuyan tend to have the brown pectoral band reduced and interrupted when compared with Luzon birds as a group; but this, too, is not sufficiently consistent to warrant nomenclatorial recognition. I prefer to call all Philippine populations of this species *Rallus t. torquatus.*

***Amaurornis olivaceus* (Meyen, 1834)**

Rand and Rabor (1960:238), in discussing the phenomenon of large bills of island populations of birds, mentioned only one endemic subspecies from the island of Siquijor (*Pachycephala philippinensis siquijorensis*) as being characterized by a long bill, although tendencies toward long bills were found also in "*Niltava*" (=*Cyornis*) *rufigaster* and *Rallus torquatus*; in fact, they even identified their specimen of the latter with *R. t.* "*sanfordi*" Gilliard, based on its bill measurement of 38, although Gilliard had given measurements of 35–39 for *R. t. torquatus* and 43.5 for "*sanfordi.*"

In one species not represented in Rand and Rabor's Siquijor collection, this "small island effect" (if that is what it is) is apparent. The small series of Siquijor specimens of *Amaurornis olivaceus* (1 AMNH, 4 USNM) indicates that the population from this small island is longer winged as well as longer billed than those from elsewhere in the Philippines. The series from other islands used for comparison included the following localities: Luzon (11), Cebu (1), Bohol (5), Samar (1), Negros (1), and Mindanao (3). Measurements are as follows:

	Wing	Culmen from feathers
4 Siquijor ♀♀	160–166 (164.5)	35.5–38 (37)
10 non-Siquijor ♀♀	148–162 (155.2)	31–35 (34.3)
1 Siquijor ♂	171	39
10 non-Siquijor ♂♂	166–178 (168.4)	36–39 (37.25)

It is interesting to note that the four Siquijor females are almost wholly separable from the non-Siquijor females. The single male would be almost as distinctively large were it not for a single male from Mindanao (FMNH 209648) with a wing of 178 and a culmen of 39; the next largest birds measured 172 and 38, respectively. It is doubtful that even with a larger series it would be worthwhile to recognize the Siquijor population nomenclatorially, but it is interesting as another possible case of the "small island effect."

***Phapitreron leucotis* (Temminck, 1823)**

Peters (1937:24) and subsequent authors have generally accepted the subspecies *P. l. albifrons* McGregor, 1907, as distinct from *P. l. brevirostris* (Tweeddale, 1877). Peters assigned Samar, Bohol, and Siquijor to the range of *albifrons* and Leyte, Dinagat, and Mindanao to *brevirostris*. The chief distinguishing character of *albifrons* is alleged to be a

whiter forehead. After I had examined the AMNH series of specimens from Bohol (7), Leyte (19), Samar (19), Siquijor (2), and Mindanao (8), I came to the conclusion that *albifrons* (type locality Bohol) was not worthy of recognition. The Bohol birds did *average* slightly whiter on the forehead than did those from Mindanao (type locality of *brevirostris*), but the numerically superior Samar and Leyte series shows virtually the entire range of difference in forehead color through individual variation. Later, I examined a much larger series from Bohol, Samar, and Mindanao in YPM and found that even the tendency toward whiter foreheads in Bohol specimens could not be upheld. In the YPM series the Bohol specimens averaged colder, grayer, and less rufous on the underparts; in this character the Samar birds (supposedly *albifrons*) were a better match for Mindanao *brevirostris*. Too many individuals would be unidentifiable to make the recognition of *albifrons* practical, and I regard this name as a synonym of *brevirostris*.

***Phapitreron amethystina* Bonaparte, 1855**

Salomonsen (1952:345) correctly pointed out that *P. a. polillensis* Hachisuka, 1930, and *P. a. mindanaoensis* Manuel, 1936, were worthy of recognition and were not synonyms of *amethystina*. Some of the characters he utilized, however, do not hold up. Of the nominate race, Salomonsen had for comparison with Polillo specimens only two from Luzon and two from Samar. Comparing 10 Luzon specimens with three from Polillo, I find that the latter are not "darker brown on the underparts" as alleged by Salomonsen. On the other hand, the blackish brown dorsum of *polillensis* is a good character. Salomonsen showed that the larger size of Polillo specimens claimed by Hachisuka was only an average difference at best. In bill size, the three Polillo birds I examined were approached by only the largest of the Luzon series:

		Culmen from base
Luzon	♂	24, 24.5, 25, 25, 27, 27
	♀	22, 24.5, 25, 25.5
Polillo	♂	27.5
	♀	26.5, 26.5

As for Mindanao birds, Salomonsen describes these as being "lighter greyish brown on the crown" than nominate *amethystina;* whereas Rand and Rabor (1960:284), making the same comparison, state that their Mindanao birds "differ in having the top of the head darker and clearer gray (not lighter gray with a brownish tinge)." I would not characterize the crown of *mindanaoensis* as being either "lighter" or "darker" than

that of *amethystina,* but it is, as Rand and Rabor state, of a clearer and less brownish gray. The pale under tail-coverts of *mindanaoensis* mentioned by the latter authors is also a good character, but the vinaceous wash on throat and breast claimed by Rand and Rabor for Mindanao birds is variable and not to be relied on. The upperparts (except the crown) of *mindanaoensis* are little if at all different from *amethystina*; if there is any trend visible at all, it is in the direction of darkness in Mindanao birds, not lightness as stated by Salomonsen. The Davao Province specimens measured by Salomonsen seem to have been exceptionally small: he gave 138–145 as the wing length for *mindanaoensis* and 144–150 for *amethystina*. Specimens I have measured from Mts. Apo, Katanglad, and Malindang, Mindanao, have wings of 143, 143, 145, 146, 146.5, 147, 148, and 150; two Luzon birds now before me both measure 144. The validity of *mindanaoensis* must obviously rest on color rather than size, but the subspecies is adequately recognizable on the basis of the color of crown and under tail-coverts, as previously mentioned.

Macropygia phasianella tenuirostris **Bonaparte, 1854**

DeSchauensee (1957:6) called attention to the fact that his three Mindanao specimens of this species had shorter wings than his five from Luzon; he stated, "Whether this difference would hold in large series I do not know." I have measured specimens from the following islands: Luzon (8), Mindoro (2), Negros (3), Leyte (5), Mindanao (6), Basilan (4), Palawan (2), and Sulus (2). To my measurements can be added those of Rand and Rabor (1960) for Bohol and Mindanao, as well as those presented by deSchauensee. The results are as follows: Mindanao ♂—169, 172, 172, 174, 176, 176, 177; Mindanao ♀—170, 171, 171, 175. Luzon ♂—177, 177, 179, 179, 181, 182, 182, 185, 185, 190; Luzon ♀—174, 177, 180.

The measurements indicate that a separation between Mindanao and Luzon birds could, indeed, be made. Adding the measurements of birds from the intervening islands to those of Luzon would create very little additional overlap with Mindanao birds: ♂ 176–184, ♀ 173–179. On the other hand, the birds of Basilan, an island usually related to Mindanao in its avifauna, show tremendous variation for such a small series: ♂ 172, 179, 182; ♀ 167. The two birds examined from the Sulu Archipelago match Luzon birds in size: ♂ 182, ♀ 180. I believe, therefore, that unless other distinguishing characters can be found, the smaller size of Mindanao examples of this species should not be given nomenclatorial recognition.

***Prioniturus discurus* (Vieillot, 1822)**

Recent authors (Salomonsen, 1953; Rand and Rabor, 1960; deSchauensee and duPont, 1962) agree that the Samar, Leyte, and Bohol populations of this parrot are intermediate between nominate *discurus* of Mindanao and *whiteheadi* Salomonsen, 1953, of Negros. Salomonsen called these birds simply *discurus* ⇌ *whiteheadi;* the other authors, although discussing intermediacy, used the heading *whiteheadi,* thus by implication considering their specimens assignable nomenclatorially to that race. There are these points to be made:

1. The yellow of the underparts of Negros and Leyte birds described by deSchauensee and duPont has no geographic significance; the underparts are individually variable in color in the birds from all the islands under discussion.

2. My measurements bear out Salomonsen's statement that *whiteheadi* is larger than *discurus*. Our measurements indicate that the Mindanao series measured by deSchauensee and duPont consisted of rather small birds for that race (wing 144–150 vs. 143–155 of Salomonsen), that their Negros male was *very* small for *whiteheadi* (161; 158–170 Salomonsen; 162–171 Parkes), and that their Negros female was so small (153) as probably to have been an immature bird. This led them to place their Leyte specimens with the Negros rather than the Mindanao subspecies.

3. Immature birds of any race of this species have much less blue on the crown than do adults, and this may have misled some authors. When immature (short-tailed) birds are deleted from the series, Samar, Leyte, and Bohol birds are seen to be much closer to Mindanao than to Negros adults in the extent of blue on the crown, *contra* Rand and Rabor (1960) and deSchauensee and duPont (1962).

4. A character not used by previous authors is the dorsal coloration. Mindanao specimens are paler and more yellowish green (vs. deeper and purer green) than Negros birds and have on the foreback a distinctly yellowish area that is completely lacking in *whiteheadi*. Dorsal color in all Leyte birds examined is like that of Mindanao birds; one Bohol bird is nearest Mindanao birds, whereas another approaches Negros birds; of three Samar specimens, one resembles *discurus,* one *whiteheadi,* and one is intermediate.

5. Of the relatively small series I have measured of birds from these intermediate islands, eight adults from Leyte are decidedly the smallest (wing 149–161). Two from Bohol measured 160 and 166; two from Samar measured 161 and 163.

6. In conclusion, Salomonsen is correct in calling birds from these central islands intermediate, but the populations vary. Leyte specimens

are best considered *discurus*>*whiteheadi,* Samar intermediate, and Bohol *whiteheadi*>*discurus.*

Immature specimens of both these subspecies are duller green than adults, have less grass-green on cheeks and less yellowish green on the underparts, and have the blue of the crown duller and less extensive. A structural character separates the young of *discurus* and *whiteheadi.* It should first be pointed out that in adults the central rectrices grow with the shaft area proximal to the spatulate tip bare of barbs from the beginning (see AMNH 768214 and 768221). In young birds, however, the barbs are continuous along the shaft from the base to the tip but wear away (as in motmots, Momotidae) to produce the spatulate terminus (see AMNH 768217). In *discurus* the tip is rounded, and the area from which the barbs will be lost is somewhat pinched in, giving a spatulate appearance even before barb loss (see AMNH 620945). In *whiteheadi* the sides of this part of the feather are parallel; and the tip has straighter edges, being angulate rather than rounded (see AMNH 620936).

***Tanygnathus lucionensis* (Linnaeus, 1766)**

I fully agree with Rand and Rabor (1960:420–421) that it is futile to try to recognize as many green-backed subspecies of this species as did Salomonsen (1953). They combined all seven of the races recognized by Salomonsen into *talautensis* Meyer and Wiglesworth, 1895, the oldest name in the group, but apparently without actually examining specimens from the Talaut Islands. I have seen specimens in the AMNH of all of Salomonsen's putative subspecies and find that there is a clear difference between specimens from the Talaut Islands and all other green-backed populations. They have the bright blue of the head not restricted to varying portions of the crown, as in all other populations, but extending over the cheeks and entire facial area, even, in one specimen, to the chin. With one exception, no specimen examined from any Philippine island has more than a faint blue tinge on the cheek area. The exception is the type specimen of *nigrorum* Salomonsen, which approaches the Talaut birds in cheek color. However, as implied by Salomonsen himself (1953:219) in quoting Hartert's description of this very specimen as "remarkable," it is an aberrant individual. A series of eight Negros birds in the AMNH shows no approach to this bird; this matches the findings of Ripley and Rabor (1958:35–36) with respect to their Negros series. In calling the last-mentioned specimens *lucionensis,* however, the latter authors overlooked the difference between the blue-backed *lucionensis* of Luzon and Mindoro and the green-backed birds from farther south.

T. l. talautensis, then, must be considered a well-marked endemic race of the Talaut (or Talaud) Islands, between Celebes and Mindanao. The remaining green-backed populations of the species may then be combined under the next oldest name, *salvadorii* Ogilvie-Grant, 1896, type locality Mantanani Island, North Borneo. I have compared the same two Mantanani birds seen by Salomonsen with a good series from other islands. Synonyms of *salvadorii* are *horrisonus* Bangs and Peters, 1927 (Maratua Island, Borneo); *paraguenus* Hachisuka, 1930 (Puerto Princesa, Palawan); *koikei* Hachisuka, 1930 (Samal Island, off Mindanao); *moro* Hachisuka, 1934 (Jolo); *nigrorum* Salomonsen, 1953 (Canlaon Volcano, Negros); and *siquijorensis* Salomonsen, 1953 (Siquijor).

Salomonsen, in discussing the plumage sequence in this species, stated: "After the natal down follows apparently a juvenile plumage with brownish head, but I have seen only one bird of this appearance (in the Hachisuka-collection in PMYN)." Excessively worn individuals of this species appear very blackish on the head, as only the tips of the head feathers are green, the rest being brownish black. In the specimen mentioned by Salomonsen, which I have examined (Hachisuka 655, now S. Dillon Ripley collection 693), these head feathers are not only badly worn, but stained, as can be seen by examining other parts of the plumage. There is thus no "brown-headed" juvenal plumage, and the reader can skip to Salomonsen's description of what he calls "the ordinary juvenile plumage."

***Chrysococcyx xanthorhynchus* (Horsfield, 1821)**

This species is called *Chalcites xanthorhynchus* in most of the Philippine literature, but I fully agree with Friedmann (1968) that the genus *Chalcites* cannot be maintained. It is difficult enough to delimit the three genera *Cuculus, Cacomantis,* and *Chrysococcyx;* it does not help to artificially split any of them further.

Peters (1940:31) recognized three subspecies of this species, one with a query. *C. x. amethystinus* (Vigors, 1831) is the endemic Philippine race and is easily recognized by the bluer, less reddish violet of adult males. Peters considered *C. x. bangueyensis* (Chasen and Kloss, 1929) as a "doubtful form" and gave its range as Banguey Island, off northern Borneo. Friedmann (1968:110) gives the alternate spelling for the island (Banggi) and agrees that the race is dubious. Delacour and Mayr (1946:265) list *bangueyensis* as the resident race of Palawan, without comment; Peters had listed Palawan with a query in the range of nominate *xanthorhynchus.* The authors of *bangueyensis* described it as having less white on the rectrices than *xanthorhynchus.* I have examined no Banguey Island specimens, but I have compared a series of seven

Palawan specimens with the series of *xanthorhynchus* in the AMNH and cannot separate them. Whatever may be the validity of *bangueyensis,* then, it is not found in Palawan; Friedmann *(loc. cit.)* agrees in assigning Palawan birds to *xanthorhynchus.*

***Eudynamys scolopacea* (Linnaeus, 1758)**

Delacour and Mayr (1946:109) expressed their doubt about the validity of a Mindoro race of this species, *E. s. onikakko* Hachisuka, 1934 (not *"onikokko"* as spelled by Delacour and Mayr), by saying that the female was "alleged" to be lighter in color than that of *mindanensis,* the widespread Philippine race. Peters (1939:91) had already rejected it on the basis that his one Mindoro female was strongly rufescent, not "practically black and white." The type of *onikakko,* which I have examined in the AMNH, is a worn and faded female, but the new feathers that are beginning to appear on this specimen are as rufescent as in any other female *mindanensis;* so *onikakko* is a synonym of *mindanensis* (Linnaeus, 1766) .

A supposed Palawan subspecies, *E. s. paraguena* Hachisuka, 1934, was accepted by Delacour and Mayr (1946:265), who characterized it as having the "female redder and darker even than *E. s. mindanensis."* Peters (1940:37) considered *paraguena* "doubtfully distinct." I have compared the type and four additional females from Palawan with a good series of *mindanensis* from other islands. Just as the type specimen of *onikakko* is worn and faded, so the type specimen of *paraguena* is exceptionally fresh and unfaded, thus appearing to be richly colored. However, it can be matched by fresh specimens from Mindanao and elsewhere; and *paraguena,* too, is a synonym of *mindanensis.*

Traylor (1967:19–20) has given a detailed account of the plumage sequence of this species. He stated that the juvenal plumage is *not* wholly black, as had been stated by several previous authors, but blackish brown, with the lower breast and belly barred with buff. Traylor did not state the geographic origin of his juvenile specimens of this widespread Asian species. Rand (1951:581) described an "immature female" from Mindanao that was just beginning a molt into a barred plumage from a completely black plumage, similar to but duller and less glossy than the plumage of the adult male. The Philippine material in the AMNH indicates that in females such a black juvenal plumage is succeeded by a barred plumage but *not* of "adult female type" as characterized by Rand. This plumage differs from the definitive female plumage in having smaller rufous spots dorsally, slightly broader dark bars on the underparts (giving a blacker aspect), and narrower rectrices. The black juvenal

rectrices are also narrow. AMNH 627290 from Ayala, Mindanao, October 8, 1889, has one new narrow barred rectrix among the narrow black ones of the juvenal plumage. Traylor (*loc. cit.*) has already suggested, on the basis of a FMNH specimen from Bangkok, that in tropical populations of this species the "post-juvenal" molt may be complete and involve remiges and rectrices. The discrepancies that still remain among plumage descriptions of this species even after Traylor's careful study indicate that it is virtually a certainty that there is geographic variation both in the aspect of some of the predefinitive plumages and in the extent of the molts of young birds.

***Centropus melanops* Lesson, 1830**

The proposed subspecies *C. m. banken* Hachisuka, 1934, described as a Samar endemic, has had little support. Peters (1940:76) stated that its distinctness needed confirmation, and Delacour and Mayr (1946:111) called it "doubtfully distinct." Rand and Rabor (1960:334) were unable to confirm the supposed characters of *banken* and synonymized it with *melanops*.

I have examined an excellent series of this species, distributed as follows: Mindanao, 12; Basilan, 3; Samar, 15; Leyte, 14; Bohol, 3. I find that *banken* is a recognizable race; but, as might be expected on geographic grounds, it is not a Samar endemic. The birds of Samar, Leyte, and Bohol are *banken;* those of Mindanao and Basilan are *melanops.* The distribution of the two races thus matches a frequent pattern of geographic variation in Philippine birds. I agree with Rand and Rabor that size is not a character of *banken* and the subspecies must be defined on the basis of color. The most obvious character is the greater amount of black on the face of *banken,* just as described by Hachisuka. This is best seen by examining the specimens from above (dorsally): the buff area between the black face patches is narrower in *banken,* and the black also extends farther posteriorly. This character is even better developed in Leyte than in Samar birds.

The other characters of *banken* are more subtle and, unfortunately, tend to disappear rapidly with wear and fading of feathers. Such characters have been rejected by some taxonomists as "not useful" because so many museum specimens have been collected at the height of the breeding season and are too worn to use for color comparisons. This defeatist attitude overlooks the fact that such characters, even if visible for only a short period, have a genetic base and are just as much an expression of the genetic distinctness of a population as are more long-lasting and "useful" characters.

When unworn feathers are compared, then, it can be seen that the browns of Mindanao specimens are paler than those of *banken,* notably on the mantle and remiges. Fading of these feathers rather quickly obscures the color difference. Another character, overlooked by previous authors, lies in the color of the iridescence of rump, tail, and belly. This, too, is a difficult character to use because of the effects of wear. However, when the series as a whole are compared, it can be seen that the iridescence of Mindanao birds is greener; that of birds from Samar/Leyte/Bohol is bluer. This is especially noticeable when growing, fresh rectrices are compared.

The poorest specimens among the examined material are the three birds from Basilan. I cannot separate these from the Mindanao series of *melanops,* and so identify them, admittedly partly on the basis of geographic probability.

***Bubo philippensis philippensis* (Kaup, 1851)**

This owl is attributed to the island of Cebu in all of the standard literature in recent years. The supposed Cebu record is derived from Hachisuka (1934:49), who stated that "McGregor records in 1921 the Cebu specimen which arrived at Manila in captivity." In point of fact, Hachisuka misread the statement in McGregor (1921), which is as follows: "On May 2, 1921, we received a live owl at the Bureau of Science. Under the date April 30 Mr. Dean C. Worcester, of Cebu, wrote that he had received this owl from Catbalogan, Samar." A more nearly accurate statement about the same specimen is presented in Rand and Rabor's Samar list (1960:387) under *Bubo philippensis mindanensis* (Ogilvie-Grant, 1906): "Collected by Worcester in 1921." It is obvious that Cebu must be deleted from the range of the nominate race, which is known only from Luzon.

***Ninox scutulata* (Raffles, 1822)**

DuPont (1971) listed three Luzon specimens of this species under the name *N. s. florensis* (Wallace, 1864), following the usage of Deignan (1951). It is not clear from Deignan's paper whether he actually compared the type of *Athene florensis* Wallace with specimens from the Chinese population to which he assigns the name. Whether or not the name is applicable, I agree with Deignan that there is a paler mainland race, with grayer (less rufescent) tail and whiter underparts, that is separable from *N. s. japonica* (Temminck and Schlegel, 1850), as exemplified by Japanese specimens. In addition to the three Luzon specimens

listed by duPont, I have now examined another Philippine specimen of this migrant race in the James Ford Bell Museum of Natural History, University of Minnesota, where it bears the catalogue number 11501. It is a female collected by Bourns and Worcester (orig. no. 347) on the island of Sulu (= Jolo) during the Menage Expedition, September 30, 1891. I believe it to be highly likely that many Philippine specimens that have been identified in the past as *japonica* will prove, upon reexamination, to be referable to the pale, grayish race called *florensis* by Deignan.

***Penelopides panini* (Boddaert, 1783)**

Some of the characters that have been used in the literature to define races of this species are not trustworthy. Delacour and Mayr (1946:145) give a single description each for males and females of the entire species, stating that the subspecies differ "mostly in size and in the amount of light color on the tail." This overlooks the fact that the sexes are alike in the Mindoro race, *P. p. mindorensis* Steere, 1890. Hachisuka (1934:160) states that "the female is similar to the male but has the forehead blackish and the black band on upper throat wider." The material in the AMNH indicates that there is no correlation between sex and the width of the throat band. Ripley and Rabor (1958: 47) mention only the supposed blackish forehead of the female. This, too, is not a sex character; either it represents an age character or it is simply individual variation. Of three males in the AMNH, one has as much blackish on the crown and forehead as do the two females; one has somewhat less; and one has none at all.

The original description of *P. p. basilanica* Steere, 1890 (which was copied intact by Hachisuka [1934:165] without credit) relies heavily upon differences in tail pattern to separate this form from *P. p. affinis* Tweeddale, 1877, from Mindanao. The greater amount of rufous and lesser amount of black at the base of the tail claimed for *basilanica* are present only on the average. The pale (flesh color in life) base of the bill of *basilanica* is a much better character and is visible even in juveniles.

Although Leyte males do have, on the average, somewhat less black at the base of the tail than do Samar males, this is far too variable to warrant the recognition of *P. p. leytensis* Hachisuka, 1930, and it does not hold true in females. In fact, I can find no character by which Samar and Leyte females can be separated from *affinis,* and the recognition of *P. p. samarensis* Steere, 1890, rests on the buff rather than black upper tail-coverts of the male.

***Mulleripicus funebris* (Valenciennes, 1826)**

No one appears to have critically reviewed the validity of *M. f. mayri* Gilliard, 1949a, described from northeastern Luzon, such authors as Rabor (1955) continuing to use the name *funebris* for birds from northern Luzon without comment. I have reexamined Gilliard's original material in the AMNH, plus more recently acquired specimens in the AMNH and CM.

In separating *mayri* from *funebris,* Gilliard used tail and bill length; bill color; size of spotting on chin, throat, and neck; and amount of spotting on crown and occiput. The spotting characters represent a genuine trend, although the geographic variation is partly masked by individual variation. There is a decided cline in size, decreasing from north to south, that includes wing length but, as indicated by Gilliard, is better expressed in tail and bill length. The difference in bill color is as described by Gilliard, with northern birds having the maxilla yellowish ivory in the dried skin (I noted the bill color of CM 136931 in the field as being "whitish horn") and southern birds blackish; even in southern birds the distal portion of the mandible is usually pale. Gilliard has restricted the type locality of *funebris* to "Mt. Maguiling," Laguna, Luzon; this is a misspelling of the Spanish orthography Maquiling, which is now obsolete, the Filipino spelling Makiling being preferred. Birds from Laguna Province south in Luzon are typical of *funebris* in all characters, as is one from Cavite Province, west of Laguna. As Gilliard indicates, his series from Bataan is intermediate. One from southernmost Tarlac Province is intermediate, but nearer *mayri,* and two from Nueva Ecija Province show a mixture of characters.

In summary, *M. f. mayri* Gilliard can be recognized for the birds of northern Luzon, at least in Isabela, Cagayan, and Ilocos Norte provinces. Intergradation with *M. f. funebris* takes place in a fairly broad belt across central Luzon, starting just north of Manila.

***Dryocopus javensis* (Horsfield, 1821)**

At the time of my description of *D. j. samarensis* (Parkes, 1960a), the extant material of *D. j. pectoralis* (Tweeddale, 1878) from Leyte was highly inadequate. Subsequently, the AMNH received a fine series of eight Leyte specimens, and it was immediately apparent that the supposed differences between Samar and Leyte specimens were completely bridged by individual variation. *D. j. samarensis* Parkes is therefore a synonym of *D. j. pectoralis* (Tweeddale).

Additional material from Luzon has made it apparent that this is another of the species that varies geographically on that large island. At

present, all Luzon birds are called *D. j. confusus* (Stresemann, 1913), of which the type locality is Mount Arayat. Hachisuka (1930:181) erred in stating that the type locality is located in Benguet [subprovince], Mountain Province. Mount Arayat is a volcanic cone arising abruptly from the interior lowlands of northeastern Pampanga Province, about 45 miles north of Manila. The type of *confusus,* which I have examined, matches specimens from farther south in Luzon. The northern bird therefore needs a name and may be called:

***Dryocopus javensis esthloterus* new subspecies**

Type AMNH 416832, adult ♂, collected at Haight's Place, Benguet Subprovince, Mountain Province, Luzon, April 24, 1930, by Francisco Rivera.

Diagnosis: Similar to *D. j. confusus* (Stresemann) of central and southern Luzon, but white markings on throat and sides of head of both sexes greatly reduced, to the extent that they are wholly absent from the interramal area (which is streaked with white in *confusus);* bill averaging more slender. Width of bill at base: *esthloterus* ♂ 18; ♀ 16, 16.5, 17. *confusus* ♂ 18, 19, 19, 20; ♀ 18, 19, 20.

Range: Northern Luzon; known from Mountain and Isabela provinces.

Etymology: From the Greek *esthloteros,* meaning "better," in the confident hope that this subspecies is more certain to survive reexamination than was true of *samarensis.*

Specimens examined: *confusus*—Mt. Arayat (type), 1; Mt. Makiling, Laguna Prov., 3; Lamao, Bataan Prov., 1; Sorsogon, Sorsogon Prov., 1; "Camarines," 1; "Philippines," 2. *esthloterus*--Haight's Place, Benguet Subprov., Mountain Prov., 2; Benguet, unspecified, 1; Barrio Disulap, San Mariano, Isabela Prov., 4.

***Riparia paludicola tantilla* Riley, 1935**

Mayr (*in* Delacour and Mayr, 1945:111) sought to suppress *tantilla* as inseparable from *R. p. chinensis* (Gray, 1830), partly on the basis that differences in rump color were "slight" and partly because of uncertainty of the type locality of *chinensis.* My original comparisons were made with my own three specimens, collected in Luzon in 1956. They were completely unlike any AMNH specimens of *chinensis,* being much darker. This might have been attributed to differences in museum age, as the newest specimens at the AMNH had been collected 18 and 21 years earlier. However, in all specimens of *chinensis* (including the one Formosa specimen cited by Mayr) the rump is noticeably paler than the

back, whereas in my three specimens from Luzon it is scarcely if at all paler.

Riley's original comparison states that *tantilla* is similar to *chinensis* "but darker above, especially on the pileum and rump." Like Mayr, I could not verify any special darkness on the pileum. Riley's Philippine specimens were old (the type was collected in 1907), and yet the dark color as compared with Burmese and Siamese specimens was still obvious. I have subsequently examined the type series in the USNM and have confirmed the absence of a pale rump area as an excellent character of Luzon birds. As for the type locality, this has now been fixed by Deignan (1963:100) as Formosa; as just mentioned, the Formosan bird in the USNM matches mainland specimens, but not Luzon birds, in having a pale rump. I therefore consider *R. p. tantilla* to be a recognizable endemic Philippine subspecies, characterized by having the rump not paler than the back and (probably) by general darker dorsal coloration than *chinensis*.

Hirundo rustica **Linnaeus, 1758**

Both the taxonomy and the nomenclature of the Barn Swallow populations of Asia are uncertain. Delacour (1951:25–26) recognized three subspecies among the winter visitors to Indochina: *gutturalis* Scopoli, 1786, with white underparts; *tytleri* Jerdon, 1864, with chestnut underparts; and *mandschurica* Meise, 1934, for an intermediate form. Vaurie (1959:11) uses the name *saturata* Ridgway, 1883, for the intermediate form, with *mandschurica* as a synonym. Peters (1960:106–107) recognized *four* subspecies under the four names just mentioned, but he considered the status of *saturata* uncertain, as Dementiev had been unable to distinguish birds from Kamchatka (type locality of *saturata)* from the North American *erythrogaster* Boddaert, 1783.

Without question, more than one form of Barn Swallow migrates to the Philippines. The vast majority are referable to *gutturalis,* which has the underparts white to faintly pinkish. A few are more intensely pigmented below, but not as dark as *tytleri.* Whether these birds can, in fact, be separated in series from *erythrogaster* is an open question; the one now before me has a richer chestnut throat than any *erythrogaster* in the CM series, but this may not be consistent, and the remaining portions of the underparts can be matched in the New World series. For convenience, I follow Vaurie in using the name *saturata* for these birds. Specimens I have identified as being of this form are AMNH 296071 and 296073, Las Pinas, Rizal Province, Luzon, September 19, 1915, and CM 138359, Tacloban, Leyte, September 28, 1945.

***Hirundo tahitica javanica* Sparrman, 1789**

The subspecific treatment of the Pacific Swallows of the Indo-Malaysian area has fluctuated greatly. The Philippine population has gone under three or four different names with shifting concepts. Oberholser (1926) described the Philippine population as *Hypurolepis javanica mallopega*. Peters (1960:108) synonymized this name with *H. j. abbotti* Oberholser, 1917, type locality Anamba Islands. The name *H. j. hypolampra* Oberholser, 1926, was synonymized by Peters with *javanica*.

After I had looked over the available material in the AMNH, it appeared that Oberholser badly oversplit these swallows, and I refer the Philippine birds to *javanica*. Whether the name *abbotti* is valid for the birds of a portion of the large range listed by Peters I am not prepared to say, but I am satisfied that Philippine birds cannot usefully be separated from those of Java.

***Coracina striata* (Boddaert, 1783)**

Delacour and Mayr (1946:164–167) list briefly the characters of the races recognized at that time, and Ripley and Rabor (1958:55–56) discuss geographic variation in some detail. A few additional, supplementary, or corrective points can be made.

Subsequent to the appearance of the two papers just cited, Rand and Rabor (1959) separated *C. s. boholensis* of Bohol and Samar from *C. s. kochii* (Kutter, 1882) of Mindanao, with which birds from Bohol and Samar had formerly been placed. Rand and Rabor did not examine Leyte specimens nor mention Leyte; but, as might be expected, birds from that island are referable to *boholensis*. Although this is a good subspecies, there are fewer valid differences between it and *kochii* than were listed by its authors. The best characters lie in the described differences in the barring of the rump and under tail-coverts, except that a few individuals of *kochii* have as much black barring on the under tail-coverts as do some of the less heavily marked individuals of *boholensis*. In series there is no significant difference in the shade of gray of the underparts. The only difference in the black barring of the abdomen is that in most, but not all, *kochii* the bars thin somewhat on the middle of the abdomen; whereas in most, but not all, *boholensis* the bars are consistent in width across the abdomen. My measurements show no size difference.

Within *kochii*, Basilan specimens tend to have black barring on the under tail-coverts more often than do Mindanao specimens, although they are farther from the range of *boholensis*.

A careful reading of the accounts of *panayensis* (Steere, 1890) and *kochii* in Delacour and Mayr (1946:164) will show that, although both races are described in some detail, there is actually no character given in the descriptions to differentiate between the two; the wording of Ripley and Rabor is clearer when they describe the female of *panayensis* as having "patches of solid gray mixed with black and white barring on the breast, becoming clear black and white bars on the abdomen . . ." etc.; whereas female *kochii* is "barred with black and white on the entire underparts." In point of fact, the degree of development of the barring on the anterior underparts of *panayensis* is highly variable. Ripley and Rabor mention no differences between males of these two races. There are three excellent characters differentiating both sexes of *kochii* and *panayensis*. The latter is larger (wing of ♂ approximately 170 vs. 155 in *kochii*), more *heavily* barred on rump and abdomen, and much blacker on the lores; in fact, the male of *panayensis* has a clearly defined black mask extending back over the eyes.

Neither of these pairs of authors mentions the characters of young birds. In addition to the longer and more pointed rectrices typical of young Campephagidae in general, they have prominent white borders on the wing-coverts and are much more extensively barred. For example, in the nominate race of Luzon, adult males normally have only a trace of barring on the rump (somewhat more in birds from southernmost Luzon), and adult females have bars on the rump and posterior underparts. Young males resemble adult females, with heavily barred rumps and posterior underparts; whereas young females are barred from the chin to the under tail-coverts (as in *kochii* adult females) and apparently on the back as well, judging from CM 136939 from Tarlac Province, August 9, 1956, the youngest Philippine specimen examined.

Ripley and Rabor consider plain gray plumage primitive in this species, with evolution tending toward increasing amounts of black and white barring. In view of the barred condition of the young of unbarred races, I suspect that the exact opposite sequence of evolution may be correct. The female of the all-gray race *mindorensis* preserves a trace of the barring on the under wing-coverts; in this concealed area it is easier to imagine this as a relict pattern than as the beginning of something that will be selected for.

***Coracina morio* (Müller, 1843)**

The type locality of *Edoliisoma elusum* McGregor, 1905 (= *Coracina morio elusa*) is Balete, Río Bacó, Mindoro. Luzon birds have hith-

erto been assigned to this race, but comparison of assembled series from the two islands shows that the Luzon birds are separable. They may be known as:

***Coracina morio lecroyae* new subspecies**

Type AMNH 459424, adult ♂, collected at Lamao, Bataan Province, Luzon, Philippines, on November 29, 1947, by E. Thomas Gilliard (collector's no. 210).

DIAGNOSIS: Similar to *C. m. elusa* of Mindoro, but wing and especially tail shorter; general body color somewhat paler gray; edgings of remiges and wing-coverts decidedly paler gray, even whitish in females, so that wing edgings are distinctly paler than body color rather than concolorous as in *elusa*.

MEASUREMENTS: ♂ wing: *elusa* 129, 130, 132, 134, *lecroyae* 126, 126, 127, 128, 128, 130, 132. ♂ tail: *elusa* 102, 104, 107; *lecroyae* 90, 93, 97, 98, 98, 98.5. ♀ wing: *elusa* 127, 127; *lecroyae* 116, 122. ♀ tail: *elusa* 95, 99; *lecroyae* 90, 91.

RANGE: Island of Luzon.

ETYMOLOGY: *Coracina morio* is one of the relatively few Philippine land birds whose range extends to New Guinea. Tom Gilliard, collector of the type of the new race, may have been the only ornithologist to have collected the species in both areas. It is a pleasure to name this race for Dr. Gilliard's long-time collaborator, Mrs. Mary LeCroy of the AMNH, who has always been most helpful in my Philippine studies.

As recently as Vol. 9 of the Peters Check-list in 1960, the range of *C. m. mindanensis* (Tweeddale, 1878) was given simply as Mindanao and Basilan; the species has since been collected on Samar, Leyte, and Bohol. Rand and Rabor (1960:396) stated that their one Samar female did not differ from Mindanao specimens, while deSchauensee and duPont (1962:161) pointed out differences in both size and color between three Leyte and three Mindanao specimens. Examination of material from several museums shows that the birds of Samar, Leyte, and Bohol can be separated from those of Mindanao and Basilan and may be called:

***Coracina morio ripleyi* new subspecies**

Type AMNH 768363, adult ♀, collected at Barrio Patok, Dagami, Mt. Lobi, Leyte, Philippines, on July 27, 1961, by G. Alcasid and M. Celestino.

DIAGNOSIS: Nearest *C. m. mindanensis,* but wing and tail averaging longer; males with rump paler than back but not as pale as in *mindanensis,* and with all grays (body, wing edgings) paler, about as in *lecroyae* of Luzon; females with rump usually pale gray rather than whitish as in *mindanensis,* and lower abdomen and under tail-coverts light gray, not white; terminal black band of central rectrices of both sexes narrower. Although this subspecies is obviously intermediate in its characters between *lecroyae* and *mindanensis,* it cannot be placed with either one; it is relatively stable in its characters over a large range of its own, so is worthy of nomenclatorial recognition. There is some variation: a Leyte female (DMNH 2166) is as white on the under tail-coverts as *mindanensis,* but has the reduced black tail band typical of *ripleyi.*

MEASUREMENTS: ♂ wing: *mindanensis* 117, 117, 117, 119, 120, 120, 121; *ripleyi* 124, 124.5, 125. ♂ tail: *mindanensis* 88, 91.5, 92, 92, 93.5, 94; *ripleyi* 92, 96, 99. ♀ wing: *mindanensis* 116, 116, 117, 117, 120; *ripleyi* 118, 120, 121, 125. ♀ tail: *mindanensis* 83, 89, 90.5, 91.5, 94; *ripleyi* 94, 94, 99.

RANGE: Islands of Samar, Leyte, and Bohol.

ETYMOLOGY: This subspecies is named in honor of Dr. S. Dillon Ripley of the Smithsonian Institution, one of the most prolific of modern contributors to our knowledge of Philippine birds.

As literature descriptions suggest, *C. m. everetti* (Sharpe, 1893) is exceedingly close to *elusa.* I have seen only three Sulu specimens and cannot separate these from Mindoro birds in color. They are, however, smaller. Thus *everetti,* which is geographically separated from *elusa* by the distinctive pale-rumped *mindanensis,* is a poorly characterized race of the size of *lecroyae* and the color of *elusa.* The two Sulu males measure wing 118, 126; tail 92, 102. The smaller of the two specimens is a subadult.

SPECIMENS EXAMINED: Luzon, 9; Mindoro, 5; Leyte, 6; Bohol, 2; Samar, 1; Mindanao, 9; Basilan, 5; Sulu Archipelago, 3.

Coracina ostenta Ripley, 1952

Steere (1890:14) named two new species of campephagids as *Artamides Panayensis* and *Edoliisoma (Graucalus) Panayensis.* For many years, both of these names were used, in the forms *Coracina striata panayensis* and *Edolisoma panayensis* respectively. With the merging of *Edolisoma* into *Coracina* now generally accepted, Ripley (1952) pointed out that there were now two forms of identical date named *panayensis* within the expanded genus *Coracina;* and as first revisor, he proposed the name *Coracina ostenta* as a substitute for *Edoliisoma (Graucalus)*

Panayensis Steere. Mayr (*in* Peters, 1960:193, footnote) claimed that "this name is invalid because of the mandatory provision stated in Bull. Zoöl. Nomencl., 4, 1950, p. 265, par. 38, and *id.*, 14, 1957, p. 184, Art. 24, Sect. 14, which states that 'If homonyms are of identical date, one proposed for a species takes precedence over one proposed for a subspecies.'" This provision (now Article 57e of the International Code of Zoological Nomenclature) does not apply to the present case, and Mayr's action (which left two *"panayensis"* within *Coracina* in the Peters Check-list) was unwarranted. Steere proposed *both* of his names for what he believed to be species; the fact that later authors have made the *subjective* taxonomic decision to consider *Artamides Panayensis* Steere a subspecies of *Coracina striata* is irrelevant. As first revisor, Ripley was perfectly within his rights in retaining the first *panayensis* on the page and renaming the second, and *Coracina ostenta* Ripley is the valid name for the White-winged Graybird.

I may say in passing that I do not consider the smaller bill, invoked by Voous and van Marle (1949:33) to be a sufficient basis for reviving *Edolisoma,* nor can I follow Mees (1964:15) in recognizing *Edolisoma* "mainly because otherwise *Coracina* would become a very large genus."

***Dicrurus balicassius* (Linnaeus, 1766)**

In naming *D. b. abraensis* from northern Luzon, Vaurie (1947:2) neglected to restrict the type locality of *Corvus balicassius* Linnaeus, 1766 ("Philippines"). He obviously assumed the type locality to be the vicinity of Manila, and it should be so restricted. The species is, however, a forest bird and does not now occur at Manila itself, nor did it probably occur there in the late 18th century. I therefore restrict the type locality of *balicassius* to Mount Makiling, Laguna Province, a well-known locality near Manila from which ample topotypical material is available.

Material received in recent years by the YPM from Cagayan Province and by the AMNH from Isabela Province amply confirms the validity of *abraensis* Vaurie as a race of northern Luzon. The statement in Vaurie (1962:148) to the effect that *abraensis* "intergrades with *balicassius* in north-central Luzon in the region of the Lingayen Gulf or a little to the south of it" was based on two specimens from Bayambang, Pangasinan Province. Recent specimens help to verify and clarify the zone of intergradation. A specimen from the Tarlac-Pampanga border, about three miles southwest of Bamban (CM 136940), and a series in the AMNH and CM from central Nueva Ecija Province are all intergrades between *abraensis* and *balicassius,* while Gilliard's Bataan Peninsula series (AMNH), not used by Vaurie, is typical *balicassius.* The

northernmost specimens assigned to *balicassius* by Vaurie were from Rizal Province, and CM material from that province confirms Vaurie's identification.

***Dicrurus hottentottus samarensis* Vaurie, 1947**

Rand and Rabor (1960:360–361) rejected this subspecies, considering it a synonym of *D. h. striatus* Tweeddale, 1877. Vaurie based *samarensis* on three characters: length of tail, depth of tail fork, and width of the spangles of throat and breast. I agree with Rand and Rabor that the variation in the latter two characters has no geographic correlation. In tail length, however, my measurements of Leyte specimens not seen by other authors, plus the measurements published by Vaurie and by Rand and Rabor, indicate that there is an overlap of only 2 or 3 mm. between the two forms. The tail length differences are sufficiently consistent to warrant recognition of Vaurie's *samarensis* as a weak but recognizable subspecies. In the specimens I have measured, the longest (outermost) rectrix of *striatus* is 100–111.5, of *samarensis* 90–99.5. Assuming the measurements were made the same way, there is a slight overlap when the measurements of Rand and Rabor are added; they found a maximum of 102 in Bohol and 103 in Samar specimens.

***Oriolus albiloris* Ogilvie-Grant, 1894**

Gilliard (1950:502–503) cleared up the question of the relationships of *Oriolus albiloris* and *O. isabellae* Ogilvie-Grant, 1894, pointing out that they had nothing to do with one another, *contra* the suspicions of Delacour and Mayr (1946:254) that the two forms might be age classes or color phases of a single species. Gilliard did not, however, take the next step and show that *Oriolus albiloris* is nothing more than the Luzon representative of *O. xanthonotus,* albeit a highly distinctive one because of its xanthic pigmentation. The relationship is shown clearly in the bill color, tail pattern, general size and proportions, and the subdued streaking of *albiloris* that corresponds exactly in pattern to the streaking of *O. xanthonotus* subsp. The chest of *albiloris* is even darkened in the same area that is gray or gray-brown in Philippine races of *xanthonotus.* At first glance, the differences between *albiloris* and the races of the rest of the main Philippine archipelago may seem so striking as to preclude conspecificity. If these latter birds, however, are to be united (as they have been by all recent authors) with the black-headed, black-winged, black-tailed *O. xanthonotus* Horsfield, 1821, of Malaysia as a single species, then there is no doubt that *albiloris,* which in some ways resembles the other Philippine races more than the latter do *xan-*

thonotus, should also be considered a member of this species. The White-lored Oriole, then, should be known as *Oriolus xanthonotus albiloris.*

Incidentally, the sequence of the subspecies of *Oriolus xanthonotus* as listed by Greenway (1962) is misleading; the Palawan race *O. x. persuasus* is placed among the Philippine races; but it is, in fact, one of the black-headed group allied to *O. x. xanthonotus* (and was not considered separable from *O. x. consobrinus* of Borneo by Delacour and Mayr [1946:282]).

***Parus semilarvatus* (Salvadori, 1865)**

The type locality of *Melaniparus semilarvatus* Salvadori was originally given as "Himalayas" as the two original specimens had been catalogued into the Turin Museum along with a Himalayan collection. Salvadori himself was dubious about their origin, as he later (1879) conjectured that they might have been received with a collection from central Africa; and, in a list of species of the "genus" *Melaniparus,* he gave the range of *semilarvatus* as "in Himalaja, an potius in Africa centrali?" Gadow (1883:38–39) pointed out that two specimens in the BMNH were labeled, respectively, "Philippine Islands" and "N. China" but that the latter specimen was from the Fortune collection, many of which came from Luzon. The first specimens with definite localities were two from the vicinity of Manila, reported by Wardlaw Ramsay (1884:334–335), and shortly thereafter Whitehead collected the species at several localities in Luzon. Worcester and Bourns (1898:560), in a table of distribution of Philippine birds by islands, indicated the presence of *Parus semilarvatus* on Negros. McGregor (1909:608) attributed the Negros record to the Steere Expedition. The report of the latter (Steere, 1890) does not list this species, nor can I find any documentation for any Negros record. Although Negros appears in the literature of *Parus semilarvatus* as recently as the Peters Check-list (Snow, 1967), there does not appear to be a documented Negros record for the species, which is known only from Luzon and Mindanao.

No formal designation of the type locality of *semilarvatus* appears to have been made, although when the species was thought to be confined to Luzon (*i.e.,* before Negros was erroneously added to the range), the type locality was obviously inferentially Luzon. As it now develops that there is geographic variation on the island of Luzon itself, a further restriction must be made. The colored plate of the type specimen (Salvadori, 1879) shows a bird matching quite well the population of central and southern Luzon, and this is, of course, the most likely source of

specimens in the mid-19th century. I therefore restrict the type locality of *Melaniparus semilarvatus* Salvadori, not simply to "Manila," as this is a species of mountain forests, but specifically to Mount Arayat, Pampanga Province, Luzon, the first *definite* locality from which the species was reported (Whitehead, *in* Ogilvie-Grant, 1894:408).

As long ago as 1896, Ogilvie-Grant, in describing specimens of *Parus semilarvatus* from Cape Engaño, northeasternmost Luzon, mentioned precisely the characters by which the population of northern Luzon is distinguished. He stated (1896:119) that in a young male "the white patch on the nape is very conspicuous" and that "it is worth mentioning that the adult *female* differs from the adult male in having the underparts deep brown instead of shining black, for this sexual difference appears to have been hitherto overlooked." It was overlooked because it is much less true of the birds from near Manila, the only ones previously described.

The distinctive northern race may be known as:

***Parus semilarvatus snowi* new subspecies**

Type AMNH 768004, adult ♀, collected at Barrio Disulap, San Mariano, Isabela Province, northern Luzon, Philippines, on May 10, 1961, by G. Alcasid *et al.* (collectors' no. 403).

Diagnosis: Adult males differ from *semilarvatus* of central and southern Luzon in being slightly duller, less glossy black above and below; the concealed white patch on the nape averaging more extensive; inner webs of remiges with broader, purer white edgings; bases of under tail-coverts more extensively white. Adult females differ more strikingly: the underparts are decidedly browner than in *semilarvatus,* and the upperparts less glossy; the white nape patch (which is larger than that of males in both races) conspicuous, not fully concealed, and continuing (partly concealed) around the sides of the head as a "semicollar"; white on remiges as in males. Juvenile males resemble adult females in having the "semicollar"; there is a trace of this in juveniles of *semilarvatus,* but it is much more concealed. No detailed comparison is needed with *P. s. nehrkorni* (Blasius, 1890), the Mindanao subspecies, which differs from both Luzon races in having a conspicuous white band across the remiges.

Range: Northern Luzon (see list of specimens examined for localities).

Etymology: This new titmouse is appropriately named for Dr. David Snow of the British Museum (Natural History), author of the section on the family Paridae in the Peters Check-list.

Specimens examined: (All localities are on Luzon.) *P. s. semilarvatus*

—Mount Arayat, 1; Bataan Province (various localities), 6; Sorsogon, 2. *P. s. snowi*—San Mariano, Isabela Province, 8; Cape Engaño, 3; Isabela Province (unspecified), 1.

***Rhabdornis mysticalis* (Temminck, 1825)**

Rand and Rabor (1960:436) recommended the recognition of three races, rather than the traditional two, of this species; and their treatment was followed in the most recent list, that of Greenway (1967:161). For the birds of Negros and (probably) Panay, Rand and Rabor revived the name *R. m. longirostris* McGregor, 1911. Their material, however, was severely limited. They presented measurements of one pair each from Bataan and Abra provinces, Luzon, as representative of *mysticalis* and 3 ♂ 1 ♀ from Negros as representative of *"longirostris."* As their measurements show, and as they state, "The birds of the mountains of northern Luzon are larger than those from Bataan." In point of fact, a decided cline in decreasing bill length runs from north to south in Luzon, as shown below:

Northern (various provinces): AMNH, CM, FMNH
♂ (total culmen) 26, 27, 27, 27, 27, 27.5, 28, 28, 29
♀ 25, 25.5, 26, 27, 27.5, 27.5, 27.5
Central (Bataan Prov., FMNH; Laguna Prov., CM)
♂ 24
♀ 23, 25
South (Sorsogon Prov.): AMNH
♂ 23, 23, 23, 24.5
♀ 21.5
Negros: AMNH, FMNH
♂ 27, 27.5, 27.5, 28, 28.5, 29
♀ 25

As already suggested by Rand and Rabor, there are no color characters separating any of these populations. The measurements of Negros specimens are precisely the same as those of northern Luzon. I see no basis here for the recognition of *"longirostris"* and regard this name as a synonym of *mysticalis.*

Neither Delacour and Mayr (1946:220) nor Greenway (1967:161) lists the island of Catanduanes in the range of this species. In the AMNH there are three specimens collected by Whitehead on that island; they do not differ in any way from Luzon *R. m. mysticalis.*

The subspecies *R. m. minor* Ogilvie-Grant, 1896, although also based chiefly on bill length, can be recognized; culmen measurements are consistently smaller than even the smallest of Luzon *mysticalis* (see Rand and Rabor, 1960:436). Rand and Rabor also state that *minor* differs from *mysticalis* "in the browner, less grayish brown upper parts." There is a strong but inconsistent tendency in this species toward sexual dimorphism in the color of the upperparts. In general, males are grayer and females browner. Two specimens in the AMNH taken by reliable collectors represent exceptions. AMNH 296389, from Mt. Makiling, Laguna Province, was marked as "♂ ad." by John T. Zimmer and is very brown, whereas a gray-backed bird, AMNH 459618, taken by E. T. Gilliard at Lamao, Bataan, not only is sexed as female but has a drawing of the gonad on the label. Thus, color comparisons must be made on a sex-for-sex basis. I find little difference between gray individuals of *mysticalis* and *minor*, but it is true that brown individuals from Samar and Leyte are slightly ruddier than those from Luzon.

***Stachyris striata* (Ogilvie-Grant, 1894)**

This has been considered a highland species; Delacour and Mayr (1946:189) give its range as "mountain slopes of northern Luzon, between 4000 and 6000 feet." A series recently received by the AMNH was collected on April 24, 1961, at Sitio Pinablog, Barrio Santa Filomena, San Mariano, Isabela Province, at an altitude of 380 feet.

***Cisticola juncidis* (Rafinesque, 1810)**

I accept only tentatively the name *tinnabulans* (Swinhoe, 1859) for the population of this species in the Philippines, as used by Lynes (1930) and other authors. After examining the AMNH material from the large range ascribed to *tinnabulans*, I believe it almost certainly to be a composite race. The type locality is Formosa, and unfortunately only a single worn bird from this island was available. There is the added complication that at least some of the mainland populations ascribed to *tinnabulans* are migratory. A series from several mainland localities in the vicinity of the mouth of the Yangtze River is colder, less rufescent than Luzon birds, while a small series from the island of Hainan is richer in color and less contrastingly streaked than Luzon birds. A long series in the YPM from various parts of Indochina are warmer and more rufescent in color than the Luzon sample.

Lynes (1930:96) considered "southern Philippine birds, *e.g.* Bohol and Palawan" to represent intergrades between *tinnabulans* and *fuscicapilla* Wallace, 1863, the subspecies of eastern Java, the Lesser Sunda

Islands, and Celebes. I have examined nine Palawan specimens, four of which were handled by Lynes and labeled by him as intergrades, as noted above. I disagree with this analysis and find that the Palawan population differs from both *fuscicapilla* and *tinnabulans* (including both Luzon and other populations). It amply merits its own name and may be called:

***Cisticola juncidis nigrostriata* new subspecies**

Type USNM 477502, adult ♂, collected at Puerto Princesa, Palawan, Philippines, on May 22, 1962, by D. S. Rabor.

Diagnosis: Much more heavily and blackly streaked dorsally than *fuscicapilla* and more so than in most Luzon specimens, with the edgings of these dorsal feathers colder and less rufescent than in either *fuscicapilla* or *tinnabulans*; the rump color differs in the same way. Underparts whiter than in most Luzon specimens, more like *fuscicapilla* in this.

Range: Island of Palawan. Birds from the Calamianes group, between Palawan and Mindoro, usually belong to Palawan subspecies. Unfortunately, only a single specimen of *Cisticola exilis* has been available from these islands, CM 138270 from Culion. It exhibits the heavy black dorsal streaking of *nigrostriata,* but the general ground color of the upperparts (except for the crown) does not exhibit the cold tones typical of that race. However, it was collected in 1892, whereas most of the Philippine material used for comparison is much more recent; so the rufescence of the back and rump of this specimen may represent "foxing." On the other hand, the birds of the Calamianes may ultimately prove to be intergrades between *nigrostriata* and the Philippine birds currently called *tinnabulans.*

Etymology: The subspecific name is taken from the Latin *niger,* black, and *stria,* furrow or stripe, referring to the heavy black dorsal streaks of this race.

General remarks on Cisticola sp. in the Philippines: The two species of this genus found sympatrically in the Philippines, *C. juncidis* and *C. exilis,* are quite distinctive in the hand, but a surprising number of specimens in collections have been misidentified; for example, the Culion skin of *juncidis* just mentioned was identified by the collectors, Bourns and Worcester, as *exilis.* They are readily separable by tail pattern: *juncidis* has a pure white terminal and sharply defined black subterminal band on the rectrices, a pattern never present in *exilis.* Gilliard (1950:495) commented on the difficulty of collecting both of these species; during his Bataan expedition he secured only one

juncidis and three *exilis*. This difficulty is a function of season. Gilliard was collecting in November and December. I collected these warblers in several provinces of central Luzon (Tarlac, Pampanga, Rizal, Cavite) on dates ranging from August 4 to September 13, just at the end of the breeding season. At this time both species were still singing and could also easily be located by their call notes. They responded quickly to a "squeak," and would usually remain more or less in the open for some time, scolding the intruder, before disappearing back into the grass. Although I collected only four *exilis* and five *juncidis*, I could readily have obtained more if I had made a special point of getting *Cisticola*. On Mindoro, according to Ripley and Rabor, *exilis* prefers drier, somewhat more upland areas than *juncidis*, although both may be found in the same tract of grassland. In the vicinity of Clark Air Force Base, Pampanga Province, my notes state, "Although virtually side-by-side with *exilis, juncidis* seems to prefer shorter grass." On the other hand, at Novaliches, Rizal Province, where I collected one each of the two species, my notes state, "Little or no ecological separation here—both species side-by-side."

***Cisticola exilis semirufa* Cabanis, 1866**

The Philippine population of the Golden-headed Fantail Warbler has appeared in most of the literature under the name *C. e. rustica* Wallace, 1863, of which the type locality is Buru Island in the Moluccas. I have compared a total of 11 Buru Island, 8 Celebes, and 24 Philippine specimens (AMNH + ANSP) and find that the name *semirufa* Cabanis (type locality Luzon) should definitely be revived for the Philippine birds. Dorsally, Philippine specimens are paler rufous on the crown and have the edges of the streaked feathers of the back grayer; there is more contrast between the color of the crown (more rufous) and the ground color of the back (less rufous) in *semirufa* than in *rustica*. Ventrally, Philippine birds are whiter, less completely suffused with rufous, plumage for plumage. This is true even of birds in juvenal plumage. Two juveniles from Buru (AMNH) are pale lemon-yellow below, with no white; whereas CM 137026, from Novaliches, Rizal Province, Luzon, is whitish below, faintly washed with yellow, heaviest on the breast but pure white on the midabdomen.

***Phylloscopus olivaceus* (Moseley, 1891), *Phylloscopus cebuensis* (Dubois, 1900), and *Phylloscopus trivirgatus* (Strickland, 1849)**

Rand and Rabor (1952) were the first to demonstrate that there are two endemic Philippine species of *Phylloscopus* that had previously

been confused, all passing under the name *P. olivaceus*. They revived the name *cebuensis* for the second species, which they considered to be monotypic and confined to Cebu (type locality) and Negros. *P. o. olivaceus* was assigned to Samar (restricted type locality), Negros, Mindanao, and the Sulu Archipelago. A new subspecies, *P. o. luzonensis*, was named, with the type locality Massisiat, Abra Province, in northwestern Luzon. The range was given as "probably Luzon only," and the only localities cited were Abra Province and "central Luzon," with the statement that "there is little difference between northern and central Luzon birds. Skins taken many years ago have the grays slightly duller and the yellow somewhat warmer than in fresher skins." It was not stated whether the new and old samples came from the same or different areas of Luzon, and the source in "central Luzon" was not given.

Rand and Rabor considered "the possibility of relating *luzonensis* with *cebuensis*, rather than *olivaceus*." They considered the new subspecies "in some ways. . .equally close to both." Their final decision was made on the basis of geographical distribution; *luzonensis* "seemed to be better considered a representative of *olivaceus* and that led [them] to unite it with *olivaceus*."

In a more recent paper, Rand and Rabor (1967) described a new southern Luzon subspecies as *sorsogonensis* and placed it in the species *P. cebuensis*. Their entire discussion of species relationship is as follows: "It seems advisable to consider *cebuensis* a species with three races: *sorsogonensis*, yellowest race, southern Luzon; *cebuensis*, medium yellow, Negros; *luzonensis*, least yellow race, northern Luzon. *P. olivaceus* is thus left as monotypic." The range of *sorsogonensis* was given simply as "southern Luzon in Camarines Sur and Sorsogon Provinces"; the identity of central Luzon birds was not discussed. No explanation of why "it seems advisable. . ." was presented, no rationale for reversing their decision on the relationships of *luzonensis* was given, and no species characters differentiating *olivaceus* and *cebuensis* were listed.

Some years earlier, in studying the AMNH and CM material, I had come to the conclusion that *luzonensis* Rand and Rabor had been described in the wrong species and was, in fact, a race of *cebuensis* rather than of *olivaceus*. The following characters distinguish *olivaceus* from all of the races, collectively, of *cebuensis*: throat white rather than yellow; crown grayer, less green; postocular line obscure and white rather than well developed and yellow; light tips of greater wing-coverts forming a single wing bar (absent in *cebuensis*).

As for the identity of central Luzon specimens of *P. cebuensis*, I sent Dr. Rand two Laguna Province specimens for comparison with his series of Abra Province *luzonensis* and his series from southernmost

Luzon (which, although not yet described, I had seen in the FMNH in 1963 bearing the manuscript name *"sorsogonensis"*). Rand (letter of November 17, 1965) described these birds as follows: "As you suspected, they are intermediate between the pale grayish birds from the extreme north and the more richly colored birds from the extreme south. This results in the very unsatisfactory situation of the central Luzon birds being very similar to Negros birds." My own notes indicate that three Bataan Province specimens in the AMNH are "dingier and less yellow" than the series from the vicinity of Laguna de Bay, indicating that they are closer to *luzonensis* of northern Luzon.

The two species are sympatric on Negros. Rand and Rabor (1952) found them both at Tolong, 1500–2000 feet, and at Bais, 1000 feet. They considered *P. cebuensis* on Negros as apparently "a higher altitude species with a partial overlap, at least, with the lower altitude *P. olivaceus.*" The zone of overlap reaches a substantially higher elevation. YPM 23762, originally identified as *cebuensis,* is a specimen of *olivaceus* collected by Rabor at Pula, Canlaon, May 2, 1953, at 4000 feet. A specimen of *cebuensis* was collected the same day at 4200 feet, and other *cebuensis* were collected on other days in this area at 3700 feet.

My comparison of specimens of *Phylloscopus olivaceus* from Samar, Negros, Mindanao, Jolo, and Tawi-Tawi shows that this species does not vary geographically through a large area of the central and southern Philippines; the two specimens examined from the Sulu Archipelago are completely inseparable from Samar birds. It would appear that *P. olivaceus* is a relatively recent invader of the Philippines; whereas *P. cebuensis,* with its Cebu-Negros and geographically variable Luzon populations, is a relict. This is further suggested by the fact that the populations of *P. cebuensis* on Luzon, where *olivaceus* is absent, have a fairly wide altitudinal range; whereas on Negros *cebuensis* is primarily a highland form, *olivaceus* is primarily a lowland form. This is a pattern that might be expected if the more recent occupant, *olivaceus,* is a more successful species, "driving" *cebuensis* to higher altitudes where they are sympatric. The lack of geographic variation in *olivaceus* is also suggestive of relatively recent arrival in the Philippines.

These two Philippine species belong to the same general group as *Phylloscopus trivirgatus* and its close relatives. The nearest to *olivaceus* in every way is *maforensis* (Meyer, 1874), of Numfor Island in Geelvink Bay off northern New Guinea; this form was placed by Mayr (1941:126) in the *trivirgatus* superspecies, but placed as a subspecies of *trivirgatus* by Rand and Gilliard (1968:372). The latter authors called *maforensis* "very different from other races [of *trivirgatus*]"; and, indeed, in reading their description one would almost think they had specimens of

olivaceus before them. The differences between *olivaceus* and *maforensis* are minor differences of degree; the latter is simply a somewhat grayer (less green and yellow) edition of *olivaceus*. Like both *olivaceus* and *cebuensis,* and unlike most races of *trivirgatus, maforensis* has a large bill with a pale lower mandible. It is difficult to interpret this similarity, although conspecificity of *olivaceus* and *maforensis* is not beyond the realm of possibility.

Phylloscopus trivirgatus itself is a tremendously complicated species. There is a tendency in many of the races toward much individual variation, seemingly not associated with age or sex, in the amount of yellow on the underparts. Some races show scarcely any variation; whereas others, such as *capitalis* of northern Celebes, show an almost continuous gradation between birds with a white superciliary, white throat and cheeks, white underparts streaked with yellow, and a brownish gray crown to those of the opposite extreme with yellow superciliary, yellow of the underparts expanded to eliminate virtually all of the white, and a more greenish crown. In the Philippines, this tendency reaches its extreme manifestation in the subspecies *malindangensis,* which divides almost completely into two color types, yellow and gray, with only a very few equivocal specimens (which, however, are enough to show that the yellow and gray types are not another case of undetected sympatric species). Elsewhere in the Philippines, *P. trivirgatus* is supposed to be represented by the yellow forms *nigrorum* (Negros), *benguetensis* (northern Luzon and Mindoro), and *peterseni* (Palawan) and a rather distinct group of four Mindanao races, *mindanensis, malindangensis, diuatae,* and *flavostriatus.* These four collectively differ, as pointed out by Salomonsen (1953), in averaging browner above, lacking a wing bar, and having white spots on the inner webs of the rectrices. In these characters they resemble a group of subspecies including *floris* of Flores, *presbytis* of Timor, and *sarasinorum* of southern Celebes. In several ways, the "yellow" group of subspecies resembles *olivaceus* and *cebuensis* more than it does the other Philippine populations of the species *P. trivirgatus*; yet *P. olivaceus, P. c. cebuensis,* and *P. t. nigrorum* are all sympatric on Negros.

The differences between the sympatric species *olivaceus* and *cebuensis* are sufficiently subtle so that their distinction was overlooked for many years. Nevertheless, populations far more different in appearance are presently included within the single polytypic species *P. trivirgatus.* It appears to me to be quite possible that the checkerboard distribution of "kinds" of races of *trivirgatus* on mountains and islands within the range of the "species" as a whole may prove to be explainable if the existence of more than one species is postulated. Many of the

mountains and islands can support only one *Phylloscopus* of this group; through some form of competitive exclusion, the single form at any given locality may be either the original or a replacement inhabitant. The "successful" form at any locality may have derived from one of several different stocks (= species), not necessarily the same as that giving rise to its nearest neighbor. Calling all of these one species (i.e., *Phylloscopus trivirgatus*) simply because they are geographic replacements is almost certainly an oversimplification. I fully agree with Mayr (1944): "How the various forms of the *trivirgatus* group should be arranged into species can be determined only in the course of a revision of the whole group." In such a revision, whenever some brave soul undertakes it, the relationship of the Philippine forms *olivaceus* and *cebuensis* to the *trivirgatus* group must be taken into account.

***Orthotomus derbianus* Moore, 1854, and *Orthotomus atrogularis chloronotus* Ogilvie-Grant, 1895**

I have already (Parkes, 1960b:76) pointed out that the distribution on Luzon of gray-backed (*derbianus*) and green-backed (*chloronotus*) tailorbirds is more complicated than indicated by Delacour and Mayr (1946:201–202). They state that *chloronotus* is found in "northern Luzon, south about to hills east of Manila," while *derbianus* is attributed to "southern Luzon, from Manila southward, Catanduanes." I know of no specimens justifying the attribution of the green-backed form as far south as the "hills east of Manila" in existence at the time Delacour and Mayr wrote their book. Gilliard (1950) discovered the population of *chloronotus* on the Bataan Peninsula, west across Manila Bay from Manila. This peninsula represents the southern tip of the Zambales Mountains, in which little or no collecting has been done; and it is not known which form of tailorbird exists in these mountains north of Bataan. The Bataan population is separated from the main range of *chloronotus* by populations of *derbianus* extending north from Manila at least as far as Bayambang, Pangasinan Province (USNM). Until recently, I had seen specimens of *chloronotus* from as far south as Sablan, Benguet Subprovince, Mountain Province, and Dalton Pass, on the border between Nueva Vizcaya and Nueva Ecija. The specimens from the isolated population from Bataan cannot be distinguished either in color or in size from northern *chloronotus*.

Gilliard (1950:497) thought that *chloronotus* and *derbianus* "would certainly seem worthy of specific distinction" were it not for two specimens that he considered to represent intermediates between these two forms: AMNH 296293 from Antipolo, Rizal Province, and AMNH

592414 from "southern Luzon"; these, according to Gilliard, have "an almost equal amount of gray and green" on the back. I have examined both of these specimens and find them to be immature; a greenish wash on the back is typical of young tailorbirds of gray-backed forms of this group. Both specimens are referred to *derbianus*. Hachisuka (1930:196) described two specimens collected at Aloneros, Tayabas (= Quezon) Province, in southern Luzon. One he called *chloronotus*, although he describes it as having a "slate black" back; he appears at that time to have been unaware of the existence of *derbianus*. The other Aloneros specimen, on the basis of comparison with a colored plate of *chloronotus*, seemed also to be referable to that form. I have examined these specimens, now respectively SDR 1206 and SDR 1203. The former is an unsexed adult of *derbianus*; the latter is a juvenile male *derbianus*, labeled "*chloronotus*."

There are thus no specimens that show intermediacy between *derbianus* and *chloronotus*. In my 1960b paper I predicted that "it is highly possible that the two forms may prove to be sympatric in parts of central Luzon." This prediction was realized with the receipt by the DMNH of typical specimens of both *derbianus* and *chloronotus* from Pangil and Pakil, Laguna Province, on the east side of Laguna de Bay. This is far south of any previously known locality for *chloronotus*. A specimen of this form from Casiguran, northernmost Tayabas (= Quezon) Province (USNM) suggests, however, that *chloronotus* may follow the Sierra Madre south along the east side of Luzon, with *derbianus* meeting it from the west and south at the newly discovered area of sympatry in eastern Laguna Province. In any case, it is clear that the two forms must now be considered to be separate species.

The next question, of course, is nomenclatorial. Which of the two forms is to be considered conspecific with the tailorbirds of this group on the other islands of the Philippines? The decision is by no means as clear-cut as was the allocation of *luzonensis* to one or another of the sympatric species of *Phylloscopus*. In addition to its green back, *chloronotus* differs from *derbianus* in having bright yellow rather than white wing linings and yellow-green upper and under tail-coverts; the base of the rectrices is also greenish. Wing-lining color in other races of tailorbird varies between white and yellowish, and several races have the back partly gray. Only in *derbianus*, however, is any hint of green completely absent from the tail and its coverts. The differences in color between *derbianus* and *chloronotus*, some of which are bridged by populations on other islands, suggest, in fact, that some reinforcement ("character displacement") may have taken place on Luzon. It appears probable that the populations of other islands are more nearly related

to *chloronotus* than to *derbianus*; so the former is here considered to be the Luzon representative of the species *Orthotomus atrogularis,* with *O. derbianus* a separate species.

The only species of tailorbird hitherto reported from the island of Palawan is *O. sericeus*; no representative of the *atrogularis* superspecies has been known to occur there. A specimen of *O. derbianus* in the DMNH collected by John E. duPont at Puerto Princesa, Palawan, July 21, 1958, must, in the absence of other evidence, be considered a stray.

***Rhipidura cyaniceps cyaniceps* (Cassin, 1855)**

A series of specimens recently received by the AMNH from the Sierra Madre of Isabela Province in northeastern Luzon shows no approach at all to *R. c. pinicola* Parkes, 1958, which is apparently confined to the highlands of northwestern Luzon.

***Cyornis lemprieri* Sharpe, 1884, and *Cyornis herioti* Ramsay, 1886**

The endemic blue flycatcher of Palawan, *lemprieri,* has been associated in much of the literature of *Cyornis* with the widely distributed species *C. banyumas* (*cf.* Delacour and Mayr, 1946:277; Vaurie, 1953:504). Stresemann and deSchauensee (1936:341) state that they regard *C. lemprieri* as a distinct species and not a race of *banyumas,* but they give no details as to their reasoning. The placement of *lemprieri* with *banyumas* appears to be based primarily on the fact that both have brown rather than blue-backed females. In the assessment of the relationships among certain of the species of *Cyornis,* however, the color of the females seems to be of little importance. The Borneo lowland species, *C. caerulata* (also specifically excluded from the *banyumas* group by Stresemann and deSchauensee), has a female intermediate between the brown and blue types (head and foreback brown; tail blue; rump, lower back, and wings washed with blue). Females of the subspecies *C. b. banyumas* and *C. b. cantatrix,* both of Java, have a decided bluish cast to the gray of head and back (contrary to the description of Delacour [1947:290], who described females of *C. banyumas* subsp. simply as "entirely brown above"). Finally, some female specimens of *lemprieri* (notably AMNH 468257 and CM 100783) may have some blue or bluish feathers on the head. There is thus no clear guide to relationships to be found in the color of females in this group.

There is a clearly defined difference in the *pattern* of the face of females of *lemprieri* on the one hand and females of all races of both *banyumas* and *rufigastra* on the other. In *lemprieri* there is a well-developed white eye-ring; the lores are *black,* bordered above by a white

line from the base of the bill almost to the upper edge of the eye-ring. In the other forms, the lores are white (or pale), and there is no well-defined eye-ring. The bill of *lemprieri* is larger and heavier than that in any of the examined races of *banyumas*, except the nominate race of eastern Java. The brown area of the breast is more restricted and more clearly defined than in any race of the *banyumas* or *rufigastra* groups (both of which have both white-bellied and tawny-bellied races).

Although they differ in ecology in areas where both are found (*cf.* Borneo; Smythies, 1960:446–447), there seems to be little doubt that *C. rufigastra* and *C. banyumas* are closely related, as indicated by Vaurie (1953:509); but *C. lemprieri* of Palawan is *not* part of this group.

Another Philippine endemic species is *Cyornis herioti*, which appears to be confined to Luzon. Its affinities have been the subject of some debate. Robinson and Kinnear (1928) considered both *herioti* and *C. hainana* (Ogilvie-Grant, 1899) of south China and Hainan to be conspecific with *C. pallipes* (Jerdon, 1840) of India. This view was disputed by Stresemann and deSchauensee (1936:338), who felt that *herioti*, *hainana*, and *pallipes* were all separate species, not particularly closely related to one another within the genus *Cyornis*. Vaurie (1953:509) returned to the earlier view, although preferring to consider the three as closely related species rather than as conspecific. Stresemann (1925:48) suggested tentatively that *herioti* might belong to the *banyumas* group, and this suggestion was repeated by Mayr (*in* Delacour and Mayr, 1945:114).

The interpretation of Stresemann and of Mayr is, I believe, the correct one, but only insofar as *herioti* is the representative on Luzon of *Cyornis lemprieri* which, as indicated previously, is *not* a race of *banyumas*. When females of *lemprieri* and *herioti* are compared, the resemblance is unmistakable, *herioti* being merely a more pigmented version. The facial pattern of eye-ring, line from base of bill to upper edge of eye-ring, and dark lores described earlier for *lemprieri* is identical in *herioti*, except that the light areas are buff instead of white. In both forms, individual variation in females is manifested in traces of blue appearing in the area of the forehead where this color is normally found in males (compare *herioti* AMNH 450758 and *lemprieri* CM 100783). The general size, bill proportions, etc., of the two forms are quite similar. Statements in the literature about the differences in color between males of the two forms (*herioti* with throat and breast blue rather than orange-buff as in *lemprieri*) were rendered obsolete with the discovery of the interesting *Cyornis herioti camarinensis* (Rand and Rabor, 1967) of southernmost Luzon, which has the "throat pale ochraceous and upper breast buffy-rufous tinged with dusky."

As will be mentioned further, the pattern of the juvenal plumage seems to be a good clue to relationships among these blue flycatchers. That of *herioti* (exemplified by AMNH 767958, in full juvenal plumage) and *lemprieri* (USNM 161501, in first prebasic molt) is, as far as can be told with the specimens available, closely similar. Although I have not compared these with juveniles of true *banyumas*, the young *herioti* and *lemprieri* differ collectively in several respects from the juvenile of *rufigastra* (as exemplified by DMNH 1163, *"litoralis"* = *philippinensis*, and CM 137123, *simplex*). In the latter species the dorsal spots are smaller, brighter, more orange-brown, and more linear on the crown; moreover, they form more clearly defined wing bars on the greater and median wing-coverts.

In view of the opinions of Robinson and Kinnear and of Vaurie, the possible relationships of *C. herioti* to *C. hainana* and *C. pallipes* merit a brief examination. Here the juvenal plumage again offers important evidence. That of *herioti* is typical of most muscicapine flycatchers in being heavily spotted above and below (or at least in having dark edgings on the underparts feathers, giving the appearance of spottedness). The juvenal plumage of *C. hainana* (AMNH 418451; USNM 304348, 350216) is quite different. The crown varies in the three specimens examined from having small dense spots not unlike those of other species to having nothing more than pale shaft streaks to the forehead feathers. The dorsum, however, is almost completely unmarked; and the underparts are white, stained with buff across the chest. I have not seen juveniles of *pallipes*. The closest approach to the juvenal plumage of *hainana* among species examined is that of *C. rubeculoides* (AMNH 605332), which has the spotting somewhat better developed, but much less than in other species. In adults, too, I am struck more by the resemblance of *hainana* to *rubeculoides* rather than to either *herioti* or *pallipes*. The females are somewhat similar in color and pattern, and the males are not dissimilar in spite of the orange-brown breast of male *rubeculoides*. They agree in having the bend of the wing bright blue, which is not true of *pallipes* males. The males of *hainana* show an indication of the bright blue rump of *rubeculoides*, which is also absent in *pallipes*. The latter is a very much stronger-billed bird than either *rubeculoides* or *hainana*. In view of the resemblances between both adults and juveniles, I suggest that *hainana* has its closest relationships with *rubeculoides*, not with either *herioti* or *pallipes*. This is contrary to the opinion of Vaurie (1953) but, interestingly enough, reverts to the viewpoint of Delacour (1932:433–435), who believed that *rubeculoides* and *hainana* were conspecific. I have not studied *pallipes* sufficiently to comment further on its relationships, but I do not consider it conspecific with *herioti*.

In view of the marked resemblance in females and the intermediate coloration of *C. h. camarinensis,* it is tempting to consider *Cyornis herioti* conspecific with *C. lemprieri.* In view of the distributional gap, I prefer for the time being to consider these two as members of a superspecies. Within *C. herioti,* some authors (*cf.* Rand and Rabor, 1967) have recognized a northeastern subspecies, *enganensis* (Ogilvie-Grant, 1896). I have compared specimens from the purported ranges of *herioti* and *enganensis* and find absolutely no basis for separation; I recognize only *C. h. herioti* and *C. h. camarinensis.*

***Cyornis rufigastra* (Raffles, 1822)**

In an earlier paper (Parkes, 1965:61), I discussed some of the Philippine populations of this species and explained my preference for the generic name *Cyornis* for the blue flycatchers rather than *Muscicapa* or *Niltava,* used by other recent authors.

The name *simplex* Blyth, 1870, has been in general use for the Luzon race of *Cyornis rufigastra.* Blyth believed his specimens to have come from Borneo; this was corrected to Luzon by Robinson and Kinnear (1928:246). The original description of *simplex* is deficient in several respects. In view of the uncertainty of the origin of the type specimen, I asked Dr. G. F. Mees of the Rijksmuseum van Natuurlijke Historie in Leiden to reexamine it for me. He writes (letter of October 4, 1971) that he is satisfied that the specimen is, indeed, a female of one of the Philippine populations of *Cyornis rufigastra* and that historical evidence suggests that the specimen came from the vicinity of Manila.

Delacour and Mayr (1946:211) list only Luzon and Marinduque as the range of *C. r. simplex;* but, as indicated by Manuel (1957), it occurs on Polillo as well. I have examined a series of eight specimens from Polillo; these differ in neither color nor size from Luzon specimens of *simplex.*

The subspecies *mindorensis* Mearns, 1907, has received general recognition; in fact, both Stresemann (1925:50) and Hachisuka (1935:292) synonymized *simplex* with *philippinensis* Sharpe, 1877, while recognizing *mindorensis* (Stresemann was uncertain about the identity of *simplex* and therefore did not use the name; Hachisuka simply erred in using the junior name, as he did not query the identity of *simplex*). In point of fact, the north and south Philippine races are quite distinct, as described by Robinson and Kinnear (1928:246–247); but *mindorensis* is a very weak race. Ripley and Rabor (1958:59) give a series of characters to differentiate Mindoro birds from *philippinensis* but fail to compare

them with *simplex*. In spite of claims to the contrary in the literature, the color of the throat, breast, and back of *mindorensis* can be completely matched in series of Luzon *simplex*. The *only* character by which *mindorensis* can be distinguished is the color of the under tail-coverts. In most *simplex* these feathers are white, although in some there is a faint wash of orange-rufous. In *mindorensis* the under tail-coverts are distinctly of this orange-rufous color, more markedly in females.

The alleged Palawan subspecies *litoralis* Stresemann, 1925, is very rare in collections. I have compared a small series from the DMNH and the BMNH with good series of the other races and regard *litoralis* unequivocally as a synonym of *philippinensis*. I had come to this conclusion before I found that *litoralis* had already been refuted by its author (Stresemann and deSchauensee, 1936:341).

***Culicicapa ceylonensis* (Swainson, 1820)**

All of the standard literature of Philippine birds, dating at least as far back as 1889, credits the Gray-headed Canary-Flycatcher as having been recorded from the island of Palawan. Several authors, myself included (Parkes, 1960c), have commented on the "fact" that *Culicicapa ceylonensis* and *C. helianthea* are sympatric on Palawan. McGregor (1909:472) lists Platen as the collector of the species on Palawan, and he is followed in this by Hachisuka (1935:337). In his report on the Platen collection from Palawan, Blasius (1888:310) lists *Culicicapa panayensis* (Sharpe, 1877) (= *C. helianthea panayensis*) but says nothing about *C. ceylonensis*.

The earliest reference I can find to the supposed presence of *C. ceylonensis* on Palawan is in a table published by Everett (1889), only a year after the Blasius paper appeared. Everett's tables of the Palawan avifauna include both *C. ceylonensis* and *C. panayensis*; so this listing was not just a simple misreading of the name given in the Blasius paper.

I have found no other documented record for *C. ceylonensis* from Palawan, an island that has been visited by many collectors since Platen. Dr. Erwin Stresemann was kind enough to write on my behalf to the Staatliches Naturhistorisches Museum in Braunschweig, where Platen's specimens are deposited. The only Palawan specimen of *Culicicapa* collected by Platen present in the collection or listed in the catalogue is no. 14212, an example of *C.h. panayensis*.

There is thus no proof for the existence of *C. ceylonensis* on Palawan, and the species should be deleted from the Philippine list; further, this means that the two species of *Culicicapa* are nowhere sympatric.

***Motacilla flava taivana* (Swinhoe, 1863)**

Vaurie (1959:82) listed Palawan in the winter range of this subspecies and also "Philippines (probably)." On September 20, 1956, I collected an immature female *taivana* (CM 137232) in a rice paddy at Tagig, Rizal Province, Luzon. The specimen was identified using comparative material at the AMNH. This subspecies, which, as Vaurie points out, has been kept in a separate species from *flava* by several authors, differs from *simillima* Hartert, 1905 (the commonest wintering race in the Philippines) of the same age and sex in having a distinctly yellow rather than white eye stripe. The dorsal color is heavily washed with yellow, rather than the gray or brown of *simillima*. The two other races that have been reported from the Philippines (Grant and Mackworth-Praed, 1952) are *tschutschensis* Gmelin, 1789, and *macronyx* (Stresemann, 1920). The former is even less yellowish than *simillima,* and in the latter the eye stripe is virtually obsolete. Peters (1939:115) was unable to identify two May 1 specimens from Mindoro with any known breeding population of this species.

***Anthus novaeseelandiae sinensis* (Bonaparte, 1850)**

Gladkov (*in* Dementiev and Gladkov, 1954) ascribes the Philippines to the winter range of this subspecies in both map (p. 650) and text (p. 653) (although, oddly, Harber [1955:452] states erroneously that the Philippines are not mentioned in the text). This migratory race is quite different from the resident Philippine race *A. n. lugubris* (Walden, 1875), especially in its decidedly longer wings. I have seen no specimens nor specific published record for *sinensis* from the Philippines, although its winter range as given by Vaurie (1959:62) indicates that such an occurrence would not be unlikely. I would appreciate having any Philippine specimens of this race called to my attention.

***Anthus gustavi gustavi* Swinhoe, 1863**

Gilliard (1950) did not list this species in his paper on the birds of Bataan, Luzon. However, AMNH 459390, taken by Gilliard at Lamao, December 15, 1947, is *A. gustavi* rather than *A. hodgsoni* as labeled. The rest of Gilliard's series of eight *hodgsoni* are correctly identified and listed on page 491 of his paper.

***Sarcops calvus* (Linnaeus, 1766)**

Some years ago, a great flurry of papers appeared discussing geographic variation in this species (Gilliard, 1949b; Rand, 1951; Parkes,

1952; Salomonsen, 1952; Amadon, 1956). Since that time, several museums have received new material, and I have gone over the question again. This study has not resulted in any name changes; I would still follow the nomenclatorial treatment of Amadon (1956), in which only three subspecies are admitted. The new material, however, gives a better insight as to the nature of the geographic variation. The excellent series from Leyte now available (I utilized 11 specimens, all collected between 1945 and 1961) make it clear that, although Davao, Mindanao, is the type locality of the black-backed form *S. c. melanotus* Ogilvie-Grant, 1906, the center of *differentiation* is obviously Leyte. I examined only one Bohol specimen, but examination of Samar and Mindanao birds makes it clear that the farther from Leyte, the less consistently black-backed these starlings are. The amount of variation on other islands does, as both Rand (1951) and Amadon (1956) indicate, militate against the use of any additional names. It is merely that Leyte is the geographic center of the black-backed character; and the birds of Davao, the type locality of the name *melanotus*, are somewhat intermediate. There are two centers of extreme silver-backedness, at the opposite ends of the species' range—north Luzon and the Sulu Archipelago, with the birds of the latter region (*S. c. lowii* Sharpe, 1877) exhibiting the extreme manifestation of this character. Salomonsen's (1952) description of *S. c. samarensis* was an attempt to push closer to the center of "black-backedness"; but he did not go far enough, not having seen Leyte specimens.

Some small errors in the literature remain to be corrected. Contrary to Salomonsen (1952:361), Samar birds do have the white "shaft-streaks" on the throat, which Rand (1951) showed correctly to be filoplumes whose apparent absence is seasonal, as they wear or break off easily. Amadon (1956:11) described the bare areas on the head of *Sarcops* as "yellowish, perhaps not so bright as in [*Basilornis*] *mirandus*." Delacour and Mayr (1946:244) state that this bare area is "pinkish flesh-colored," and my field notes on the two specimens collected during my 1956 expedition give the color as "flesh pink."

Anthreptes malacensis (Scopoli, 1786)

This is a highly plastic species, with many island races both in and beyond the Philippines. Two recent treatments of its races demonstrate diametrically opposed taxonomic philosophies. Salomonsen (1953) approached it from the viewpoint of a "splitter" (at least at the subspecific level); whereas Rand (1967:211–214) preferred to suppress many subspecific names. In studying geographic variation in this species in the

Philippines, I have used principally the combined AMNH and CM collections, numbering 125 specimens in all, plus long series of non-Philippine specimens in the AMNH. The extensive "lumping" of Rand's list appears to represent an unnecessary oversimplification. If populations are characterized by the possession of consistent features of taxonomic use that differentiate them from other populations, with discrete ranges, the fact that such populations may be rather numerous (thus resulting in numerous names) is *not* justification for suppression of these facts through "lumping"; quite the contrary, as the very fact of such polytypy is an interesting aspect of a species and may suggest something of its history, especially in contrast to equally wide-ranging species in which such variation cannot be demonstrated.

Both Salomonsen and Rand agree that there are three subspecies groups within *Anthreptes malacensis.* The *malacensis* group is characterized by iridescent violet anterior upperparts and reddish brown throats in adult males; the *chlorigaster* group, with similar throats and bottle-green iridescence; and the *griseigularis* group, with bottle-green iridescence and gray throats. In the green-backed groups, the rump is violet and contrasts abruptly with the mantle, which usually looks green from any angle. In some (worn?) individuals of the *malacensis* group, the mantle can look quite greenish from some angles, but turning in the light will show that the pure violet feathers of the rump do not contrast with the more variable anterior feathers as abruptly.

Within the violet-backed group, Rand recognizes only nominate *malacensis,* synonymizing nine proposed subspecies. Salomonsen (1953:246–247) does not discuss most of these, mentioning only *bornensis* Riley, 1920 (which he and several other authors, but not Rand, consistently misspell "*borneensis*") and *paraguae* Riley, 1920. He considered the former inseparable from *malacensis* and the latter a "very poor subspecies" that might better be included in the nominate race. Contrary to Salomonsen, I find *bornensis* different from *malacensis*; males have the sides of the face redder (as described by Riley), the red of the scapular region decidedly darker, and the greater coverts edged with dark red instead of greenish. The Palawan race *paraguae,* as stated by Salomonsen, has the underparts in both sexes distinctly darker, more olive-green, and less yellow than in topotypical *malacensis.* This character must be used with care, comparing specimens of similar museum age. Comparison of four *paraguae* taken in 1891, four in 1916, and four in 1955 shows clearly that the underparts become progressively greener, less intensely yellowish, with age. In addition to the underparts character, *paraguae* also differs from *malacensis* in having the edgings of the remiges somewhat darker and more reddish. From *bornensis,* its nearest

neighbor to the south, *paraguae* differs in less intensely yellow underparts and somewhat greener, less reddish cheeks in males.

Salomonsen states that a specimen from Sibutu, the westernmost island in the Sulu Archipelago, is *malacensis* "or comes very near to it." Rand includes Sibutu in the range of *malacensis* without comment. In a comparison of three AMNH specimens from Sibutu with topotypes of *malacensis* and with specimens from other islands in the Sulus, it became apparent that Sibutu birds are not *malacensis* but form an interesting link between the violet-backed *malacensis* group and the green-backed *chlorigaster* group, but with some nonintermediate characters of their own. The Sibutu population may be called:

***Anthreptes malacensis iris* new subspecies**

Type AMNH 685721, adult ♂, collected on Sibutu Island, Sulu Archipelago, Philippines, July 1893, by A. Everett.

Diagnosis: Male with feathers of crown and anterior back with *alternating bands* of green and violet iridescence, producing an overall optical effect of steel-blue. Underparts intermediate in color between the rather bright yellow of *malacensis* and the dull greenish yellow of *wiglesworthi* of the rest of the Sulus, but flanks and under tail-coverts paler and grayer than in either of these races—the under tail-coverts grayish cream color with almost no yellow; sides of the face of males near *wiglesworthi* in reddish color, not dark olive-green as in *malacensis*. The one available female of *iris* is nearest *malacensis* in yellowness of underparts and in lacking the decided reddish wash of the edges of rectrices, tertials, and wing-coverts found in *wiglesworthi;* it resembles the male in that it has grayer flanks and under tail-coverts than do females of the other two races under consideration. An unsexed juvenile, compared with specimens of similar age from Malacca, is browner and duller on the back, with light edges of the wing and tail feathers much darker and less contrasting, and has the under tail-coverts paler, less yellow. No juveniles of *wiglesworthi* were available for comparison.

Range: Sibutu Island, westernmost Sulu Archipelago, Philippines. A male from Bongao, the next island northeastward in the Sulu chain, is exactly intermediate between *iris* and *wiglesworthi* in the color of the underparts, including the under tail-coverts. The anterior upperparts are largely green, but with a small admixture of purple. A female from Bongao, however, is virtually indistinguishable from *wiglesworthi* of Jolo.

Etymology: This subspecies is named for Iris, the classical goddess of the rainbow, in reference to the multicolored iridescence of the dorsal plumage.

The male from Bongao just mentioned is quite similar in color, above and below, to *A. m. cagayanensis* Mearns, 1905, from the outlying island of Cagayan Sulu, but the latter has the edgings of the remiges and wing-coverts olive, without the reddish color found in *wiglesworthi.*

Rand synonymizes *A. m. wiglesworthi* Hartert, 1902 (type locality Sulu) and *A. m. heliolusius* Oberholser, 1923 (type locality Basilan) with *A. m. chlorigaster* Sharpe, 1877 (type locality Negros), thus recognizing only two Philippine subspecies, *chlorigaster* and *cagayanensis,* within the *chlorigaster* subspecies group. Salomonsen, on the other hand, admits both *wiglesworthi* and *heliolusius.* I agree with Salomonsen that these two races are quite similar to each other. They can be recognized, however, not only by the characters he mentions, but also by the color of the edgings of the remiges, which corresponds to the difference in cheek color of males—*heliolusius* being more greenish and *wiglesworthi* more reddish.

True *A. m. chlorigaster* is an uncommon bird in collections. The few specimens I have seen, however, show that it is better differentiated from *heliolusius* and *wiglesworthi* than indicated by Salomonsen (1953:248–249). Salomonsen stated that *heliolusius* differs from *chlorigaster* only in its more yellowish, less olive underparts. Although this is, on the average, true, this is by no means the best character separating the two races. In the first place, *chlorigaster* has reddish cheeks like *wiglesworthi* (perhaps even redder), not olive like *heliolusius;* and *chlorigaster* differs from both *wiglesworthi* and *heliolusius* in having the red of the wing-coverts and edgings of the remiges very much darker, scarcely contrasting with the blackish brown of the remiges themselves.

There are two races of the gray-throated *griseigularis* subspecies group, both recognized by Rand. These are *A. m. griseigularis* (Tweeddale, 1877), from northern Mindanao, Samar, and Leyte (the species does not seem to have been recorded from Bohol), and *A. m. birgitae* Salomonsen, 1953, from Luzon and possibly Mindoro (where it is apparently very rare). The gray-throated *griseigularis* and the reddish brown-throated *heliolusius* of Basilan and western Mindanao meet and intergrade in central Mindanao (Salomonsen, 1953:251). The difference in color between the underparts of *griseigularis* and *birgitae* mentioned by Salomonsen seems rather poor. In the very small series of *griseigularis* I have examined, the edgings of the remiges are redder than in *birgitae* in males and washed with dull orange (absent or nearly so in *birgitae)* in the one female. The short and stubby bill (for this species) of *griseigularis* is by far the best character separating that race from *birgitae.*

Specimens examined: *A. m. malacensis*—long series (AMNH). *paraguae*—Palawan, 54. *iris*—Sibutu, 3. *iris* × *wiglesworthi*—Bongao, 2.

cagayanensis—Cagayan Sulu, 1. *bornensis*—North Borneo, 11. *wiglesworthi*—Jolo, 15; Tawi Tawi, 1. *heliolusius*—Basilan, 5; Mindanao, 5. *chlorigaster*—Panay, 1; Cebu, 1; Negros, 1; Tablas, 1; Masbate, 1. *griseigularis*—Samar, 3. *birgitae*—Luzon, 31.

***Nectarinia sperata* (Linnaeus, 1766)**

Few Philippine species have been subjected to as many nomenclatorial rearrangements of their subspecies in recent years as has this sunbird. As of the time of Delacour and Mayr (1946:229), four subspecies were recognized. One, *N. s. henkei* (Meyer, 1884), has a velvety black back; it is found in northern Luzon. The other three have maroon-red backs. The nominate race, which has a scarlet-red breast, is assigned a range from southern Luzon to northern Mindanao, also Palawan. A subspecies *davaoensis* Delacour, 1945, said to differ from *sperata* in "having breast vermilion, suffused with yellow on base of feathers," is attributed to southeastern Mindanao. Finally, a yellow-breasted race (with a touch of vermilion in the center), *N. s. juliae* (Tweeddale, 1877), is assigned to western and southern Mindanao, Basilan, and the Sulu Archipelago.

The first change in this "status quo" was made by Gilliard (1950:500), who described *N. s. thereseae* from five specimens from Lamao, Bataan. However, Salomonsen (1953:255) quickly pointed out that "*thereseae*" represented nothing but intergrades between *henkei* and *sperata* (as Gilliard had already admitted) and had neither the definable range nor the consistent characters required of a named subspecies; four males from Mariveles (only about 10 miles from the type locality of "*thereseae*"), not seen by Gilliard, were inseparable from *sperata*. Salomonsen postulated, undoubtedly correctly, that such specimens as the type of "*thereseae*" could be found in a zone of intergradation wherever *henkei* and *sperata* meet in north-central Luzon. He placed the name *thereseae* in the synonymy of *sperata*, apparently agreeing with Gilliard that it was closer to that race than to *henkei*.

In an earlier paper, Salomonsen (1952:355–356) extended the ranges of red- and yellow-breasted forms on Mindanao, restricting the intermediate form, *davaoensis*, to the City of Davao District and pointed out that it was "no doubt of hybrid origin." He enlarged on this point in his second paper (1953:257) and showed that "*davaoensis*" represents an unstable series of intermediates between the red- and yellow-breasted races and has no discrete range of its own. This has since been verified by additional Mindanao material received by the DMNH.

Salomonsen (1952:355–356) at first thought that there were no color variations among the red-backed, red-breasted populations previously all

called *N. s. sperata,* but he described two subspecies based on size. Two pairs from Polillo were larger than his other *sperata* and were described as *manueli;* whereas two pairs from Limot, Davao Province, eastern Mindanao, were small and were described as *minima.* By the time his next paper appeared (1953), Salomonsen had learned that the name *minima* was preoccupied. Instead of simply renaming the subspecies, however, he adjusted his concepts of geographic variation in this species and described as *trochilus* (with a type locality in Agusan Province, eastern Mindanao) the birds from all of the islands from Marinduque to eastern Mindanao, including Palawan and the Calamianes, all formerly included in *sperata.* No size characters were involved this time—*trochilus* was separated from *sperata* on color characters only. Salomonsen continued to regard *manueli* as similar to *sperata* but larger.

The next authors to discuss this species were Ripley and Rabor (1958:72-73). Although they apparently saw no Polillo specimens, they synonymized *manueli* with *sperata.* Further, they justify the synonymizing of *trochilus* with *sperata* by stating that "measurements of birds from Luzon and the Visayan Islands show the great variability of the populations in these regions"—completely overlooking the fact that Salomonsen separated *trochilus* on color, not size!

Rand and Rabor (1960:439) had only one Polillo specimen, but also declined to recognize *manueli,* attributing its slightly larger size to a so-called "small island effect," which also appeared in their specimens from Sibuyan. To dispose of *manueli* before going on to other matters, a long series of Polillo specimens recently received by the AMNH (four of which have been exchanged to CM) shows conclusively that even the alleged larger size cannot be supported, and *manueli* is here considered a synonym of *sperata.*

Rand and Rabor (1960:439) supported the concepts for which Salomonsen used the names *sperata* and *trochilus* but rejected the latter name in favor of *davaoensis,* explaining as follows: "The name *trochilus* Salomonsen, 1953, is used for a subspecies which includes a population which already has a name, *davaoensis* Delacour, 1945. It is unfortunate that *davaoensis* was based on specimens intermediate between a yellow-bellied and a red-bellied race. A line of reasoning which would consider *davaoensis* based on a hybrid and unavailable would be valid only if species were involved, which is not the case. No matter how inappropriate the type locality or the appearance of the type, no matter how unfortunate the name, it is available and must be used." It is difficult to see any justification for this specious reasoning. The population from which the type of *davaoensis* was taken is not

"included" in *trochilus*; all recent authors admit that it is an unstable population of intermediates between a red- and yellow-breasted (not "-bellied," as stated by Rand and Rabor) population. If Rand and Rabor reasoned that the name *davaoensis* must be used for the red-breasted race since such birds contribute half of the genes of the birds from Davao City, it may with equal logic and more useful results be claimed that *davaoensis* is a synonym of the earlier name *juliae* (Tweeddale, 1877), the yellow-breasted race, thus disposing of *davaoensis* as a junior name. I prefer to use the unequivocal name *trochilus* Salomonsen, as *davaoensis* cannot incontrovertibly be assigned to either "parental" subspecies.

In the most recent list of the family Nectariniidae, Rand (1967:237–238) has reversed himself and has placed *trochilus* as a synonym, not of *davaoensis*, but of *sperata*. The two variable intermediate populations "*thereseae*" and "*davaoensis*" are given full typographic entries as subspecies, although their status is explained in the range descriptions. The range of "*thereseae*" is given as "Philippine Islands, from Bataan eastward across central Luzon; probably a band of 'hybridization,' perhaps unstable, between red-backed *sperata* and black-backed *henkei*." This is a paraphrase of Salomonsen's statement (1953:255); neither Salomonsen nor Rand gives any indication of having seen specimens from such a "band" except the type series of *thereseae* from Lamao, Bataan. Salomonsen had seen specimens of *henkei* from as far south as Novaliches, Rizal Province, and of *sperata* from as far north as Laguna de Bay (from which there are excellent recent series, not seen by Salomonsen, in the AMNH and CM). This does not leave much room for a "band" (or "zone," as Salomonsen called it). It is probable that interbreeding, leading to specimens of the "*thereseae*" type, may take place at several points; the lack of a *broad* zone of intergradation and the marked differences between *henkei* and *sperata* strongly suggest that the contact between them is probably both secondary and recent. It is quite possible that careful study, especially of behavior, at contact areas may indicate that the apparent lack of introgression can be explained by the fact that *henkei* and *sperata* have developed isolating mechanisms and must be considered as two species, even though these isolating mechanisms may occasionally break down (thus producing the *thereseae* type).

We turn now to the question of the propriety of recognizing more than one red-backed, red-breasted race or combining them all into *sperata* as Rand (1967) has done. I have compared an excellent series of Luzon males with 63 males from 15 islands within the putative range of *trochilus* and find that the color characters described by Salomonsen (1953:256) are readily visible; I can see no reason to synonymize *trochi-*

lus with *sperata*. It is possible that the populations grouped under *trochilus* by Salomonsen will eventually be further divided; duPont (1971:3–4) has already described *N. s. marinduquensis* from Marinduque on the basis of the color of females. At present, then, the following forms can be recognized: *Nectarinia* (*sperata*?) *henkei* (Meyer, 1884), *N. s. sperata* (Linnaeus, 1766), *N. s. trochilus* (Salomonsen, 1953), *N. s. marinduquensis* duPont, 1971, and *N. s. juliae* (Tweeddale, 1877).

Prionochilus olivaceus Tweeddale, 1877

Salomonsen (1960a:20–21) was dubious about the separability of the subspecies *P. o. samarensis* Steere, 1890, described from Samar and Leyte, but he left the question open. He found four specimens from these two islands to be "slightly darker, more brownish, not so ash gray, on the sides of the throat and breast." He saw no specimens from Bohol; when birds from Samar and Leyte differ from those of Mindanao, the Bohol population usually resembles the Samar/Leyte race. Rand and Rabor (1960) had no Bohol specimens, commenting only that the species (listed as nominate *olivaceus*) had been collected on Bohol by McGregor. They had a series from Samar, but they listed these also under *P. o. olivaceus* without mention of the possible validity of *samarensis*.

I, too, have not seen specimens from Bohol and have seen only a single bird from Leyte, but I have seen adequate series from Samar, Mindanao, and Basilan. The type locality of *olivaceus* is Dinagat, a small satellite island whose avifaunal affinities are with neighboring Mindanao, although it is only a short distance from Leyte across the Surigao Strait. I have not seen specimens from Dinagat and must assume they resemble those of Mindanao. The differentiation of *olivaceus* is greatest at the opposite end of the range of that race, on the island of Basilan. However, although Mindanao birds are somewhat variable, they are on the whole nearer the Basilan population than the Samar/Leyte birds. This means that the traditional division between *olivaceus* and *samarensis* can be maintained; the alternative would be to consider *samarensis* a synonym of *olivaceus* and describe the somewhat more strongly differentiated Basilan population under a new name. The first alternative seems preferable.

Collectively, Mindanao and Basilan *olivaceus* differ from *samarensis* in the somewhat purer, less brownish gray of the sides of the throat and breast, as indicated by Salomonsen. In addition, this color (especially in Basilan birds) extends farther caudad on the flanks and does not tend to break up into streaks as in *samarensis*. The presence or

absence of a pale loral spot is a variable character, but it is less often present in *samarensis*. Of 12 Samar specimens in the FMNH, only two have a pale loral spot; whereas it is present in three Mindanao and one Basilan *olivaceus* in that museum. It appears to be present, but not always well developed, in all Mindanao and Basilan specimens.

With the understanding that the characters of the subspecies are better developed in birds from Basilan than in those from Mindanao, a case can be made for restricting *olivaceus* to the latter two islands (and satellites) and reviving *samarensis* for the populations of Samar and Leyte. Bohol birds will probably be found to be assignable to *samarensis*.

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

Salomonsen's treatment of this species (1960b:24–25) is unsatisfactory in several respects, undoubtedly because of the inadequacy of his material. Although he examined a total of 42 specimens, these came from five islands; and, as the species is strongly sexually dimorphic, his series of a given sex from any one island was small. I have seen well over 100 specimens (including many collected since Salomonsen's paper appeared) and have examined material from two islands (Leyte and Bohol) from which he had seen none.

At present, the subspecies *inexpectatum* (Hartert, 1895) is recognized for the Bicolored Flowerpeckers of all the islands within the species' range except Mindanao, to which nominate *bicolor* is assigned. Islands included in the range of *inexpectatum* by Salomonsen included Luzon, Mindoro, Negros, Samar, Catanduanes, Bohol, and Leyte; he had seen specimens from the first five listed. In the paper cited (1960b) and in the Peters Check-list (Salomonsen, 1967:181) he lists the type locality of *inexpectatum* as Luzon. This is an error. No type locality was specified in the original description (Hartert, 1895) of *inexpectatum,* but specimens were mentioned from Mindoro and from Laguna de Bay, Luzon. In his list of type specimens in the Rothschild Collection, however, Hartert (1920:430) specifies as the type of *inexpectatum* a specimen collected by Everett in "North Mindoro"; this specimen is now in the AMNH, where I have examined it. The type locality of *inexpectatum* should be corrected from "Luzon" to "North Mindoro."

The characters of the two races recognized by Salomonsen need to be adjusted, and his allocation of islands to these two is not correct. In addition, there is a well-marked third race, which may be known as:

Dicaeum bicolor viridissimum **new subspecies**

Type AMNH 698461, adult ♂, collected on Canlaon Volcano, Negros, Philippines, on March 24, 1896, by J. Whitehead.

DIAGNOSIS: Similar to *D. b. inexpectatum* (Hartert), as exemplified by the type and topotypes from Mindoro, but iridescence of upperparts of males is decidedly greenish rather than blue, especially on rump and upper tail-coverts; females less purely gray on underparts, washed with olive-green; posterior upperparts slightly brighter green, this color extending farther anterior, often even to the crown (which is brownish in females of *inexpectatum);* averaging larger.

RANGE: Island of Negros, Philippines.

ETYMOLOGY: The name is taken from Latin *viridis,* green, plus *-issimus,* adjectival superlative.

The comparisons above were intentionally limited to Mindoro specimens of *inexpectatum,* as these are not identical with Luzon birds. The latter differ from Mindoro specimens only in size, not color, and are as large as *viridissimum:* wing of ♂—Mindoro, 47–52; Luzon 52.5–54; Negros 52–55. However, measurements were taken on only a portion of the available series, and a larger sample would undoubtedly demonstrate somewhat more overlap between Mindoro and Luzon birds; I do not believe the separation of the latter based on the size difference to be warranted.

Salomonsen (1960b:24) described the gloss of the upperparts of male *D. b. bicolor* as "dark bluish violet" and that of *inexpectatum* as "a duller and more bluish green." His series of *inexpectatum* males was, of course, composite; nine of his specimens were Negros *viridissimum.* Further, he was completely unable to verify Hartert's attribution of delicate gray flanks to *inexpectatum* males, rather than the white of *bicolor.* This, too, is explainable on the basis of the composite nature of Salomonsen's small series. He saw only 5 ♂ 1 ♀ from Mindanao, 2 ♂ 1 ♀ from Samar, and none from Bohol or Leyte. He assumed that Samar birds pertained to *inexpectatum.* In point of fact, the populations of Samar, Leyte, and Bohol cannot be distinguished taxonomically from those of Mindanao and must be called *bicolor.* Males from these four islands *collectively* are indeed whiter on the underparts than males from Mindoro and Luzon—their flanks are little if any grayer than the medial portion of the underparts; whereas in males of *inexpectatum* there is a noticeable contrast. Males from Mindanao are the whitest among *bicolor,* but there is extensive overlap through individual variation with birds from the other islands. Dorsally, males of *bicolor*

have slightly more of a purple gloss, as opposed to steel-blue in *inexpectatum*.

Salomonsen did not discuss the color of females of this species. The females of *bicolor* are strikingly different from those of the other two races. They are very much darker green dorsally, with, in good light, a distinct sheen that is found in the other races on the flight feathers only. Ventrally, the females of *bicolor* resemble the greenish females of *viridissimum*, rather than the grayish ones of *inexpectatum*.

Just as the Mindoro and Luzon populations of *inexpectatum* differ in size, so do the Mindanao and Samar/Bohol/Leyte populations of *bicolor*. Wing length of ♂—Samar/Bohol (no Leyte measured) 46–50; Mindanao 49–55.5. Again, overlap would be greater in a larger series; the minor size difference and the faintly grayer underparts of the Samar/Bohol/Leyte population are not sufficient grounds for taxonomic separation.

In summary, then, the color characters of the three subspecies of *Dicaeum bicolor* can be presented in tabular form thus:

	Males		Females	
	back	*flanks*	*back*	*underparts*
inexpectatum	steel-blue	gray	dull green	grayish
viridissimum	green	gray	bright green	olive-green
bicolor	purplish blue	white	dark glossy green	olive-green

***Dicaeum hypoleucum lagunae* Parkes, 1962**

An excellent series of specimens of *Dicaeum hypoleucum* recently received from several localities in Luzon by the DMNH indicates that the separation of *D. h. lagunae* cannot be upheld, and the name must be placed in the synonymy of *D. h. obscurum* Ogilvie-Grant, 1894.

***Zosterops meyeni* Bonaparte, 1850**

Species characters in the notoriously difficult genus *Zosterops* are often subtle, and the allocation of isolated, insular populations to one species or another is often difficult. Barring the unexpected discovery of new morphological characters, it appears that many problematical relationships will be solved only when modern techniques of study in the field, especially of vocalizations and other behavior, are applied to *Zosterops*.

A case in point is the common Luzon lowland bird currently known as *Zosterops japonica meyeni*. I have carefully studied all of the races

of *Z. japonica* available in the AMNH and am not convinced that *meyeni* is properly considered a member of this species. It differs from the highly variable *Z. japonica* in a number of ways. It is, in general, a smaller bird (although approached by some races of *japonica;* see measurements given by Mees, 1957:97) with a notably smaller bill. Several races of *japonica* are very brown on the flanks; *meyeni* shows at most a faint smoke-brown in this area. The black mark below the white eye-ring that is often so prominent in *japonica* is absent in *meyeni.* No race of *japonica* is as richly yellow above, especially on the head, as *meyeni.* No race of *japonica* examined shows any trace of yellow along the midventral line beyond the yellow of the throat; this is faintly but definitely present in many specimens of *meyeni.* The latter character suggests affinity with *Zosterops montana;* and, in fact, *meyeni* is rather difficult to distinguish from *Z. m. whiteheadi* of the mountains of Luzon. The two species were often confused in the earlier literature, and misidentified specimens may still be found in museums. It may well prove eventually that *meyeni* is actually a lowland representative of the *montana* group and not particularly related to *japonica* at all. For the time being, the state of our knowledge is best reflected by using the name *Zosterops meyeni* and considering it a separate species.

The very large race *batanis* McGregor, 1907, is quite similar in size to some of the medium-sized races of *japonica,* such as *loochooensis,* but bears no resemblance to them in color; *batanis* is also quite different in color and much larger than its closest geographic neighbor within the species *japonica, Z. j. taivaniana* Momiyama, 1927 (which, according to Mees [1957:129], is not separable from *simplex* Swinhoe, 1861, of the Chinese mainland; I have not studied this and simply use here the subspecific names as the specimens are arranged at the AMNH). Although Hachisuka and Udagawa (1951:23) considered *batanis* "much similar" to *taivaniana,* the differences are of a high order for *Zosterops.* These authors synonymize *kikutii* Momiyama, 1927, with *batanis* (Mees [1957:131] concurs, although he did not see specimens), thus extending the range of *batanis* from the Batanes Islands (north of Luzon) north to Botel Tobago and Koshoto islands off southeastern Formosa. On the other hand, Hachisuka and Udagawa describe specimens from these islands as intermediate in color between *taivaniana* and "the typical *batanis.*" Mees cites Kuroda (1932:389) as his authority for synonymizing *kikutii* with *batanis,* but Kuroda gave no discussion, simply listing the synonymy. Like Mees, I have been unable to examine specimens from Botel Tobago, but I consider the identity of *kikutii* an open question in view of the intermediacy claimed by Hachisuka and Udagawa. The gap between *batanis* and *taivaniana* is such that I find it

difficult to believe that *kikutii* could bridge it. The Batan race, although so much larger, resembles *meyeni* closely in color (and thus differs from *japonica* subsp.) and for the time being is best called *Zosterops meyeni batanis.*

In characterizing *meyeni,* Mees (1957:134) states: "The yellow forehead and the yellowish upper surface suffice to distinguish this bright subspecies from all other forms with the exception of some specimens of *hainana* as has been fully explained in the discussion of that form." On page 131, we find that the "some specimens of *hainana*" refers to a single specimen supposed to have been collected by J. Whitehead in the Five Finger Mountains of Hainan, which differs radically from six other Hainan specimens seen by Mees and which he could not separate from *meyeni.* As one possible explanation for this specimen, Mees postulated a cline within the island of Hainan that would shift from typical *simplex* to what appears to be typical *meyeni;* such a cline seems exceedingly unlikely. I agree with Mees that only additional specimen material will illuminate the status of the white-eyes of Hainan. I offer, however, an alternative hypothesis that seems to me to be at least as plausible as Mees' dramatic cline, especially since *meyeni,* as Mees himself has pointed out, is a lowland bird. The expedition to the Five Finger Mountains was Whitehead's last: he was ill with fever during much of the time, as were also his collectors—Filipinos who joined him at Manila on the way to Hainan. That Whitehead's Hainan collection reached England at all was something of a miracle (Ogilvie-Grant, 1900), and it is hardly beyond the realm of possibility that one or more specimens from the Manila region got mixed up with the Hainan birds or that labels may have been switched. Only the examination of additional specimens from the Five Finger Mountains will prove whether, in fact, a bright yellow *Zosterops* indistinguishable from Luzon *meyeni* occurs there.

Mees (1969:334–335) has discussed at length the possibility of sexual dimorphism in color in *Zosterops.* Detailed analyses have been made of only the Australian *Z. lateralis,* and authors have obtained conflicting results. Mees concludes by stating that there is as yet no proof of color sexual dimorphism in the Zosteropidae, although he considers it a possibility and invites detailed information. My series of *Z. meyeni* collected in central Luzon in August and September 1956, some of which have been dispersed by exchange, now consists of 2 adult ♂ , 5 immature ♂ , 4 adult ♀ , and 3 immature ♀ . I examined personally the skulls and gonads of all specimens. All are either molting or have completed the molt; so the colors of freshly molted, unworn feathers are evident. Examining these for possible color differences, I

find the following: males collectively are brighter and yellower green dorsally. The immatures of both sexes are slightly duller above than their respective adults; thus the difference between adult males and immature females is most marked. The color differences are best observed in the brighter, yellower areas of the dorsal plumage, especially the forehead and the rump. Ventrally, throat color corresponds to dorsal color. Adult males have the richest yellow, least greenish or lemon-yellow throats; and, again, they contrast the most with the immature females. In flank color, there is a tendency for males collectively to be buffy, females grayer; but this is less consistent than the differences in the shades of green and yellow, in which there are no discrepancies in the series.

I do not claim, of course, that this one species proves that sexual dimorphism in color exists throughout *Zosterops.* I have also found it, however, in *Z. nigrorum;* even though I did not collect the *nigrorum* specimens myself, the differences are consistent with those I have found in *meyeni.* In the case of *nigrorum* these differences are more important than in *meyeni,* as they account for some statements that have been made in the literature concerning individual and geographic variation in *Z. nigrorum,* as will be discussed later.

***Zosterops montana* Bonaparte, 1851**

There is a debate in the literature, with the opposing viewpoints most recently expressed by Mees (1969:370) and duPont (1971:4), on the number of subspecies of *Zosterops montana* worthy of recognition in the Philippines. I do not wish to discuss this species in detail here (I may be accused of being prejudiced, as duPont [*loc. cit.*] has named the Palawan population after me!), but I will say this much: I have seen a number of large series of recently collected examples of this species, in some cases more and better material of certain populations than was available to some of the revisors who have studied this species in the past. Although there is, as has been claimed by several authors, a certain amount of variation within each series, nevertheless there is no doubt in my mind that more than just the one subspecies *Z. m. montana* can be recognized in the Philippines. How many and what the correct names are to apply to them are questions that await the additional revisionary work called for by Mayr (1967:301, footnote). When this is done, it is to be hoped that the revisor will avail himself of the combined series from all accessible collections, as has not always been done in the past.

***Zosterops everetti* Tweeddale, 1878**

All recent authors (Rand and Rabor, 1960; Mees, 1957; Mayr, 1967) have considered *boholensis* McGregor, 1908, as an endemic Bohol subspecies of *Zosterops everetti,* assigning to *Z. e. basilanica* Steere the populations of Basilan, Mindanao, Samar, and Leyte. I have examined a total of 23 specimens from Bohol and have compared them with the following material: Basilan, 3; Mindanao, 10; Samar, 13; Leyte, 5. In comparison with *basilanica,* the brighter upperparts and paler flanks of *boholensis* are evident; however, the variability in color of *basilanica* alluded to by Mees (1957:148) is easily explained by the fact that birds from Samar and (especially) Leyte belong to *boholensis,* not to *basilanica.* This, of course, conforms to a typical pattern of geographic variation in Philippine birds, with the populations of the three major Visayan islands collectively differing from those of Mindanao and Basilan. A reanalysis of all available specimens from Mindanao might show that the variation within that island referred to by Mees may (as he suggested) be resolved by restricting *basilanica* to Basilan and western Mindanao; the birds of eastern Mindanao may prove to be more closely related to those of Samar, Leyte, and Bohol.

Incidentally, the lectotype of *basilanica* chosen by Mees (1957:148), AMNH 700019, is an extreme individual, with the greatest amount of ventral yellow exhibited by any specimen of any Philippine race I have examined.

The four specimens in CM (one now exchanged to the DMNH) of the extinct *Z. e. everetti* of Cebu indicate that some modifications should be made in some of the subspecific diagnoses given by Mees (1957). His comparisons of *mandibularis* Stresemann (see page 154 of his paper) were made with *basilanica,* but (as hinted on page 146) *mandibularis* is much closer to *everetti* in its characters. These two subspecies exhibit the minimal amount of yellow in the midventral region; and, as indicated by Mees on page 146, both have pale bills. However, the CM material does not confirm Mees' statement that the bill of *mandibularis* is even paler than that of *everetti.* Mees correctly states that the flanks of *mandibularis* are paler than those of *basilanica* (of Basilan and western Mindanao), and in this *everetti* matches *mandibularis* also. The chief differences between *everetti* and *mandibularis* are the presence of a well-marked black line below the white eyering in *everetti* and the slightly brighter and richer yellow colors of that race.

Bourns and Worcester had four specimens of their new *Zosterops siquijorensis* (1894:21), as indicated in their original catalogue, which I have examined at the University of Minnesota. All four carry Bourns

and Worcester's red type label. On two of these, ♂ no. 3846 and ♀ no. 3848 (now USNM 316189 and 316188, respectively), Bourns and Worcester wrote the word TYPE. Another female in the USNM collection (3847, now USNM 315712) lacks this designation. Deignan (1961: 509) listed the male (USNM 316189) as *the* type specimen of *Z. siquijorensis* and stated, "In addition to this specimen, a female, no. 316188, has also been marked by Bourns and Worcester as 'type,' but it can be considered only a paratype." This statement directly contradicts Deignan's own philosophy on cotypes and lectotypes (1961:vii) and, in this case, is based on his misunderstanding of the Bourns and Worcester type specimens. In presenting descriptions of their new Philippine forms, Bourns and Worcester gave actual descriptions only of the male or males *when there was no sexual dimorphism.* Deignan construed this practice to mean that only a male specimen was eligible to be the "type" of such a form (see his remarks on *Hyloterpe winchelli* and *Hyloterpe major;* Deignan, 1961:471), an interpretation with no justification and certainly not in accordance with the intentions of Bourns and Worcester. On the labels of most (but not all) of their new forms, they wrote the word TYPE on one or more specimens, often a pair, but sometimes more. These designations have never been published except insofar as they are mentioned (usually only in part and sometimes inaccurately) in Deignan's paper. I prefer to follow Deignan's announced (but not practiced) philosophy of considering all of the series as cotypes, accepting designations of lectotypes only when a revisor has clearly shown the need for such a selection.

The fourth cotype of *Zosterops siquijorensis,* referred to by Mees (1969:265) as having been present in the Minnesota Museum of Natural History in 1959, was exchanged by that institution to CM in the latter year; it is now CM 138290. Mees *(loc. cit.)* stated that "if a lectotype has to be selected, it is perhaps preferable to take the Minnesota specimen." I do not follow his logic in this; but, in any case, the specimen in question (no. 3849 of Bourns and Worcester) is the least suitable as a lectotype because it is of unknown sex. However, no necessity for designation of a lectotype for *Zosterops siquijorensis* has been demonstrated, and I regard all four specimens simply as cotypes.

Zosterops nigrorum Tweeddale, 1878

As mentioned in the discussion of *Z. meyeni,* sexual dimorphism in color in this species makes it mandatory to separate out the sexes before any geographic comparisons are made, as some of the small series have lopsided representation of one sex or the other.

Mees (1957:164) could find no differences between the populations from Negros, Panay, and Masbate; he called all *Z. n. nigrorum*. I have found what seems to be geographic variation within *nigrorum,* but it is not correlated with a simple separation by islands. A series of 17 specimens from four localities in southern Negros, including eight near-topotypes of *nigrorum* (type locality Valencia), differs from a series composed of 12 from northern Negros (Canlaon), six from Masbate, and four from Panay. The birds from southern Negros are brighter and richer yellow above and below—that is, less grayish above and less whitish below. The two series, however, are not seasonally comparable. If additional material should support a separation, then the dull northern bird would need a name. In spite of the proximity of Masbate to Sorsogon, southern Luzon, the affinities of Masbate specimens are clearly with those of northern Negros, not with *luzonica*.

The treatment of the Luzon races adopted by Mees (1957) was essentially that of Mayr (*in* Delacour and Mayr, 1945:115), although Mees queried a few of Mayr's statements. The same allocation of ranges within Luzon appears in the Peters Check-list (Mayr, 1967). According to this arrangement, *Z. n. luzonica* Ogilvie-Grant, 1895, occupies only southeasternmost Luzon, in Sorsogon and Albay (misspelled "Albany" by Mees) provinces, and *Z. n. aureiloris* Ogilvie-Grant, 1895, occupies Luzon at least south to Laguna de Bay, as well as Mindoro. The excellent material I have examined indicates that this is an oversimplification of the geographic variation in this species on Luzon and Mindoro.

Mees apparently examined only three specimens of *luzonica;* I have been able to examine only six (Albay, 2; Sorsogon, 4), but I agree that *luzonica* should be limited to southeasternmost Luzon. The area between Albay and Laguna provinces has been inadequately collected; so it is not known how far north and west the characters of *luzonica* can be traced.

The remainder of Luzon is *not* occupied by *aureiloris,* of which the type locality is Lepanto, northern Luzon. The population of central Luzon differs from both *aureiloris* and *luzonica* and is, moreover, not intermediate between the two in some of its characters. I have based this conclusion on the examination of 27 specimens from central Luzon and 26 from northern Luzon. For the population of central Luzon, the name *innominata* Finsch, 1901, can be revived, as Mees (1957:166) has restricted its type locality to Manila. It must be understood that the species does not occur *at* Manila, in the coastal lowlands, where *Z. meyeni* is found; it is, in general, more of a highland bird in Luzon. The nearest thing to a definite lowland record I have seen is Gilliard's statement (1950:501) that his only records from the Bataan Peninsula

area were "of a male and female taken in the lowlands on November 29 by a local hunter."

Mees (1957:167) found three cotypes of *Z. innominata* in the BMNH, all in bad condition. One is labeled "Manila" and the other two are simply labeled "Philippines" or "Phil. I." He selected a juvenile as lectotype, on the basis that in spite of its plumage stage and its dirtiness, "it seems to belong to *aureiloris*" and also "it is the only specimen with a collector's name indicated an [*sic*] the label." Unfortunately, the collector whose name is on the label is Cuming; Mees, in making the statement (p. 166, footnote) that "as Cuming lived in Manila . . . it is highly likely that the skins were collected near Manila," showed that he was unaware of the utter unreliability of the localities (when localities are given) in Cuming's collection. For a detailed discussion of the problem, see Parkes, 1961:3–4. However, in view of the poor condition of the cotypes, it is highly unlikely that anyone will ever be able to associate them any more definitely with any population of *Zosterops nigrorum;* so the designation of the type locality for *innominata* made by Mees, "near Manila," can be accepted.

Males of *innominata* are nearest *luzonica* dorsally, although somewhat yellower, but with a distinctly defined yellow area between the crown and the bill as in *aureiloris.* The rump and upper tail-coverts are practically concolorous with the rest of the back, whereas they are brighter and yellower in *aureiloris.* The throat is even brighter and richer yellow than in *aureiloris* (thus not intermediate between the races to the north and to the south) and is richer yellow than the under tail-coverts, whereas in *aureiloris* the underparts are approximately uniform in color from front to back. Mayr *(in* Delacour and Mayr, 1945:115) mentions as a character of *aureiloris* "the reduction of citrine (in favor of yellow) on the sides of the breast and on the flanks." In *innominata* the flanks, and to some extent the breast, are heavily washed with citrine, contrasting quite sharply with the yellow of the midventral area. The yellow line at the forehead is like the throat in color, whereas in *aureiloris* it is deeper yellow than the throat. The facial pattern is like that of *aureiloris,* described and figured by Mees (1957:166–167; fig. p. 162). The females of *innominata* are duller in color than the males; but, when compared with females of the other two Luzon races, they agree with their males in general depth of yellow and contrasting flanks. Specimens examined of *innominata* came from Bataan and Laguna provinces; those of *aureiloris* came from Abra, Cagayan, Ilocos Norte, Isabela, and Mountain provinces.

Note: The preceding notes on Luzon races of *Zosterops nigrorum* were made prior to the description of *Z. n. sierramadrensis* by Rand and Rabor (1969:165–166). I examined five specimens from Isabela Province

and one from Cagayan Province that should belong to this new race, but at the time I did not note their differences from 20 specimens from northwestern Luzon. In some ways their description of *sierramadrensis* as compared with *aureiloris* is similar to the characters of *innominata;* Rand and Rabor had no specimens from central Luzon. It is obvious that new comparisons between the birds of northeastern, northwestern, and central Luzon birds need to be made to verify the distinctness of *sierramadrensis.* It is also of interest to note that Rand and Rabor have verified the sexual dimorphism in color, at least in the northeastern Luzon population ("females are duller"; 1969:166).

Examination of 12 specimens from five localities on Mindoro shows that the population of *Zosterops nigrorum* on this island cannot be allocated to any of the Luzon races, nor to any other, and is worthy of its own name. These birds may be called:

***Zosterops nigrorum mindorensis* new subspecies**

Type AMNH 790482, adult ♂, collected on the north slope of Mt. Halcon, Mindoro, Philippines, on March 19, 1965, by J. Ramos.

Diagnosis: Richest and deepest yellow of all the subspecies of *Zosterops nigrorum,* both above and below; the yellow neither greenish in tone, nor the brilliant lighter yellow of the larger race *catarmanensis* Rand and Rabor, 1969, of Camiguin South Island; black mark under eye slightly more extensive and white eye-ring slightly broader than in *aureiloris* and *innominata.*

Range: Highlands of Mindoro Island, Philippines.

I have seen the same four specimens of *Z. n. meyleri* McGregor, 1907, from Camiguin North Island, as were seen by Mees (1957:168). The variability in color that he mentions is accounted for by the fact that the series consists of one adult male, one adult female, one juvenile male, and one juvenile female. The adults are inseparable in color from *aureiloris,* but *meyleri* may be distinguished by its exceptionally large eye-ring (Mees, 1957:162; figured).

SUMMARY

Information on taxonomy, nomenclature, distribution, and plumages of a number of species of Philippine birds is presented. A partial breakdown by category is given below (with names given alphabetically in each category); these lists do not include all of the species mentioned in the paper.

New subspecies: *Anthreptes malacensis iris, Cisticola juncidis nigrostriata, Coracina morio lecroyae, Coracina morio ripleyi, Dicaeum bicolor viridissimum, Dryocopus javensis esthloterus, Parus semilarvatus snowi, Zosterops nigrorum mindorensis.*

Subspecies upheld or revived: *Centropus melanops banken, Cisticola exilis semirufa, Dicrurus hottentotus samarensis, Microhierax erythrogonys meridionalis, Mulleripicus funebris mayri, Prionochilus olivaceus samarensis, Riparia paludicola tantilla, Zosterops nigrorum innominata.*

Subspecies synonymized: *Butorides striatus carcinophilus, Cyornis herioti enganensis, Dicaeum hypoleucum lagunae, Dryocopus javensis samarensis, Eudynamys scolopacea onikakko, Eudynamys scolopacea paraguenae, Hirundo tahitica mallopega, Phapitreron leucotis albifrons, Rallus torquatus quisumbingi, Rallus torquatus sanfordi, Rhabdornis mysticalis longirostris.*

Partial taxonomic revisions: *Anthreptes malacensis, Coracina striata, Cyornis rufigastra, Nectarinia sperata, Penelopides panini, Phapitreron amethystina, Phylloscopus* sp., *Prionoturus discurus, Tanygnathus lucionensis, Zosterops everetti, Zosterops nigrorum.*

Nomenclatorial notes: *Coracina ostenta, Nectarinia sperata.*

Subspecies made full species: *Cyornis lemprieri, Orthotomus derbianus, Zosterops meyeni,* and possibly *Nectarinia henkei.*

Full species made subspecies: *Oriolus xanthonotus albiloris.*

Distributional notes: *Anthus gustavi, Anthus novaeseelandiae sinensis, Bubo philippensis, Butorides striatus amurensis, Culicicapa ceylonensis, Hirundo rustica saturata, Motacilla flava taivana, Ninox scutulata florensis, Orthotomus derbianus, Pernis apivorus philippensis, Rallus philippensis, Rhipidura cyaniceps, Stachyris striata.*

Notes on plumages: *Coracina striata, Eudynamys scolopacea, Prionoturus discurus, Rallus philippensis, Tanygnathus lucionensis, Zosterops meyeni.*

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NOTES ON ARIZONA BIRDS

*John P. Hubbard**

INTRODUCTION

This paper provides supplemental information to the excellent book on Arizona birds by Phillips, Marshall, and Monson (1964) and is based primarily on material collected in the first quarter of this century. This early information is important not only in the usual sense of distribution, taxonomy, etc., but also in helping to complete the historical record of Arizona ornithology. In view of the many known and suspected changes in status of Southwestern birds (e.g., Phillips, 1968), it is desirable to place in print all data that contribute to the accuracy and completeness of the record. Most of the specimens and other data cited here were amassed by the late J. Eugene Law, whose major interest in Arizona was centered on the Chiricahua Mountains. Law worked in those mountains at several different times, including April 1913, May through September 1919, and June through July 1921. He was also aided by several others, including Frank Hands, a long-time resident of the Chiricahuas; Adriaan J. van Rossem, employed to collect from October 1914 through June 1915; and Donald D. McLean, who accompanied Law in 1921. Law also obtained specimens from elsewhere in Arizona, including a small collection taken by Mortimer Jesurun in August and September 1916 from the poorly collected Chemehuevis (=Mohave) Mountains.

From the time of his death in 1931 until 1962, Law's holdings were housed at the Museum of Vertebrate Zoology, after which they were incorporated into the Bailey-Law Collection. The entire collection has been donated to the Virginia Polytechnic Institute and State University, Blacksburg, Virginia, and includes not only Law's bird skins but his field notebooks and other papers as well. While not containing a great deal of quantitative ecological information, Law's notes on Arizona localities, animals, and habitats are valuable and interesting documents. These notes are referred to frequently in the species accounts that follow and are indicated in this paper by "(ms)."

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Throughout the paper I have used Law's original catalog numbers, these being prefixed by "JEL." Other citations used are as follows: HHB—Harold H. Bailey; CNH—Cincinnati Museum of Natural History; DM—Delaware Museum of Natural History; MVZ—Museum of Vertebrate Zoology; PA—Academy of Natural Sciences of Philadelphia. US—National Museum of Natural History; UM—University of Michigan Museum of Zoology. Some of the material in the Bailey-Law Collection has now been deposited in these museums, and such transfers are appropriately indicated.

In keeping with the meticulous attention to Arizona birds shown by Phillips et al. (1964), I have included in this paper information of minor as well as of major importance and interest. The desire for completeness and the need to place data on the published record outweigh the added length brought about by this approach. One source of commentary in this paper is on maps in Phillips et al. (1964), to which a number of additions can be made. I am informed by Allan Phillips (*in litt.*) that some of the maps were altered from the originals in the publication process, and as a result some of the gaps are more apparent than real. However, as most readers cannot readily distinguish between what is shown and what was intended, I have treated all cases for which I have supplemental data.

In general, taxonomy and sequence follow the A. O. U. Check-list (1957). Measurements are in millimeters (mm.), with wing length being the chord. Elevations are given in feet, in keeping with original notations on labels. To avoid repetition, several frequently mentioned localities can be located precisely as follows:

Barfoot Park—in the Chiricahua Mountains, about 8 miles due west of the village of Portal. Elevations 8000 feet and higher.

Bonita Canyon—in the Chiricahua Mountains on the northwest slope; at its head about 15 miles west and 5.5 miles north of Portal. Elevations up to 5500 feet.

Chiricahua Mountains—in extreme central-eastern Cochise County, in southeastern Arizona. Elevations up to about 9800 feet.

Dos Cabezas—in central-northern Cochise County, about 15 road miles east-southeast of Willcox, on Arizona Route 186.

Light—a settlement west of the Chiricahua Mountains, about 20 miles due west of Portal. Elevation 4500 feet.

Mohave Mountains—in extreme southern Mohave County, between the Colorado and Big Sandy Rivers; called the Chemehuevis Mountains by Jesurun in 1916. Elevations up to 5300 feet.

Pinery Canyon—in the Chiricahua Mountains on the northwest slope; at its head about 7 miles west and 0.5 miles north of Portal. Elevations 5000 feet and higher.

Rustler Park—in the Chiricahua Mountains about 1 mile south of Barfoot Park. Elevations 8000 feet and higher.

Willcox—in central-northern Cochise County on Arizona Route 86.

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ANNOTATED LIST OF SPECIES

Double-crested Cormorant: *Phalacrocorax auritus* (Lesson). Phillips et al. (1964) surmise that the race occurring in Arizona should be *albociliatus* Ridgway, but they had seen no material to verify this. Two white-plumed specimens of this race were taken 2 miles north of Light by van Rossem: adult female, 20 May 1915 (JEL 3898); subadult male, 27 May 1915 (JEL 3897). (JEL 3898 is now in US collection.)

Goshawk: *Accipiter gentilis* (Linnaeus). Goshawks breeding in the Chiricahua Mountains and southward were separated by van Rossem (1938) as *A. g. apache*, which was described as larger than more northern birds, with darker upperparts in adults and darker and broader ventral streaking in immatures. Although not recognized by most workers, this race is accepted as valid by Phillips et al. (1964), and its range is extended to the nearby Huachuca and Santa Catalina Mountains. This acceptance is supported by my investigations, which suggest that at least on the basis of wing length *A. g. apache* is distinct from Goshawks of most of the remainder of North America.

Wing lengths of 31 Goshawks from probable breeding grounds or areas of residency are shown in Table 1. From these data it is apparent that the adult female that served as the type of *A. g. apache* is very long winged, exceeding the closest value from elsewhere in North America (the Yukon, in this case) by 28 mm. The wing measurements of the two immature female *A. g. apache* exceed those of the next largest

Table 1: Wing Lengths (in mm.) of Breeding and Resident Goshawks of North America

Area	Males		Females	
	Adult	*Immature*	*Adult*	*Immature*
Southeastern Arizona	344[1]	332[2]	*390[1]	365[1], 368
Northern New Mexico and central Arizona	335	none	none	341, 351
More northern North America	320–325 (7)	305–325 (5)	340–362 (9)	345, 347

[1] Measured by van Rossem (1938)
[2] Measured by D. M. Niles
* Type of *Accipiter gentilis apache* van Rossem

bird (from northern New Mexico) by 14 and 17 mm. and are greater than those of the largest more northern bird (from Labrador) by 17 and 21 mm. Of the two adult male *A. g. apache,* the larger is 9 mm. longer winged than the next largest bird (again from northern New Mexico), but the smaller is 3 mm. *shorter* than the latter. However, when compared to more northern specimens, the two *A. g. apache* both prove longer winged, being 19 and 7 mm. longer than the longest (a bird from Idaho). These data, although based on small samples, show that *A. g. apache* averages longer winged than more northern Goshawks, although approached by some birds in northern New Mexico and probably elsewhere in the Southwest. Additional specimens, all nonbreeding adult females, that are intermediate toward *A. g. apache* are the following from southwestern New Mexico: Reserve, Catron County, 11 October 1927 (UM 121501), wing 378 mm.; Black Range, Grant County, 2 December 1917 (CNH 6), wing 371 mm.; Pinos Altos Mountains, Grant County, 10 December 1926 (CNH 7), wing 370 mm.

Color comparisons could not be generally undertaken, except with material in the Bailey-Law Collection. The only summer *A. g. apache* in the collection is an immature female from Pinery Canyon, in the Chiricahua Mountains: 21 June 1921 (JEL 6824), wing 368 mm. Compared to a series of five immatures from northeastern North America, this specimen is generally darker above, especially on the crown; but the character of the ventral streaking is not notably different from certain of the northeastern birds. The same assessment of color characters applies to four other immature Chiricahua specimens, identified as *A. g. apache* on the basis of long wings: female, 22 October 1914 (JEL 2861), wing 368 mm.; probable female, autumn 1917 (JEL 5751), wing 370 mm.; probable male, 9 November 1915 (JEL 4642), wing 336 mm.; male, December 1924 (JEL 7358), wing 341 mm. In essence, then, the character of ventral streaking may not separate immature *A. g. apache* from more northern Goshawks, but darker upperparts may (except perhaps for the race *A. g. laingi* [Taverner], which should be notably smaller).

Among adults from the Chiricahua Mountains in the Bailey-Law Collection, three are large enough to be called *A. g. apache.* Only one of these is darker than most of 10 more northern specimens, and two are as pale as most of that series: female, 5 February 1917 (JEL 5323), wing 377 mm., upperparts dark; male, 12 November 1916 (JEL 5748), wing 349 mm., upperparts moderately dark; male (somewhat subadult), 20 November 1916 (JEL 5745), wing 347 mm., upperparts pale. These findings do not necessarily indicate that upperpart color is invalid for separating *A. g. apache,* but certainly it does not appear to be entirely

consistent. Another long-winged and dark adult, apparently *A. g. apache*, is a female taken in the Santa Rita Mountains, 2 February 1958 (US 478800), wing 365 mm.

The remaining Chiricahua Goshawk specimens in the Bailey-Law Collection are smaller and generally pale. All are adults and can be assigned to *A. g. atricapillus* (Wilson): male, 10 November 1916 (JEL 5747), wing 317 mm.; male, 15 November 1916 (JEL 5746), wing 322 mm.; female, on or about 20 December 1917 (JEL 5706), wing 358 mm.; female, 24 December 1917 (JEL 5661), wing 352 mm.; female, 9 February 1918 (JEL 5749), wing 349 mm. The first two specimens were taken during the winter of 1916–1917, cited by Phillips et al. (1964) as an invasion year for this form into southern Arizona. The other three were taken in the winter of 1917–1918, which suggests that another invasion occurred in that period. That this race occurs further south is evidenced by an adult probable male taken by I. W. Knobloch in Chihuahua, presumably in the Morjarachi area, on 15 April 1940 (US 365099), wing 324 mm.

Ferruginous Hawk: *Buteo regalis* (Gray). The first Arizona nest recorded by Phillips et al. (1964) was found in 1926 near Prescott, but an earlier one was located by van Rossem in the southeast, where the bird is local and irregular as a breeder. The nest was located in May 1915 at Deep Wells, Cochise County, 15 miles west of the Chiricahua Mountains. The young were taken as follows: one very small nestling on 13 May (JEL 3940); three medium-sized young on 31 May, including one that was kept alive until 5 June (JEL 3937–3939). Also taken there was an adult light phase female on 13 May 1915 (JEL 3935); and opposite Fife Creek, 5 miles west of the Chiricahuas, a light phase adult male and a dark phase (erythristic) female were taken on 31 May 1915 (JEL 3933, 3934). Law (ms) also described and recorded collecting as a skeleton a dark phase adult found dead 4 miles east of Dos Cabezas, Cochise County, on 17 June 1919. Law's field notes contain frequent references to what he thought were these hawks in southern Arizona in the summers of 1919 and 1921, but it appears that in part the records actually refer to Red-tailed Hawks of or approaching the race *Buteo jamaicensis fuertesi* Sutton and Van Tyne. For example, a supposed (ms and label) *B. regalis* nestling (JEL 8163) taken from a nest in a sahuaro 13 miles west of Wickenburg, Maricopa County, on 29 June 1921, proves to be a Red-tail. The error is understandable because of the similarity of these ventrally pale Red-tails and light phase *B. regalis*. (JEL 3937 and 3940 are now in US collection.)

Gray Hawk: *Buteo nitidus* (Latham). J. Eugene Law (1929), in a rather spirited review of a paper on Arizona birds, stated that he had twice seen this species in the Chiricahua Mountains. Examination of his field notes, however, indicates that he was far from positive concerning the identity of his sightings at the time they were recorded. He notes having seen single birds on 22 May and 21 June 1919 that may have been this species, plus possible sightings by his companion, D. D. McLean, on 22 and 27 June 1921. The descriptions in the notes refer to long tail, rounded wings, gray color, and barring; and the birds were all seen at high altitudes, except for one in Pinery Canyon, 5400 feet. Inasmuch as Law seems never to have seen *B. nitidus* elsewhere in the wild, it is likely that his Chiricahua sightings were actually of Goshawks. The latter species breeds in those mountains (Tanner and Hardy, 1958), fits the preceding description, and is more likely to be seen in the habitats in which the observations were made.

Mountain Plover: *Eupoda montana* (Townsend). Phillips et al. (1964) report this species as rare in southeastern Arizona at any time and as wintering eastward only to Phoenix and Florence; however, van Rossem took 14 specimens (JEL 3427–3440) 12 miles south of Dos Cabezas on 23 and 24 February 1915. The possibility exists that these were early spring migrants moving eastward, rather than wintering birds. (JEL 3437–3440 are now in US collection.)

Northern Phalarope: *Lobipes lobatus* (Linnaeus). This species is considered to be rare in southeastern Arizona at any time or anywhere in the state in spring (Phillips et al., 1964). Van Rossem took a male, in breeding plumage, 2 miles north of Light on 27 May 1915 (JEL 3901, which is now in US collection).

California Gull: *Larus californicus* Lawrence. This species is a vagrant in Arizona, except in the lower Colorado Valley where it is a regular migrant (Phillips et al., 1964). J. E. Law (ms) described and identified as this species a gull that he received as a feathered carcass from Frank Hands. Hands found the bird at Chiricahua Seep (exact location unknown to me), Cochise County, on 15 November 1923 and surmised that it had been killed 7 to 10 days before by duck hunters (ms). At that time Law had specimens in his collection that would have allowed him to correctly identify large immature gulls, and his measurements (ms) support the identification: wing 411 mm., tail 159 mm., exposed culmen 50 mm., tarsus 63 mm., bill depth at gonydeal angle about 16 mm. I do not know the ultimate disposal of this bird.

Thick-billed Parrot: ***Rhynchopsitta pachyrhyncha*** **(Swainson).** During their invasions of Arizona in 1917–1918, these parrots were reported in the Chiricahua Mountains only as early as July 1917 (Phillips et al., 1964). E. J. Hands took three males and a female (HHB 1078–1082) in these mountains, in Jhus Canyon, which are dated 18 January 1917. However, it is possible these were misdated and were actually taken on 18 January in 1918, rather than 1917. Frank Hands, brother of E. J., wrote Law (ms) extensively on this species, particularly concerning its occurrence in the Chiricahuas in 1917–1918. His earliest record in 1917 was 30 August, when 150 were seen, and his latest in 1918 was on 26 or 27 March, when 15 were seen. During this period Hands thought that the birds occurred only intermittently, with a notable absence from mid-October to mid-December and perhaps in January. Frank Hands also reported shooting one of two parrots seen in these mountains at Cave Creek about 1890 and shooting another, from a flock of about 30, in Pinery Canyon in August or September 1903 or 1904. (JEL 5566, 5665, 5752, 6219, and HHB 1082 are now in US collection; HHB 1081 is in DM collection.)

Elf Owl: ***Micrathene whitneyi whitneyi*** **(Cooper).** This species is rare in western Arizona, in the region west of the Big Sandy River, where it has been reported only from near Fort Mohave (the type locality) and at Chloride (Phillips et al., 1964). Jesurun took an adult in that region in the Mohave Mountains, 3200 feet: male, 16 August 1916 (JEL 6232). In a letter to J. E. Law (dated 19 August 1916), he indicated that this was the only Elf Owl observed. Interestingly, the specimen is in active molt, with new and sheathed feathers on the forehead and crown and the tail partially regrown; the inner six primaries are new, the seventh is half-grown, and the outer three are old. Ligon (1968) reported that the Elf Owl begins the annual molt in early September; but, as this specimen shows, it may begin in mid-August. This appears to be only the second wild-taken specimen in the midst of postnuptial molt (*vide* Ligon, 1968). (Specimen is now in US collection.)

Common Nighthawk: ***Chordeiles minor*** **(Forster).** Although summer specimens are known from the Chiricahua Mountains, the status of this species in that range appears unclear, and the species is not definitely known to breed there (Phillips et al., 1964). Additional data include records of J. E. Law (ms) in Pinery Canyon in the summers of 1919 and 1921, as well as a specimen of *C. m. henryi* Cassin: adult male, 21 June 1921 (JEL 6939), testes 5.5 x 7 mm. Several of Law's observations were of "booming" birds, as were records obtained in Whitewater Can-

yon on 7 July 1919 and Rucker Canyon on 8 July 1919. In addition, 12 specimens were taken by van Rossem in Bonita Canyon in the period from 26 May to 5 June 1915, although these may all be migrants. All but three I refer to *C. m. henryi*, the exceptions being a dark male, 27 May (JEL 3961), that is near *C. m. hesperis* Grinnell; and two pale males, 27 and 28 May (JEL 3962, 3966), that may prove to be *C. m. howelli* Oberholser when proper comparisons can be made. More recently, Ligon and Balda (1968) report seeing the species in the range on 18 July 1965.

Calliope Hummingbird: *Stellula calliope* (Gould). This species was not mapped by Phillips et al. (1964) as occurring in the Chiricahua Mountains, but J. E. Law (ms) saw three and took an immature male specimen in Barfoot Park, 8200 feet, on 24 August 1919 (JEL 6435). More recently, Ligon and Balda (1968) list two sight records from these mountains.

Rivoli's Hummingbird: *Eugenes fulgens aureoviridis* van Rossem. Summer habitats of this species in Arizona are reported by Phillips et al. (1964) as being in the mixed Upper Sonoran and Transition Zones, with males sometimes ranging up to the lower edge of fir forest. Observations by J. E. Law (ms), with D. D. McLean, in the Chiricahua Mountains in 1921 indicate that a mixture of Transition and Canadian habitats also may be used. They found the species mainly above 8000 feet in and near arboreal habitats dominated by fir, aspen, pines, and live and deciduous oaks, with feeding done mainly at flowering locust and agave. The only record in dense fir forest was of a female taken at a honeysuckle on Fly Peak, 9000 feet: adult, 1 July 1921 (JEL 6942). In contrast to Law's failure (ms) to find the species at lower elevations (5500 to 7000 feet in Pinery Canyon in 1919 and 1921), Ligon and Balda (1968), in their recent studies in these mountains, found it regularly in Cave Creek Canyon and only occasionally up to the lower edge of pine forest. (JEL 6942 is now in US collection.)

Gilded Flicker: *Colaptes chrysoides mearnsi* Ridgway. This form is not mapped as occurring west of the Big Sandy River in Mohave County, except formerly at Fort Mohave (Phillips et al., 1964), but in 1916 Jesurun took three adults in the Mohave Mountains, 3200 to 4500 feet: male, 13 August (JEL 6236), molting; male, 2 September (JEL 6234), molt nearly complete; female, 20 September (JEL 6235), molt nearly complete. The specimens suggest that this flicker is or was resident in these mountains. Also taken there by Jesurun was a fresh-plumaged *C. auratus collaris* Vigors: adult female, 14 September 1916 (JEL 6232);

this is presumed to be an early postbreeding migrant from farther north, although slightly earlier than first arrivals reported in southern Arizona by Phillips et al. (1964).

Yellow-bellied Sapsucker: ***Sphyrapicus varius*** **(Linnaeus).** Intergrades between the red-headed forms of this species and more easterly populations are rare enough in Arizona to warrant reporting three others taken by van Rossem in Pinery Canyon, 6000 feet, all in the autumn of 1914: immature male, 24 October (JEL 2434); immature female, 29 October (JEL 2439); adult male, 8 November (JEL 2441). Although I am unable to determine precisely the ancestry of these specimens, their size, the brightness of the red coloration, and the amount of light spoting suggest that they are *S. v. nuchalis* Baird x *S. v. ruber* (Gmelin) (JEL 2439 may be *S. v. nuchalis* x *S. v. daggetti* Grinnell). All are generally similar to *S. v. nuchalis,* except for being more extensively red on the head and breast. JEL 2439 lacks black on the nape and breast, whereas in the other two specimens the black areas are retained but overlaid with red. (Specimens are now in US collection.)

Hairy Woodpecker: ***Dendrocopos villosus icastus*** **(Oberholser).** Phillips et al. (1964) consider this species as resident in coniferous forests in Arizona (although formerly ranging lower in winter). In 1919 J. E. Law found the species present in summer in oak, pine-oak, and riparian woodlands of Pinery Canyon, 6000 to 6200 feet; he took two specimens: adult male, 13 June (JEL 6418); immature female, 27 June (JEL 6422). Van Rossem took one even lower in the canyon, at 5800 feet: adult male, 26 October 1914 (JEL 2418). More recently, Ligon and Balda (1968) found two nests in riparian woodland along Cave Creek at about 5400 feet.

Downy Woodpecker: ***Dendrocopos pubescens*** **(Linnaeus).** This species is rare in southeastern Arizona and has not been previously reported in the Chiricahua Mountains (Phillips et al., 1964). J. E. Law received the carcass of an adult female shot by Frank Hands in Pinery Canyon, 5500 feet, on 10 April 1928, from which he saved feathers (JEL 9646) and apparently the skeleton (ms). I have not seen the latter, but the feathers are definitely this species, probably the race *D. p. leucurus* (Hartlaub). Measurements given by Law (ms) are also confirmatory: wing 99.7 mm., tail 59.8 mm., exposed culmen 13.7, tarsus 17.2 mm.

Western Kingbird: ***Tyrannus verticalis*** **Say.** Phillips et al. (1964) report that the first spring migrants appear in Arizona in late March, occurring north and east to Phoenix and Tucson. That the species also occurs farther east at that time is indicated by a male taken by van

Rossem in Bonita Canyon, Chiricahua Mountains, on 29 March 1915 (JEL 3494); another was taken there on 2 April 1915 (JEL 3495). Those authors also state that this species is local in the breeding season in parts of southernmost Arizona and absent in Guadalupe Canyon in extreme southeastern Cochise County. I have several records of the species in the latter area in summer, including two pair seen on 20 June 1959 (along with *T. vociferans* and *T. crassirostris* Swainson).

Cassin's Kingbird: *Tyrannus vociferans vociferans* Swainson. Specimens representing early arrival dates in southeastern Arizona are three males taken by van Rossem in Bonita Canyon, Chiricahua Mountains, on 29 March 1915 (JEL 3496–3498).

Buff-breasted Flycatcher: *Empidonax fulvifrons pygmaeus* Coues. This species was formerly more widespread in Arizona (Phillips et al., 1964) and in New Mexico (Hubbard, 1970) but is now very local and rare in the Southwest. In Arizona and in Mexico the habitat is reported to be open riparian woodland and pine forest, with a bare, weedy, or grassy understory (Phillips et al., 1964). These authors suggest that the decline of the species in Arizona is due to an increase in brush and young trees, resulting from fire protection, which has eliminated much of the openness. Phillips (1968) reiterates this theory but admits that it does not explain the species' present absence from such seemingly suitable higher elevation localities as Rustler and Barfoot Parks in the Chiricahua Mountains, where he implies that the species has not been recorded. This species, in fact, formerly did occur in these parks and almost certainly bred there as well, as is evidenced by Law's specimens and observations (ms).

In Barfoot Park, Law saw at least nine birds on 14 August 1919 and took two grown juveniles (JEL 6467, 6468). In 1921 he saw four birds on 6 July and took two stub-tailed juveniles (JEL 6960, 6961), both being attended by adults and almost certainly hatched nearby. In Rustler Park he noted two birds in late April 1913 that were possibly the same as two specimens (JEL 899, 901) taken on 25 April 1913 and labeled as Paradise, 7800 feet. Law also reported that D. D. McLean took a specimen in Rustler Park on 9 July 1921, a fact borne out by recent correspondence from McLean (Laura Bailey, pers. comm.). The implication from Law's notes is that the species was fairly common in the above areas and was seen with regularity. (JEL 6467 and 6961 are now in US collection.)

Interestingly, Law noted a propensity by the birds for foraging near the ground in dense vegetation, such as bracken fern, even to the point

of being entirely hidden in the growth at times. This willingness to penetrate at least certain types of dense growth and the former occurrence of species in seemingly still suitable areas argue for caution in more than tentative acceptance of a simple explanation for the species' decline in the Southwest.

Vermilion Flycatcher: *Pyrocephalus rubinus flammeus* van Rossem. This species is not mapped as summering on the west side of the Chiricahua Mountains by Phillips et al. (1964), but J. E. Law (ms) recorded it locally in Pinery Canyon in the summers of 1919 and 1921. The species was seen mainly about the ranches of Rhoda Riggs and T. B. Startes, and an adult female was taken on 28 June 1919 (JEL 7401). In 1915, van Rossem took 26 specimens in Bonita Canyon, 5000 feet, also on the west side of the Chiricahuas, but most of these may have been migrants. In all, 16 males (nine adult and seven subadult) were taken there from 2 March to 5 May, along with 10 females from 26 March to 22 April.

Barn Swallow: *Hirundo rustica erythrogaster* Boddaert. Additional breeding data of this species in southeastern Arizona are of interest, as it is local and somewhat irregular there (Phillips et al., 1964). J. E. Law (ms) recorded this species breeding on the depot building of the Southern Pacific Railroad in Willcox, where he found an active nest in 1919 and two nests on 15–17 June 1921. The species also breeds at present in Cave Creek Canyon, Chiricahua Mountains (Ligon and Balda, 1968), but Law's only summer record in that range was of a solitary adult seen over Rustler Park, 8400 feet, on 5 July 1921.

Incidentally, Phillips et al. (1964) contend that this swallow migrates at night in Arizona, based on the finding of a broken-winged bird fluttering under a tree on the San Francisco Peaks. The assumption is made that the bird collided with the tree in the dark, but as it was not encountered until midmorning, one cannot rule out other possibilities, e.g., collision while feeding, fighting, or fleeing a raptor in broad daylight.

Purple Martin: *Progne subis* (Linnaeus). Martins breeding in Arizona from the Mogollon Plateau and the Chiricahua Mountains northward have been assigned by Behle (1968) to his recently described race, *P. s. arboricola* (type locality: Payson Lakes, Utah County, Utah). This new taxon is said to differ from *P. s. subis* and *P. s. hesperia* Brewster in being larger in both sexes, plus paler on the forehead and whiter below than females of *P. s. subis*. In Table 2, wing lengths of 11 breeding martins from the Chiricahua Mountains are compared to those given by Behle (1968).

Table 2: Wing Lengths of Breeding Martins (*Progne subis* ssp.)

Form or Sample	Adult Males			Adult Females		
	N	*Mean ± 1 SD*	*Range*	*N*	*Mean ± 1 SD*	*Range*
P. s. arboricola[1]	31	150.1 ± 2.37	146.0–155.7	17	145.6 ± 3.07	141.1–154.1
P. s. subis[1]	49	144.2 ± 3.35	134.3–151.9	34	141.0 ± 2.96	136.1–146.4
P. s. hesperia[1]	22	139.5 ± 1.69	132.0–146.5	14	136.4 ± 2.49	132.6–140.2
Chiricahua Mts.[2]	6	147.5	144.0–153.0	5	141.8	139.0–144.0

[1] Measurements from Behle (1968)
[2] *SD* not calculated because of small samples

From these data it is apparent that breeding males from the Chiricahuas are actually intermediate between *P. s. subis* and *P. s. arboricola* and that females are very close to *P. s. subis*. Admittedly, the sample sizes are small, but they are a better basis for evaluating this breeding population than Behle (1968) had, because he measured no birds from the Chiricahua Mountains. On the basis of measurements, it appears that he was premature in assigning the breeding birds of these mountains to his newly described race. The same conclusion also applies when color characters are analyzed; for of seven females examined by me, three are indistinguishable from *P. s. subis*, three fit *P. s. arboricola*, and one is intermediate. The first three have dark foreheads and mainly grayish underparts, with the white of the belly not extensive. The second three have pale foreheads and more extensively white bellies, and the seventh specimen lies between the two groups in both characters. Based on these data, breeding birds from the Chiricahuas should be called *P. s. subis* x *P. s. arboricola*, should the latter be recognized.

The inclusion by Behle (1968) of the Mogollon Plateau of Arizona in the range of *P. s. arboricola* also requires study, as his sample size there is very small. In fact, the range of the proposed form is not well researched outside of Utah, and the identity of the breeding birds of the Pacific Coast (regarded as *P. s. subis* by most workers) is essentially ignored by Behle. Obviously, a broader review of the available specimen material is necessary, not only to define the range of *P. s. arboricola* but also to establish the validity of the taxon.

Scrub Jay: *Aphelocoma coerulescens nevadae* Pitelka. Additional records from far western Arizona, where this species is apparently only a nonbreeding visitor, are of two specimens taken in 1916 by M.

Jesurun in the Mohave Mountains, 4500 feet: female, 7 September (JEL 6253); male, 20 September (JEL 6252). These are pale and both seem to be adults.

Clark's Nutcracker: *Nucifraga columbiana* (Wilson). Additions to the chronicle of incursions of this species in Arizona include the following observations from the Chiricahua Mountains, supplied to J. E. Law (ms) by Frank Hands. In 1919, up to eight birds at a time were present in Pinery Canyon from 18 September through 8 November. In 1921–1922, single birds were noted at intervals in the same canyon through the winter. Both of these periods represent years unreported by Phillips et al. (1964). These authors also refer to a specimen taken by H. H. Kimball in April 1895 in the Huachuca Mountains as apparently being a postbreeding migrant. Such a specimen also exists in the Bailey-Law collection, an adult female taken on 24 April 1895 (JEL 653). The supposition that it is postbreeding is supported by the fact that the specimen is in the early stages of the postnuptial molt. (Specimen is now in US collection.)

Plain Titmouse: *Parus inornatus plumbescens* (Grinnell). Phillips et al. (1964) indicate that this species is very local in the Chiricahua Mountains, although recently Ligon and Balda (1968) report it to be fairly common in more xeric areas of the range. This possibly indicates a change in status there. J. E. Law (ms) never found the species in these mountains during his field work in 1913, 1919, and 1921, although in 1915 van Rossem took two in Pine Canyon, 5000 feet, on the west side of the range: male, 23 April (JEL 4296); female, 3 May (JEL 4297). (JEL 4297 is now in US collection.)

Common Bushtit: *Psaltriparus minimus plumbeus* (Baird). Phillips et al. (1964) list only one record from the Mohave Mountains, to which can be added another taken by M. Jesurun: adult female, 5 September 1916 (JEL 6331). The specimen is in the terminal stages of the postnuptial molt.

Red-breasted Nuthatch: *Sitta canadensis* Linnaeus. An exceptionally early autumn migrant and unusual occurrence is a specimen taken in the Colorado Valley, 400 feet, Mohave County, by M. Jesurun: female, 26 August 1916 (JEL 6330). No specific locality is given in the valley, but it was probably somewhere west of the Mohave Mountains.

Dipper: *Cinclus mexicanus unicolor* Bonaparte. To the few records from the Chiricahua Mountains may be added two unsexed specimens taken by E. J. Hands: Pinery Canyon, 28 November 1914 (JEL 3387); Cave Creek, 5500 feet, 18 December 1920 (JEL 6602). (Specimens are now in US collection.)

Bewick's Wren: *Thryomanes bewickii eremophilus* Oberholser. A specimen taken by M. Jesurun in the Mohave Mountains, 3200 feet, where the species is not known to breed, is slightly earlier than the earliest record of an autumn migrant given by Phillips et al. (1964): adult female, 14 September 1916 (JEL 6329). The plumage is fresh.

Sage Thrasher: *Oreoscoptes montanus* (Townsend). Phillips et al. (1964) consider this species as casual or irregular in winter in southeastern Arizona, east of the San Pedro River. Additional records from the area are the following taken by A. J. van Rossem in 1915: female, 3 miles southeast of Dos Cabezas, 4700 feet, 18 January 1915 (JEL 2788); male, Bonita Canyon, 5000 feet, Chiricahua Mountains, 7 February 1915 (JEL 3761). Possibly also wintering in this range is the following from Pinery Canyon, 5400 feet: female, 20 November 1914 (JEL 2789). In addition, a very early autumn migrant was taken by M. Jesurun in the Mohave Mountains, 3200 feet: female, 22 August 1916 (JEL 6314). Another, more recent specimen (DM 1421) was taken 3 miles east of Portal, Cochise County, on 12 August 1960 by John E. duPont. The bird is a worn female and is almost certainly an early autumn migrant. Both of these August dates are earlier than the earliest sub-Mogollon Plateau record listed by Phillips et al. (1964); i.e., 29 August 1884.

Western Bluebird: *Sialia mexicana bairdi* (Ridgway). Phillips et al. (1964) indicate that this species is confined to higher elevations in summer in southern Arizona, but J. E. Law (ms) found it as low as 5650 feet in Pinery Canyon, Chiricahua Mountains, in live oak and adjacent riparian woodlands. On 5 May 1919 he located a pair in the vicinity of the Frank Hands homestead, and on the following day he saw them carrying nesting material into a cavity in a sycamore. Later, on 29 June, Witmer Stone took a grown juvenile in the vicinity (PA 78826). In the same area, Law found one or two pairs present during his stay from 3 to 25 June 1921, and he also noted that Hands found a pair nesting there in 1918. The juvenile is identifiable as this species in part by its grayish blue throat, rather than whitish as in *S. sialis*.

Law did not find *S. sialis* (Linnaeus) in the Chiricahuas during his field work in 1913, 1919, and 1921, although he made no special search for it and noted (ms) that it would have been easily overlooked or mistaken for *S. mexicana*. *S. sialis* is now known to breed in these mountains (Phillips et al., 1964).

Gray Vireo: *Vireo vicinior* Coues. While mapping this vireo as breeding in the Santa Catalina Mountains, Phillips et al. (1964) report that they have never personally encountered the species there but would

expect it at the northern base of the range. In 1963 I found two individuals in Molino Basin on the south slope of these mountains and took one as a skeletal specimen: adult male, 25 June (UM), testes 3.5 x 4 mm., weight 11.5 grams. The specimen was singing when shot and had been chasing or courting the other bird.

In the Chiricahua Mountains, van Rossem took four males and one female on 20 April 1915 (JEL 4225–4228), which he noted to be the first arrivals detected by him. The only arrival date in a breeding area given by Phillips et al. (1964) is 1 April 1885, in the Santa Catalina Mountains, but that may be exceptionally early. Interestingly, on 13 November 1964, Gale Monson (pers. comm.) saw one in the Chiricahua Mountains, in lower Cave Creek Canyon, which may have been wintering. If so, this is considerably east of the winter range as presently known in Arizona (Phillips et al., 1964).

Solitary Vireo: ***Vireo solitarius cassinii*** **Xantus.** Law took an adult female (JEL 9604) on the San Pedro River on 18 March 1928, a date which precedes by 6 days the earliest spring record of a migrant listed by Phillips et al. (1964). The exact locality is the 111 Ranch, 8 miles northwest of Mammoth, Pinal County. The specimen was supposedly skeletonized (ms), but I have seen only the spread wing that was salvaged (approximate length 73 mm.). Law and A. Brooks saw two or three of these vireos at the 111 Ranch on that date and apparently one on the preceding day (ms). These birds may also have wintered in the area, as the species is known to do so in similar habitats to the west (Phillips et al., 1964).

Lucy's Warbler: ***Vermivora luciae*** **(Cooper).** That there have been range expansions of this species in the Southwest in historic times is recognized (Phillips et al., 1964; Phillips, 1968; Hubbard, 1970), but some details of the chronology of events are still lacking. The earliest specific date given by Phillips et al. (1964) in the Chiricahua Mountain area is 1947, but van Rossem took five specimens there in Bonita Canyon, 5000 feet, in 1915: pair, 20 April; male, 26 April; two males, 5 June (JEL 4224–4225, 4229–4231). In his work in Pinery Canyon in 1919 and 1921, Law did not find the species, but he reported (ms) that Witmer Stone found a family group in Rucker Canyon on 9 July 1921; one of these, an adult male, was taken as a specimen (PA 78778). Thus, it seems likely that this warbler was already a local summer resident in the Chiricahua Mountain region by 1915. The species is omitted from Guadalupe Canyon on the map in Phillips et al. (1964), but the bird is a common breeder there. (JEL 4229 and 4325 are now in US collection.)

Western Meadowlark: ***Sturnella neglecta neglecta*** **Audubon.** This species is only a migrant and wintering bird in Arizona south of the Gila Valley and east of Tucson, except for one breeding record (Phillips et al., 1964). During several months of continuous collecting from the autumn of 1914 through the spring of 1915, van Rossem took a series of this species in the Chiricahua Mountains area, which elucidates the period of its occurrence there during that span. A total of 20 specimens was taken, all on the west side of the range in Pinery and Bonita Canyons, except for two that were collected somewhat farther west. The earliest are two specimens taken on 25 October 1914 and the latest is one on 3 April 1915; most specimens were taken in October (five) and March (five), with a total of only six in the colder months of January and February. During the same period, 19 *S. magna lilianae* Oberholser were also collected, including four in the colder months of December and February.

Red-winged Blackbird: ***Agelaius phoeniceus fortis*** **Ridgway.** No wintering specimens are shown from the Chiricahua Mountains (Phillips et al., 1964), where van Rossem took 31 females and two males in the period 17 January through 28 February 1915. Most are from Bonita Canyon, 5000 feet, but a few are from Picket and Pinery Canyons, also 5000 feet. A female taken in Bonita Canyon on 9 February (JEL 3554) is somewhat more extensively dark on the belly than the remainder of the series, and its subspecific identity is unclear.

Hooded Oriole: ***Icterus cucullatus nelsoni*** **Ridgway.** This species is not mapped as summering in the Chiricahua Mountains (Phillips et al., 1964), but J. E. Law found it (ms) to be fairly common in Pinery Canyon, up to 5500 feet, in the period 3–13 June 1921. In addition, van Rossem took an unsexed, short-tailed juvenile (JEL 4395) in Bonita Canyon, 5000 feet, on 5 June 1915; earliest spring specimens taken by him in 1915 were also from Bonita Canyon: male, 3 April (JEL 4117); female, 5 April (JEL 4118). More recently, Ligon and Balda (1968) have found this species summering in these mountains.

Bullock's Oriole: ***Icterus galbula bullockii*** **(Swainson).** This species is not shown summering in the Chiricahua Mountains (Phillips et al., 1964), but J. E. Law found it (ms), albeit rarely, in Pinery Canyon in June 1921. He took an adult male in the canyon, 5500 feet, on 20 June (JEL 6966), testes 6 mm. in diameter. More recently, Ligon and Balda (1968) found it nesting in Cave Creek Canyon.

Brown-headed Cowbird: ***Molothrus ater obscurus*** **(Gmelin).** This species is not shown summering in the Chiricahua Mountains (Phillips et al., 1964), but J. E. Law found it (ms) present in Pinery Can-

yon in June 1921, 5500 feet. He took two adult males there: 17 June (JEL 6963), testes 6.0 x 4.5 mm.; 23 June (JEL 6964), testes 10 mm. Van Rossem also took an adult male in Bonita Canyon, 5000 feet, on 5 June 1915 (JEL 4314). More recently, Ligon and Balda (1968) have found the species breeding in these mountains. This cowbird is also common in summer in Guadalupe Canyon (not mapped by Phillips et al., 1964), and records there include an instance of parasitism of Bell's Vireo in the New Mexico section of the canyon in June 1959.

Blue Grosbeak: *Guiraca caerulea interfusa* Dwight and Griscom. This species is not shown summering in the Chiricahua Mountains by Phillips et al. (1964), but J. E. Law found it (ms) present in small numbers in lower Pinery Canyon (about 4500 feet) from July through September 1919. He also took an adult male there on 18 June 1921 (JEL 6991), testes 6 x 8 mm. More recently, Ligon and Balda (1968) found it uncommonly in mesquite near Portal.

Evening Grosbeak: *Hesperiphona vespertina montana* Ridgway. Additional summer records and a nest of this erratic (as to place) breeder were obtained by J. E. Law and D. D. McLean in the Chiricahua Mountains in 1921 (ms). In June and July they found the species fairly common in Rustler Park, 8400 feet, and vicinity; and on 28 June a nest containing young was found in a pine by McLean. The three stub-tailed juveniles were collected, two of which were saved as skins (JEL 6968, 6969). Additional specimens taken in the period are of three adult males, two adult females, and a grown juvenal female (JEL 6967, 6971–6975). (JEL 6968, 6972, 6974, and 6975 are now in US collection; JEL 6967 is in DM collection.)

Pine Siskin: *Spinus pinus* (Wilson). This species occurs in summer in the Chiricahua Mountains, but it is not known to breed (Phillips et al., 1964). Suggestive of breeding are three grown juveniles (JEL 6501–6503) taken by J. E. Law in Pinery Canyon, 5650 to 5750 feet, in the period 6 to 8 August 1919: male, wing 74.5 mm.; two females, wings 72.5 and 73.2 mm. Although the wings are moderately long and thus approach *S. p. macropterus* (Bonaparte), they can be duplicated by extremes of more northern *S. p. pinus*. Of three specimens taken by van Rossem in Pinery Canyon in the period 24 to 26 December 1914, two are large enough to be *S. p. macropterus*: male (JEL 2966), wing 76.0 mm.; female (JEL 2968), wing 75.0 mm. The other specimen is a female with the wing 72.5 mm., which is intermediate between this and the nominate race.

American Goldfinch: *Spinus tristis* (Linnaeus). According to Phillips et al. (1964), this species has not been found in the Chiricahua Mountains, but van Rossem took four specimens (JEL 2960–2962,

4123) there in Bonita Canyon 5000 to 6000 feet: male, 21 November 1914; male, 1 December 1914; female, 25 January 1915; male, 13 April 1915. All are *S. t. pallidus* Mearns except the first (JEL 2960), which is referable to *S. t. salicamans* Grinnell on the basis of its short wing (73 mm.), darkness, and only moderate amounts of white in the flight feathers. (JEL 2960 is now in US collection.)

Red Crossbill: *Loxia curvirostra stricklandi* Ridgway. In view of the irregularity of reports of this species in the state, observations by J. E. Law (ms) in the Chiricahua Mountains are of interest. In 1919 Law found the species fairly common from June to August, with observations confined to higher elevations, mainly in and near Barfoot Park. Twelve specimens (JEL 6486–6497) were taken on 19 June on the north slope of Ida's Peak, 8000 feet, and consist of two adult males and 10 juveniles or immatures. The adults are just beginning molt, two immatures have nearly finished postjuvenal molt, and the eight juveniles show none to heavy molt. An immature male (JEL 6485) taken at Barfoot Park, 8200 feet, on 14 August has completed the molt. In 1921, during their stay from 25 June through 11 July, Law and D. D. McLean found the species to be fairly common in Barfoot Park and occasional in Rustler Park. Three juveniles (JEL 6976–6978) showing slight to nearly complete molt were taken in the former locality on 27 June. All of the specimens are long winged and heavy billed—characters of *L. c. stricklandi*. (JEL 6487, 6489, 6491, 6494, and 6496 are now in DM collection.)

Green-tailed Towhee: *Pipilo chlorurus* (Audubon). Additional records of what Phillips et al. (1964) regard as a generally scarce resident in most winters in the southeast are two specimens (JEL 3204, 3205) taken by van Rossem in Bonita Canyon, 5000 feet, Chiricahua Mountains, on 24 January 1915. Three other specimens (JEL 3734–3736) were taken at the same place on 10 and 20 March 1915, and these are either very early migrants or wintering birds.

Rufous-sided Towhee: *Pipilo erythrophthalmus montanus* Swarth. This species is regarded by Phillips et al. (1964) as a rather rare transient in the Colorado Valley area. An additional record from the area is a female (JEL 6269) collected in the Mohave Mountains, 4500 feet, by M. Jesurun on 20 September 1916. This date precedes by 2 days the earliest record listed by these authors for autumn birds in nonbreeding areas; the record also seems to be the first of this species from these mountains. The specimen is indistinguishable from a series of *P. e. montanus* from the Chiricahua Mountains, with notable features being heavy dorsal spotting and grayish black head and upperparts.

Lark Bunting: *Calamospiza melanocorys* Stejneger. This species is not shown wintering in the Chiricahua Mountains by Phillips et al. (1964), where van Rossem took three males (JEL 3229–3231) in Bonita Canyon, 5000 feet, on 24 January 1915. He took a total of 52 specimens in the area between these mountains and Willcox during his stay in 1914–1915, the earliest on 29 October 1914 and the latest on 4 May 1915.

Grasshopper Sparrow: *Ammodramus savannarum* (Gmelin). Phillips et al. (1964) record only one summer occurrence east of the San Pedro River, to which may be added an adult male (JEL 6980) taken by Law near Dos Cabezas on 23 June 1921. The exact locality is 3 miles north of the Riggs Home Ranch, where the apparently solitary bird was found in a grassy swale (ms). The very worn nature of the plumage prevents subspecific determination, but it is probably *A. s. ammolegus* Oberholser. (Specimen is now in US collection.)

Baird's Sparrow: *Ammodramus bairdii* (Audubon). Although there is little question that the numbers and possibly the range of this species have declined dramatically in historic times in the Southwest, the timing of the decline is subject to clarification. In Arizona, Phillips et al. (1964) place the initial major decrease about 1880, after which the species is known to have wintered mainly in the vicinity of the Chiricahua and Huachuca Mountains. In the Chiricahua region those authors regard it to have been decidedly uncommon between 1878 and 1920, yet van Rossem took 26 specimens in Pinery and Bonita Canyons from 5 December 1914 to 18 April 1915. This number of specimens of an elusive sparrow, which was far from the sole object of van Rossem's collecting, suggests that the species was more common then than previously suspected, at least in 1914–1915. (JEL 3014, 3018, 3657, 3659, 4134, and 4141 are now in US collection; JEL 3015, 3655, 4135, and 4140 are in DM collection.)

Vesper Sparrow: *Pooecetes gramineus confinis* Baird. This species is not reported by Phillips et al. (1964) as wintering in the Chiricahua Mountains or anywhere in the Upper Sonoran Zone. Van Rossem took seven specimens (JEL 3001–3004, 3006, 3535, 3536) in Pinery and Bonita Canyons in the period 4 December 1914 through 16 February 1915. Also taken farther west were single specimens, 12 miles southeast of Willcox on 9 December 1914 (JEL 3005) and at Light on 9 January 1915 (JEL 3007). (JEL 3003 is now in DM collection.)

Lark Sparrow: *Chondestes grammacus strigatus* Swainson. This species is not mapped as breeding in the Chiricahua Mountains by Phillips et al. (1964), but information obtained by J. E. Law shows that it has

bred there. During June 1921, Law (ms) found one or two pairs in Pinery Canyon, 5500 feet, and he took an adult male there on 13 June (JEL 1921), testes 8.5 x 10 mm. On 22 June, Frank Hands (ms) reported seeing a pair feeding a young bird out of the nest a few days previously, and in past years he found a nest with four eggs near his home in Pinery Canyon. More recently, Ligon and Balda (1968) have reported this species in summer in these mountains, with several nests being found by them.

Botteri's Sparrow: *Aimophila botterii arizonae* (Ridgway). The first published proof of this species' breeding in Arizona was recently obtained and reported by Ohmart (1968), but prior evidence exists in the form of a juvenile taken by W. W. Price and R. L. Wilbur: female, 22 August 1893, Fairbank, Cochise County (JEL 2742). The bird is obviously too young to have flown far and can be assumed to have been hatched locally. Taken at the same locality and date is an adult male, while on 18 August two adult males and an adult female (JEL 2737–2740) were collected, all in worn plumage. An additional specimen obtained by these collectors is an adult male (JEL 2743), taken on 19 June 1893 at Fort Lowell, Pima County. (Specimens are now in US collection.)

Cassin's Sparrow: *Aimophila cassinii* (Woodhouse). Additional winter records of this easily overlooked species are five specimens (JEL 3161–3163, 3706, 3707) taken by van Rossem in Bonita and Pinery Canyons, 5000 feet, Chiricahua Mountains, in the period 4 December 1914 through 22 February 1915. Also of interest is a worn adult female (HHB 2004) taken by H. H. Kimball at Sonoita, Santa Cruz County, on 24 June 1923; this may be the earliest June specimen record from the state. (HHB 2004 is now in US collection.)

Junco: (*Junco* spp.). Some 160 juncos were taken over the period 18 October 1914 to 30 April 1915 in and around Pinery Canyon, 5600 to 6300 feet, in the Chiricahua Mountains. This sampling provides some assessment of the forms occurring there during that period. The most numerous form, in terms of specimens collected, is *Junco hyemalis caniceps* (Woodhouse), of which 71 were taken from 24 October through 23 March (late was a female taken there on 30 April). Next is *J. h. montanus* Ridgway, with 45 taken from 20 October through 21 March, and then *J. h. mearnsi* Ridgway, with 17 from 18 October through 1 April. From 24 October through 30 January, 17 specimens were also taken of *J. phaeonotus palliatus* Ridgway, a species which bred as low as 6000 feet in that canyon in 1919 (Law, ms). Among the rarer forms are single males of *J. h. dorsalis* Henry (JEL 3684), 16 January 1915,

and *J. h. hyemalis* (Linnaeus) (JEL 3041), 5 December 1915. The identifications of most of these specimens were verified by the late A. H. Miller. (JEL 3684 is now in US collection.)

Chipping Sparrow: *Spizella passerina arizonae* Coues. This species is not mapped as wintering in the Chiricahua Mountains by Phillips et al. (1964), where van Rossem took five specimens (JEL 3026–3028, 3032, 3671) in Pinery and Bonita Canyons, 5000 feet, in the period 4 December 1914 through 16 February 1915. He also took three (JEL 3029–3031) 5 miles north of Light on 9 January 1915. This species is recorded by Phillips et al. (1964) as a local breeder in Upper Sonoran woodland of the Chiricahuas, but in summer 1921 J. E. Law (ms) found it ranging commonly from 5500 feet in Pinery Canyon to 9000 feet in the Transition Zone. In Rustler Park, 8000 feet, Law and D. D. McLean found a nest containing an egg on 7 July 1921 and another with two eggs on 11 July. Breeding at higher elevations in those mountains may be only a former occurrence, as the recent paper of Ligon and Balda (1968) does not record the species above pine-oak woodland. (JEL 3671 is now in DM collection.)

Brewer's Sparrow: *Spizella breweri breweri* Cassin. This sparrow is not mapped as wintering in the southeast by Phillips et al. (1964) east of the San Pedro and south of the Gila Rivers. However, van Rossem took a total of eight specimens (JEL 3033–3040) 12 miles southeast of Willcox on 8 December 1914, 3 miles east of Dos Cabezas on 18 January 1915, and at Light on 9 January 1915.

Fox Sparrow: *Passerella iliaca zaboria* Oberholser. Not listed by Phillips et al. (1964) is a specimen of this rare-in-Arizona race taken by van Rossem in Pinery Canyon, 6000 feet, in the Chiricahua Mountains: female, 6 November 1914 (JEL 2524). The specimen is recorded by Swarth (1920) as the nominate race, but at that time *P. i. zaboria* had not been described. Van Rossem also took a single specimen of *P. i. townsendi* (Audubon) (JEL 3178), as reported by Swarth (1920), which remains unique for Arizona (Phillips et al., 1964). (Specimens are now in US collection.)

McCown's Longspur: *Calcarius mccownii* (Lawrence). Phillips et al. (1964) report a marked decline in numbers and range of this species in Arizona and indicate an absence of records between 1902 and 1922 (between 1902 and 1939 in the southeast). However, van Rossem took 11 specimens (JEL 2991–2996, 2998–3000, 3368, 3369) on 8 and 9 December 1914 at localities variously 10 to 15 miles south and southeast of Willcox and of Dos Cabezas. (JEL 2991, 2993, 3000, and 3368 are now in US collection; JEL 2994 and 2997 are in DM collection.)

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NOTES ON PHILIPPINE BIRDS (No. 2)

BIRDS OF TICAO

John E. duPont

INTRODUCTION

The small island of Ticao is located about 6 miles east of the larger island of Masbate and about 10 miles west of the southern tip of the main Philippine island of Luzon. To date, only two ornithological expeditions have visited there. The first was in the period April–June 1902 (McGregor, 1903, 1905), and the second was in July 1971 by collectors for the Delaware Museum of Natural History. McGregor recorded a total of 91 species from the island, but because most of the specimens were destroyed during World War II, the number of species actually collected is unknown. At least one of the species was reported on the basis of a sight record, i.e., *Phalacrocorax carbo* (McGregor, 1903:5); and I suspect that others, such as *Circus* sp. and *Gallinago* sp. (McGregor, 1903:11), were also uncollected. Most of the species reported by McGregor were merely listed without annotation (1903:11–12), but a few species are treated in more detail, including *Penelopides panini, Cypsiurus parvus, Copsychus luzoniensis,* and *Hypsipetes philippinus,* which were collected.

The Delaware Museum of Natural History recorded 57 species, based entirely on collected specimens and consisting mainly of small landbirds. The combined 1902 and 1971 lists contain 100 species, with 34 recorded only in 1902 and nine only in 1971 (see list following introduction). The discrepancy between the two figures probably lies in the shorter visit of the Delaware Museum of Natural History expedition and its lack of waterbird and sight records; thus, the smaller total in 1971 may be more apparent than real. Among passerines, the Delaware Museum of Natural History recorded 31 species, compared to 41 by McGregor, but seven of the latter were migrants not expected during July. Resident birds overlooked by the Delaware Museum of Natural History collectors include *Coracina striata, Anthreptes malacensis,* and *Aethopyga shelleyi,* while the 1902 expedition failed to record only one of the recently taken species, *Pitta sordida.*

McGregor's visit to Ticao preceded large-scale settlement and logging there, and he reported (1903:4) the island to be well wooded. In 1971

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Ticao was only about 20–30 percent forested, with 10–20 percent in cultivation and the remainder mainly grown up in cogonal grass. As pointed out by McGregor (1903:4–5), Ticao is faunally related to Masbate and the central Philippine Islands (Panay, Negros, etc.) and only to a minor degree with Luzon. Endemic in Ticao is *Penelopides panini ticaoensis* and a race of *Ninox philippensis* described in this paper. In the following list, subspecies names in brackets are based on literature citations only, as no current material to verify them is known to exist.

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FAMILY **PHALACROCORACIDAE** CORMORANTS

Phalacrocorax carbo [***sinensis*** **(Shaw, 1801)**]
McGregor, 1903

FAMILY **ARDEIDAE** HERONS

Ixobrychus cinnamomeus **(Gmelin, 1789)**
McGregor, 1903

Gorsachius melanolophus [***kutteri*** **(Cabanis, 1881)**]
McGregor, 1903

Butorides striatus [***javensis*** **Horsfield, 1821**]
McGregor, 1903

Bubulcus ibis [***coromandus*** **(Boddaert, 1783)**]
McGregor, 1903

Egretta sacra [***sacra*** **(Gmelin, 1789)**]
McGregor, 1903

Ardea purpurea [***manilensis*** **(Meyen, 1834)**]
McGregor, 1903

Nycticorax caledonicus [***manillensis*** **Vigors, 1831**]
McGregor, 1903

FAMILY **ANATIDAE** DUCKS

Dendrocygna arcuata [***arcuata*** **(Horsfield, 1824)**]
McGregor, 1903

Anas luzonica **Fraser, 1839**
McGregor, 1903

FAMILY **ACCIPITRIDAE** HAWKS

Elanus caeruleus hypoleucus **Gould, 1859**
Delaware Museum of Natural History—1 ♀
Not previously recorded from Ticao.

Haliastus indus [***intermedius*** **Blyth, 1865**]
McGregor, 1903

Haliaeetus leucogaster **(Gmelin, 1788)**
McGregor, 1903

Circus **sp.**
McGregor, 1903

FAMILY **MEGAPODIIDAE** MEGAPODES

Megapodius freycinet [***pusillus*** **Tweeddale, 1877**]
McGregor, 1903

FAMILY **PHASIANIDAE** PHEASANTS

Coturnix chinensis lineata **(Scopoli, 1786)**
McGregor, 1903
Delaware Museum of Natural History—1 imm. ♀

Gallus gallus [***gallus*** **(Linné, 1758)**]
McGregor, 1903

FAMILY **RALLIDAE** RAILS

Rallus torquatus torquatus **Linné, 1766**
McGregor, 1903
Delaware Museum of Natural History—1 ♀, 1 imm. ♀

Poliolimnas cinereus [***ocularis*** **(Sharpe, 1894)**]
McGregor, 1903

Amaurornis olivaceus [***olivaceus*** **(Meyen, 1834)**]
McGregor, 1903

Gallicrex cinerea **(Gmelin, 1789)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂

FAMILY **CHARADRIIDAE** PLOVERS

Charadrius alexandrinus [***dealbatus*** **(Swinhoe, 1870)**]
McGregor, 1903

Charadrius peronii **Schlegel, 1865**
McGregor, 1903

Charadrius mongolus [***mongolus*** **Pallas, 1776**]
McGregor, 1903

FAMILY **SCOLOPACIDAE** SANDPIPERS

Tringa glareola **Linné, 1758**
McGregor, 1903

Tringa hypoleucos **Linné, 1758**
McGregor, 1903

Gallinago **sp.**
McGregor, 1903

FAMILY **COLUMBIDAE** PIGEONS AND DOVES

Treron pompadora axillaris **(Bonaparte, 1855)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 1 ♀

Treron vernans vernans **(Linné, 1771)**
Delaware Museum of Natural History—1 ♂, 3 ♀
Not previously recorded from Ticao.

Phapitreron leucotis nigrorum **(Sharpe, 1877)**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 4 in alcohol

Ptilinopus leclancheri leclancheri **(Bonaparte, 1855)**
Delaware Museum of Natural History—3 ♂, 1 ♀, 3 in alcohol
Not previously recorded from Ticao.

Ducula aenea aenea **(Linné, 1766)**
McGregor, 1903
Delaware Museum of Natural History—2 ♀

Ducula bicolor **(Scopoli, 1786)**
McGregor, 1903

Streptopelia bitorquata dusumieri **(Temminck, 1823)**
McGregor, 1903
Delaware Museum of Natural History—3 ♂, 1 ♀

Geopelia striata striata **(Linné, 1766)**
Delaware Museum of Natural History– 3 ♂ , 1 ♀ , 4 in alcohol
Not previously recorded from Ticao.

Chalcophaps indica indica **(Linné, 1758)**
McGregor, 1903
Delaware Museum of Natural History–4 ♂ , 5 in alcohol

FAMILY **PSITTACIDAE** PARROTS

Kakatoe haematuropygia **(P. L. S. Müller, 1776)**
McGregor, 1903

Prioniturus discurus [***discurus*** **(Vieillot, 1822)**]
McGregor, 1903

Tanygnathus lucionensis [***lucionensis*** **(Linné, 1766)**]
McGregor, 1903

Loriculus philippensis [***panayensis*** **Tweeddale, 1877**]
McGregor, 1903

FAMILY **CUCULIDAE** CUCKOOS

Cuculus fugax pectoralis **(Cabanis and Heine, 1863)**
Delaware Museum of Natural History–1 ♂
Not previously recorded from Ticao.

Cacomantis variolosus sepulcralis **(S. Müller, 1843)**
Delaware Museum of Natural History–2 ♀
Not previously record from Ticao.

Cacomantis merulinus [***merulinus*** **(Scopoli, 1786)**]
McGregor, 1903

Eudynamys scolopacea mindanensis **(Linné, 1766)**
McGregor, 1903
Delaware Museum of Natural History–3 ♂ , 1 ♀ , 4 in alcohol

Centropus viridis viridis **(Scopoli, 1786)**
McGregor, 1903
Delaware Museum of Natural History–3 ♀ , 4 in alcohol

FAMILY **STRIGIDAE** OWLS

Ninox philippensis

2 ♂ , July 1971, Sitio Calpi, Danao, San Jacinto, Ticao, 200–400′; testes small; DMNH 11494, 11495

These two recent specimens constitute the second and third from Ticao, the first having been an adult male taken there by McGregor and A. Celestino on 12 May 1902 (FM 19904). Mayr (*in* Delacour and Mayr, 1945:108) referred the 1902 specimen to his newly described race, *N. p. proxima*; and, besides the type, it constituted the only other specimen of it seen by him. The type is from Masbate (USNM 314872), an adult female taken on 14 November 1892 by D. C. Worcester and F. S. Bourns. On comparing the Masbate and the three Ticao birds, I find that the latter represent a distinct race and may be called:

***Ninox philippensis ticaoensis* new subspecies**

Type DMNH 11495, ♂ Sitio Calpi, Danao, San Jacinto, Ticao, P. I., 200–400′, July 1971. Wing 175; tail 81.5; bill 20.7; tarsus 34.7.

Diagnosis: Differs from *proxima* by having the upperparts darker, the ventral streaking sharper and darker, and the light barring on the tail narrower.

Range: Ticao.

Specimens examined: *proxima* (Type)—Masbate 1 ♀; *ticaoensis*—Ticao 3 ♂.

Remarks: Two of the Ticao birds (DMNH 11494, FM 19904) are darker above than the type; the third (DMNH 11495) is notably darker. The two recent birds are also more grayish and less rufous-brown than the type of *proxima* and the 1902 Ticao bird, but this may be due to "foxing."

Seasonal differences might be expected to exist among these specimens because their dates of collection range from May to October. However, all of the Ticao birds show active back molt, and most of the feathers appear to be new. Thus, these summer specimens are probably as freshly plumaged as the October type of *proxima*.

			Wing	Tail
Ticao birds:				
FM	19904	(♂)	173.0	81.0
DMNH	11495	(♂)	175.0	81.5
DMNH	11494	(♂)	168.0	80.5
Type *proxima*:				
USNM	314872	(♀)	172.0	80.0

In ventral streaking, FM 19904 is slightly darker and sharper than the type of *proxima*, whereas the more recent DMNH 11494 and 11495 are more markedly so. In general, the character of ventral streaking is

less marked than that of back color. In addition, the light barring on the tails of the Ticao birds is narrower; but in coloration of both light and dark barring, the Ticao and Masbate specimens overlap. In wing and tail lengths the Ticao birds cluster around the type, the measurements being shown in the table.

FAMILY **CAPRIMULGIDAE** NIGHTJARS

Caprimulgus macrurus [***manillensis* Walden, 1875**]
McGregor, 1903

FAMILY **APODIDAE** SWIFTS

***Collocalia vanikorensis amelis* Oberholser, 1906**
Delaware Museum of Natural History—2 ♂
Not previously recorded from Ticao.

***Collocalia troglodytes* G. R. Gray, 1845**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 2 ♀, 3 in alcohol

***Cypsiurus parvus pallidior* (McGregor, 1905)**
McGregor, 1903
Delaware Museum of Natural History—2 ♀

FAMILY **ALCEDINIDAE** KINGFISHERS

***Ceyx cyanopectus cyanopectus* Lafresnaye, 1840**
McGregor, 1903
Delaware Museum of Natural History—1 ♀

Pelargopsis capensis [***smithi* (Mearns, 1909)**]
McGregor, 1903

***Halcyon chloris collaris* (Scopoli, 1786)**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 2 ♀, 4 in alcohol

***Halcyon smyrnensis gularis* (Kuhl, 1820)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 1 ♀

FAMILY **MEROPIDAE** BEE-EATERS

***Merops viridis americanus* P. L. S. Müller, 1776**
Delaware Museum of Natural History—4 ♂, 3 ♀, 4 in alcohol
Not previously recorded from Ticao.

FAMILY **CORACIIDAE** ROLLERS

***Eurystomus orientalis cyanocollis* (Vieillot, 1819)**

McGregor, 1903

Delaware Museum of Natural History—1 ♂, 2 ♀, 3 in alcohol

FAMILY **BUCEROTIDAE** HORNBILLS

***Penelopides panini ticaensis* Hachisuka, 1930**

McGregor, 1903

Delaware Museum of Natural History—2 ♂, 2 ♀, 1 imm., 3 in alcohol

The four adult birds are very large (♂ wing 284–288 and tail 259–269; ♀ wing 251–264 and tail 242–246) in comparison to our series from Luzon (5 ♂ wing 231–238 and tail 210–218; 4 ♀ wing 214–225 and tail 195–204). Males—differ from Luzon birds by having upperparts with a strong blue-green gloss, not brown-green; basal half of tail white; abdomen with a rufous wash; thighs and under tail-coverts rufous. Females—similar to males but darker and with heavy blue-green gloss.

FAMILY **PICIDAE** WOODPECKERS

***Chrysocolaptes lucidus* [*xanthocephalus* Walden and Layard, 1872]**

McGregor, 1903

FAMILY **PITTIDAE** PITTAS

***Pitta erythrogaster erythrogaster* Temminck, 1823**

McGregor, 1903

Delaware Museum of Natural History—1 ♂

***Pitta sordida sordida* (P. L. S. Müller, 1776)**

Delaware Museum of Natural History—1 ♀

Not previously recorded from Ticao.

FAMILY **ALAUDIDAE** LARKS

***Alauda gulgula* [*wolfei* Hachisuka, 1930]**

McGregor, 1903

FAMILY **HIRUNDINIDAE** SWALLOWS

***Hirundo rustica* [*gutturalis* Scopoli, 1786]**

McGregor, 1903

***Hirundo tahitica abbotti* (Oberholser, 1917)**

McGregor, 1903

Delaware Museum of Natural History—3 ♂, 2 ♀, 4 in alcohol

FAMILY **CAMPEPHAGIDAE** CUCKOO-SHRIKES

***Coracina striata* [*panayensis* (Steere, 1890)]**
McGregor, 1903

***Lalage nigra chilensis* (Meyen, 1834)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 3 ♀, 6 in alcohol

FAMILY **DICRURIDAE** DRONGOS

***Dicrurus balicassius mirabilis* Walden and Layard, 1872**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 1 ♀

FAMILY **ORIOLIDAE** ORIOLES

***Oriolus chinensis chinensis* Linné, 1766**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 5 ♀, 4 in alcohol

FAMILY **CORVIDAE** CROWS

***Corvus macrorhynchos philippinus* (Bonaparte, 1853)**
McGregor, 1903
Delaware Museum of Natural History—1 ♀

FAMILY **PARIDAE** TITMICE

***Parus elegans albescens* (McGregor, 1907)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 1 ♀, 2 in alcohol

Dr. Kenneth C. Parkes (1958:101) in his revision of this species wrote, "When McGregor described *albescens,* he had before him two specimens from Ticao (not three, as claimed by Hachisuka, 1930:201) and three from Masbate. As the type he chose one of the Ticao specimens. All of these skins were destroyed in 1945.... McGregor, the author of *albescens,* considered Ticao and Masbate specimens to be the same, and I have fortunately been able to assemble a series of six specimens from Masbate to use as presumably typical of *albescens* for comparative purposes."

In comparing the four Ticao specimens with four specimens in the Carnegie Museum from Masbate, Dr. Parkes and I find that the Masbate birds do not differ from the topotypical specimens from Ticao.

FAMILY **PYCNONOTIDAE** BULBULS

***Pycnonotus goiavier samarensis* Rand and Rabor, 1960**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 1 ♀, 3 in alcohol

Hypsipetes philippinus guimarasensis **(Steere, 1890)**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 1 ♀, 4 in alcohol

In our series two of the males and the female are juveniles. The three differ from five juveniles of the nominate race on Luzon by having less rufous above and paler rufous in the wings. When compared to three juveniles from Leyte, the wings are similar but slightly more rufous; upperparts are darker brown and less rufescent.

FAMILY **TURDIDAE** THRUSHES

Copsychus saularis mindanensis **(Boddaert, 1783)**
McGregor, 1903
Delaware Museum of Natural History—2 ♂

Copsychus luzoniensis superciliaris **(Bourns and Worcester, 1894)**
McGregor, 1903
Delaware Museum of Natural History—5 ♂, 3 in alcohol

Saxicola caprata caprata **(Linné, 1766)**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 1 ♀, 1 in alcohol

Monticola solitarius **[*philippensis* (P. L. S. Müller, 1776)]**
McGregor, 1903

FAMILY **SYLVIIDAE** OLD WORLD WARBLERS

Megalurus palustris forbesi **Bangs, 1919**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 2 ♀, 3 in alcohol

Megalurus timoriensis tweeddalei **McGregor, 1908**
McGregor, 1903
Delaware Museum of Natural History—1 ♂

Cisticola exilis semirufa **Cabanis, 1872**
McGregor, 1903
Delaware Museum of Natural History—3 ♂, 2 ♀, 4 in alcohol

Phylloscopus borealis **ssp.**
McGregor, 1903

Orthotomus atrogularis castaneiceps **Walden, 1872**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 1 ♀, 5 in alcohol

FAMILY **MUSCICAPIDAE** OLD WORLD FLYCATCHERS

Rhipidura cyaniceps albiventris **(Sharpe, 1877)**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 2 ♀, 4 in alcohol

Rhipidura javanica nigritorquis **Vigors, 1831**
McGregor, 1903
Delaware Museum of Natural History—1 ♀

Cyornis rufigaster philippinensis **Sharpe, 1877**
McGregor, 1903
Delaware Museum of Natural History—7 ♂, 2 ♀, 4 in alcohol

Hypothymis azurea azurea **(Boddaert, 1783)**
McGregor, 1903
Delaware Museum of Natural History—3 ♂, 2 ♀, 3 in alcohol

Pachycephala cinerea winchelli **(Bourns and Worcester, 1894)**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 2 ♀, 1 in alcohol

FAMILY **MOTACILLIDAE** PIPITS

Motacilla cinerea [***robusta*** **(Brehm, 1857)**]
McGregor, 1903

Motacilla flava [***simillima*** **Hartert, 1905**]
McGregor, 1903

Anthus novaeseelandiae lugubris **(Walden, 1875)**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 3 ♀, 4 in alcohol

FAMILY **ARTAMIDAE** WOOD-SWALLOWS

Artamus leucorhynchus leucorhynchus **Linné, 1771**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 5 ♀, 4 in alcohol

FAMILY **LANIIDAE** SHRIKES

Lanius cristatus [***lucionensis*** **Linné, 1776**]
McGregor, 1903

FAMILY **STURNIDAE** STARLINGS

Aplonis panayensis panayensis **(Scopoli, 1783)**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 2 ♀, 4 in alcohol

Sarcops calvus melanonotus **Ogilvie-Grant, 1906**
McGregor, 1903
Delaware Museum of Natural History—6 ♀, 4 in alcohol

FAMILY **NECTARINIIDAE** SUNBIRDS

Anthreptes malacensis [***chlorigaster*** **Sharpe, 1877**]
McGregor, 1903

***Nectarinia sperata sperata* (Linné, 1766)**
McGregor, 1903
Delaware Museum of Natural History—4 ♂, 3 in alcohol

***Nectarinia jugularis jugularis* (Linné, 1766)**
McGregor, 1903
Delaware Museum of Natural History—9 ♂, 4 ♀, 4 in alcohol

***Aethopyga shelleyi* [*bonita* Bourns and Worcester, 1894]**
McGregor, 1903

FAMILY **DICAEIDAE** FLOWERPECKERS

***Dicaeum australe australe* (Hermann, 1783)**
McGregor, 1903
Delaware Museum of Natural History—5 ♂, 1 ♀, 2 in alcohol

***Dicaeum pygmaeum* [*pygmaeum* (Kittlitz, 1833)]**
McGregor, 1903

FAMILY **ZOSTEROPIDAE** WHITE-EYES

***Zosterops nigrorum nigrorum* Tweeddale, 1878**
McGregor, 1903
Delaware Museum of Natural History—2 ♂, 5 ♀, 3 in alcohol

FAMILY **ESTRILDIDAE** MANNIKINS

***Lonchura malacca jagori* (Martens, 1866)**
McGregor, 1903
Delaware Museum of Natural History—1 ♂, 4 ♀, 4 in alcohol

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NOTES ON PHILIPPINE BIRDS (No. 3)

BIRDS OF MARINDUQUE

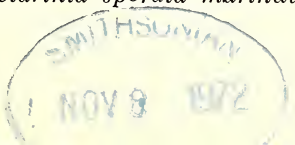
John E. duPont

INTRODUCTION

The island of Marinduque lies in Tayabas Bay, west of the Luzon province of Quezon and east of the island of Mindoro. The area of Marinduque is 743 square kilometers and the maximum elevation is 872 meters. At present the island is 30 per cent forested, with the remainder under cultivation of such crops as coconuts, corn, rice, garlic, cassava, and sweet potatoes. The island has been visited by four ornithological expeditions: two in the late 19th century and one each in 1970 and 1971.

The first expedition to the island was by Alfred Marche in the period April–June 1881. He collected 77 specimens of 29 species, three of which subsequent collectors have not found, i.e., *Haliaeetus leucogaster, Rallus striatus,* and *Monticola solitarius.* Marche's specimens are at the Paris Museum and are published for the first time in this paper. The second expedition to the island was by J. B. Steere in May 1887, as part of an extensive survey throughout the Philippine Islands. His party recorded 74 species on the island, which were reported in a general way only (Steere, 1890, 1891).

More recently, the Delaware Museum of Natural History sponsored field work on Marinduque, with the first visit to Barrio Canat, Boac, in March 1970, and the second to Santa Cruz in May 1971. These visits yielded a total of 57 species, 16 of which were new to the island. Some of these records have been included in duPont (1971) but are documented for the first time in the present paper. This brings the total known avifauna of the island to 96 species, not counting the questionable record of *Mimizuku gurneyi* (Hachisuka, 1934:51) and Worcester's record of *Ciconia episcopus* (McGregor, 1909:160). This paper provides a summary of these species, indicates which expeditions have recorded them on the island, and comments on some of the forms or records. In addition, new subspecies are described of *Coracina coerulescens* and of *Cyornis rufigaster.* This brings to four the total of endemic races from Marinduque, the others being *Nectarinia sperata marinduquensis* duPont and *Zosterops*



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montana gilli duPont. While the racial affinities of the island are otherwise with southern Luzon, the presence of these four endemics shows that Marinduque is of some import as an area of avian differentiation.

In the list that is to follow, subspecies names in brackets are based on literature and catalogue citations only, as the collections are scattered and I have not seen material to verify them. Nomenclature follows duPont (1971) unless otherwise indicated.

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For their assistance, I wish to thank Dr. Dean Amadon and Mrs. Mary Le Croy of the American Museum of Natural History and Dr. Richard L. Zusi of the United States National Museum. Dr. Jean Dorst of the Paris Museum very kindly sent me a copy of the catalogue of the Marche Collection and has allowed me to publish on it. I am grateful to Dr. Kenneth C. Parkes of the Carnegie Museum and Dr. John P. Hubbard of the Delaware Museum of Natural History for reading this paper.

FAMILY **ARDEIDAE** HERONS

Dupetor flavicollis [***flavicollis*** **(Latham, 1790)**]

Collected by Steere Expd.

Ixobrychus cinnamomeus **(Gmelin, 1789)**

Collected by Steere Expd.

Butorides striatus [***javensis*** **(Horsfield, 1821)**]

Collected by Marche Expd.—1 ♂ ; May
Collected by Steere Expd.

Egretta sacra [***sacra*** **(Gmelin, 1789)**]

Collected by Steere Expd.

Ardea purpurea [***manilensis*** **Meyen, 1834**]

Collected by Steere Expd.

Nycticorax caledonicus [***manillensis*** **Vigors, 1831**]

Collected by Marche Expd.—1 ♂ , 1 ♀ ; May, June
Collected by Steere Expd.

FAMILY **CICONIIDAE** STORKS

Ciconia episcopus [***episcopus*** **(Boddaert, 1783)**]

According to McGregor (1909:160), this species was collected by Worcester, but Worcester did not list this species in his "Hand-list" in 1906

and I find nothing in the literature between 1906 and 1909 to indicate that Worcester had been to Marinduque and collected a stork. Consequently, I propose that this species be deleted as a Marinduque record.

FAMILY **ANATIDAE** DUCKS

***Anas luzonica* Fraser, 1839**

Collected by Steere Expd.
DMNH—1 ♂, Sta. Cruz

FAMILY **PANDIONIDAE** OSPREYS

***Pandion haliaetus* [*melvillensis* Mathews, 1912]**

Collected by Steere Expd.

FAMILY **ACCIPITRIDAE** HAWKS

***Haliastus indus intermedius* Blyth, 1865**

Collected by Steere Expd.
DMNH—1 ♀, Sta. Cruz

***Haliaeetus leucogaster* (Gmelin, 1788)**

Collected by Marche Expd.—1 ?; June
Not previously recorded from Marinduque.

***Spilornis holospilus* (Vigors, 1830)**

Collected by Steere Expd.

***Hieraaetus kieneri* [*formosus* Stresemann, 1924]**

Collected by Steere Expd.

FAMILY **MEGAPODIIDAE** MEGAPODES

***Megapodius freycinet* [*pusillus* Tweeddale, 1877]**

Collected by Steere Expd.

FAMILY **PHASIANIDAE** PHEASANTS

***Gallus gallus* [*gallus* (Linné, 1758)]**

Collected by Steere Expd.

FAMILY **RALLIDAE** RAILS

***Rallus striatus* [*striatus* Linné, 1766]**

Collected by Marche Expd.—1 ♀; May
Not previously recorded from Marinduque.

***Rallus torquatus torquatus* Linné, 1766**

Collected by Marche Expd.—1 ♂ ; April
Collected by Steere Expd.
DMNH—1 ♂ , Sta. Cruz

***Poliolimnas cinereus* [*ocularis* Sharpe, 1894]**

Collected by Steere Expd.

***Amaurornis phoenicurus* [*javanicus* (Horsfield, 1821)]**

Collected by Steere Expd.

***Gallicrex cinerea* (Gmelin, 1789)**

Collected by Steere Expd.

FAMILY **ROSTRATULIDAE** PAINTED-SNIPE

***Rostratula benghalensis* [*benghalensis* (Linné, 1758)]**

Collected by Steere Expd.

FAMILY **CHARADRIIDAE** PLOVERS

***Charadrius dubius dubius* Scopoli, 1786**

DMNH—1 ?, Boac

Not previously recorded from Marinduque. Breeds throughout the Philippines.

FAMILY **SCOLOPACIDAE** SANDPIPERS

***Numenius minutus* Gould, 1841**

Collected by Steere Expd.

FAMILY **COLUMBIDAE** PIGEONS

***Phapitreron amethystina amethystina* Bonaparte, 1855**

Collected by Marche Expd.—1 ?; May
DMNH—2 ♂ , Boac; 1 ♀ , 1 in alcohol, Sta. Cruz

***Ptilinopus occipitalis* G. R. Gray, 1844**

DMNH—2 ♂ , 1 ♀ , Sta. Cruz

Not previously recorded from Marinduque. Breeds throughout the Philippines.

***Ducula aenea* [*aenea* (Linné, 1766)]**

Collected by Marche Expd.—2 ♂ , 3 ♀ ; April
Collected by Steere Expd.

***Ducula bicolor* (Scopoli, 1786)**

Collected by Marche Expd.—2 ♂, 1 ♀, 2 ?; April, May
Collected by Steere Expd.

***Macropygia phasianella tenuirostris* Bonaparte, 1854**

Collected by Steere Expd.
DMNH—2 ♂, 2 ♀, 2 in alcohol, Sta. Cruz

***Streptopelia bitorquata* [*dusumieri* (Temminck, 1823)]**

Collected by Steere Expd.

***Chalcophaps indica indica* (Linné, 1758)**

Collected by Marche Expd.—2 ?; April, May
Collected by Steere Expd.
DMNH—2 ♂, 1 in alcohol, Sta. Cruz

FAMILY **PSITTACIDAE** PARROTS

***Kakatoe haematuropygia* (P. L. S. Müller, 1776)**

Collected by Marche Expd.—5 ♂, 4 ♀, 1 ?; April, May, June
Collected by Steere Expd.

***Prioniturus luconensis* Steere, 1890**

Collected by Marche Expd.—4 ♂, 3 ♀; May, June
Collected by Steere Expd.
DMNH—1 ♂, 1 ♀, Boac

***Tanygnathus lucionensis* ssp.**

Collected by Marche Expd.—1 ♂, 3 ♀, 2 ?; April
Collected by Steere Expd.

***Loriculus philippensis* ssp.**

Collected by Marche Expd.—7 ♂, 1 ♀; May, June
Collected by Steere Expd.

FAMILY **CUCULIDAE** CUCKOOS

***Cuculus saturatus horsfieldi* Moore, 1857**

DMNH—1 ♀, Sta. Cruz

Not previously recorded from Marinduque. Winters in the Philippines from China.

***Eudynamys scolopacea mindanensis* (Linné, 1766)**

Collected by Steere Expd.
DMNH—3 ♂, Boac; 1 ♂, Sta. Cruz

***Phoenicophaeus superciliosus superciliosus* Dumont, 1823**

Collected by Marche Expd.—1 ♀ ; April
Collected by Steere Expd.
DMNH—1 ♂ , 2 ♀ , Boac; 2 ♂ , 2 ♀ , Sta. Cruz

***Phoenicophaeus cumingi* Fraser, 1839**

Collected by Steere Expd.
DMNH— 1 ♂ , Boac; 1 ♂ , 5 ♀ , 2 in alcohol, Sta. Cruz

***Centropus viridis viridis* (Scopoli, 1786)**

Collected by Steere Expd.
DMNH—1 ♂ , 1 ♀ , Boac; 3 ♂ , 2 in alcohol, Sta. Cruz

FAMILY **STRIGIDAE** OWLS

***Mimizuku gurneyi* (Tweeddale, 1879)**

Hachisuka (1934:51) states that an immature specimen (about three weeks old) in the British Museum belongs to this species. The author and several members of the British Museum Bird Room have looked for this specimen and cannot find it. A check of the catalog shows a *"Bubo"* specimen collected by Moseley on Marinduque.

In view of the facts that (a) the species has never been recorded other than on Mindanao, (b) our collectors looked for but could not find this bird on Marinduque, and (c) the alleged specimen is lost, the Marinduque record of Hachisuka should be disregarded as it was probably based on a misidentification.

***Ninox philippensis* [*philippensis* Bonaparte, 1855]**

Collected by Steere Expd.

***Ninox scutulata randi* Deignan, 1951**

DMNH—1 ♂ , Boac
Not previously recorded from Marinduque.

FAMILY **CAPRIMULGIDAE** NIGHTJARS

***Eurostopodus macrotis macrotis* (Vigors, 1831)**

DMNH—1 ♂ , Sta. Cruz
Not previously recorded from Marinduque but recorded from throughout the Philippines.

FAMILY **APODIDAE** SWIFTS

***Collocalia troglodytes* G. R. Gray, 1845**

Collected by Steere Expd.

***Chaetura gigantea dubia* McGregor, 1905**

DMNH—1 ♀, Sta. Cruz

Not previously recorded from Marinduque but agrees with specimens from Luzon that are considered to be *dubia*.

FAMILY **HEMIPROCNIDAE** TREE SWIFTS

***Hemiprocne comata* [*major* (Hartert, 1895)]**

Collected by Steere Expd.

FAMILY **TROGONIDAE** TROGONS

***Harpactes ardens luzoniensis* Rand and Rabor, 1952**

Collected by Steere Expd.
DMNH—1 ?, Boac; 2 ♂, 2 ♀, 2 in alcohol, Sta. Cruz

FAMILY **ALCEDINIDAE** KINGFISHERS

***Ceyx cyanopectus* [*cyanopectus* Lafresnaye, 1840]**

Collected by Steere Expd.

***Halcyon chloris collaris* (Scopoli, 1786)**

Collected by Marche Expd.—1 ♂; April
Collected by Steere Expd.
DMNH—1 ♂, 2 ♀, Boac; 3 ♂, 1 in alcohol, Sta. Cruz

***Halcyon smyrnensis* [*gularis* (Kuhl, 1820)]**

Collected by Marche Expd.—1 ?; April
Collected by Steere Expd.

***Halcyon lindsayi lindsayi* (Vigors, 1831)**

DMNH—2 ♂, Boac; 1 ♂, 1 ♀, Sta. Cruz

Not previously recorded from Marinduque but agree with topotypical material from Luzon.

FAMILY **MEROPIDAE** BEE-EATERS

***Merops viridis* [*americanus* P. L. S. Müller, 1776]**

Collected by Steere Expd.

FAMILY **CORACIIDAE** ROLLERS

***Eurystomus orientalis cyanocollis* Vieillot, 1819**

Collected by Marche Expd.—2 ♂, 2 ♀; April, May
Collected by Steere Expd.
DMNH—1 ♀, Boac

FAMILY **BUCEROTIDAE** HORNBILLS

***Penelopides panini manilloe* (Boddaert, 1783)**

Collected by Marche Expd.—2 ♂ ; April, June
Collected by Steere Expd.
DMNH—3 ♂ , 1 ♀ , Boac; 1 ♂ , 1 ♀ , Sta. Cruz

***Buceros hydrocorax* [*hydrocorax* Linné, 1766]**

Collected by Marche Expd.—1 ♂ ; May
Collected by Steere Expd.

FAMILY **PICIDAE** WOODPECKERS

***Mulleripicus funebris* [*funebris* (Valenciennes, 1826)]**

Collected by Steere Expd.

***Dendrocopos maculatus validirostris* (Blyth, 1849)**

Collected by Steere Expd.
DMNH—1 ♂ , Boac; 1 ♀ , Sta. Cruz

***Chrysocolaptes lucidus haematribon* (Wagler, 1827)**

Collected by Steere Expd.
DMNH—2 ♂ , 2 ♀ , Boac; 1 ♂ , Sta. Cruz

FAMILY **PITTIDAE** PITTAS

***Pitta erythrogaster erythrogaster* Temminck, 1823**

Collected by Steere Expd.
DMNH—2 ♂ , 2 ♀ , Boac

***Pitta sordida sordida* (P. L. S. Müller, 1776)**

Collected by Steere Expd.
DMNH—1 ♀ , Boac

FAMILY **HIRUNDINIDAE** SWALLOWS

***Hirundo tahitica* [*abbotti* (Oberholser, 1917)]**

Collected by Steere Expd.

FAMILY **CAMPEPHAGIDAE** CUCKOO-SHRIKES

***Coracina striata striata* (Boddaert, 1783)**

DMNH—1 ♀ , Boac; 2 ♂ , Sta. Cruz

Not previously recorded from Marinduque but agree with topotypical material from Luzon.

Coracina coerulescens

This species has been recorded from two islands: *C. c. coerulescens* (Blyth, 1842) on Luzon and a very pale race (in females), *C. c. altera*

(Ramsay, 1881), from Cebu; Rabor (1959:39) reports that the latter is extinct. A third and very dark population heretofore unrecorded from Marinduque may be called:

Coracina coerulescens deschauenseei **new subspecies**

Type DMNH 11284, ♀ Matabang Bundok, Kilo-Kilo, Sta. Cruz, Marinduque, P.I., 1000–1500′, May 1971. Wing 129; tail 108; bill 26; tarsus 22.

DIAGNOSIS: Females differ from *C. c. coerulescens* of Luzon by being darker, most notably so on the crown, mantle, and underparts; lores are darker black and more extensive; forehead is almost black, not gray. Males do not differ.

RANGE: Marinduque.

SPECIMENS EXAMINED: *coerulescens*—Luzon 2 ♂, 10 ♀; *deschauenseei*—Marinduque 3 ♂, 2 ♀; *altera*—Cebu 1 ♀.

ETYMOLOGY: This new subspecies is named for Rodolphe Meyer de Schauensee of the Academy of Natural Sciences of Philadelphia.

Lalage nigra chilensis **(Meyen, 1834)**

Collected by Marche Expd.—1 ♂, 1 ♀; May
Collected by Steere Expd.
DMNH—5 ♂, 1 ♀, 2 in alcohol, Sta. Cruz

FAMILY **DICRURIDAE** DRONGOS

Dicrurus balicassius balicassius **(Linné, 1766)**

Collected by Marche Expd.—1 ♂, 1 ♀; June
Collected by Steere Expd.
DMNH—2 ♂, Boac

FAMILY **ORIOLIDAE** ORIOLES

Oriolus chinensis chinensis **Linné, 1766**

Collected by Steere Expd.
DMNH—3 ♂, Boac; 2 ♂, 1 ♀, Sta. Cruz

FAMILY **CORVIDAE** CROWS

Corvus macrorhynchos philippinus **(Bonaparte, 1853)**

Collected by Marche Expd.—1 ♂, 1 ?; May
Collected by Steere Expd.
DMNH—1 ♂, 1 ♀, Boac

FAMILY **PYCNONOTIDAE** BULBULS

***Pycnonotus goiavier goiavier* (Scopoli, 1786)**

Collected by Marche Expd.—1 ♀ ; June
Collected by Steere Expd.
DMNH—1 ♂ , 2 ♀ , Boac; 4 ♂ , 5 ♀ , 2 in alcohol, Sta. Cruz

***Hypsipetes philippinus philippinus* (J. R. Forster, 1795)**

Collected by Steere Expd.
DMNH—4 ♂ , 3 ♀ , Boac; 2 ♂ , 2 ♀ , 2 in alcohol, Sta. Cruz

FAMILY **TURDIDAE** THRUSHES

***Copsychus luzoniensis luzoniensis* (Kittlitz, 1832)**

Collected by Marche Expd.—1 ♂ , 1 ♀ ; April
Collected by Steere Expd.
DMNH—3 ♂ , 1 ♀ , Sta. Cruz

***Saxicola caprata caprata* (Linné, 1766)**

DMNH—4 ♂ , 1 ♀ , 2 in alcohol, Sta. Cruz
Not previously recorded from Marinduque.

***Monticola solitarius* [*philippensis* (P. L. S. Müller, 1776)]**

Collected by Marche Expd.—1 ?; April
Not previously recorded from Marinduque but winters throughout the Philippines.

FAMILY **SYLVIIDAE** OLD WORLD WARBLERS

***Megalurus palustris forbesi* Bangs, 1919**

Collected by Steere Expd.
DMNH—1 ♂ , Sta. Cruz

***Megalurus timoriensis tweeddalei* McGregor, 1908**

Collected by Steere Expd.
DMNH—1 ♂ , 2 in alcohol, Sta. Cruz

***Cisticola exilis semirufa* Cabanis, 1872**

Collected by Steere Expd.
DMNH—1 ♂ , Sta. Cruz

***Locustella fasciolata* (Gray, 1860)**

Collected by Steere Expd.

***Locustella certhiola* [*ochotensis* (Middendorff, 1853)]**

Collected by Steere Expd.

***Phylloscopus borealis* ssp.**

Collected by Steere Expd.

FAMILY **MUSCICAPIDAE** OLD WORLD FLYCATCHERS

***Rhipidura javanica nigritorquis* Vigors, 1831**

Collected by Marche Expd.—1 ?; April
Collected by Steere Expd.
DMNH—1 ♀, Sta. Cruz

Cyornis rufigaster

Although the Steere Expedition recorded this species on Marinduque, there has not been a series available for study until recently. The Marinduque birds are really distinct and may be called:

***Cyornis rufigaster marinduquensis* new subspecies**

Type DMNH 11216, ♂ Matabang Bundok, Kilo-Kilo, Sta. Cruz, Marinduque, P.I., 1000–1500′, May 1971. Wing 80; tail 70; bill 16.5: tarsus 18.

Diagnosis: Males—dorsally similar to *C. r. simplex* Blyth, 1870, of Luzon but differ in having the white of the abdomen extending further anterior. Similar to *C. r. philippinensis* Sharpe, 1877, to the south, in color of underparts but differ in having upperparts paler and grayer blue. Females—differ from *C. r. simplex* by having less white on the abdomen and also average somewhat more intensely reddish brown on chest; upperparts average slightly darker blue. Similar to *C. r. philippinensis* but separable by somewhat brighter dorsal coloration, especially the tail.

Range: Marinduque.

Specimens examined: *simplex*—Luzon 5 ♂, 6 ♀. *marinduquensis*—Marinduque 5 ♂, 5 ♀. *philippinensis*—Ticao 6 ♂, 3 ♀; Cebu 3 ♂, 2 ♀; Bohol 2 ♂, 1 ♀.

Etymology: This new subspecies is named for the island that it inhabits.

***Muscicapa griseisticta* (Swinhoe, 1861)**

DMNH—1 ♀, Sta. Cruz

Not previously recorded from Marinduque but winters throughout the Philippines from eastern Asia.

***Hypothymis azurea azurea* (Boddaert, 1783)**

Collected by Steere Expd.
DMNH—1 ♀, 1 ?, Boac; 3 ♂, 1 ♀, 1 in alcohol, Sta. Cruz

***Terpsiphone cinnamomea unirufa* Salomonsen, 1937**

Collected by Steere Expd.
DMNH—1 ♂, 1 ♀, Boac; 4 ♂, 1 ♀, Sta. Cruz

FAMILY **MOTACILLIDAE** PIPITS

Motacilla cinerea [***robusta*** **(Brehm, 1857)**]

Collected by Steere Expd.

Anthus novaeseelandiae lugubris **(Walden, 1875)**

DMNH—1 ♀, Sta. Cruz

Not previously recorded from Marinduque but winters throughout Philippines.

FAMILY **ARTAMIDAE** WOOD-SWALLOWS

Artamus leucorhynchus leucorhynchus **(Linné, 1771)**

Collected by Steere Expd.
DMNH—1 ♂, 2 ♀, Boac

FAMILY **LANIIDAE** SHRIKES

Lanius schach nasutus **Scopoli, 1786**

DMNH—2 ♂, 1 ♀, Sta. Cruz

Not previously recorded from Marinduque but found throughout the Philippines, except the Sulu Archipelago.

FAMILY **STURNIDAE** STARLINGS

Aplonis panayensis panayensis **(Scopoli, 1783)**

Collected by Marche Expd.—2 ♂, 1 ♀; April
Collected by Steere Expd.
DMNH—2 ♂, 1 ♀, Boac; 3 ♂, 1 ♀, Sta. Cruz

Sarcops calvus calvus **(Linné, 1766)**

Collected by Steere Expd.
DMNH—1 ♂, 2 ♀, Boac

FAMILY **NECTARINIIDAE** SUNBIRDS

Anthreptes malacensis chlorigaster **Sharpe, 1877**

DMNH—1 ♂, 3 ♀, Sta. Cruz

Not previously recorded from Marinduque but agree with topotypical material from Negros.

Nectarinia sperata marinduquensis **duPont, 1971**

Collected by Marche Expd.—2 ♂, 1 ♀; April, May
Collected by Steere Expd.
DMNH—1 ♀, Boac; 3 ♂, Sta. Cruz

***Nectarinia jugularis jugularis* (Linné, 1766)**

Collected by Marche Expd.—1 ♂ ; April
Collected by Steere Expd.
DMNH—3 ♂ , 1 ♀ , Sta. Cruz

***Aethopyga shelleyi flavipectus* Ogilvie-Grant, 1894**

DMNH—1 ♀ , Sta. Cruz

Not previously recorded from Marinduque but agrees with topotypical material from Luzon.

FAMILY **DICAEIDAE** FLOWERPECKERS

***Dicaeum australe australe* (Hermann, 1783)**

Collected by Steere Expd.
DMNH—2 ♂ , 2 ♀ , Boac; 1 ♀ , Sta. Cruz

***Dicaeum trigonostigma xanthopygium* Tweeddale, 1877**

Collected by Steere Expd.
DMNH—4 ♀ , Boac

***Dicaeum pygmaeum pygmaeum* (Kittlitz, 1833)**

Collected by Steere Expd.
DMNH—1 ♂ , 2 ♀ , Boac

FAMILY **ZOSTEROPIDAE** WHITE-EYES

***Zosterops montana gilli* duPont, 1971**

DMNH—1 ♂ , Boac; 5 ♂ , 4 ♀ , 2 in alcohol, Sta. Cruz

FAMILY **PLOCEIDAE** WEAVERBIRDS

***Lonchura malacca jagori* (Martens, 1866)**

DMNH—2 ♀ , Sta. Cruz

Not previously recorded from Marinduque but agree with topotypical material from Luzon.

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PROPORTIONS AND ALLOMETRY IN THE GRAY SQUIRREL, *SCIURUS CAROLINENSIS*

*Richard W. Thorington, Jr.**

INTRODUCTION

The anatomy of *Sciurus* has been treated in part by many authors. Cranial anatomy has been studied in some detail, notably by Olson and Miller (1958), Guthrie (1963), and in some papers on sciurid taxonomy. Postcranial anatomy has been treated more superficially. Owen (1866) and Flower (1885) included a few descriptions of sciurid osteology; Parsons (1894) described the myology of *Sciurus prevosti*; Peterka (1936) listed some osteologic and myologic aspects of the anatomy of *Sciurus niger*; and several authors have used postcranial anatomy to determine age in *Sciurus carolinensis* (Kirkpatrick and Barnett, 1957). However, there is no adequate description of the proportions of any species of *Sciurus*. There are data on the commonly recorded external measurements (total length, tail length, length of hind foot, and height of ear), but these provide a poor description of body proportions and are completely inadequate for comparisons of locomotor anatomy. Therefore, one of the objectives of this paper is to provide a description of the proportions of one species of *Sciurus*, that it may serve as a basis for comparisons with other mammals.

In contrast, the primate literature is full of measurements of body proportions of prosimians, monkeys, and apes (see particularly Schultz, 1930, 1933, 1937, 1938, 1953; Erikson, 1963; and data summarized in Napier and Napier, 1967, pp. 393–395). However, the lack of comparative data from nonprimate mammals presents a significant problem. It inevitably leads to a lack of perspective, particularly a lack of appreciation of the different ways in which nonprimates have overcome the same locomotor problems faced by primates. Primarily to highlight this factor and because of the extent of our knowledge of primate proportions, the data in this paper are compared in detail with those of Erikson (1963). The obvious comparison to be made is between squirrels and marmosets, which live and move about in similar ways. One might

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hypothesize that the proportions of gray squirrels would approximate those of marmosets, tamarins, and other ceboids included in Erikson's springer group. This hypothesis will be evaluated later.

A more general objective of this paper is to consider the appropriateness of using ratios to compare animals of different sizes. Kowalski (1972) has wisely remarked on the desirability of using ratios if they behave in a simple way. However, it seems evident from published data that ratios frequently do not behave simply. Since this problem is basic to describing shape, it was examined in detail in each analysis.

Finally, the subject of robustness is reexamined with data from *Sciurus*. Usually robustness is defined in terms of lengths and distal widths of the humerus and femur (Jolicoeur, 1963; Goldstein, 1972). The objective of this reexamination is simply to evaluate the appropriateness of using distal widths of limb bones as general measures of robustness.

Acknowledgments

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The paper was read and criticized by Drs. R. Tucker Abbott, John E. duPont, John P. Hubbard, H. Daniel Roth, and Gentry Steele. Dr. Roth and Mr. Dante Piacesi were of particular assistance in the preparation of computer programs and criticism of statistical techniques. Drs. Stuart O. Landry and Charles A. Long offered valuable advice in response to an earlier version of this paper. Mrs. Dorothy Osborn typed all versions. Finally, I wish to express appreciation to my mentor, Dr. G. E. Erikson, whose enthusiasms and interests caused me to initiate this study.

MATERIALS AND METHODS

The 67 squirrel skeletons measured for this study include 27 from eastern Massachusetts (personal collection), 26 from the Delmarva Peninsula (Delaware Museum of Natural History), and 14 from the vicinity of the District of Columbia and other nearby eastern localities (in the U.S. National Museum).

The measurements of vertebrae and long bones are based on the discussion and warnings of Erikson (1963), who in turn based his measurements on Schultz (1929). Femur length was measured from the

femoral head to the medial condyle. In *Sciurus* this differs very little from Schultz's measurement, taken from the greater trochanter to lateral condyle. Lengths of other long bones are greatest lengths. Vertebral lengths were taken ventrally on dried, straightened vertebral columns. The length of the cervical vertebrae is measured from the anterior end of the odontoid process of the axis to the posterior end of the centrum of C7. In squirrels the trunk length, as measured by the sum of the lengths of thoracic, lumbar, and sacral vertebrae, is slightly less than the suprasternal to symphysion length, taken by Schultz and others as a measure of trunk length.

For a study of robustness of long bones, seven measurements of bone widths were taken and compared with the lengths of the respective bones. These were the greatest width across the tubercles of the humeral head, the least width at the middle of the humerus, the maximum epicondylar width at the distal end of the humerus, the greatest

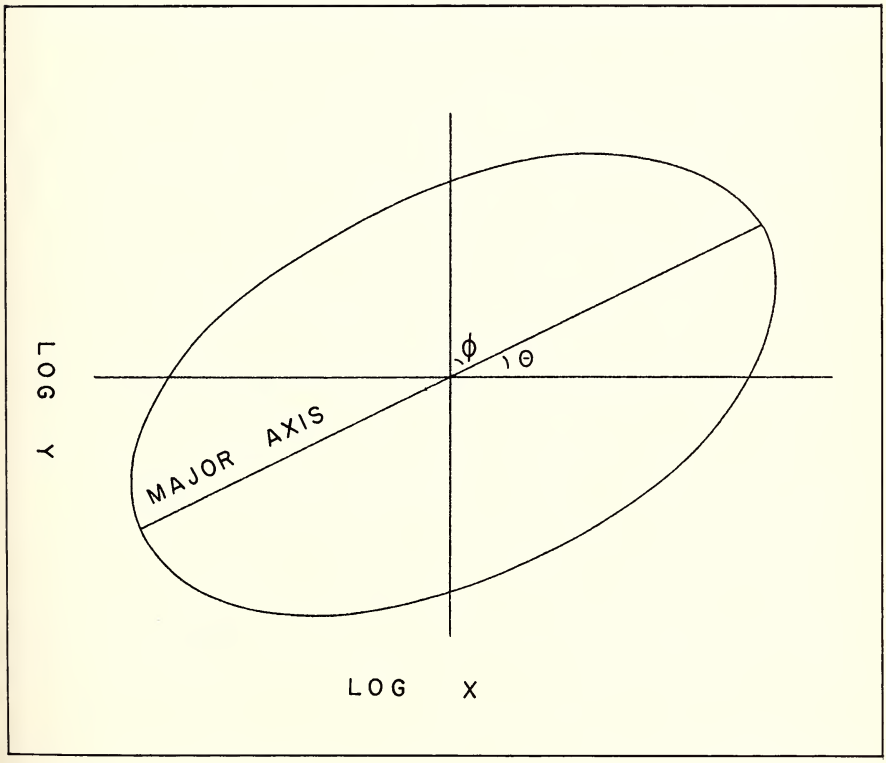

Figure 1: Definition of the major axis by directional cosines. A value z on the major axis is defined by $z = \cos \Theta \log x + \cos \Phi \log y$. The major axis is the allometric equation $y = bx^a$, in which $a = \cos \Phi / \cos \Theta$. The isometry hypothesis is $\cos \Theta = \cos \Phi$.

and least widths at the middle of the femur, the greatest width of the femoral condyles, and the least width of the tibia. The middles of the humerus and femur were estimated with a millimeter rule and marked before the respective widths were measured. Jolicoeur (1963) and Goldstein (1972) used only distal widths—the maximum epicondylar width of the humerus and the greatest width of the femoral condyles. The other measurements used in this study were chosen to provide measures of the robustness of the proximal end and midshaft of the bones.

Analysis of the proportions is based on the discussion of the multivariate solution of the allometric equation presented by Jolicoeur (1963). It utilizes principal component analysis based on the variance-covariance matrix of logarithmically transformed data. In this procedure the major axis of the ellipsoid of data points is determined, an axis which accounts for the most variance and is the best description of the allometric relationship between the variables. In principal component analysis this axis is defined by a series of factors, which are weightings of the original variables. In Q mode, each factor is the cosine of the angle formed by the major axis and a line through the centroid parallel to the axis of its respective variable. For two dimensions this is illustrated in Figure 1. If there is an isometric relationship between variables, all the cosines are the same. With two variables the major axis meets the x and the y axes at 45° angles and the two cosines are both 0.707. With three variables the angles are 54.7° and the cosines are 0.577.

The cosines are easily computed for four or more variables, although visualization of this situation becomes difficult. The isometry hypothesis is represented by the vector with all cosines equal. The angle between the observed major axis and this (or any other) hypothesized vector can be determined from their dot product. Anderson (1963) and Jolicoeur (1963) present and discuss a test of significance of the difference between an hypothesized vector and the observed vector. If the observed vector differs significantly from the isometric vector, one must conclude that the data demonstrate a size-related change in shape.

The standard bivariate allometry equation can easily be derived from the multivariate solution. For any two variables the constant of allometry (i.e., the exponent of the equation) can be determined by dividing the cosine of one variable by the cosine of the other. The other constant of the equation can be obtained by substituting mean values of the two variables in the equation.

An extension of Jolicoeur's procedures is desirable because isometric relationships between variables do not preclude size-related changes in shape. If the relationships do not differ significantly from isometry, the untransformed data should be analyzed. Again, a principal component analysis will yield the major axis of the ellipsoid of original data

points (again in Q mode). The ratios between the variables will remain constant only if the major axis has the same direction as the line connecting the origin and the centroid of the ellipse—this line is the mean vector—as is the case when the x, y, and other intercepts are all zero. Therefore, the test of constant proportions (e.g., $y/x = k$) is provided by the null hypothesis that the major axis does not differ in direction from the mean vector (see Figure 2). The cosines are easily calculated for the angles between the mean vector and the axes of the variables. The angle between the major axis and the mean vector may be determined from the dot product of the vectors divided by the product of their lengths, and the significance of this divergence may be determined as described by Jolicoeur. Again, if there is a significant difference, then the data demonstrate that proportions change with size.

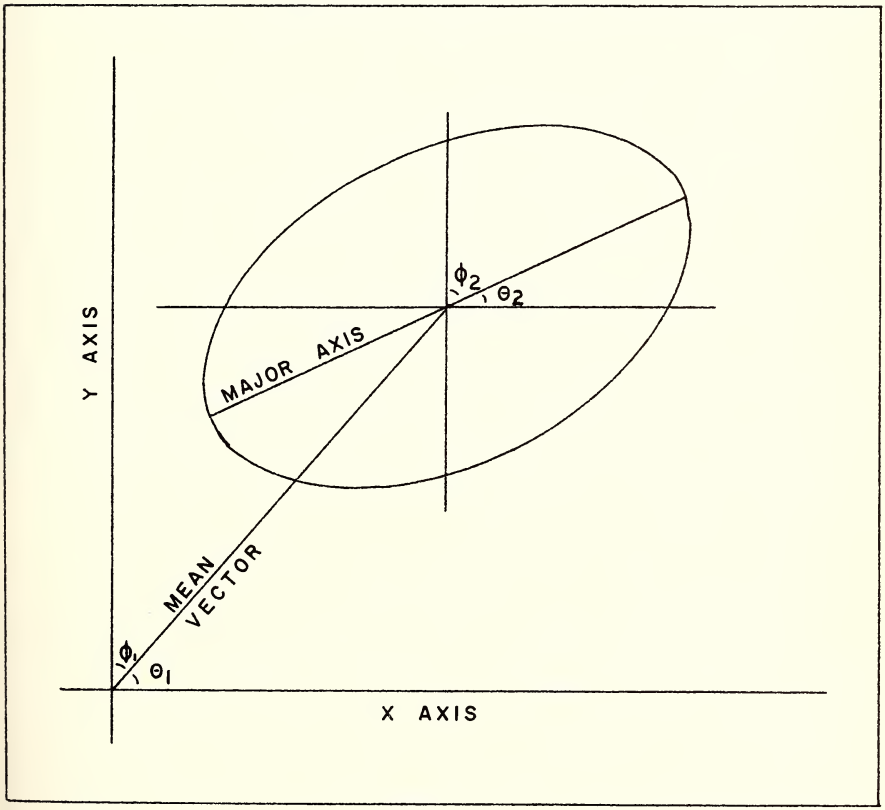

Figure 2: Test of constant ratio between untransformed variables. Ratios are unaffected by size, e.g., $y/x = k$, if $\Theta_1 = \Theta_2$ and $\Phi_1 = \Phi_2$.

GENERAL DESCRIPTION

Most gray squirrels examined had seven sternebrae and 26 presacral vertebrae. The first seven vertebrae were cervical, the next 12 were rib-bearing (the classic thoracic vertebrae), and the last seven were lumbar vertebrae. The tenth thoracic vertebra was the anticlinal vertebra. It and the posterior vertebrae had a lumbar type of articulation (Washburn and Buettner-Janusch, 1952). Thus, as defined by articulations there were 10 thoracic and nine lumbar vertebrae. There were three sacral vertebrae and 26 to 29 caudal vertebrae. The normal and variant vertebral formulae of 51 skeletons are presented in Table 1.

In the quantitative analyses of proportions, only the normal animals were used. This avoided the use of data that are not strictly comparable. Similarly, specimens with pathological conditions were not included. Three animals (of 65 carefully examined) exhibited broken bones which were healing: one fractured humerus, two fractured femora, and one fracture of both tibia and fibula. There was one case of bilateral aplasia of the neck of the femur. In this skeleton the humeri were abnormally thick and short; it was similarly excluded from these analyses.

The sample was treated as a whole and was not subdivided by sex, age, or geographic origin of the specimens unless indicated. All specimens were aged by degree of closure of epiphyseal sutures of humeri and femora, as described by Kirkpatrick and Barnett (1957). Adults were defined as animals with complete fusion of the diaphysis and distal epiphysis of the femur. There was considerable overlap in size between juvenile animals and adults, as will always be true when the adults are defined by closure of growth sutures. However, the overlap was greater in this sample because of the geographic heterogeneity of the sample. Only eight juveniles had shorter femora than that of the smallest adult. Among the 25 adult animals, the average animal from Massachusetts had a longer femur than the average squirrel from Delaware and Maryland.

RESULTS

The body proportions of *Sciurus carolinensis* are summarized in Figure 3. Limb proportions are presented proportional to a trunk length of 100 units. In Tables 2 and 3 the data are presented as indices (the ratios are multiplied by 100) and compared with the indices reported by Erikson (1963) for different kinds of neotropical primates. He divided ceboids into three locomotor types: springers, climbers, and brachiators. With respect to relative lengths of forelimb to trunk and of forelimb to hindlimb, gray squirrels appear to be "superspringers."

Table 1: Normal and Unusual Vertebral Patterns in *Sciurus carolinensis*

	Cervical	Thoracic	Lumbar	Sacral
Normal (N = 45)	7	12	7	3
RWT 1149 ♀	7	12	8	2
RWT 1148 ♂	7	12½	7½	3
DMNH 4212 ♂	7	12	7	2
DMNH 4211 ♀	7	13	6	3
USNM 248247 ♀	7	12	7	4
DMNH 2968 ♀	7	12	7	4

Table 2: Relative Lengths[1] of Long Bones for *Sciurus carolinensis* and Ceboid Primates[2]

	Squirrels	Ceboid Primates		
	Sciurus	Springers	Climbers	Brachiators
Hum. + Rad. / Vert. Col.	58	67	84	123
Hum. + Rad. / Fem. + Tib.	71	75	80	101
Radius / Humerus	96	89	90	94

[1] Data presented as indices (ratios multiplied by 100).
[2] Data from Erikson, 1963.

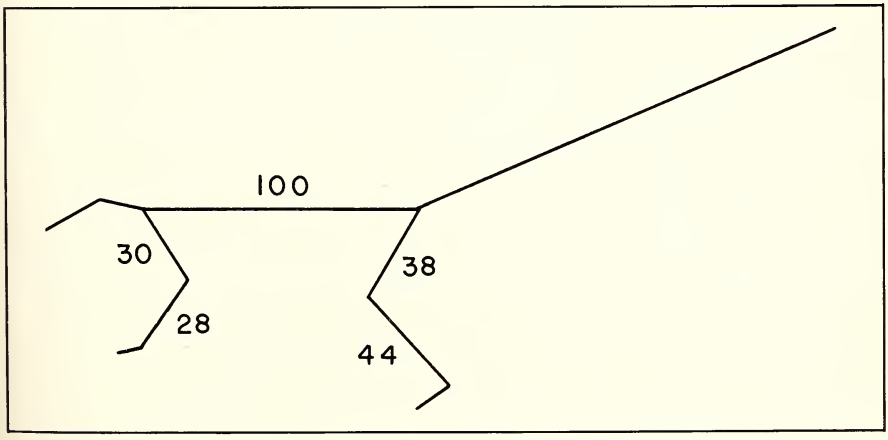

Figure 3: Body proportions of *Sciurus carolinensis.*

Table 3: Relative Lengths[1] of Lumbar and Thoracic Vertebrae for *Sciurus carolinensis* and Ceboid Primates[2]

	Squirrels	Ceboid Primates		
	Sciurus	Springers	Climbers	Brachiators
Lumb. Length* / Thor. Length*	97	110	91	57
Lumb. Length† / Thor. Length†	148	195	167	96

[1] Data presented as indices (ratios multiplied by 100).
[2] Data from Erikson, 1963.
* Defined by ribs.
† Defined by articulations.

With respect to their brachial index, however, they appear anomalously to be similar to the neotropical brachiators. With respect to relative lengths of lumbar and thoracic parts of the vertebral column, whether defined by their ribs or by their articulations, gray squirrels are similar to Erikson's climbers.

In order to obtain a better understanding of the proportions of gray squirrels and how they might be expected to change with changes in size, a more detailed analysis of the linear measurements was undertaken. These analyses are described in the section on methods, to which the reader is referred before examining the results presented in the following section.

Lengths of Vertebrae

The lengths of six segments of the vertebral column are presented in Table 4. The principal component analysis (Table 5) conducted on the log-transformed data demonstrates that these are not isometric. The most divergent measurement is the length of the sacral vertebrae, which accounts for most of the X^2 value. The serial decline in the directional cosines from cervical to sacral vertebrae suggests an anterior-posterior growth gradient, similar to those described by Huxley (1932) for extremities.

The lengths of thoracic and lumbar vertebrae, which are sometimes used to form ratios, are approximately isometric with respect to each other (Table 6). The untransformed data were examined, and the principal axis was found to diverge from the isometric by 1.5°, mostly in

Table 4: Lengths and Ratios of Limbs and Vertebral Segments of *Sciurus carolinensis*

	N	Mean	S.E.	C.V.	Skewness[1]	Kurtosis[2]
Lengths:						
Forelimb (Humerus + Radius)	45	84.44	.54	4.2	−.57	0.2
Hindlimb (Femur + Tibia)	46	118.91	.73	4.1	−.64	0.5
Cervical Vertebrae	46	24.07	.21	5.8	−.47	0.0
Vertebrae T1 to T10	46	49.88	.40	5.4	−.29	0.5
Vertebrae T1 to T12	46	62.66	.48	5.2	−.20	0.3
Vertebrae T11 to L7	46	73.60	.52	4.7	−.41	−0.2
Vertebrae L1 to L7	46	60.78	.44	4.9	−.60	0.0
Sacral Vertebrae	45	21.18	.13	3.9	.29	−0.1
Thoracic, Lumbar, and Sacral Vertebrae	45	144.85	.92	4.2	−.26	0.3
Ratios:						
Brachial (Radius/Humerus)	43	.96	.003	2.1	−.24	−0.5
Crural (Tibia/Femur)	43	1.13	.003	1.8	.35	−0.2
Intermembral (Forelimb/ Hindlimb)	43	.71	.001	1.1	.26	1.1
Forelimb/Trunk vertebrae	43	.58	.003	2.9	.54	0.8
Hindlimb/Trunk vertebrae	43	.82	.004	2.8	.29	−0.1
L1 to L7/T1 to T12	43	.97	.004	2.5	.06	−1.0
T11 to L7/T1 to T10	43	1.48	.007	3.2	−.40	0.0

[1] Skewness $= \Sigma (x - \bar{x})^3/Ns^3$
[2] Kurtosis $= \Sigma (x - \bar{x})^4/Ns^4 - 3$

Table 5: Demonstration That Vertebral Lengths Are Not Isometric with One Another (N = 46)

Log Transformed Lengths:	C1–7	T1–10	T1–12	T11–L7	L1–7	S1–3
Major Axis	.460	.455	.437	.398	.425	.227
Isometry Hypothesis	.408	.408	.408	.408	.408	.408

82.3% of the variance is accounted for by the first principal axis. The null hypothesis that the principal axis is not significantly different from the isometry hypothesis is rejected ($X^2 = 40.5$ $p < .001$). The two axes diverge by 11.5°.

the plane of the T1–10 and T11–L7 axes. The divergence is not significant and suggests that the ratios of these vertebral lengths do not change significantly within the size range of gray squirrels.

Table 6: Approximate Isometry of Lengths of Thoracic and Lumbar Vertebrae (N = 46)

Log Transformed Lengths:	T1–10	T1–12	T11–L7	L1–7
Major Axis	.530	.509	.464	.495
Isometry Hypothesis	.500	.500	.500	.500

The major axis accounts for 89.5% of the variance of the four variables. The isometry hypothesis is not rejected ($X^2 = 4.3$ $p \cong 25\%$). The two axes diverge by 2.5°.

Untransformed Lengths:	T1–10	T1–12	T11–L7	L1–7
Major Axis	.423	.520	.563	.484
Hypothesis of Constant Ratios	.400	.503	.591	.488

The major axis accounts for 91.5% of the variance of the four variables. The hypothesis of constant ratios is not rejected ($X^2 = 2.5$ $p \cong 50\%$). The two axes diverge by 1.5°.

Lengths of Limbs

The trunk length (the sum of the lengths of the thoracic, lumbar, and sacral segments) was compared with the limb lengths, where the forelimb length is taken as the sum of lengths of humerus and radius, the hindlimb length as the sum of lengths of femur and tibia. As shown in Figure 3, the forelimb is 58 per cent of the trunk length and the hindlimb is 82 per cent of the trunk length. The principal axis of log-transformed data is shown in Table 7. The observed eigenvector diverges from that of the isometry hypothesis by 5.2°, but the observed values are not significantly isometric ($X^2 = 0.9$ $p > 50$ percent). Similarly, the major axis of the untransformed variables does not differ significantly from the hypothesis of equal ratios.

The lengths of the long bones are presented in Table 8. The log-transformed data were examined for size allometry, and the results are presented in Table 9. The first eigenvector accounts for 95.5 per cent of the variance, and the vector diverges from the vector of isometry by

Table 7: Approximate Isometry of Trunk and Limb Lengths (N = 45)

Log Transformed Lengths:	Forelimb	Hindlimb	Trunk
Major Axis	.604	.594	.531
Isometry Hypothesis	.576	.576	.576

The major axis accounts for 88% of the variance. The isometry hypothesis is not rejected ($X^2 = 0.9$ $p > 50\%$). The two axes diverge by 5.2°.

Table 8: Lengths of Long Bones of *Sciurus carolinensis*

	N	Mean	S.E.	C.V.
Humerus	61	43.02	.25	4.5
Radius	61	41.18	.24	4.5
Femur	61	55.63	.35	4.9
Tibia	61	62.98	.32	4.0

Table 9: Allometry in the Lengths of Long Bones of *Sciurus carolinensis* (N = 61)

Log Transformed Lengths:	Humerus	Radius	Femur	Tibia
Major Axis	.500	.493	.559	.441
Isometry Hypothesis	.500	.500	.500	.500

The major axis accounts for 95.5% of the total variance. The isometry hypothesis is rejected ($X^2 = 33.4$ $p < .001$). The two axes diverge by 4.8°.

4.8° ($X^2 = 33.4$ $p<.001$). Most of the divergence from isometry is found in the plane of the measurements of the femora and the tibia, indicating that the femora are relatively longer in larger animals and the tibia relatively shorter.

In Table 10 a comparison is made with a similar analysis conducted on a small sample (N = 30) of tamarins, *Saguinus oedipus*. The major differences between tamarins and gray squirrels are that the tibia of the tamarins is not negatively allometric, whereas the radius appears to be. The principal axis of the tamarin does not differ significantly from the axis of isometry ($X^2 = 3.6$ $p>.25$). However, the sample size is small so one cannot state with confidence that the measurements are isometric.

Table 10: A Comparison of Long Bone Measurements of *Sciurus carolinensis* (N = 61) and *Saguinus oedipus* (N = 30)

		Humerus	Radius	Femur	Tibia
Major Axes (Log Transf.)	*Sciurus*	.500	.493	.559	.441
	Saguinus	.499	.450	.531	.517
Mean Vectors	*Sciurus*	43.02	41.18	55.63	62.98
	Saguinus	51.43	46.48	64.98	66.33
Standardized Mean Vectors	*Sciurus*	.417	.400	.540	.611
	Saguinus	.444	.401	.561	.572

In a comparison of the standardized mean vectors it is evident that the greatest difference is in the relatively longer tibia of *Sciurus*. Lesser differences are the relatively longer humerus and femur of the *Saguinus*. These data combined with extrapolation of the allometric relationships for *Sciurus* suggest that larger gray squirrels would have a crural index more similar to that of the tamarin than do the ones used in this study. The higher brachial index of *Sciurus* is due to its relatively shorter humerus. Since the humerus and the radius of *Sciurus* have similar directional cosines, the brachial index of this species should be little affected by size. The directional cosines of the humerus and radius of *Saguinus* suggest that the brachial index of this species may be inversely proportional to the size of the animal. A larger sample is necessary to adequately test this hypothesis.

Robustness of Limbs

The robustness of three of the long bones was examined by principal component analysis, paralleling and extending the studies by Jolicoeur (1963) and Goldstein (1972). A sample of 45, including skeletons of young and adult animals, was studied first. The lengths of the humerus, femur, and tibia were associated with similar values in the first eigenvector. A directional cosine of approximately 0.30 would appear to be associated with length measurements in this analysis. Therefore, a directional cosine of approximately 0.45 should be associated with width measurements, if these increase at the 1.5 power of limb lengths as is usually hypothesized. This value is approximated by the directional cosines of the least width of the humerus at midshaft and the greatest width of the femur at midshaft. Widths of the proximal and distal ends of the humerus and of the distal end of the femur are associated with cosines well below the expected value. In fact, they are negatively allometric to the length measurements. Thus, for this cross-sectional series of growth stages, some widths of the diaphyses increase at approximately the 1.5 power of limb lengths, whereas widths of the epiphyses do not.

To determine whether these results might be peculiar to a growth series, the analysis was repeated on a sample of 24 fully adult skeletons, in which the epiphyses and diaphyses were completely fused. The lengths of the long bones were associated with directional cosines of 0.26 in this analysis. Therefore, widths which increase at the 1.5 power of length should be associated with cosines of approximately 0.39. The greatest and least widths of the femur at midshaft fit this prediction, whereas the distal widths of the humerus and femur are better described

as being approximately isometric with the lengths of these bones. The other widths increase at rates intermediate between 1.0 and the 1.5 power of length. In Table 11 the directional cosines of the two samples are listed together with the approximate ratio of each cosine to that of the length of the humerus. (This ratio is equal to the constant of allometry for each variable compared with the length of the humerus.) This allows easy comparison of the differences between the total sample and the sample of adults only and shows clearly which widths do not increase at the 1.5 power of length.

DISCUSSION AND CONCLUSIONS

There are several kinds of size allometry which must be distinguished from one another. The one given primary emphasis in this paper is the allometry found in a sample of young to adult animals. It must be distinguished from growth allometry and from the allometric relationships found within or between samples of fully grown animals of different sizes. A basic hypothesis of this paper is that the allometry found is functionally important. In this sample of growing and adult animals, all were out of the nest and facing the same environmental problems of locomotion, feeding, and so on. Therefore, it is reasoned that the functionally important relationships between linear measure-

Table 11: Size Allometry of Lengths and Widths of Long Bones of *Sciurus carolinensis*

	Directional Cosines of Major Axis			
Variable	*Total sample* (N = 45)	*Approx. ratios**	*Adults* (N = 24)	*Approx. ratios**
Humeral Length	.30	1.0	.26	1.0
Width of Humeral Head	.19	0.6	.33	1.3
Least Midshaft Diameter	.48	1.6	.30	1.2
Distal Width	.11	0.4	.23	0.9
Femoral Length	.32	1.1	.26	1.0
Greatest Midshaft Diameter	.45	1.5	.42	1.6
Least Midshaft Diameter	.38	1.3	.40	1.5
Condylar Width	.22	0.7	.30	1.2
Tibial Length	.27	0.9	.26	1.0
Least Tibial Width	.26	0.9	.34	1.3

* The ratios are equal to a in the equation $y = bx^a$, where x is the length of the humerus and y is the other variable listed.

ments are the same or similar to the relationships that would be found in a sample of adults of the same species. Unfortunately the small sample size of adults precludes critical testing of this hypothesis in this study. Examination of the data suggests that it is valid for length measurements of the vertebrae and limb bones, but that it is not valid for comparisons of lengths and widths of the long bones. It is particularly likely to be invalid for widths of epiphyses.

If these allometric or isometric relationships are functionally important, then biological scaling factors (Stahl, 1962) may be derived from them. The multivariate solution of the allometry equation is analogous to such factors. In some instances it may be identical with the relationship described by various ratios of the average lengths; in other cases it is not.

The data on the gray squirrel demonstrate that there is size allometry between different segments of the vertebral column but this does not appear to affect the ratios presented in Table 3. If the ratios for the ceboids are similarly unaffected by absolute size, then this comparison of *Sciurus* and larger ceboids would seem valid. However, the modal number of rib-bearing vertebrae is 13 for both the ceboid springers and climbers, whereas it is 12 for *Sciurus*. If the vertebrae are defined by their articulations, the modal numbers of thoracic and lumbar vertebrae are the same for these ceboids and for gray squirrels. Therefore, the relative proportions of vertebrae are more comparable when that definition is used.

The conclusion is that gray squirrels have a relatively shorter lumbar segment of the vertebral column than do most of the nonbrachiating ceboid monkeys. This is the segment that is flexed and extended when the animal jumps, so the implication is that the monkeys have a vertebral column more adapted to jumping. However, in primates and squirrels the amount of flexion which actually occurs between lumbar vertebrae is much greater in the middle of the back than near the sacrum. In an x-ray examination of a gray squirrel, it appears that most of the ventrodorsal flexion of the vertebral column occurs in the joints between the vertebrae T10 and L2. Therefore, conclusions about the functional significance of the relative length of the whole lumbar segment should be tempered, and other measures of the locomotor significance of the lumbar part of the vertebral column should be sought.

The lengths of the forelimb, hindlimb, and trunk vertebrae (thoracic, lumbar, and sacral) are apparently isometric. The relative shortness of the forelimb of *Sciurus* (shown in Table 2), then, is a real difference between it and ceboids of various sizes.

The lengths of the long bones are significantly allometric, but most of the divergence from isometry occurs in the lengths of the femur and tibia. The lengths of the humerus and radius are approximately isometric to each other; consequently, the high brachial index of *Sciurus carolinensis* (Table 2) would therefore appear to be a noteworthy characteristic. As is demonstrated by the standardized mean vectors, shown in Table 10, the high index is due to a short humerus rather than to a long radius as in brachiating primates. This further illustrates how the forelimb is relatively short in gray squirrels compared with ceboids.

The hindlimb of *Sciurus carolinensis* presents an interesting situation, as illustrated in Table 10. The crural index (tibia/femur) is higher in *Sciurus* than in *Saguinus*. The standardized mean vectors show that this results from both a relatively longer tibia and a relatively shorter femur in gray squirrels compared with tamarins. However, the tibia is negatively allometric to the femur in *Sciurus* and not in *Saguinus*. These facts suggest that if gray squirrels were as big as tamarins, their crural ratios would not be as different.

The data on the lengths and widths of long bones were mentioned earlier. In the total sample of young to fully adult squirrels, the midshaft diameters were allometric to the lengths of the long bones and increased at approximately the hypothesized 1.5 power of the latter. The widths of the proximal and distal ends of the humerus and femur clearly were not. (The tibia is assisted by the fibula in transmitting weight from the femur to the foot; therefore, the power function of tibial width to length may be hypothesized to be different than 1.5.) The sample of adult measurements suggests that the hypothesized power relationship does not accurately describe the relationships between distal widths and lengths of humeri and femora. The sample size is small, however, and the significance limits correspondingly broad. The analysis clearly demonstrates how an analysis of robustness of long bones can be biased by inclusion of lengths and widths of bones with unfused growth sutures. It also demonstrates that different widths are best described by different power functions of length measurements. Robustness would appear to be a more complex characteristic than the analyses of Jolicoeur (1963) and Goldstein (1972) indicate.

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SOUTH SULU ARCHIPELAGO BIRDS

AN EXPEDITION REPORT

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and
*Dioscoro S. Rabor**

INTRODUCTION

The Delaware Museum of Natural History and Mindanao State University Expedition to the south Sulu islands (see Itinerary, Table 1) recorded 147 species of birds, 33 of which represent range extensions, including the first Philippine records of *Hemiprocne longipennis harterti, Caprimulgus macrurus salvadorii, Halcyon coromanda rufa,* and one unidentified *Rhinomyias,* with the senior author being responsible for the taxonomic accounts. The junior author is responsible for the ecological accounts. The latter led the field party and has also contributed many heretofore unpublished field notes about Philippine birds.

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Table 1: Itinerary of the Sulu Archipelago Biological Expedition

Sept. 20, 1971	Departure from Mindanao State University, Marawi City, for Sanga Sanga Island, where the main headquarters of the expedition party was to be established.
Sept. 21	Arrival in Dumaguete City. Final preparations for expedition completed, including acquisition of more trained personnel, regular members of previous biological expeditions, and much-needed supplies.
Sept. 29	Arrival in Jolo, Sulu. Conferences with provincial officials concerning operations on various islands; acquisition of necessary identification papers; departure for Bongao Municipality, Bongao Island, Tawitawi Group.
Sept. 30	Arrival in Bongao. Expedition party immediately proceeds to Barrio Pag-asinan, Sanga Sanga Island, Tawitawi Group; main camp and headquarters established.
Oct. 1 to Dec. 24	Sanga Sanga Island: collections and studies of Philippine terrestrial vertebrates, especially birds and mammals.
Oct. 9 to 14	Bongao Island, Tawitawi Group: collections and studies.
Oct. 12 to 21	Simunul Island, Tawitawi Group: collections and studies.
Oct. 23 to 27	Eastern localities of Sanga Sanga Island: collections and studies.
Oct. 28	Departure of main party for Sibutu Island, Sibutu Group; established main headquarters at Tandu Banak.
Oct. 28 to Nov. 24	Sibutu Island: collections and studies.
Nov. 20	Omapoy Island, Sibutu Group: collections and studies.
Nov. 21	Sipangkot Island, Sibutu Group: collections and studies.
Nov. 21 to 22	Tumindao Island, Sibutu Group: collections and studies.
Nov. 23	Saluag and Sikulan Islands, Sibutu Group: collections and studies. Short field work on southernmost tip of Sibutu Island, opposite Saluag Island.
Nov. 24 to 29	Sanga Sanga Island: collections and studies in the localities not yet worked.
Nov. 30	Departure of main collecting party for Batu Batu, on the southern half of Tawitawi Island.
Dec. 1 to 23	Southern part of Tawitawi Island, including areas around Balimbing: collections and studies.
Dec. 24	Departure for main headquarters in Barrio Pag-asinan, on Sanga Sanga Island.
Dec. 26	Departure for Mindanao State University.
Jan. 3, 1972	Arrival at Mindanao State University.

THE SULU ARCHIPELAGO

Geographic, Physiographic, and Geologic Features

The Sulu Archipelago is comprised of some 400 islands of varying sizes and shapes located between 4°30′ and 5°20′ north latitude and 119°25′ and 121°52′ east longitude. It is bounded by the Sulu and Mindanao Seas on the west and north and by the Celebes Sea on the east and south.

The islands fall into seven island groups, namely:

(1) Samales Group or Tongkil (Tongquil)–Balanguingui Group, including the main islands of Tongkil, Balanguingui, Bucutua, Bulan, Bangalao, Simisa, Tatalan, and many islets;

(2) Jolo Group, including the main islands of Jolo, Pata, Cabucan, Capual, Bubuan, Pangasinan, Kamawi, Dongdong, Patian, and many islets;

(3) Pangutaran Group, including the main islands of Pangutaran, Panducan, North Ubian, Kulassein, Usada, and many islets;

(4) Tapul Group or Siasi-Tapul Group, including the main islands of Tapul, Siasi, Lugus, Lapac (Lapak), Cabinga-an, and many islets;

(5) Tawitawi (Tawi Tawi) Group, including the main islands of Tawitawi, Sanga Sanga, Tandubatu, Baliungan, Bongao, Simunul, Belatan (Bellatan, Bilatan), Tandubas, Secubun (Sikubung), Latuan, Mantabuan, Manuk Manka, and many islets;

(6) Sibutu Group, including the main islands of Sibutu, Tumindao (Tomindao), Omapoy (Omapui), Sipangkot, and the islets of Sikulan (Siculan), Saluag, and several others; and

(7) Cagayan Sulu Group, including the main island of Cagayan Sulu and several nearby islets such as Pamelikan, Mandah, and Muligi.

The last-named island group is situated quite apart from the other main groups of islands comprising the Sulu Archipelago, being located between the Jolo Group and Palawan Island, but quite a distance from either, and being surrounded by the Sulu Sea.

A typical islet in the Sulu Archipelago is a raised, perfectly flat coral shelf just above sea level. Very rarely there may be one or two low elevations that could be called hills; these are found frequently near the center. Seen from the air, the islets appear more numerous than shown on maps of the region. Many of the formations that appear as islands and islets are actually still in the process of being built up by the coral polyps and may actually be 1 meter or more below the sea surface. Even during the lowest tides of the year, these numerous islets are never fully exposed above sea level.

Tawitawi Island has a number of high mountains, such as Mt. Sibangkai (533 meters, P.C.G.S. Chart No. 2552). Smith (1924) considered the main mountain mass on Tawitawi as possibly ". . .volcanic but old."

Figure 1: Coast of Sibutu Island, showing irregular terrain.

Figure 2: Tide flat of Tumindao Island, Sibutu Group, showing mangrove swamp and low tide flats.

In Smith's studies (1924) of the geologic features of the Sulu Archipelago, he wrote: "The striking feature about this little archipelago is of course the multitude of islets with innumerable little bays and proportionately great length of coast line. . . .In the Sulu Archipelago volcanism has played a very prominent role and for the most part is of more recent date than that in Mindanao. . . .Jolo Island, as far as I could see, is almost entirely blanketed by volcanic material, either basalt, tuff, or loose ash. . . .On Tawitawi the signs of recent volcanism are not so pronounced, and from what I have seen this island is largely made up of sedimentaries. . . .Tawitawi Mountain may be volcanic but old. . . .Siasi

and Lapac Islands are, as far as known, covered with a mantle of volcanic material weathered to a considerable depth. Bongao Island, at the extreme southwest end of Tawitawi, is made up largely of tilted beds of sandstones and conglomerate." Bongao Peak (300 meters) is at present already cultivated at its base and for about 100 meters up its slope. The top and higher elevations of the peak are still covered with a good growth of remnant forest vegetation, although it is no longer as extensive as the original forest vegetation that covered this area 30 or 40 years ago. Merrill (in Smith, 1924) noted that ". . .the long narrow island of Sibutu is merely a raised coral shelf just above sea level and is perfectly flat except for one hill in the center." Sibutu Hill (137 meters) is still covered with dense forest vegetation, especially close to and at the top.

Smith (1924) briefly summarized the geologic history of the Sulu Archipelago as follows: "A submarine bank, which may represent a mountain or an upthrust fault block, rose out of the sea, with alternate periods of submergence and elevation. Corals grew upon this platform, and at several points volcanic flows and fragmental material, such as tuff, were spread over the country. The period of greatest activity was probably in the Pliocene and Pleistocene. At this time there may have been a continuous land bridge between Mindanao and Borneo by way of the Sulu Islands. Then followed disruption due to subsidences, as indicated by atolls, and the bridge was broken. Volcanic activity in some quarters certainly continued until recently. The weathering of the volcanic formation has produced a heavy, ferruginous deposit not unlike the laterite of India."

There are a few more or less perfect atolls in the Sulu Archipelago, some of them with large lagoons in the center and others with only shallow depressions. Atolls are not common in the Philippines, but a few crater lakes are found on Jolo Island and on Cagayan Sulu.

Jolo is the largest island (624 sq. km.), followed in size by Tawitawi and Sibutu. Some of the other large islands are Siasi, Tapul, Lugus, Lapac, Bongao, Sanga Sanga, and Simunul. The rest of the islands and islets are small.

There is a lack of knowledge about the real distribution of the various forms of animals and plants in the Sulu region. This is especially true concerning the terrestrial vertebrates. The presence of shallow seas among the numerous islands and islets should not normally make it difficult for the natural dispersion of plants and animals. After all, the islands and islets, especially those that belong to a particular island group, are generally close to one another. The fact is, however, that there are quite a few terrestrial vertebrates, including birds, that have a very restricted distribution. It is possible that the restricted distribution

may be the secondary effect of the radically changed ecological conditions on most of the islands. Fifty or more years ago, when most of the islands were still covered with original vegetation and were not yet disturbed by man, these vertebrate forms might have been widely distributed; but, with the changed ecosystems, some of the forms must have become extinct.

Ecologic and Biologic Features

Varying degrees of destruction have been wrought by man on the vegetation of the numerous islands of the Sulu Archipelago. All the larger islands, such as Jolo, Tawitawi, Sibutu, Sanga Sanga, Bongao, and many others, have their original vegetation covers already very much modified from what they must have been originally.

In spite of these varying degrees of destruction, the following original vegetation types can still be identified, especially on the larger islands: mangrove forest; beach forest; dipterocarp forest; modified dipterocarp-molave forest; and scrub forest, which is quite common on the tops and sides of hills and mountains.

Mangrove Forest Type. On the larger islands of the Sulu Archipelago there are still extensive areas of mangrove forests thriving. Generally, these areas are more extensive than on other islands of the Philippines. They occur in the swampy areas off the shores, along the coasts, and well inside the islands where there are freshwater streams of some size coming from the interior and draining into the sea. In many of these

Table 2: Dominant Plant Species Occurring in Mangrove Swamps

Local name	Species	Family
Bakauan-lalaki	*Rhizophora candelaria* DC.	RHIZOPHORACEAE
Bakauan-babae	*R. mucronata* Lam.	"
Tangal, Tungog	*Ceriops tagal* (Perr.)	"
Malatangal	*C. Roxburghiana* Arn.	"
Busain	*Bruguiera conjugata* (Linn.)	"
Langarai	*B. parviflora* (Roxb.)	"
Pototan-lalaki	*B. cylindrica* (Linn.)	"
Pototan	*B. sexangula* (Lour.)	"
Pagatpat	*Sonneratia caseolaris* (Linn.)	SONNERATIACEAE
Pedada	*S. acida* Linn.	"
Api-api	*Avicennia officinalis* Linn.	VERBENACEAE
Nipa	*Nypa fruticans* Würmb.	PALMAE

swamps the mangrove trees have attained much larger sizes than those on most of the other islands in the Philippines. The plant species listed in Table 2 are the dominant forms and occur most frequently in mangrove swamps, especially on the larger islands. Table 3 shows the plant species found in the drier areas of mangrove swamps, frequently in large numbers.

Beach Forest Type. Beach forests thrive close to the coastal areas, beginning with the zone along the shoreline about 5 meters from the highest tide level and extending well into the interior of the islands, but never in elevations of more than about 2 to 3 meters above sea level. In the higher elevations and in places that are moist or even well watered, where the soil is not sandy-rocky, the ecological conditions no longer favor the development of a typical beach forest.

Beach forests are still found extensively along many coastal areas of the Sulu islands, both large and small. On many islands, however, like on most of the islands in other parts of the Philippines, the native inhabitants have totally cleared the original beach forest areas and planted them to coconuts (*Cocos nucifera* Linn.) and other crops.

Table 3: Plant Species Occurring in Drier Areas of Mangrove Swamps

Local name	Species	Family
Tabau	*Lumnitzera littorea* (Jack)	COMBRETACEAE
Dungon-late	*Heritiera littoralis* Dryand.	STERCULIACEAE
Tabigi	*Xylocarpus granatum* Koenig	MELIACEAE
Piagao	*X. moluccensis* (Lam.)	"
Gapas-gapas	*Cumingia philippinensis* Vidal	BOMBACACEAE
Anibong	*Oncosperma tigillaria* (Jack)	PALMAE
Balatbat	*Licuala spinosa* Würmb.	"
Tigbau	*Acanthus ebracteatus* Vahl	ACANTHACEAE
Diliuariu	*A. ilicifolius* Linn.	"
Buta-buta	*Excoecaria agallocha* Linn.	EUPHORBIACEAE
Lagolo	*Acrostichum aureum* Linn.	POLYPODIACEAE
Sapinit	*Caesalpinia nuga* (Linn.)	LEGUMINOSAE
Calumbibit, Balugbog	*C. crista* Linn.	"
Orchid, Manan-aw	*Cymbidium* spp.	ORCHIDACEAE
Orchid, Manan-aw	*Dendrobium* spp.	"
Banghai	*Hydnophytum formicarum* Jack	RUBIACEAE
Banghai	*Myrmecodia echinata* Gaudich.	"

Table 4 lists plant species that occur frequently in the beach forests of the numerous islands. Several plant species that are found in the drier portions of the mangrove swamps also thrive frequently in beach forests.

Dipterocarp Forest Type. On the larger islands, especially Jolo, Tawitawi, and Sibutu, there are still good-sized areas of remnant original dipterocarp forest. These remnant patches are frequently found in the interior regions of these islands and grow on the sides and tops of hills and low mountains. In general, however, the inhabitants have already cleared most of the areas that were originally covered with dense growths of original dipterocarp forests. The largest and most intact areas of dipterocarp forests, many of which have not yet been touched by man, are found in the northern half of Tawitawi Island. Those in the southern half of this island, especially the areas close to the Batu Batu area, have been logged and eventually cleared fully, then planted to various crops, including rice (*Oryza sativa* Linn.), corn (*Zea mays* Linn.), cassava (*Manihot utilissima* Pohl.), and camote or sweet potato (*Ipomoea batatas* Linn.). Other minor crops are also planted in these cleared areas.

Table 4: Plant Species Occurring in Beach Forests

Local name	Species	Family
Botong	*Barringtonia asiatica* (Linn.)	LECYTHIDACEAE
Putat	*B. racemosa* (Linn.)	"
Sapinit	*Caesalpinia nuga* (Linn.)	LEGUMINOSAE
Calumbibit, Balugbog	*C. crista* Linn.	"
Talisai	*Terminalia catappa* Linn.	COMBRETACEAE
Labusei (Sulu)	*Ochrosia littoralis* Merr.	APOCYNACEAE
Katang-katang	*Ipomoea pes-caprae* (Linn.)	CONVOLVULACEAE
Lagunding-dagat	*Vitex trifolia* Linn.	VERBENACEAE
Tiwi	*Dolichandrone spathacea* (Linn.)	BIGNONIACEAE
Balibago	*Hibiscus tiliaceus* Linn.	MALVACEAE
Banago	*Thespesia populnea* (Linn.)	"
Diliuariu	*Acanthus ilicifolius* Linn.	ACANTHACEAE
Pandan	*Pandanus tectorius* Solander	PANDANACEAE
Pandan	*Pandanus* spp.	"
Balatbat	*Licuala spinosa* Würmb.	PALMAE
Tikog	*Fimbristylis ferruginea* (Linn.)	CYPERACEAE
Bitaog, Palo maria de la playa	*Calophyllum inophyllum* Linn.	GUTTIFERAE

The plant species listed in Tables 5a and 5b are frequently found in the remnant patches of original dipterocarp forests on the larger islands. The vegetation follows the three-story type of forest, with the tall dipterocarps forming the dominant forms in the tallest story.

In the interior regions of Sibutu Island there are still a few patches of remnant original dipterocarp forests of varying sizes. None of these patches is really extensive enough to approach closely the state of the original dipterocarp forests that must have covered this island originally. The greater parts of the well vegetated areas on this island are covered with second growth, modified dipterocarp-molave type and

Table 5a: Important Dipterocarp Species Found in the Sulu Archipelago*

Official common name	Local common name	Scientific name
Mindanao Palosapis	Baligan	*Anisoptera mindanensis* Foxw.
Malahagakhak	Balau	*Dipterocarpus affinis* Brandis
Basilan Apitong	Hagakhak	*D. basilanicus* Foxw.
Apitong	Balau, Apitong	*D. grandiflorus* Blanco
Hasselt's Panau	Balau	*D. hasseltii* Blume
Broad-winged Apitong	Balau	*D. speciosus* Brandis
Panau	Montalina	*D. vernicifluus* Blanco
Manggachapui	Oliva, Sagil	*Hopea acuminata* Merrill
Basilan Yakal	Dalindingan, Sagil	*H. basilanica* Foxw.
Magasusu	Ganon, Magususu	*H. mindanensis* Foxw.
Gisok-gisok	Gisok-gisok	*H. philippinensis* Dyer
Almon	Kalingtig, Malakayan	*Shorea almon* Foxw.
Guijo	Kloang, Gisok	*S. guiso* (Blanco)
Kalunti	Kalunti	*S. kalunti* Merrill
Yakal	Yakal	*S. astylosa* Foxw.
Mayapis	Balakbalakan, Malakayan	*S. squamata* (Turcz.)
Red Lauan	Kulian, Tampalasha	*S. negrosensis* Foxw.
Malaanonang	Bahai	*S. polita* Vidal
Tangile	Lauan Colorado	*S. polysperma* (Blanco)
Malayakal	Takpang, Gisoktakpang, Yakal-batu	*S. seminis* (De Vriese)
Tiaong	Malakayan	*S. agsaboensis* Foxw.
White Lauan	Malakayan	*Parashorea plicata* Brandis
Mindanao Lauan	Malakayan-colorado, Malakayan-blanco	*Pentacme mindanensis* Foxw.
Narig	Tampasak, Tapitong	*Vatica manggachapoi* Blanco
Tawi Tawi Narig	Tampasak	*V. papuana* Dyer
Narig	Lutub, Tapasuk	*V. blancoana* Merrill

*Data from the Forest Research Division, Bureau of Forest Development, Republic of the Philippines.

scrub forests. Most of the areas along the coasts and even extending deep into the interior have already been planted to coconuts and other food crops, including cassava, camote or sweet potato, corn, and a little rice, both the lowland wet varieties and the upland types.

In many places on Sibutu the tall first-story species of dipterocarps have already been cut down by the inhabitants and utilized in building their houses and boats.

Inside the small patches of remnant original dipterocarp forests, the soil forming the forest floor is composed mainly of decaying plant and plant products or of humus. These deep humus deposits must have been laid down and formed from thousands of years of decaying forest trees and other vegetable matter. This type of soil at one time formed the forest floor of the various vegetation types, including even the beach forest areas along the coasts and the various original forest types that were found in the deeper parts of the island. Even the forests on the hillsides and hilltops had floors of humus. Presently, the soil that forms the floor of forests on the top and sides of the highest elevation of the island is still mainly humus. In other places, as the original dense forest covers were gradually cut down or thinned out by the settlers, much of the forest floor became exposed and then suffered the erosive actions of water, winds, and other factors that gradually swept it away layer by layer, leaving only coral sand and rocks, of which the island was originally composed. During the last 40 years or so, after the protective for-

Table 5b: Plant Species Occurring in Dipterocarp Forests

Group	Species	Family
Vines:		
Rattan	*Calamus* spp.	PALMAE
Climbing bamboo	*Schizostachyum* spp.	GRAMINEAE
Climbing pandan	*Freycinetia* spp. and *Pandanus* spp.	PANDANACEAE
Amlong	*Pothos* spp.	ARACEAE
Epiphytes:		
Dapo	*Phalaenopsis* spp. and numerous other species with nonshowy flowers	ORCHIDACEAE
Ground coverings:		
Rattan	*Calamus* spp.	PALMAE
Fern	*Dryopteris* spp., *Nephrolepis* spp., *Athyrium* spp., and others	POLYPODIACEAE
Herb	Many species	URTICACEAE

est covers were gradually removed, fissures and cracks of varying dimensions developed extensively in all parts of the island, from the coasts to the interior and from the lowlands to the tops of the highest elevations. At present, every time there is a hard rain on Sibutu Island, the rain water is immediately absorbed by the coral sand, or else it immediately runs into the cracks and fissures and disappears under the ground, leaving the topsoil as dry as it was before the rain. Even inside the well vegetated areas on the island, the ground is extensively crisscrossed with a complex network of cracks and fissures, and the rain does not make the forest floor truly wet. Consequently, fruits and seeds that come from the tall-tree species in a typical dipterocarp forest have a difficult time germinating, not to mention flourishing. Thus, the forest patches do not seem to grow and increase in area at all. The forest soil has already become too sandy and coralline in most places; and, as a result, most of the vegetation on this island consists of scrub forests and second growth. There is only a sparse growth of tall trees that represents remnants of the original tall-tree dipterocarp forest type.

The original dipterocarp forest vegetation on Sibutu Island, as well as the other original types of forest vegetation, will never develop again under the prevailing ecological conditions. Second-growth forests and grasslands will take the place of what used to be original forest growths. In fact, the island can become even more barren if the inhabitants ever decide to cut down the remaining scrub and second-growth forests. Present conditions on the island point toward this possibility.

Modified Dipterocarp-molave Forest Type. On some of the larger islands, including Jolo, Tawitawi, Sanga Sanga, and Bongao, a modified type of original vegetation that combines the characteristics of both the dipterocarp and molave types of forest vegetations is found on the hillsides and lower slopes of mountains, where the soil type is mainly coralline limestone. Many of the dominant tree species are those that belong to the typical molave type of forest vegetation; and the wide distances between trees, characteristic of this particular forest type, is also very apparent. Some dipterocarp species grow sparsely among the molave and other hardwood types of trees and are normally found only in patches of varying sizes. There is, however, no formation of a distinct three-storied or two-storied type of vegetation. The tall dipterocarp species are found frequently as sparse growths interspersed among the much lower molave-type tree species, and this tall-tree growth is frequently found on the more level areas and in the small valleys at the bases of hills and mountains.

At first glance the area appears as if it had been once cleared and is now recovering and developing the succession of vegetation that will

eventually reach a particular climax type. Upon more detailed study, however, one finds that the area is really still untouched and that it is actually covered with mixed growths of plants of the molave and dipterocarp forest types of vegetation, representing the climax types in this particular forest area. This mixed vegetation type must have been found originally on the larger islands of the Sulu Archipelago, such as on Lugus, Siasi, Lapac, and others. At present these islands no longer possess this particular type of original forest.

Table 6 shows the plant species that are found in the patches of modified dipterocarp-molave type of original forest vegetation. Some of the shrubs, herbs and grasses, and other plant species that form the undergrowth are mainly those that are also found in typical dipterocarp and molave forest types.

Scrub Forest Type. In the areas on both the large and small islands that man has not yet cleared for cultivation, dense growths of low hardwood tree species still flourish extensively. The individual trees, on the average, are not large enough for construction purposes and the soil on which they grow is not really fertile enough for growing crops. Consequently, these scrub forests are still intact in many areas. In fact, on the small islands that are just a few meters above sea level, where the soil is predominantly coral sand and rock and is generally coralline, the entire island, from the seacoasts at elevations above the reach of the highest tides deep into the interior, the land is covered with dense growths of this scrub type of forest.

Table 6: Plant Species Occurring in Modified Dipterocarp-molave Forests

Local name	Species	Family
Molave, Molauin	*Vitex parviflora* Juss.	VERBENACEAE
Lagundi group	*Vitex* spp.	"
Alagau	*Premna odorata* Blanco	"
Kamagong	*Diospyros discolor* Willd.	EBENACEAE
Isis	*Ficus ulmifolia* Lam.	MORACEAE
Balete group	*Ficus* spp.	"
Antipolo	*Artocarpus communis* Forst.	"
Apitong group	*Dipterocarpus* spp.	DIPTEROCARPACEAE
Palosapis group	*Anisoptera* spp.	"
Lawan group	*Parashorea* spp.	"
Guijo group	*Shorea* spp.	"
Pili group	*Canarium* spp.	BURSERACEAE
Malaruhat group	*Eugenia* spp.	MYRTACEAE
Dao group	*Dracontomelum* spp.	ANACARDIACEAE

On the islands, especially the larger ones with quite high elevations in the interior, scrub forests also thrive luxuriantly. On the very tops of the mountain peaks on Jolo and Tawitawi, the scrub type of forest merges imperceptibly into what should be the mossy forest type, but this latter type is not in evidence—perhaps because of the small sizes of the islands in the Sulu Archipelago, coupled with the low elevations that most of them have attained and their continued exposure to the brisk, salty winds of the seas around them. Mossy forest types are, however, extensively developed on the ridges and peaks of high mountains on the islands of Luzon, Mindanao, Samar, Negros, and Leyte.

Table 7 lists a few of the dominant species found growing frequently in the scrub type of forest vegetation.

Many species of shrubs and herbs growing among the predominant low-tree species also grow in the surrounding areas that are occupied by second growth, parang, and even grassland.

Other areas on the various islands, especially on the larger ones, are already occupied by vegetation of different types that have replaced the original forest types after man cleared them and left them to grow to one kind of vegetation or another. The following vegetation types may be identified: secondary forest or second growth, parang vegetation, grassland and open-country vegetation, and cultivated areas.

On most of the islands, but especially on the larger ones, the secondary forest or second growth merges imperceptibly with the parang type of vegetation. Moreover, it is difficult to put distinct demarcation lines between the areas with parang type of vegetation and those that are grasslands. In many cases, even the cultivated areas are so neglected that they get mixed with the grassland, parang, or second-growth patches. Only the well-cared-for cultivated areas stand out in contrast with the surrounding countryside.

Secondary Forest or Second-Growth Vegetation Type. The secondary forest or second-growth vegetation type is very common on the larger and well settled islands of the Sulu Archipelago. Large areas are cov-

Table 7: Plant Species Occurring in Scrub Forests

Local name	Species	Family
Alagau	*Premna odorata* Blanco	VERBENACEAE
Lagundi group	*Vitex* spp.	"
Lantana	*Lantana camara* Linn.	"
Isis	*Ficus ulmifolia* Lam.	MORACEAE
Alibangbang	*Bauhinia malabarica* Roxb.	LEGUMINOSAE

ered with this vegetation type on Jolo, the southern half of Tawitawi, Sibutu, Sanga Sanga, Bongao, Siasi, Lugus, Lapac, and many others in the various island groups. A typical secondary forest or second-growth vegetation starts from the seacoasts where the beach forests were cleared sometime in the past, then temporarily cultivated by man for his crops, and eventually abandoned. It then extends into the interior, occupying the lowlands that have not been cultivated recently and continuing up the hillsides to the hilltops. It extends further into the interior and occupies the slopes of mountains. It covers the slopes and occupies even the ridges and tops of the mountains if they are not very high. In places where the inhabitants have made clearings within the secondary forests, patches of cultivated areas planted to corn, cassava, camote, and upland rice may be found. After three to five seasons, these cultivated patches may again be left idle. Eventually, they will be covered with second growth. Meanwhile the slash-and-burn farmers, or kaingeros, proceed to make new clearings in some other sites that have been covered with second growth. There is really no area in any particular locality that will be covered by secondary forests permanently because from time to time the inhabitants in that locality will make clearings inside these forests. All the plants in the area selected for kaingin clearing will be cut down and, when dry enough, will be burned. This cleared area will then be planted with food crops.

The average secondary forest or second growth is not covered with uniform dense growth throughout its entire extent. The trees, which are on the average of medium or low height with sparse growths of tall species, do not grow very close together; many shrubs and bushes grow among them. These lower growths may grow close to one another, and progress through them on foot is rather difficult. However, in other areas of the same secondary forest site, the shrub and bush growths may not be dense at all; thus progress will be easy.

The plant species shown in Table 8 are frequently found growing in secondary forests.

Parang Vegetation Type. This vegetation type is really a mixture of grassland areas and patches of variable dimensions of second-growth vegetation. Large areas on many islands of the Sulu Archipelago, including lowlands, hillsides and hilltops, and mountain sides and summits, are covered with parang vegetation type. Typically, the area is covered with a wide expanse of grasslands, but distributed on this wide expanse of grass are tree growths forming definite islands in a sea of grass. Most of the time the tree growths are composed of second-growth tree, shrub, and bush species. When one is inside such a patch, he is really inside secondary forest surrounded by grassland. If allowed to develop without

Table 8: Plant Species Occurring in Secondary Forests

Local name	Species	Family
Alagau	*Premna odorata* Blanco	VERBENACEAE
Teak	*Tectona grandis* Linn.	"
Lagunding-dagat	*Vitex trifolia* Linn.	"
Lagundi	*V. negundo* Linn.	"
Molauin, Molave	*V. parviflora* Juss.	"
Binonga	*Macaranga tanarius* (Linn.)	EUPHORBIACEAE
Binayoyo	*Antidesma ghaesembilla* Gaert.	"
Kamagong	*Diospyros discolor* Willd.	EBENACEAE
Isis	*Ficus ulmifolia* Lam.	MORACEAE
Balete group	*Ficus* spp.	"
Antipolo	*Artocarpus communis* Forst.	"
Nangka	*A. integra* (Thunb.)	"
Baluno	*Mangifera caesia* Jack	ANACARDIACEAE
Kalumpang	*Sterculia foetida* Linn.	STERCULIACEAE
Katurai	*Sesbania grandiflora* (Linn.)	LEGUMINOSAE
Ipil-ipil	*Leucaena glauca* (Linn.)	"
Alibangbang	*Bauhinia malabarica* Roxb.	"
Pandakaki (Pandacaqui)	*Tabernaemontana pandacaqui* Poir.	APOCYNACEAE
Talong-punai	*Datura metel* Linn.	SOLANACEAE
Konti	*Solanum nigrum* Linn.	"
Pingka-pingkahan	*Oroxylum indicum* (Linn.)	BIGNONIACEAE
Kapanitulot (along streams)	*Justicia gendarussa* Burm.	ACANTHACEAE
Aligango	*Hymenodictyon excelsum* (Roxb.)	RUBIACEAE
Bangkoro	*Morinda citrifolia* Linn.	"
Banghai (epiphyte)	*Myrmecodia echinata* Gaudich.	"
Sambong	*Blumea balsamifera* (Linn.)	COMPOSITAE
Sorghum	*Andropogon sorghum* (Linn.)	GRAMINEAE
Tiguas (Sulu)	*Coix lachryma-jobi* Linn.	"
Pungapung	*Amorphophallus campanulatus* (Roxb.)	ARACEAE
Butuan, Botoan, Butuhan	*Musa errans* (Blanco) Teodoro var. *botoan* Teodoro	MUSACEAE
Saguing, Banana	*Musa sapientum* Linn. (many varieties)	"
Saguing, Banana	*Musa paradisiaca* Linn. (many varieties)	"
Ikmo, Buyu	*Piper betle* Linn.	PIPERACEAE
Bunga	*Areca catechu* Linn.	PALMAE
Pugahan	*Caryota Rumphiana* Mart. var. *philippinensis* Becc.	"
Anibong, Takipan	*Caryota cumingii* Lodd.	"
Balatbat	*Licuala spinosa* Würmb.	"
Pandan group	*Pandanus* spp.	PANDANACEAE

man's intervention, the parang will become real secondary forest by having the tree, shrub, and bush growths gradually but eventually take over the areas once occupied by grass growths.

The same species of trees, shrubs, and bushes that are characteristic of the average secondary forest or second growth are found commonly inside the patches of trees, shrubs, and bushes that are surrounded by grass growths. Grass species commonly found in parang vegetation type are shown in Table 9. Around the edges of the tree, shrub, and bush patches, the species listed in Table 10 may be found growing densely, especially in the areas that are close to marshy parts.

Grasslands and Open-Country Vegetation Type. It is difficult to place distinct demarcation lines between a typical parang vegetation area and a grassland patch. On some of the islands, such as Jolo, Tawitawi (southern half), Siasi, Lapac, Lugus, and many of the larger islands, there are

Table 9: Grass Species Occurring in Parang Vegetation

Local name	Species	Family
Kogon	*Imperata cylindrica* (Linn.)	GRAMINEAE
Kogon	*I. exaltata* Brongn.	"
Bikad-bikad (Sulu), Sambali	*Eleusine indica* (Linn.)	"
Talahib	*Saccharum spontaneum var. indicum* Hack.	"
Anos	*Schizostachyum lima* (Blanco)	"

Table 10: Plant Species Growing Around the Edges of Tree, Shrub, and Bush Patches

Local name	Species	Family
Biga, Badiang	*Alocasia macrorrhiza* (Linn.)	ARACEAE
Palauan	*Cyrtosperma merkusii* (Hassk.)	"
Tangan-tangan	*Ricinus communis* Linn.	EUPHORBIACEAE
Pandan group	*Pandanus* spp.	PANDANACEAE
Saguing, Banana	*Musa sapientum* Linn. (many varieties)	MUSACEAE
Saguing, Banana	*M. paradisiaca* Linn. (many varieties)	"
Butuan, Botoan, Butuhan	*M. errans* (Blanco) Teodoro var. *botoan* Teodoro	"
Abaca	*M. textilis* Neé	"

wide tracts of grasslands and open country occupying the hills and the lower slopes of the higher mountains. In the same general areas there are also tracts of varying sizes that are covered with second growth or with scrub forest vegetation types. One can see, however, that the areas are not typical parang vegetation types. In the real grassland areas there are, at most, only sparse growths of the nongrass species.

Species found in grassland areas, with the grass forms comprising the largest part in any particular site, are shown in Table 11. In grassland areas that include marshy tracts within them, the plant species

Table 11: Plant Species Occurring in Grassland Areas

Local name	Species	Family
Kogon	*Imperata cylindrica* (Linn.)	GRAMINEAE
Kogon	*I. exaltata* Brongn.	"
Talahib	*Saccharum spontaneum* Linn. var. *indicum* Hack.	"
Anos	*Schizostachyum lima* (Blanco)	"
Bikad-bikad (Sulu), Sambali	*Eleusine indica* (Linn.)	"
Batad-batadan	*Andropogon halepensis* (Linn.) var. *propinquus* (Kunth)	"
Tangan-tangan	*Ricinus communis* Linn.	EUPHORBIACEAE
Binayoyo	*Antidesma ghaesembilla* Gaertn.	"
Binonga	*Macaranga tanarius* (Linn.)	"
Tuba-tuba	*Jatropha curcas* Linn.	"
Pandakaki	*Tabernaemontana pandacaqui* Poir.	APOCYNACEAE
Lantana, Kanding-kanding	*Lantana camara* Linn.	VERBENACEAE
Alagau	*Premna odorata* Blanco	"
Kapanitulot	*Justicia gendarussa* Burm.	ACANTHACEAE
Sambong	*Blumea balsamifera* (Linn.)	COMPOSITAE
Ipil-ipil	*Leucaena glauca* (Linn.)	LEGUMINOSAE
Alibangbang	*Bauhinia malabarica* Roxb.	"
Katurai	*Sesbania grandiflora* (Linn.)	"
Aroma	*Acacia farnesiana* (Linn.)	"
Madre-cacao	*Gliricidia sepium* (Jacq.)	"
Dapdap	*Erythrina indica* Lam.	"
Banaba	*Lagerstroemia speciosa* (Linn.)	LYTHRACEAE
Hanagdong	*Trema amboinensis* (Willd.)	ULMACEAE
Bagalnga	*Melia candollei* Juss.	MELIACEAE
Biga, Badiang	*Alocasia macrorrhiza* (Linn.)	ARACEAE
Palauan	*Cyrtosperma merkusii* (Hassk.)	"
Pandan group	*Pandanus* spp.	PANDANACEAE

listed in Table 12 are found growing among the grass species that are characteristic of the ordinary dry-soil grasslands.

Cultivated Areas. Large tracts of what used to be occupied by beach forests, dipterocarp forests, and second growth have been planted to coconut. Thus, coconut areas extend from the seacoasts up to the lower slopes of the mountains on the larger islands. Among these coconut areas the inhabitants have their houses and, in addition, their small gardens planted to vegetables and various fruit trees. There are also wet rice fields, and these are usually found in the lowlands immediately behind the areas that were originally covered with beach forests. On the hillsides and hilltops, and even on the lower slopes of the mountains on the larger islands, there are cleared areas planted to upland rice, cassava, camote, and corn.

Along the edges of the farms good growths of secondary forest species flourish. Table 13 lists species usually found growing as hedges and divisions between clearings and cultivated fields.

Table 12: Plant Species Occurring in Grassland Areas Containing Marshy Tracts

Local name	Species	Family
Bangkal	*Nauclea junghuhnii* (Miq.)	RUBIACEAE
Tambo	*Phragmites vulgaris* (Lam.)	GRAMINEAE
Balatbat, Tikog	*Fimbristylis ferruginea* (Linn.)	CYPERACEAE

Table 13: Species Found Growing as Hedges or Divisions Between Clearings and Cultivated Fields

Local name	Species	Family
Madre-cacao	*Gliricidia sepium* (Jacq.)	LEGUMINOSAE
Dapdap	*Erythrina indica* Lam.	"
Ipil-ipil	*Leucaena glauca* (Linn.)	"
Kamachiles, Kamanchiles	*Pithecolobium dulce* (Roxb.)	"
Hanagdong	*Trema amboinensis* (Willd.)	ULMACEAE
Tuba-tuba	*Jatropha curcas* Linn.	EUPHORBIACEAE
Duhat, Lomboy	*Eugenia cumini* (Linn.)	MYRTACEAE
Datiles, Ratiles	*Muntingia calabura* Linn.	TILIACEAE
Pugahan	*Caryota Rumphiana* Mart. var. *philippinensis* Becc.	PALMAE
Balete group	*Ficus* spp.	MORACEAE
Kapok	*Ceiba pentandra* (Linn.)	BOMBACACEAE

CONCLUSION

Tawitawi Island, especially in the northern half, still possesses the original vegetation types in relatively untouched condition. This island has still the richest terrestrial animal life of all the islands in the Sulu Archipelago, including even the much larger island of Jolo. Jolo has lost the greater area of its original vegetation, and many places have been left as either grasslands or barren wastes.

It is unfortunate that biological explorations and collecting could not have been made more extensively in the northern half of Tawitawi. Roving bands of outlaws who have found sanctuary among the densely forested hills and mountains made such explorations impossible. The southern half of this island has already been logged and cleared for cultivation by a large number of settlers. The original forest types of vegetation are found only in comparatively small patches on the hills and on mountain slopes and summits.

On the whole, the terrestrial vertebrate fauna on most of the forested islands of the Sulu Archipelago is still rich. It is a pity that there had never been thorough and detailed biological explorations and collections of the fauna and flora on most of the islands and islets of the Sulu Archipelago. Whatever collections have been made were carried out only on the larger islands and in very few places by the collectors of European and American scientific expeditions that worked in the Philippines while passing through the islands. Only the Delaware Museum—Mindanao State University Biological Expedition Party has explored and collected thoroughly on the islands of the Sulu Archipelago that are still covered with original forests of one type or other, even if found at present only in remnant patches.

The islands where biological explorations and collections were conducted include Sanga Sanga, Bongao, Simunul, Sibutu, Tumindao, Sipangkot, Omapoy, Saluag, and Tawitawi (southern half). The plan being followed was to work on the islands that were closest to Borneo during the earlier part of the work, and then proceed northeastward toward the main island of Jolo, thus covering most of the main islands in the Sulu Archipelago.

FAMILY **FREGATIDAE** FRIGATEBIRDS

***Fregata minor minor* (Gmelin, 1789) and**
***Fregata ariel ariel* (G. R. Gray, 1845)**

LOCALITY RECORDS: Sanga Sanga (1 ♀; Oct. 4), Simunul (Oct. 16).

COMMENT: Man-o'-War Birds, or Frigatebirds, of these two species were commonly seen in flight as they fed over the seas among the islands of Sanga Sanga, Simunul, and Tawitawi. On the average there were always fewer *F. minor* than the smaller species, *F. ariel.*

The numbers of these birds always seemed to increase on the dates that (and even a few days after) typhoons were reported over the more northern Philippine islands. Strong winds of northeast monsoons caused a similar increase.

Examinations of the stomachs of six birds revealed from three to six flying fishes inside them.

One *F. ariel* was taken along the coast of Sanga Sanga on October 4, 1971, when typhoon "Barang" was over the region from Mindanao to Samar and Leyte. This bird bore band number 777-56927 of the Fish and Wildlife Service, Washington, D.C. It had been banded as a nestling on Howland Island, 15 October 1966, by the USNM.

Not previously recorded from the Sulu Archipelago.

LOCAL NAME: Ling-gisan (Tao Sug and Samal).

FAMILY **ARDEIDAE** HERONS

***Butorides striatus javensis* (Horsfield, 1821)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul.

COMMENT: The Little Mangrove Heron was common on the larger islands of the Sulu Archipelago, especially in the mangrove areas along the seashores and in the marshy and swampy parts. During low tide several birds of this species could frequently be seen actively feeding on small animals on the exposed muddy or sandy bottoms of the sea close to the coast. It was observed many times flying across the narrow channel between the islands of Bongao and Sanga Sanga. Interisland flights of this and other heron species must be commonplace in this region, with its numerous islands separated from one another only by narrow seas.

***Bubulcus ibis coromandus* (Boddaert, 1783)**

LOCALITY RECORD: Sanga Sanga (1 ♂; Oct. 1).

COMMENT: On the larger islands of the Sulu Archipelago flocks of about six to a dozen Cattle Egrets were frequently observed actively flying or feeding in the marshy and swampy open areas.

LOCAL NAMES: Bug-gak (Tao Sug) and Kal-lô (Samal).

***Egretta sacra sacra* (Gmelin, 1789)**

Locality records: Sibutu (1♂, 1♀; Oct. 29, Nov. 15; gray phase), Sibutu (1♂; Nov. 17; white phase), Simunul (1♂, 1♀; Oct. 16 and 17; gray phase).

Comment: Birds of both the gray and white phases were observed commonly feeding on the exposed rocky tide flats around many of the numerous islands of the Sulu Archipelago. They occurred singly or at most in pairs, feeding on the small animals found among the rocks and on the exposed sea bottoms.

Local name: Kal-lô (Sibutu Samal), especially referring to birds in the white phase.

***Ardea sumatrana sumatrana* Raffles, 1822**

Locality record: Omapoy (1♀; Nov. 20).

Comment: The Giant Heron was observed singly on the exposed tide flats on the shores of several Sulu islands, including Sibutu and the small islands around it (Omapoy, Saluag, Sipangkot, and Tumindao). It was difficult to approach because during low tide it always stayed on the exposed tide flats off stretches of coasts that were densely covered with mangrove forests.

Not previously recorded from the south Sulu Archipelago.

***Nycticorax caledonicus manillensis* Vigors, 1831**

Locality records: Omapoy, Saluag, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Batu Batu).

Comment: The Rufous Night Heron was frequently disturbed from its daytime roosts in tall trees having thick foliage and growing in dense forest patches or heavily forested areas. Very often birds roosted singly, but once in a while several birds (six to eight) roosted together. The same phenomenon had been observed several times in a number of localities on Mindanao and the Negros islands.

Not previously recorded from the south Sulu Archipelago.

FAMILY ANATIDAE DUCKS

***Dendrocygna arcuata arcuata* (Horsfield, 1824)**

Locality record: Sanga Sanga (2♀; Nov. 8 and 12).

Comment: The Wandering Whistling Duck was frequently observed in flight over the marshy and swampy areas on the islands of Sanga Sanga, Sibutu, and Tawitawi. They occurred in pairs or in small flocks of about five to eight members. Several birds were often seen actively feeding and swimming in the lagoons found in the extensive marshes and swamps of Sanga Sanga and Tawitawi.

Not previously recorded from the south Sulu Archipelago.

Aythya fuligula (Linné, 1758)

Locality record: Sanga Sanga (1 ♀; Nov. 4).

Comment: Not previously recorded from the southern Philippines. Several migrant ducks that could not be easily distinguished from the resident species were observed occasionally feeding singly in the lagoons and marshes. Only one was collected.

FAMILY ACCIPITRIDAE HAWKS AND EAGLES

Pernis celebensis steerei Sclater, 1919

Locality record: Tawitawi (Batu Batu; 1 ♀; Dec. 9).

Comment: The Barred Honey Buzzard was rare in the localities collected in, with the single specimen taken among the branches of a tall tree in remnant dipterocarp forest among the hills. The bird was most difficult to discern in the dense foliage.

Elanus caeruleus hypoleucus Gould, 1859

Locality record: Sanga Sanga (1 ♂; Dec. 25).

Comment: The Black-winged Kite was seen just once—in open country where patches of forest vegetation of various sizes were interspersed with cleared areas and isolated tall trees. When first sighted, the bird was perching on one of the top branches of a moderately tall tree that stood alone in an otherwise open area grown to tall grass.

Haliastus indus intermedius Blyth, 1865

Locality records: Sanga Sanga (Dec. 25), Sibutu, Simunul.

Comment: The Brahminy Kite was commonly seen on all the larger islands and on many of the smaller ones in the southern region of the Sulu Archipelago. Sometimes two, or even three, individuals could be seen at the same time fishing over the narrow channel between Sanga Sanga and Bongao. The species definitely preferred to feed on fish in the areas worked in.

Occasionally a bird could be observed soaring at moderate height over the open country, both cultivated and grassland, where there were still some small patches of forest vegetation and trees. These kites would perch on the higher bare branches at the top of one of the taller trees, often staying on a perch for quite some time. A pair was in the habit of perching on a bare branch close to the top of a tall tree that grew on the lower parts of the almost vertical peak (2100 feet) on the northern end of Bongao.

Local names: Sam'bula-an' (Tao Sug) and Bel-lê (Sibutu Samal).

Haliaeetus leucogaster **(Gmelin, 1788)**

LOCALITY RECORDS: Sibutu, Tawitawi (Batu Batu).

COMMENT: The White-breasted Sea Eagle was frequently seen in flight over open country and along the coastal areas of Bongao, Sanga Sanga, Sibutu, and Tawitawi, as well as over the seas around these islands.

Spilornis holospilus **(Vigors, 1830)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Serpent Eagle was seen fairly frequently in soaring flight on the larger islands; its characteristic notes could not be mistaken for those of any other bird of prey. Occasionally it was also seen perching on some tall, dead tree trunk or on a bare branch at the top of a tall tree in cleared or open country. More often than not, the bird would be feeding on a snake that it had clasped in its claws and was gradually cutting to pieces for swallowing.

Accipiter gularis **(Temminck and Schlegel, 1845)**

LOCALITY RECORDS: Sanga Sanga, Sibutu.

COMMENT: The Asiatic Sparrow Hawk was occasionally encountered on Sanga Sanga, Sibutu, and Tawitawi. Its shy habits made it difficult to see in the foliage of the tree where it perched.

The present specimens were collected either inside the well forested areas or in the heavily foliaged trees of moderate height inside the dense patches of forest vegetation in otherwise open country.

Accipiter soloensis **(Horsfield, 1821)**

LOCALITY RECORDS: Bongao (Oct. 19 and 25), Sanga Sanga (Oct. 7, Nov. 27), Sibutu (Nov. 1), Tawitawi (Batu Batu; Dec. 9).

COMMENT: The Gray Frog Hawk or Chinese Hawk is fairly common on the larger southern Sulu islands, including Bongao, Sanga Sanga, Sibutu, and Tawitawi.

The birds were frequently encountered in open country with good-sized patches of forests. The birds preferred to stay in the upper branches of tall trees inside these patches or among the foliage of tall trees that grew sparsely in otherwise already open country.

This winter migrant is rather rare on the more northern islands of the Philippines. Not previously recorded from the south Sulu Archipelago.

Butastur indicus **(Gmelin, 1788)**

LOCALITY RECORDS: Sibutu (Nov. 13 and 15), Tawitawi (Batu Batu).

COMMENT: The Gray-faced Buzzard was seen occasionally as it flew from tree to tree in open country, frequently perching on the higher branches of the taller trees left standing in the area. Several birds were seen perching on the fronds of the tall coconut palms around the edges of the cultivated fields.

FAMILY **MEGAPODIIDAE** MEGAPODES

***Megapodius freycinet pusillus* Tweeddale, 1877**

LOCALITY RECORDS: Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The inhabitants of the area, especially the larger southern Sulu islands, were familiar with this megapode and told the collectors about its habits. They reported digging the large eggs from inside the mounds of earth that are found on the forest floor, both inside the large tracts of virgin forests and in the remnant patches of forest vegetation.

Several adult birds were encountered by the collectors near the seashores, well into the interior, and even on the slopes of some of the hills and low mountain peaks, such as on Sibutu and Tawitawi. More often than not, the birds disappeared rapidly into the dense growth, mainly by running into the undergrowth but sometimes by flying low among the trees.

LOCAL NAME: Tambon (Samal).

FAMILY **PHASIANIDAE** PHEASANTS

***Coturnix chinensis lineata* (Scopoli, 1786)**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Painted Quail was not as common in the open grasslands and cultivated areas on the various islands as it was in similar habitat on the more northern islands of the Philippines.

FAMILY **RALLIDAE** RAILS

***Rallina eurizonoides eurizonoides* (Lafresnaye, 1845)**

LOCALITY RECORD: Sanga Sanga.

COMMENT: The few specimens of the Philippine Banded Crake were all taken on the forest floor inside the dense patches of remnant original forest vegetation.

***Poliolimnas cinereus ocularis* Sharpe, 1894**

LOCALITY RECORD: Sanga Sanga.

COMMENT: The White-browed Rail was commonly seen walking and feeding among the grass and weeds growing along the edges of the la-

goons, in the marshy and swampy areas, and even on the muddy floor of the mangrove forests on the larger islands, including Bongao, Sanga Sanga, Sibutu, Simunul, and Tawitawi.

***Amaurornis phoenicurus javanicus* (Horsfield 1821)**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The White-breasted Swamphen was very common on the larger Sulu islands and could often be seen walking unhurriedly on the ground in well cultivated areas, second growth forest patches, and grasslands. It was often seen sedately crossing well used roads in the barrios, and it could always be found in the marshy and swampy areas, as well as on the beaches in the immediate vicinity of mangrove swamps and mangrove forest patches.

The bird's loud notes were frequently heard, especially during the early morning and late afternoon.

LOCAL NAME: Sai-ko-kwak (Tao Sug and Samal).

***Fulica atra atra* Linné, 1758**

LOCALITY RECORD: Sanga Sanga (1 ♀; Dec. 7).

COMMENT: To date, the Black Coot has been recorded in the Philippines only twice—once from Luzon and once from Negros. It has not been previously recorded from the south Sulu Archipelago. Our collectors encountered it only once: in a large marsh close to the seashore on the island of Sanga Sanga.

FAMILY **CHARADRIIDAE** PLOVERS

***Pluvialis squatarola* (Linné, 1758)**

LOCALITY RECORDS: Saluag (1 ♀; Nov. 23), Simunul (2 ♀; Oct. 20).

COMMENT: During low tides, when wide areas of the tidal flats were exposed around the large and small islands in the southern part of the Sulu Archipelago, hundreds of winter migrant shore birds belonging to many species were frequently seen feeding actively on the exposed muddy and sandy sea bottoms. The Black-bellied Plover or Gray Plover was often observed in these places, usually in flocks of four to six members. More rarely it was seen singly or in pairs. The exposed tide flats around some localities of Saluag, Sikulan, and Simunul were favorite areas where thousands of winter migrants regularly fed. As the tide came in, flocks with 50 or more birds in each gradually dispersed and flew to other parts of the same island or to other islands.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAMES: Paeng-peng (Tao Sug) and Pem-peng (Samal).

***Pluvialis dominica fulva* (Gmelin, 1789)**

Locality records: Bongao (3♂, 3♀; Oct. 13-19), Sanga Sanga (3♂, 3♀; Oct. 2-26), Sibutu (1♂, 2♀; Nov. 5-13), Simunul (1♂, 1♀; Oct. 16-19).

Comment: The Pacific Golden Plover was frequently seen in flocks of about 12 to 50 or even more. The birds were very active, flying about from site to site over the broad, exposed tide flats during low tides. Flocks of this species were also met with along the seashores, in the open marshy and swampy areas, and even in newly plowed fields quite far from the coasts.

***Charadrius dubius curonicus* Gmelin, 1789**

Locality record: Sibutu (1♀; Nov. 3).

Comment: The Ring-necked Plover was not as abundant as the larger species of plovers on the islands in the southern regions of the Sulu islands. One or two birds were occasionally observed feeding on the sand or gravel tide flats where other shore birds were also feeding.

Not previously recorded from the south Sulu Archipelago.

***Charadrius alexandrinus dealbatus* (Swinhoe, 1870)**

Locality records: Saluag (1♂; Nov. 6), Sibutu (1♀; Nov. 3).

Comment: The Kentish Plover, like *C. dubius curonicus,* was rarely seen in the localities where large numbers of other winter migrant shore birds were regularly seen. One or two birds of this species were occasionally seen on the sand and gravel beaches around the islands of Saluag, Sanga Sanga, Sibutu, and Simunul, especially during high tides.

Not previously recorded from the south Sulu Archipelago.

***Charadrius leschenaultii* Lesson, 1826**

Locality records: Bongao (2♀; Nov. 13 and 19), Saluag (2♂; Nov. 23), Sibutu (3♀; Nov. 1, 3, and 12), Simunul (2♀; Oct. 16 and 17).

Comment: The Large Sand Plover was very common on the exposed tide flats around many islands and was seen feeding among large numbers of winter migrant shore birds of other species. These plovers usually flew about in large flocks of about 12 to 24 members.

Not previously recorded from the south Sulu Archipelago.

***Charadrius veredus* Gould, 1848**

Locality record: Sibutu (1♂; Nov. 13).

Comment: The Oriental Dotterel was seen only a few times on the exposed tide flats in parts of Sibutu and the nearby small islands of Saluag and Sikulan. It was difficult to approach and was frequently met

with singly among the usually large numbers of shore birds of many species.

Not previously recorded from the south Sulu Archipelago.

FAMILY **SCOLOPACIDAE** SANDPIPERS

***Numenius phaeopus variegatus* (Scopoli, 1786)**

LOCALITY RECORDS: Bongao (1♂; Oct. 12), Saluag (4♂, 6♀; Nov. 23), Sanga Sanga (2♀; Oct. 2 and 7), Sibutu (2♂, 2♀; Nov. 3, 5, 7, and 13), Simunul (1♂, 2♀; Oct. 19 and 29), Sipangkot (1♂; Nov. 21).

COMMENT: The Whimbrel occurred in areas of exposed shores at low tide in flocks of about seven to 12 or more. It preferred the edges of the receding waters and frequently waded into the shallow water to feed. The flight of a flock was often accompanied by the loud calls of the members as they moved from one feeding site to another. Large numbers of Whimbrels often gathered in muddy exposed areas of the marshes, preferring those not very far from the coast. When disturbed, a solitary individual habitually took flight, soon followed by a number of nearby birds; these formed a flock that would often leave the feeding area and alight somewhere else, leaving other birds of the same species to continue their feeding activities.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Ko-hek (Samal).

***Numenius arquata orientalis* C. L. Brehm, 1831**

LOCALITY RECORD: Saluag (1♀; Nov. 23).

COMMENT: The Common Curlew was rarely seen on the islands visited. Solitary individuals were occasionally observed feeding on the exposed tide flats and in shallow waters at sites frequently far from the shores and without vegetation or cover of any sort nearby. The bird was difficult to approach, and it often stayed apart from the rest of the birds feeding in the same area.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Ko-hek (Samal).

***Numenius madagascariensis* (Linné, 1766)**

LOCALITY RECORD: Saluag (1♀; Nov. 23).

COMMENT: The Long-billed Curlew, like *N. arquata*, was rare in the islands visited, being seen only in the open tide flats of Saluag Island, far out in the open area near the sea.

The bird was actively wading in the shallow waters, running with its neck outstretched and its bill pointing downward after some prey in the water.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Ko-hek (Samal).

***Limosa lapponica baueri* Naumann, 1836**

LOCALITY RECORDS: Saluag (2♂, 1♀, Nov. 23), Simunul (1♀; Oct. 17).

COMMENT: The Bar-tailed Godwit was often observed feeding on the exposed tide flats, either in pairs or in small flocks of up to seven or eight birds, especially around the tiny islands of Saluag and Sikulan. Occasionally the species was met with in the marshes of Sanga Sanga and on the exposed seashores of Sibutu and Simunul.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Paempeng (Sibutu Samal).

***Tringa totanus eurhina* (Oberholser, 1900)**

LOCALITY RECORDS: Saluag (7♂; Nov. 6 and 23), Sibutu (1♂, 2♀; Nov. 5, 11, and 13), Simunul (2♂, 4♀; Oct. 16, 17, and 20).

COMMENT: The Redshank was common on the exposed tide flats and beaches of most of the islands, especially on Saluag, Sibutu, Simunul, and other tiny islets near Sibutu Island. This form was easily one of the most common winter migrant shore-bird species on the various islands of southern Sulu at the time.

Not previously recorded from the south Sulu Archipelago.

***Tringa nebularia* (Gunnerus, 1767)**

LOCALITY RECORD: Sibutu (1♂, 1♀; Nov. 9).

COMMENT: The Greenshank was rare among the large numbers of winter migrant shore birds that were feeding on the beaches and on the exposed tide flats of the various islands.

Not previously recorded from the south Sulu Archipelago.

***Tringa ochrophus* Linné, 1758**

LOCALITY RECORD: Sanga Sanga (1♂; Nov. 29).

COMMENT: The Green Sandpiper was rare: the single collected specimen was the only bird of this type encountered.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Ko-hek (Samal). All the medium-sized shore birds of the size of *T. ochrophus* were called "Ko-hek" by the Samals.

***Tringa glareola* Linné, 1758**

LOCALITY RECORD: Sanga Sanga (3♂, 2♀; Oct. 8).

COMMENT: This sandpiper was commonly encountered in the marshes and along the beaches, especially in the immediate vicinity of mangrove forests. Most of the time it went about singly among the other winter migrant shore birds.

Not previously recorded from the south Sulu Archipelago.

***Tringa hypoleucos* Linné, 1758**

LOCALITY RECORDS: Bongao (5♂, 5♀; Oct. 9, 10, 13, and 19), Sanga Sanga (3♂, 3♀; Oct. 2, 6, 22, and 25), Sibutu (4♂, 1♀; Oct. 29, Nov. 11 and 12), Simunul (1♂, 1♀; Oct. 17).

COMMENT: The Common Sandpiper was very common along beaches on all the larger islands, where it occurred singly. It was found in the marshy and swampy areas, along the banks of shallow freshwater streams quite far from the coast, on the exposed sandy patches close to the flowing water, in rivers, and even inside the dense forest stands along the shallow creeks.

Not previously recorded from the south Sulu Archipelago.

LOCAL NAME: Paemping (Sibutu Samal).

***Arenaria interpes interpes* (Linné, 1758)**

LOCALITY RECORDS: Saluag (1♂; Nov. 23), Simunul (1♂, 2♀; Oct. 18 and 19).

COMMENT: The Turnstone was frequently met with feeding on the beaches, on exposed tide flats, and in the marshes. It occurred in groups of seven to about one dozen members.

***Limnodromus semipalmatus* (Blyth, 1848)**

LOCALITY RECORD: Simunul (2♀; Oct. 17 and 20).

COMMENT: Two specimens of the Oriental Dowitcher were collected at low tide as they fed among the large numbers of winter migrant shore birds on the wide, exposed tide flats in one locality of Simunul Island. No other specimen was seen, but it is possible that this rare winter migrant shore bird also occurred along the numerous widely exposed tide flats in several localities of Bongao, Sanga Sanga, Sibutu, and the tiny islands around Sibutu.

***Calidris alba* (Pallas, 1764)**

LOCALITY RECORD: Saluag (1♂, 1♀; Nov. 6 and 23).

COMMENT: The Sanderling was rare among the large numbers of winter migrant shore birds.

Not previously recorded from the south Sulu Archipelago.

***Calidris ferruginea* (Pontoppidan, 1763)**

LOCALITY RECORD: Simunul (2♂, 1♀; Oct. 10 and 12).

COMMENT: The Curlew Sandpiper was occasionally seen feeding on the exposed tide flats during low tide. It was mixed with many species of winter migrant shore birds and was rather difficult to detect from so many other more common species, inasmuch as only one or two were seen at any one time.

Not previously recorded from the south Sulu Archipelago.

FAMILY **GLAREOLIDAE** PRATINCOLES

***Glareola maldivarum* Forster, 1795**

LOCALITY RECORD: Sanga Sanga (1 ♀; Nov. 27).

COMMENT: The Pratincole was met only once—along the coast of Sanga Sanga.

Not previously recorded from the south Sulu Archipelago.

FAMILY **LARIDAE** GULLS AND TERNS

***Chlidonias leucoptera* (Temminck, 1815)**

LOCALITY RECORD: Simunul (1 ♀; Oct. 17).

COMMENT: The White-winged Black Tern was not rare in the localities visited, inasmuch as several were often observed feeding with the large numbers of other terns on the schools of fish in the shallow seas around the islands of Bongao, Sanga Sanga, and Simunul.

Not previously recorded from the south Sulu Archipelago.

***Gelochelidon nilotica nilotica* (Gmelin, 1789)**

LOCALITY RECORD: Simunul (1 ♂, 3 ♀, 1?; Oct. 17 and 18).

COMMENT: Many Gull-billed Terns were regularly observed feeding over the exposed tide flats and shallow seas around Simunul. Several birds of this species were seen pouncing on the schools of fish that were common in the seas off Simunul. During low tides many terns belonging to this form could be seen perching on the exposed rocks and stranded tree trunks left by the receding tide.

Not previously recorded from the south Sulu Archipelago.

***Sterna anaethetus anaethetus* Scopoli, 1786**

LOCALITY RECORD: Sanga Sanga (1 ♂; Nov. 4).

COMMENT: The Brown-winged Tern was uncommon, being occasionally encountered mixed with larger numbers of *S. bergii cristata* flying low over the shallow seas between the islands of Sanga Sanga and Bongao and between Bongao and Simunul.

Not previously recorded from the south Sulu Archipelago.

***Sterna bergii cristata* Stephens, 1826**

LOCALITY RECORDS: Bongao (Oct. 14 and 24), Saluag (Nov. 6), Simunul (Oct. 17 and 18).

COMMENT: The Crested Tern was very common around the numerous islands of the southern Sulu Archipelago. It was easily the largest and most abundant of all the tern species in the entire sea and was often seen wheeling and flying in large numbers over parts of the seas between the islands. It pursued the schools of fish that were abundant in these areas.

FAMILY COLUMBIDAE PIGEONS AND DOVES

***Treron pompadora everetti* (Rothschild, 1894)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

COMMENT: The Sulu Pompadour Green Pigeon was fairly common on islands where there were still good patches of tree growth, either of remnant original vegetation or second growth. This form was often seen feeding on the fruits of tall trees growing at the edges of clearings in the interior. The birds went about in pairs or in small flocks of up to a dozen members. They usually flew in and out of the trees on which they were feeding, moving from one part to another in the same tree.

LOCAL NAME: Kangô (Tao Sug and Samal).

***Treron vernans vernans* (Linné, 1771)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Pink-necked Green Pigeon was common to the larger islands of the southern Sulu Archipelago. It was encountered even much more frequently than *T. pompadora everetti* and, in fact, was found more often than *T. pompadora everetti* among both the tall trees in remnant patches of tall-tree forest and in the low trees of scrub forest and second-growth vegetation, expecially those found growing at the edges of cultivations, from the coastal areas and into the interior. Occasionally a pair or a flock of these pigeons was seen in mangrove forests.

LOCAL NAME: Kangô (Tao Sug and Samal).

***Ptilinopus melanospila bangueyensis* (A. B. Meyer, 1891)**

LOCALITY RECORDS: Bongao, Omapoy, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Black-winged Fruit Dove was very common in pairs

among trees both in the extensive forest stands and inside the remnant patches of forest from along the seacoast and deep into the interior, including the hills.

LOCAL NAMES: Kumof (Samal) and Manatad (Tao Sug).

***Ducula aenea aenea* (Linné, 1766)**

LOCALITY RECORDS: Bongao, Sibutu.

COMMENT: The Green Imperial Pigeon was observed on only the larger islands with good areas of dipterocarp forest or a modified dipterocarp forest type of vegetation. Unfortunately no specimens were taken on Tawitawi, although several small flocks of large pigeons, most likely of this form, were observed but never approached closely enough for collecting.

LOCAL NAME: Balud (Sibutu Samal and Visayan).

***Ducula pickeringii pickeringii* (Cassin, 1854)**

LOCALITY RECORD: Sipangkot.

COMMENT: The Gray Imperial Pigeon was rare: the single specimen taken was one of a pair and was feeding among the branches of a tall tree, one of several in a patch of remnant original dipterocarp forest on a small island still covered with good areas of this vegetation type. It was difficult to differentiate the behavior of the present form from that of the more common *D. aenea aenea.*

LOCAL NAME: Balud (Sibutu Samal).

***Ducula poliocephala nobilis* (Hachisuka, 1931)**

LOCALITY RECORD: Tawitawi (Batu Batu).

COMMENT: The Pink-bellied Imperial Pigeon was more often heard than seen, but it was not rare in the southern half of Tawitawi Island, especially in the localities where extensive dipterocarp forests were still found. It was a most difficult bird to locate, even if it called loudly among the dense foliage of the tall fruiting trees that it frequented.

LOCAL NAME: Balud (Tao Sug and Visayan).

***Ducula bicolor* (Scopoli, 1786)**

LOCALITY RECORDS: Sanga Sanga, Sibutu, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Nutmeg Imperial Pigeon was commonly observed feeding on both the tall and the low fruiting trees and flying about in flocks of a dozen or more members. This pigeon was widely distributed on the various islands, from the seacoast, into the interior, and up on the lower slopes of the mountains. The flocks, however, were more often

encountered in the lower elevations. The species was common on both the large and the small islands in the southern Sulu Archipelago.

Frequently, large flocks fed in separate regions of the larger islands and on some smaller islands. Several such flocks habitually came together late in the afternoon and stayed on small islands or islets, which usually consisted of low growths and some few trees of medium height. The pigeons, sometimes numbering 100 or more, usually roosted on a few selected trees, each tree sometimes having as many as five dozen or more birds. The birds perched on the branches close to one another, and in the resulting activities if one got disturbed and was dislodged from a branch, the others closed in immediately and the displaced bird had to look for another place.

Sometimes a few *Caloenas nicobarica* roosted among the greater numbers of *D. bicolor*. Before full daylight arrived, both pigeon species usually began to leave the roosting trees for feeding areas on the various larger islands.

LOCAL NAMES: Pifi-an (Samal) and Camasu (Visayan).

***Columba vitiensis griseogularis* (Walden and Layard, 1872)**

LOCALITY RECORDS: Sibutu, Tawitawi (Batu Batu).

COMMENT: The Metallic Wood Pigeon was not rare on Sibutu and Tawitawi, but only on rare occasions were foraging flocks of five to a dozen birds actually seen in flight; these occurred on feeding excursions over the dense dipterocarp forest stands on these islands. This pigeon was, however, disturbed rather frequently from feeding trees, especially on the island of Sibutu and particularly in the more interior regions at medium elevations on the hillsides.

LOCAL NAMES: Balud Itum (Visayan) and Balud (Sibutu Samal).

***Macropygia phasianella tenuirostris* Bonaparte, 1854**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Slender-billed Cuckoo Dove was fairly common on the larger islands in the southern region of the Sulu Archipelago, especially among the patches of forest, both original and second growth, which were in the immediate vicinity of cultivated areas and other clearings. The birds usually went about in pairs and were frequently observed feeding on the fruits of both the low and high tree species.

LOCAL NAME: Tuba-on (Visayan).

***Streptopelia bitorquata dusumieri* (Temminck, 1823)**

LOCALITY RECORDS: Omapoy, Sanga Sanga, Sibutu, Sikulan, Simunul.

COMMENT: The Philippine Turtle Dove was rather common and well spread among the islands, both large and small. Its mournful call, "Tuk-m-m-m, Tuk-m-m-m," habitually repeated several times, was often heard coming from clearings and cultivated areas, from the coastal regions and well into the interior, and even among the hills.

These birds were often seen on the ground, especially among upland rice and other plants in the cultivated areas and clearings. When disturbed, they would fly to the nearest tree along the edges and stay there for some time before leaving the site.

***Streptopelia chinensis tigrina* (Temminck, 1810)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Tigrine Dove, or Spotted Dove, was more common and widespread among the islands of the Sulu Archipelago than *S. bitorquata dusumieri*. In fact, at present, *S. chinensis tigrina* has definitely become more widespread and more common in many Philippine localities, including the islands of Cebu, Mindanao, Negros, and Siquijor, where about 25 to 30 years ago it was rare and just beginning to establish itself. *S. chinensis tigrina* was originally found in the Philippines only on Palawan and on some Sulu islands (about 50 years ago). It has now replaced *S. bitorquata dusumieri* in most localities and habitat types on these islands. Where formerly *S. bitorquata dusumieri* used to be met with very commonly along the rural roads of those northern islands, *S. chinensis tigrina* is presently the more familiar sight.

In the bird banding project of the Migratory Animal Pathological Survey, sponsored originally by the U. S. Army Institute of Pathology and later by the U. S. Army Research and Development Group (Far East), the Central and Southern Philippine Bird Banding Team succeeded in recovering in southern Cebu two *S. chinensis tigrina* that were originally banded in southern Negros. These doves definitely move about widely on the islands and then fly across to close neighboring islands, especially when these islands are separated only by narrow seas. Such conditions exist between the islands of Negros and Cebu; between Negros and Siquijor; among the numerous Sulu islands; and among the northernmost Sulu islands, the island of Basilan, and the mainland of Mindanao in the southern region of the Philippines. These conditions also exist among the islands of the Dinagat and Siargao groups and the mainland of Mindanao on the Pacific Ocean side of the southern region.

It is not to be unexpected if *S. chinensis tigrina* eventually replaces *S. bitorquata dusumieri* in all the localities and habitat types on numerous islands of the Philippines.

***Chalcophaps indica indica* (Linné, 1758)**

Locality records: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

Comment: The Green-winged Ground Dove, although rarely seen, was fairly common on the various islands of the Sulu Archipelago, especially on those with good vegetation of various types, even if found only in patches. It frequents the ground (especially the forest floor) and the dense patches of vegetation, preferably along the sides of small, shallow creeks or even on their exposed bottoms during the dry season. It was found from near the coasts into the interior among the hills and low mountains. These doves were feeding on the fruits of the various shrubs and bushes of the undergrowth. On other Philippine islands, the birds habitually stay singly at a given feeding site, except during the breeding season from March to June when they form pairs.

Local name: Manatad (Samal and Visayan).

***Caloenas nicobarica nicobarica* (Linné, 1758)**

Locality records: Sanga Sanga, Tawitawi (Batu Batu).

Comment: The Nicobar Pigeon was not very rare on the islands of the Sulu Archipelago, especially on the larger ones, but the bird was most difficult to find, even if the trees were not really large. It occurred singly while feeding and often stayed on the forest floor, especially among the trees that grew in dense patches of original vegetation. On the forest floor it was very difficult to locate, even if one saw the exact site where it alighted. It was more often accidentally flushed from the forest floor, rather than intentionally located.

Local name: Dondonai (Visayan).

FAMILY PSITTACIDAE PARROTS

***Kakatoe haematuropygia* (P. L. S. Müller, 1776)**

Locality records: Sanga Sanga, Simunul, Tawitawi (Batu Batu).

Comment: The Philippine Cockatoo was fairly common on the islands of the Sulu Archipelago, especially where there were still good patches of original vegetation. This species frequently flew about in flocks of six to a dozen members. The white plumage of the flock contrasted distinctly with the green of the countryside, so it was always easy to trace the whereabouts of a particular flock. The members of a flock also characteristically kept on giving out their loud, harsh and croaking notes, making it easy to locate the birds even while they foraged in dense vegetation. The flocks were observed feeding on low fruiting trees that grew in otherwise cleared and cultivated areas.

Local name: Abucay (Visayan).

***Kakatoe moluccensis* (Gmelin, 1788)**

LOCALITY RECORD: Sibutu (1♀; Nov. 3).

COMMENT: The specimen matches specimens in the American Museum of Natural History from the Moluccas. This species should not be considered as a part of the Sulu avifauna.

The inhabitants of Sibutu Island, especially in the immediate localities of the barrio of Tandu' Banak, told us about a large cockatoo that they had seen flying among the dense vegetation in the interior. The local barrio captain later told us that in 1968 a large foreign boat, the *M/V Karina*, loaded with logs from Borneo, became stranded in shallow seas southeast of Sibutu Island. There were a number of birds of various species in this boat that were later released from their cages. For some time after the release of the birds, people reported that quite a few strange-looking birds never before seen on Sibutu Island were to be found in the interior regions. Perhaps the most distinct and interesting was this large cockatoo, which was collected by a member of the expedition.

***Prioniturus montanus verticalis* Sharpe, 1893**

LOCALITY RECORDS: Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Sulu Crimson-spotted Racket-tailed Parrot was occasionally observed in pairs in high, fast flight over the densely vegetated areas of the larger islands in southern Sulu. Single birds or pairs were sometimes flushed from fruiting trees in the dense patches of remnant forests in the interior, especially on Sibutu and Tawitawi. This bird had the habit of feeding quietly in a fruiting tree and then suddenly taking off. While feeding, it climbs actively but silently among the branches, but one would not easily detect the bird from among the foliage.

LOCAL NAME: Tang-kil-lit (Sibutu Samal).

***Tanygnathus lucionensis salvadorii* Ogilvie-Grant, 1896**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Sulu Blue-naped Parrot was very common on the larger southern islands of the Sulu Archipelago and was frequently observed in pairs or in small flocks of up to 10 or a dozen members, which flew about as part of their feeding activities. Flocks often alighted on a tall, fruiting forest tree, while pairs or several birds would alight in a palm to feed on the young fruits. Once in a while one bird would give out with its loud, raucous notes, which would soon be answered by a similar call or calls not far away.

LOCAL NAME: Kangag si-si-kan (Sibutu Samal).

***Tanygnathus sumatranus burbidgii* Sharpe, 1879**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Sulu Blue-backed Parrot was just as common as *T. lucionensis salvadorii* on the larger islands of the southern Sulu Archipelago. It was frequently seen in pairs or in small flocks flying about on feeding excursions. The two species of parrots were difficult to differentiate in the field, except perhaps for the fact that the present form was more often encountered in well forested areas deeper in the interior of the islands and quite far from the coasts. Unlike *T. lucionensis salvadorii,* the Blue-backed Parrot was seldom seen in the coconut groves of the islands.

LOCAL NAMES: Kangag (Tao Sug and Samal) and Kangag Pató (Sibutu Samal).

***Loriculus philippensis bonapartei* Souance, 1856**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Sulu Hanging Parakeet was a common cage bird on the various islands of the Sulu Archipelago. The present form differs from the many others found in various parts of the Philippines by its black bill; the others have a red bill.

This bird was commonly seen or heard in coconut groves from the coastal areas into the interior, where it fed on the flowers of palms. It was also met with frequently in the dense patches of forest or even in trees that were still left standing in clearings. It was seen actively flying from treetop to treetop, often accompanying its flight with its characteristic musical notes.

LOCAL NAME: Ko-li-sí (Sibutu Samal).

FAMILY **CUCULIDAE** CUCKOOS

***Clamator coromandus* (Linné, 1766)**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The two specimens of the Red-winged Crested Cuckoo, a rare winter visitor from China, were each taken in dense patches of remnant original vegetation in the interior of Sanga Sanga and Tawitawi.

***Cuculus micropterus micropterus* Gould, 1837**

LOCALITY RECORD: Sanga Sanga.

COMMENT: Specimens of the Short-winged Cuckoo were taken in dense brush where they were very shy and concealed themselves well.

***Cacomantis variolosus everetti* Hartert, 1925**

Locality records: Sanga Sanga, Tawitawi (Batu Batu).

Comment: The Sulu Brush Cuckoo was not rare on the larger islands of the southern Sulu Archipelago, but its unobtrusive habits made it difficult to find except during the rare times that it gave out its loud and very characteristic notes. Nevertheless, although the bird called loudly, it was still difficult to locate, even while in full view of the observer. The notes of the Sulu bird were very closely similar to those of the other Philippine form, *C. v. sepulcralis,* found in the more northern islands of the Philippines.

***Chrysococcyx malayanus malayanus* (Raffles, 1822)**

Locality records: Sanga Sanga (1♀), Tawitawi (2♀; Batu Batu).

Comment: Three specimens of the Malay Bronze Cuckoo were taken in densely foliaged trees of medium height growing in remnant patches of original vegetation in the interior. In each case, the bird was discovered as it moved from one branch to another in the same tree. It had very stealthy habits and would remain on a particular branch for long periods.

***Surniculus lugubris velutinus* Sharpe, 1877**

Locality records: Bongao, Sanga Sanga.

Comment: The Drongo Cuckoo was seldom seen on the islands, but it was not really rare: its silence and its habits, like in most of the small forms of Philippine cuckoos, made it difficult to discover among the branches and dense foliage of a tree where it might be perching. It was often discovered only accidentally as it moved from one perch to another, or from one tree to another, and then it was most likely to be mistaken at first for a *Dicrurus.*

***Eudynamys scolopacea mindanensis* (Linné, 1766)**

Locality records: Bongao, Omapoy, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Batu Batu).

Comment: The Koel was a very common bird on all the Sulu islands, and its loud notes could be heard issuing from trees in well forested areas.

Local names: Bahaó, Kuahaó, and Kuhaó (Visayan).

***Centropus sinensis anonymous* Stresemann, 1913**

Locality record: Sanga Sanga.

Comment: The Common Coucal was met with frequently along the edges of clearings and on farms where there were still small patches of

original or second-growth forest. It was often observed in pairs and stayed in the low trees or in thickets.

LOCAL NAMES: Saguksuk (Tao Sug) and Kalungkong (Samal).

***Centropus bengalensis philippinensis* Mees, 1971**

LOCALITY NAMES: Bongao, Sanga Sanga.

COMMENT: The Lesser Coucal was occasionally met with in well cultivated areas, especially in the hills and at the base of the low mountain slopes. Birds were seen singly or in pairs in dense thickets or at the edges of second-growth forests with stands of tall grass distributed irregularly among them.

FAMILY **CAPRIMULGIDAE** NIGHTJARS

***Caprimulgus macrurus salvadorii* Sharpe, 1875**

LOCALITY RECORD: Bongao (1 ♂; Nov. 26).

COMMENT: This race known from North Borneo is a new record for the Philippines. The present specimen compares favorably to near topotypical material.

A Long-tailed Nightjar was collected as it flushed from the forest floor in a dense patch of remnant original vegetation on the slope leading to the peak of Bongao Island. Nightjars were occasionally disturbed from the forest floor in the densely forested areas on Sanga Sanga and Sibutu. Nightjars in flight were also observed at times from a distance in the late afternoon as they flew over the cleared areas adjoining the well forested patches on Sanga Sanga, Sibutu, and Tawitawi.

FAMILY **APODIDAE** SWIFTS

***Collocalia esculenta bagobo* Hachisuka, 1930**

LOCALITY RECORD: Bongao.

COMMENT: The Sulu form of the Glossy Swiftlet was frequently seen in flight over the larger southern islands of the Sulu Archipelago, including Bongao, Sanga Sanga, Sibutu, and Tawitawi. Large numbers of this swiftlet were found living and nesting inside the shallow caverns and crevices on the faces of the steep and sheer rocky cliffs of Bongao Island bordering the channel between Bongao and Sanga Sanga. Numerous likely sites for the possible roosting and breeding of this swiftlet were seen on many of the Sulu islands, both large and small.

FAMILY **HEMIPROCNIDAE** TREE SWIFTS

***Hemiprocne comata major* (Hartert, 1895)**

LOCALITY RECORDS: Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Lesser Tree Swift was not a rare bird on the larger islands in the southern Sulu Archipelago, although only a pair would frequently be found within a large area of combined clearings and patches of forest vegetation, especially in the interior. A pair would be seen perching on a bare branch of a medium-high tree growing in a clearing, but not far from the patches of forests. The pair would usually perch motionless on some bare branch, preferring the higher ones. They would fly after some insect food and then return to the same perch, or to one close by, unless disturbed. The pair would then fly to another tree, usually some distance away.

***Hemiprocne longipennis harterti* Stresemann, 1913**

LOCALITY RECORD: Sibutu (1♂, 1♀).

COMMENT: From a single observation it appears that the habits of this larger species of Tree Swift were little different from those of the Philippine form. These two were the only birds seen during the expedition.

The species is recorded for the first time in the Philippines.

FAMILY **ALCEDINIDAE** KINGFISHERS

***Alcedo atthis bengalensis* Gmelin, 1788**

LOCALITY RECORDS: Sanga Sanga, Simunul.

COMMENT: The River Kingfisher was seen occasionally along the seashores and the banks of small freshwater streams in Sanga Sanga as it perched on low branches of shrubs or small trees and sometimes on the stilt roots of the mangrove. The species probably occurs on most of the Sulu islands, but its unobtrusive habits make it easy to miss among the vegetation.

There has never been a record of the breeding of this form anywhere in the Philippines, although the species is very widely distributed among the islands.

***Alcedo meninting verreauxii* De La Berge, 1851**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Sulu form of the Malaysian Kingfisher was rare even on the two islands where it had been collected. Both specimens were taken along the banks of small freshwater streams in dense forest patches where *A. atthis bengalensis* would have been most likely to be found.

The species has a restricted distribution in the Philippines, being found only on Palawan and the small islands around it *(A. m. amadoni)* and in the Sulu Archipelago *(A. m. verreauxii)*.

***Ceyx lepidus margarethae* Blasius, 1890**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Variable Forest Kingfisher was fairly common in the forested areas of the larger Sulu islands, but its shy and silent habits made it difficult to discover. As on the other islands of the Philippines where this form had been found, the birds were seen in dense forests, perched often on the low branches of shrubs and bushes that formed the forest undergrowth, or on rocks, fallen tree trunks, and stumps often situated far away from any freshwater stream. When undisturbed, a bird would remain motionless on its low perch and then suddenly dart toward something moving close to or on the ground. It would then proceed to perch on another favorite branch, trunk, or stump in the area. One could find a particular bird perched on any one of its favorite perches in areas of the forest where this particular kingfisher was discovered.

***Pelargopsis capensis gigantea* Walden, 1874**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul.

COMMENT: The Sulu Stork-billed Kingfisher was commonly encountered along the coastal areas of the Sulu islands, large and small, especially in the immediate vicinities of mangrove forests or beach forests. It was often seen perched motionless on the stilt roots of the mangrove trees along the seashores or along the edges of the larger streams close to or at their openings into the sea. Several individuals were seen with crabs or fish in their bills. A bird would pounce on a crab on the exposed muddy bottom and would then alight on a branch or stilt root of a mangrove tree to consume the prey there.

LOCAL NAME: Ba-kak'-ka (Samal).

***Halcyon chloris collaris* (Scopoli, 1786)**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sanga Sanga, Sibutu, Simunul, Tawitawi, Tumindao.

COMMENT: The White-collared Kingfisher was commonly met with on the islands of the Sulu Archipelago regardless of size, especially in the cleared and cultivated areas from the seashores deep into the interior. It stayed along the beaches, inside coconut groves, on farms, and in open country with second-growth forest patches. Its loud notes were

often heard at all daylight hours, from morning until late afternoon. It was easily one of the most common bird species on any island in the Sulu Archipelago.

The birds were observed to feed on fish, crabs, shrimps, hermit crabs, snails and other mollusks, insects, and even lizards.

LOCAL NAMES: Bo'leng-bo'leng and Bo'leng (Samal).

***Halcyon coromanda rufa* Wallace, 1863**

LOCALITY RECORDS: Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: Three specimens from the localities cited are referred to this race, previously unknown from the Philippines, mainly on the basis of size and, to a lesser degree, color. The wings (102, 112, and 114 mm.) and tails (55, 62, 66 mm.) are generally longer than *minor* and shorter than *sulana,* as measured by Mees (1970) in his recent description of the latter subspecies. Wing formulas of our specimens are also closer to *rufa,* as characterized by Mees, but this character complex seems variable in this suite of races and is perhaps of unsatisfactory value in subspecific diagnosis.

In color, our specimens resemble *rufa,* including having the rump azure-white, rather than essentially white as in the other two forms mentioned. On the other hand, there is an approach to *sulana* (based on its description: we have not seen specimens) in that our specimens are distinctly paler below and have bright magenta upperparts.

The Ruddy Kingfisher was rare even on the larger islands of the southern Sulu Archipelago. The three specimens were taken in large patches of dense forest, one away from any stream and the others quite close to a small freshwater creek. Strangely enough, in spite of its bright colors and large size, the bird was most likely to be overlooked in its surroundings of almost total green because of its shy and silent habits.

***Halcyon pileata* (Boddaert, 1783)**

LOCALITY RECORDS: Sanga Sanga (Pagasinan; 1♀), Sibutu (1♀).

COMMENT: The Black-capped Kingfisher was a rather rare winter migrant in the Sulu Archipelago at the time of collecting, from September to December 1971. The two collected specimens were taken in good-sized patches of original modified molave forest type of vegetation with large cleared areas nearby.

***Halcyon winchelli alfredi* Oustalet, 1890**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Sulu form of Winchell's Kingfisher was fairly common in the densely forested regions of the larger southern islands of Sulu.

From a distance, a casual observer could easily mistake a perching bird for the very common and widely distributed *H. chloris collaris,* except that the latter would not be found normally inside such dense forests.

The birds were often observed perching on the higher branches of the tall-tree species in forests and took wing immediately upon seeing someone nearby. Frequently it would move to a high branch of another tree some distance away and would then usually select a perch that was well covered with leaves.

FAMILY **MEROPIDAE** BEE-EATERS

***Merops philippinus philippinus* Linné, 1766**

Locality record: Sanga Sanga (1♀).

Comment: Strangely enough, the Blue-tailed Bee-eater was met with very rarely and only on Sanga Sanga Island. In other parts of the Philippines, this bird is rather commonly seen in cultivated and open country, in the lowlands, and at medium elevations.

FAMILY **CORACIIDAE** ROLLERS

***Eurystomus orientalis cyanocollis* Vieillot, 1819**

Locality records: Bongao, Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

Comment: The Dollar Bird was quite common on the larger southern Sulu islands and was often seen perching motionless for some time on a bare branch, usually at the top or close to the top of a tall tree in a clearing or at the edge of a forest patch. It preferred newly cleared country in low elevations. From its favorite perch it would catch insects on the wing or by hovering over or settling on the foliage of bushes, shrubs, and other lower growths in the open fields. More often than not, unless disturbed, it would return to its previous perch and consume the insect prey there.

FAMILY **BUCEROTIDAE** HORNBILLS

***Anthracoceros montani* (Oustalet, 1880)**

Locality record: Tawitawi (Batu Batu; 1♀; Dec. 16).

Comment: The Sulu Hornbill was fairly common in the dipterocarp forests on Tawitawi Island, but it was most often seen at a far distance and could not be approached closely enough for collecting. A pair or more of this species would be seen feeding in tall fruiting trees inside dense original forest, typically on the slope of a mountain peak. The birds would remain there for quite some time and fly actively from one part of the tree to another. Once disturbed, the birds would fly, usually

one by one, to another part of the forest oftentimes a good distance from the former site and would then congregate again on some particular tree.

This species has not been recorded from the Sulu islands since the early 1930's (Alcasid, *in litt.*) and is thought to be extinct.

FAMILY **PICIDAE** WOODPECKERS

***Dryocopus javensis suluensis* (W. Blasius, 1890)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Sulu White-bellied Black Woodpecker was fairly common on the larger and well forested southern Sulu islands. It was met with frequently in dense forests with cleared areas nearby. Occasionally it was also seen singly or in pairs pecking on the upright trunks of dead trees still left standing in the cleared patches in large areas of forest.

LOCAL NAME: Bulantok (Tao Sug and Sibutu Samal).

***Dendrocopos maculatus ramsayi* (Hargitt, 1881)**

LOCALITY RECORDS: Bongao, Tawitawi (Batu Batu).

COMMENT: The Sulu Pygmy Woodpecker was met with rarely on the larger Sulu islands, but its rarity may be more apparent than real because of its small size and unobtrusive habits. The bird, singly or in pairs, actively fed on the trunks of trees. It was met with in the clearings, cultivated areas, and forest edges on the larger islands of Bongao, Sanga Sanga, Sibutu, and Tawitawi, from the lowlands near the coasts, into the hills, and up the mountain slopes in the interior.

FAMILY **PITTIDAE** PITTAS

***Pitta erythrogaster erythrogaster* Temminck, 1823**

LOCALITY RECORD: Sibutu.

COMMENT: The Red-breasted Pitta was met with rarely, even on Sibutu Island where two specimens were eventually collected, each on the ground in dark areas of original forest at the base of a heavily forested hill. The species was occasionally disturbed on the ground inside the dense second-growth patches, especially close to newly cleared areas. In all cases, the bird afforded the observer only momentary glimpses while it hopped actively on the forest floor prior to rapidly flying toward a darker and denser part of the forest.

The bird seemed to prefer the banks of small creeks with shallow water and with dense undergrowth growing under the tall trees border-

ing them, thus making the area really dark. The species was seen occasionally in the dense original and second-growth forests of Bongao, Sanga Sanga, and Tawitawi.

FAMILY **HIRUNDINIDAE** SWALLOWS

***Hirundo rustica gutturalis* Scopoli, 1786**

LOCALITY RECORDS: Sibutu, Tumindao.

COMMENT: The Barn Swallow was frequently observed in flight over the islands and the sea close to the shores. It was common throughout practically all the Sulu Archipelago.

***Hirundo tahitica abbotti* (Oberholser, 1917)**

LOCALITY RECORDS: Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Pacific Swallow was as common on the various islands of the Sulu Archipelago as the winter migrant, *H. rustica gutturalis*. This resident swallow was often observed actively feeding while in flight along the coastal areas and in the settlements. Occasionally, several of these swallows were also seen perching on bare branches of the low trees and shrubs that grow in the open country and at the edges of cultivated fields and clearings.

FAMILY **CAMPEPHAGIDAE** CUCKOO-SHRIKES

***Coracina striata guillemardi* (Salvadori, 1886)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

COMMENT: The Sulu Barred Graybird was common on the various southern Sulu islands, although it was not found in large numbers in any particular locality. From a distance, the harsh notes of a pair were often heard as the birds flew from treetop to treetop on well forested hillsides or in remnant forest patches. Occasionally, a pair was observed perching among the branches of the crown of some high dipterocarp tree species left growing in newly cleared areas.

***Coracina morio everetti* (Sharpe, 1893)**

LOCALITY RECORDS: Bongao, Tawitawi (Batu Batu).

COMMENT: The Sulu race of the Moluccan Graybird was only occasionally encountered on Bongao, Sanga Sanga, and Tawitawi, usually at the edges of clearings that were made in stands of original forests, especially of the dipterocarp type. When observed, the birds usually flew deeper into the dense original growth instead of out into the cultivated areas.

Lalage nigra chilensis (Meyen, 1834)

Locality records: Bongao, Omapoy, Sanga Sanga, Sibutu, Tawitawi (Batu Batu).

Comment: On the southern islands of the Sulu Archipelago, the Pied Triller was more frequently observed in the well cleared and cultivated areas than in the original forest. It was common even in the trees in the barrios, including coconut palms, where it fed actively on the insects that were attracted to the flowers.

Local names: An-jial (Tao Sug) and Achak-achak (Samal).

FAMILY DICRURIDAE DRONGOS

Dicrurus annectans (Hodgson, 1836)

Locality records: Bongao (1 ♀), Sanga Sanga (1 ♂).

Comment: The Crow-billed Drongo was taken only once on Bongao and once on Sanga Sanga. Each bird was taken in remnant forest patches with cleared areas nearby, close to the edges of these clearings—the same type of habitat that the resident form, *D. hottentottus suluensis,* normally frequented. This migrant from the Asian mainland may not be a rare visitor, especially on the numerous islands in the southern regions of the Sulu Archipelago.

There is one previous record, Jolo 1891, for the Philippines (Parkes, 1960).

Dicrurus hottentottus suluensis Hartert, 1902

Locality records: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

Comment: The Sulu form of the Spangled Drongo was a common bird in forested areas on the larger islands of the southern Sulu Archipelago, both in the original forests and in secondary growth. Pairs of these drongos were frequently observed perching among the branches of the taller trees and actively flying from one part of a tree to another, most likely in connection with chasing their insect prey. Occasionally, pairs were encountered feeding among the branches of tall trees at the edges of clearings in the hills.

The birds, often in pairs, had the habit of suddenly appearing unexpectedly near the observer and perching on the lower branches of nearby trees with dense foliage. The birds usually kept giving out varied notes. They would usually stay for quite some time in the vicinity of the observer and act as if they were curious about his presence.

On the more northern Philippine islands of Bohol, Leyte, Mindanao, and Samar, a pair of this species of drongo was frequently observed among the members of mixed feeding flocks of small birds as they traveled in the lower portions of the forests in their daily feeding migrations. The drongos were easily the largest birds in the mixed feeding flocks, which included about 10 to 12 members and even up to 20 or 30. The members usually belonged to about six to 12, or even more, species, normally of insect-eating birds. The closely related species *D. balicassius* shows the same behavior on the islands where it occurs.

FAMILY **ORIOLIDAE** ORIOLES

***Oriolus xanthonotus cinereogenys* Bourns and Worcester, 1894**

LOCALITY RECORD: Tawitawi (Batu Batu).

COMMENT: The Sulu race of the Dark-throated Oriole was heard more often than it was actually seen among the tall trees in dipterocarp forests. The bird was encountered in the extensive tracts of original forests as well as in remnant patches on Bongao, Sanga Sanga, and Tawitawi. Its characteristic notes were loud and were easily heard, even at a distance, but locating the bird on its perch from among the dense foliage and numerous branches in the crowns of the tall dipterocarps was difficult. A bird would keep on calling even when the observer was directly below the tree, but it would still be difficult to locate the bird.

***Oriolus chinensis chinensis* Linné, 1766**

LOCALITY RECORDS: Bongao, Saluag, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu), Tumindao.

COMMENT: The Black-naped Oriole was very common on the various islands of the Sulu Archipelago, both on those where collections were made and on those that were merely visited.

The species was seen in well cultivated areas along the seacoast and deep into the interior. It was also commonly met with in second-growth forests, especially in those that were close to clearings. Several birds were always disturbed inside the coconut groves, and the very characteristic notes of the species were commonly heard.

LOCAL NAME: Ti-hing-lao (Samal).

FAMILY **CORVIDAE** CROWS

***Corvus macrorhynchos philippinus* (Bonaparte, 1853)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul.

COMMENT: The Large-billed Crow was common on all the larger islands

in the southern Sulu Archipelago. As on the other islands of the Philippines, the human inhabitants of the Sulu islands dislike the species because of its predatory effects on the young poultry and eggs. Strangely enough, the species is more than holding its own and is, in fact, one of the most common species on most islands, especially in the cultivated areas with large tracts of coconut groves.

FAMILY **PARIDAE** TITMICE

***Parus elegans suluensis* (Mearns, 1916)**

Locality records: Sanga Sanga, Tawitawi (Balimbing, Batu Batu).

Comment: The Sulu Elegant Titmouse was frequently observed in tall trees in the remaining tracts of original forests, usually of the dipterocarp and modified molave types, found in the interior of the larger islands of Sanga Sanga and Tawitawi. Pairs, and occasionally up to 12 titmice, were seen feeding together among the foliage of the tall dipterocarp species inside the extensive tracts of original forests, especially in the interior of Tawitawi. After a time, the birds would fly from the crown of one tall tree to that of another close by, leaving the previous feeding tree one by one at short intervals. Rarely, a pair of these titmice was observed feeding on the lower trees inside the patches of original forest on Sanga Sanga.

On the more northern islands of the Philippines, such as Luzon, Mindanao, and Negros, this titmouse is a regular member of the mixed flocks of birds that travel inside the forests, feeding mainly on the insects found among the trees of medium height. This phenomenon was not observed on either Sanga Sanga or Tawitawi where the present species was found.

***Parus elegans bongaoensis* Parkes, 1958**

Locality record: Bongao.

Comment: The Bongao form of the Elegant Titmouse had habits similar to those of the race found on Sanga Sanga and Tawitawi. The on the slopes of the high peak on the northern end of Bongao.
birds were encountered inside the remnant patches of dipterocarp forest

FAMILY **TIMALIIDAE** BABBLERS

***Macronous striaticeps kettlewelli* Guillemard, 1885**

Locality record: Tawitawi (Batu Batu).

Comment: The Brown Tit-babbler was occasionally encountered in the dense and tangled growths that formed the undergrowths in remnant

and second-growth forests from near the coasts deep into the interior. They were seen in flocks of five to seven members. The birds were observed as they actively and thoroughly looked for insects among the leaves of bushes and vines. Their search usually started from the lower parts of the plant, then proceeded to the top. They often flew to the nearest tree trunk, starting from near the base and gradually hopping from one small lower branch to another higher branch, then to another, and so on up the tree. One bird usually followed one of the larger horizontal branches while the others followed the other branches. After completing the search for prey among the leaves and branches in one tree, the birds usually transferred to the next tree and followed the same procedure in their search for insects.

In the more northern islands of the Philippines, these birds were frequently members of the wandering mixed flocks of small birds that travel in the lower growths of the dense forests.

FAMILY **PYCNONOTIDAE** BULBULS

***Hypsipetes everetti haynaldi* (Blasius, 1890)**

Locality records: Sanga Sanga, Sibutu, Tawitawi (Balimbing, Batu Batu).

Comment: The Plain-throated Bulbul was common in the more extensive tracts of original forest and in remnant original vegetation on the larger islands in the southern Sulu Archipelago. They were usually observed in pairs on fruiting trees of the taller species growing in the dipterocarp and modified molave types of forest. They were encountered more frequently in the forests in the interior, rather than in those near the coasts. Occasionally, however, a pair of these bulbuls was observed feeding along the edges of newly cleared areas of modified molave type forest close to the coast on Sanga Sanga and Sibutu.

Local name: Ul-ul (Tao Sug).

FAMILY **TURDIDAE** THRUSHES

***Luscinia cyane bochaiensis* Shulpin, 1928**

Locality records: Bongao (1 ♂), Sanga Sanga (1 ♀).

Comment: A single female specimen, No. 579872 in the bird collection of the American Museum of Natural History, was collected on February 24, 1898, in Zamboanga on Mindanao. This specimen represents the first record of the Siberian Blue Robin in the Philippines. This particular race breeds in Ussuria, Korea (rarely), and Japan (Hokkaido,

Honshu, Shikoku, and Kyushu; eggs are found only on Honshu). It winters south in the Indochinese subregion of Malaya and Borneo.

The present records of this robin on Bongao and Sanga Sanga suggest the possibility that the Sulu Archipelago, especially the islands in the southwestern region nearest to Borneo, may be part of its regular wintering range.

The birds were taken in dense, tangled vegetation representing mixed remnants of dipterocarp forest and second growth. When they were disturbed from the ground, in each instance the birds perched on a low branch of a bush. The stealthy habits of the species as it moves about on the ground make it difficult to discover, much less to collect.

***Copsychus saularis mindanensis* (Boddaert, 1783)**

Locality records: Bongao, Saluag, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

Comment: The Dyal Thrush, or Magpie Robin, was widely distributed on the southern Sulu islands, both large and small. It was found from the coast deep into the interior and was usually seen either singly or in pairs in the darker areas of thickets and patches of dense growths. It preferred to perch among the lower branches of bushes and other low growths, which grew under taller plant species. The bird was often seen in coconut groves and quite commonly in bamboo thickets, perching on branches close to the ground. This bird was even observed occasionally in the gardens in the barrios, especially those with bamboo groves nearby.

***Monticola solitarius philippensis* (P. L. S. Müller, 1776)**

Locality records: Bongao, Sanga Sanga, Tumindao.

Comment: The Blue Rock Thrush is a widespread winter migrant to the Philippines, although it is never found in large numbers in any one locality. It was met with fairly often on most of the southern islands of Sulu. Several times it was seen singly or in pairs perching motionless on top of some of the rocks of vertical cliffs that border the sea. Occasionally, the birds were observed perching on some bare branches at the tops of trees growing at the edges of clearings and cultivated areas.

***Turdus obscurus* Gmelin, 1789**

Locality record: Tawitawi (Balimbing, Batu Batu).

Comment: The Dusky Thrush was a fairly common winter migrant to dense forests on Tawitawi, where it was observed usually flying about in flocks of a dozen members or more. Occasionally, a flock was seen perching on the top branches of a tall dipterocarp tree.

Not previously recorded from the south Sulu Archipelago.

FAMILY **SYLVIIDAE** OLD WORLD WARBLERS

Gerygone sulphurea simplex **Cabanis, 1872**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sanga Sanga, Sibutu, Simunul, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Yellow-breasted Wren-warbler was very common on the islands of the southern Sulu Archipelago, both large and small. The bird often revealed its presence among the foliage of a tree through its highly pleasing song. It was observed in a great variety of habitat types, including mangrove swamps, second-growth scrub forest near the coast, open country with many trees left standing, cultivated areas with trees at the edges, bamboo groves, and even gardens around the houses not far from the seashore.

Locustella fasciolata **(J. E. Gray, 1860)**

LOCALITY RECORD: Sanga Sanga.

COMMENT: This rare winter migrant, Gray's Grasshopper Warbler, was met with once on Sanga Sanga. It was collected among a dense mixed growth of bushes and other low tangled growth along the edges of a neglected landing field close to the seashore.

Acrocephalus arundinaceus orientalis **(Temminck and Schlegel, 1847)**

LOCALITY RECORD: Saluag.

COMMENT: The Great Reed Warbler was met with only on the small island of Saluag among the patches of tall grass toward the interior close to the edges of a coconut grove. This winter migrant was quite rare in the southern Sulu region, as well as on the other islands of the Philippines. Not previously recorded from the south Sulu Archipelago.

Phylloscopus olivaceus **(Moseley, 1891)**

LOCALITY RECORDS: Sanga Sanga, Sipangkot, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Philippine Leaf Warbler was observed fairly frequently among the foliage of the lower growths of dipterocarp forests in both the extensive areas and the remnant patches. It was also seen occasionally in the patches of modified molave forest and in scrub forest. Like other forms of *Phylloscopus,* it is often missed because of its silent habits, although it actively moves among the branches and leaves in search of food.

Phylloscopus borealis **ssp.**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Batu Batu).

COMMENT: The Arctic Willow Warbler was a very common winter migrant to the numerous islands of the Sulu Archipelago. It was observed in the barrios in gardens around houses and in coconut groves, bamboo thickets, mangrove swamps, and second-growth vegetation, as well as among the low trees and shrubs along the farms and clearings. This small bird was even seen among the foliage of the lower-story trees inside dipterocarp forest patches. It ranged from the coast deep into the interior and into the hills and mountains. Its habit of staying among the foliage makes it difficult to locate, although it keeps moving among the leaves and branches in search of insects.

***Orthotomus sericeus nuntius* Bangs, 1922**

LOCALITY RECORDS: Omapoy, Sibutu, Sipangkot, Tumindao.

COMMENT: The Rufous-crowned Tailor-bird was commonly heard, if not actually seen, among the dense bushes, shrubs, tall grass, and other tangled growths near the coasts. It was also observed inside the mangrove and beach forests along the shores and in second-growth patches a little way into the interior. Even from a distance, the characteristic loud notes of this bird could easily be heard, but locating the bird among the dense and tangled growths where the notes issued forth was quite difficult. The notes resembled the sound of "Ter-r-r . . . ter-r-r . . ., etc.," given loudly and clearly.

LOCAL NAME: Ter-ter (Samal).

FAMILY **MUSCICAPIDAE** OLD WORLD FLYCATCHERS

***Rhipidura javanica nigritorquis* Vigors, 1831**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sanga Sanga, Sibutu, Simunul, Sipangkot.

COMMENT: The Malaysian Fantail was very common on the islands of the southern Sulu Archipelago. As on the other islands of the Philippines, it was found around the edges of the farms and other cultivated areas, in second growth, and even in the gardens around houses in the barrios. This species ranged from the coasts, where it was quite common in the nipa and mangrove swamps, up into the hills in the interior, where there were cleared areas with second-growth vegetation around them.

***Rhinomyias* sp.**

COMMENT: Our specimen is different from all other members of this genus. The single specimen was taken inside a patch of remnant original dipterocarp forest with only the second-story vegetation left standing. The collecting site was on the slope leading toward the highest peak on

Bongao Island (2120 ft.). When collected, the bird was perching on one of the lower branches of a low tree that had heavy foliage.

More data will be published at a later date after the specimen has been identified.

***Rhinomyias ruficauda occularis* Bourns and Worcester, 1894**

LOCALITY RECORD: Tawitawi (Batu Batu; 1 ♂).

COMMENT: The Rufous-tailed Jungle Flycatcher was met with only once —on Tawitawi Island in a large tract of dipterocarp forest in the undergrowth. It could have been missed easily because it remained silent and motionless for some time on its perch before it flew and perched on another branch nearby.

***Ficedula narcissina narcissina* (Temminck, 1835)**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sibutu, Tawitawi (Batu Batu).

COMMENT: The Narcissus Flycatcher was fairly common on the islands of southern Sulu in October, November, and December, when collections were made. The specimens were taken in dense patches of forest, usually in trees of moderate height with dense foliage.

This species has been taken rarely in the Philippines and then only on the islands of Calayan, Cebu, Luzon, Mindanao, and Negros. Students of Philippine birds consider this bird as an occasional winter visitor. The present records point to the possibility that the species may actually be a regular winter visitor to the southern region of the Philippines, especially on the islands in the southern parts of the Sulu Archipelago.

Not previously recorded from the south Sulu Archipelago.

***Ficedula mugimaki* (Temminck, 1835)**

LOCALITY RECORD: Sibutu.

COMMENT: The Black and Orange Flycatcher was seen and collected only three times—all on Sibutu Island in the lower growths of forests in the hills. This form is a rare winter migrant in the Philippines and has otherwise been taken only on Luzon, Mindanao, and Negros.

Not previously recorded from the south Sulu Archipelago.

***Cyornis rufigaster philippinensis* Sharpe, 1877**

LOCALITY RECORDS: Bongao, Omapoy, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Batu Batu).

COMMENT: The Mangrove Blue Flycatcher was very common on the islands, both large and small, in the southern region of Sulu. It was fre-

quently met with in the dense mangrove forests. This bird was also common in the dark areas of the lower growths and undergrowths of the tracts and larger patches of original vegetation in the interior, including the dipterocarp, modified molave, and scrub forests. Occasionally, single birds and pairs were seen among the lower growths in secondary forests and even in dense bamboo groves.

LOCAL NAMES: Pi-sio-ro-din' (Tao Sug) and Ma-nok ma-mâ gam-pong (Sibutu Samal).

***Muscicapa sibirica sibirica* Gmelin, 1789**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu.

COMMENT: The Sooty Flycatcher was a common winter migrant to the larger islands in the southern Sulu Archipelago. It was usually observed in the same types of habitat as the Spotted Flycatcher.

Delacour and Mayr (1946) considered the occurrence of this form in the Philippines somewhat doubtful. Our observations of the species during October, November, and December point to the fact that this form occurs in the Philippines as a probable regular winter migrant, especially on the islands in the southern region of the Sulu Archipelago.

Not previously recorded from the south Sulu Archipelago.

***Muscicapa griseisticta* (Swinhoe, 1861)**

LOCALITY RECORDS: Bongao, Omapoy, Sibutu, Simunul, Tawitawi (Batu Batu).

COMMENT: The Spotted Flycatcher was a common winter migrant to the islands of the southern regions of Sulu, both large and small. It was frequently observed perching singly on bare branches of moderately tall trees, usually located at the edges of forest patches bordering newly cleared areas. From its perch it usually sallied forth and caught insect prey in flight; then more often than not it returned to its former perch.

This bird is a common winter migrant throughout the Philippines.

***Muscicapa cinereiceps* (Sharpe, 1889)**

LOCALITY RECORD: Sibutu (1 ♂, 1 ♀).

COMMENT: The Ferruginous Flycatcher was encountered only twice and was collected each time on Sibutu Island, the third largest island of Sulu and one that is still well forested. Of all the larger islands of the Sulu Archipelago, Sibutu is closest to Borneo.

This flycatcher has always been considered as a rare straggler to the Philippines. It is very probable that it may be a regular winter migrant on Sibutu Island and on the smaller islands around Sibutu.

Not previously recorded from the south Sulu Archipelago.

***Culicicapa helianthea mayri* Deignan, 1947**

LOCALITY RECORD: Tawitawi (Balimbing).

COMMENT: The Citrine Canary Flycatcher was seen and collected only on Tawitawi. It was never encountered on the other southern islands of Sulu, even on the larger ones. Three specimens were taken in well forested areas on the mountain slopes deep in the interior of the island.

***Hypothymis azurea azurea* (Boddaert, 1783)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Black-naped Blue Monarch was very common and was always encountered in dense and dark patches of vegetation, whether original or second growth. Occasionally, a bird or a pair could be met with inside the coconut groves, but usually only in the trees found along the edges near the remnant growths and patches of vegetation, original or second growth. Rarely, a bird was observed in bamboo thickets or in the gardens near the houses that were at the outskirts of a barrio.

***Pachycephala cinerea homeyeri* (Blasius, 1890)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Sipangkot, Tawitawi (Batu Batu).

COMMENT: The Sulu race of the White-bellied Whistler was common in the large tracts of original forests and in the remnant patches. It frequently stayed in trees with heavy foliage and fed actively among the branches, but usually its activities could be noticed only by someone who stayed immediately under these particular trees. It was very seldom that a bird, or a pair of them, ever flew outside the crown when foraging in a given tree. Wherever there were still good-sized tracts or patches of original vegetation left growing on the islands, especially the larger ones, this whistler was always found.

FAMILY MOTACILLIDAE PIPITS

***Motacilla flava simillima* Hartert, 1905**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu.

COMMENT: The Yellow Wagtail was a common winter migrant to the larger islands in the southern region of the Sulu Archipelago. As many as a dozen or more were frequently seen in marshy areas actively chasing prey among the sparse growths of herbs, grass, and low bushes that were found in the area. When disturbed, the whole group would usually

take off, more or less together, and then transfer to another part of the marshy field and resume their active foraging.

LOCAL NAMES: Po-sing Po-sing (Samal) and Pem-peng-hos' (Sibutu Samal).

Motacilla cinerea robusta **(Brehm, 1857)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu.

COMMENT: The Gray Wagtail was a fairly common winter migrant to the larger islands of southern Sulu during the months of October, November, and December. Usually it was encountered on the ground, singly, feeding actively along the small creeks inside both the large tracts and the small remnant patches of original forest. Occasionally, this bird was observed along the edges of the marshes, especially those with good forest patches still left standing where creeks and streams opened to the sea.

LOCAL NAMES: Po-sing Po-sing (Samal) and Pem-peng-hos' (Sibutu Samal).

Anthus novaeseelandiae lugubris **(Walden, 1875)**

LOCALITY RECORDS: Sanga Sanga, Sibutu.

COMMENT: Richard's Pipit was fairly common on the larger islands of southern Sulu where quite a few were seen on the ground in open clearings. Many birds of this species were seen feeding among the short grass and weeds in a landing field on Sanga Sanga. In the interior hill regions of the larger islands, this species was always flushed on the ground in the clearings, even when planted already with upland rice or corn and cassava or when grown to short grass.

The birds could not be mistaken for any other ground species because of their characteristic notes. Often, more than a dozen birds were seen at a time in one small clearing, but when disturbed, they always flushed singly and flew in different directions.

LOCAL NAMES: Po-sing Po-sing (Samal) and Pem-peng-hos' (Sibutu Samal).

Anthus gustavi gustavi **Swinhoe, 1863**

LOCALITY RECORDS: Bongao, Saluag, Sanga Sanga, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Petchora Pipit was a fairly common winter migrant to the various islands of the southern Sulu Archipelago. It was often observed feeding on the ground in clearings, especially those on the hillsides and mountain slopes, with areas nearby that were still covered with original forests. Often, one or a pair of these birds was taken on the ground as it ran among the trees and bushes at the edges of clearings. More rarely, one or a pair was encountered in patches of original and second-growth vegetation.

FAMILY **ARTAMIDAE** WOOD-SWALLOWS

***Artamus leucorhynchus leucorhynchus* (Linné, 1771)**

LOCALITY RECORDS: Saluag, Sanga Sanga, Sibutu, Simunul.

COMMENT: The White-breasted Wood-swallow was very common on most of the southern islands of Sulu. It soared on outstretched, motionless wings and rode the air currents over open fields or clearings with coconut groves and trees growing nearby. Usually a pair fed in a given area of a farm or clearing and used a favorite tall tree or coconut palm as a perch. From this perch the birds would hawk their insect prey. The feeding birds even pounced on insects crawling on the ground or on some low weed or bush.

Several times wood-swallows attacked with great ferocity birds of other species, especially crows that passed in the immediate vicinity. For courage, the wood-swallow easily ranks first among the Philippine birds.

FAMILY **LANIIDAE** SHRIKES

***Lanius cristatus lucionensis* Linné, 1776**

LOCALITY RECORDS: Bongao, Saluag, Sanga Sanga, Sibutu, Simunul, Tawitawi (Balimbing, Batu Batu).

COMMENT: The Brown Shrike was very common on both the small and the large islands in southern Sulu. It was seen from the coast deep into the interior, usually in the cultivated areas and clearings. It also occurred near houses, especially in gardens and in the extensive coconut groves on the islands. As on other islands of the Philippines, this species was a very common winter migrant.

FAMILY **STURNIDAE** STARLINGS

***Aplonis panayensis panayensis* (Scopoli, 1783)**

LOCALITY RECORDS: Omapoy, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

COMMENT: The Glossy Starling occurred in flocks of various sizes on many of the southern Sulu islands, both large and small. Large numbers fed on fruiting trees in the open fields, along the edges of farms and other clearings, in coconut groves, and even near houses in well settled communities.

The birds were frequently seen perching on the bare branches of trees, usually at the top or close to the top, or on the fronds of coconut trees, all the while sounding their characteristic notes. Then, usually

one by one or sometimes together, they left their perch and flew to another tree quite some distance away.

Local name: Man-da-siang (Samal).

Sturnus philippensis (Forster, 1781)

Locality records: Sanga Sanga, Sibutu, Simunul.

Comment: Small flocks of the Violet-backed Starling were frequently seen flying over the cultivated and cleared areas with abundant second-growth patches. They often fed in tall fruiting trees, where they proved difficult to discover among the foliage until they flushed as a flock and left for some distant tree. Occasionally, birds could be seen perching on a high, bare branch, but never for long.

Sarcops calvus lowii Sharpe, 1877

Locality records: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

Comment: The Coleto was one of the most common birds in the area and was met with all over the larger islands of the southern regions of Sulu. It was frequently encountered in coastal areas and deep in the interior (including well cultivated and cleared localities), in open country with sparse trees, in coconut groves, in second-growth forest patches, and even in original forest. One bird or a pair usually selected as a perch the top of a tree, or a bare branch at or near the top, and gave out their characteristic notes from this vantage point.

In feeding, one bird, or more often a pair, usually selected a fruiting tree and then fed on the fruits by active flight from branch to branch. Occasionally, a dozen or more birds were observed feeding in the same tree, coming to the tree singly or in pairs and from different directions. When disturbed, all would leave the tree at the same time, but would proceed singly or in pairs in different directions. Rarely, several birds would form a flock and visit fruiting trees to feed.

Local name: Tok-ling (Tao Sug and Samal).

FAMILY NECTARINIIDAE SUNBIRDS

Anthreptes malacensis wiglesworthi Hartert, 1902

Locality records: Bongao, Sanga Sanga, Simunul, Tawitawi (Balimbing, Batu Batu).

Comment: The Plain-throated Sunbird was commonly encountered, usually in pairs, as it fed on the flowers of coconut palms growing in large groves or in open fields and along the edges. Pairs were also frequently seen feeding on flowering forest trees at the edges of extensive forest stands and remnant patches with cultivated and cleared areas in

them. The species ranged from the seacoasts to the lower slopes of the mountains. It was rarely met with inside the deep forests except where there were clearings.

On the same inflorescence of a coconut palm, one or a pair of *Nectarinia jugularis woodi* was often observed also feeding. Less commonly, especially in the interior of the larger islands, *A. malacensis* was observed feeding side by side with one or a pair of *Nectarinia sperata juliae*. Thus, within a particular coconut grove, it was not rare to see these three species of sunbirds actively feeding on the inflorescences of the coconut palms close to one another.

***Anthreptes malacensis iris* Parkes, 1971**

LOCALITY RECORDS: Omapoy, Saluag, Sibutu, Sipangkot, Tumindao.

COMMENT: This race of the Plain-throated Sunbird from the more southern islands of the Sibutu Group had habits similar to those of the one found on the islands of the Tawitawi Group. Our birds confirm Parkes' new race.

***Nectarinia sperata juliae* (Tweeddale, 1877)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Sibutu, Simunul, Tawitawi (Batu Batu).

COMMENT: Van Hasselt's Sunbird was not as common in the coconut groves, cultivated areas, and clearings as *N. jugularis woodi,* especially along the coasts, but it was more common toward the interior. At the edges of the forests, it fed on flowers of forest trees at all heights. In fact, this bird was encountered more often, singly or in pairs, than *N. jugularis* in large tracts and remnant patches of original forests, especially of the dipterocarp type, and in stands of second growth.

***Nectarinia jugularis woodi* (Mearns, 1909)**

LOCALITY RECORDS: Bongao, Omapoy, Saluag, Sanga Sanga, Simunul, Tawitawi (Batu Batu), Tumindao.

COMMENT: The Olive-backed Sunbird was easily the most common bird species encountered in the coconut groves, from the seacoast deep into the interior. The species was also found to be common in open and cultivated country and in second-growth forests, especially near clearings.

These birds were not shy, and they were frequently observed, singly or in pairs, feeding on flowers in the gardens. They were also a common sight on the bushes and shrubs growing among the houses in the barrios. Their songs could be heard from early morning to late afternoon.

LOCAL NAMES: Pao-pit (Tao Sug) and Manok-manok ma-mâ (Sibutu Samal).

Aethopyga shelleyi arolasi **Bourns and Worcester, 1894**

LOCALITY RECORD: Tawitawi (Batu Batu; 1♂, 1♀).

COMMENT: The Lovely Sunbird was met with only on Tawitawi, in a heavily forested area on the slope of a mountain of moderate elevation. It was never observed on the other islands in southern Sulu. As on the other, more northern islands of the Philippines where the species occurs, the Sulu race was also rare.

FAMILY **DICAEIDAE** FLOWERPECKERS

Dicaeum trigonostigma sibutuense **Sharpe, 1893**

LOCALITY RECORDS: Omapoy, Sibutu, Sipangkot.

COMMENT: This flowerpecker was commonly encountered in fruiting trees in open country, at the edges of clearings where there were still remnant patches of original forest, and in well cultivated areas where there were good patches of second growth around and in second-growth forests. Occasionally, pairs were seen feeding on the coconut inflorescence inside groves near remnant forest patches, especially in farms in the hills.

Dicaeum hypoleucum hypoleucum **Sharpe, 1876**

LOCALITY RECORDS: Bongao, Sanga Sanga, Simunul, Tawitawi (Balimbing, Batu Batu).

COMMENT: The White-bellied Flowerpecker was very common at the edges of and inside the heavily forested areas of the larger islands of the Tawitawi Group. As many as 10 to a dozen of this species were observed feeding among the tiny fruits of fruiting forest trees, both the tall species and those of moderate height. When disturbed, the birds usually left singly or in pairs, going in different directions. Occasionally, this flowerpecker was also observed in fruiting trees in second-growth forests.

FAMILY **ZOSTEROPIDAE** WHITE-EYES

Zosterops everetti mandibularis **Stresemann, 1931**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: Everett's White-eye was very commonly observed feeding in trees of all heights in clearings, around cultivated farms, at the edges of forest patches and forested areas, and even in the second growth. The birds usually went about in groups of five to about a dozen members. It was interesting to watch the members of a flock feed on some low, fruiting, second-growth forest trees having tiny fruits with a large num-

ber of tiny insects attracted to them. The members would keep on moving from branch to branch and would eventually fly to the next tree nearby. The others would then follow one by one, except when markedly disturbed; then the whole flock would fly to a distant tree to resume their feeding.

FAMILY **ESTRILDIDAE** MANNIKINS

***Lonchura leucogastra palawana* Ripley and Rabor, 1962**

LOCALITY RECORDS: Bongao, Tawitawi (Batu Batu).

COMMENT: The White-breasted Mannikin was not as commonly seen on the larger islands in southern Sulu as *L. malacca*. It seemed to prefer the immediate vicinities of forest vegetation, either in clearings near extensive forest growths or near the remnant patches of dense forest. In fact, small flocks of about six to a dozen members were more often met with at the edges of forests in mixed tall grass and tree growth, rather than in the open clearings or in cultivated areas.

***Lonchura malacca jagori* (Martens, 1866)**

LOCALITY RECORDS: Bongao, Sanga Sanga, Tawitawi (Batu Batu).

COMMENT: The Chestnut Mannikin occurred around the well cultivated areas and in comparatively new clearings in the interior of the larger islands in southern Sulu, usually in pairs, family groups, or flocks of 100 members or more. Late in the afternoons large numbers, sometimes as many as several hundred birds, were observed to congregate in some localities in an open area, preferably part of an extensive marsh of tall grass and reeds, where they roosted. They usually arrived in these roosting places in separate flocks from different directions. Early the next morning the birds left their roost in flocks of various sizes and flew in all directions to the day's activities.

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INTRODUCTION

The Delaware Museum of Natural History and Mindanao State University Expedition to Dinagat and Siargao Islands (see Itinerary, Table 1) recorded 115 species of birds, 69 of which represent new records for Dinagat and 65 for Siargao, a previously uncollected island. (Throughout this paper such new records are indicated by an asterisk following the island name.) In addition, one new subspecies is described. The senior author is responsible for the taxonomic accounts, and the junior author is responsible for the ecological accounts. The latter led the field party and has also contributed many heretofore unpublished field notes about Philippine birds.

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DINAGAT AND SIARGAO ISLANDS

Geographic, Physiographic, and Geologic Features

Dinagat Island, the largest of the Dinagat Group (area about 671 sq. km. or 347 sq. miles) is located at 10° north latitude and 125°45′ east longitude. It lies southeast of the southern end of Leyte Island and is north of Surigao del Norte Province on the northeastern projection of Mindanao Island. One of the smaller islands in the eastern Philippines, Dinagat lies on the Pacific Ocean side; together with Luzon, Polillo, Catanduanes, Samar, Mindanao, and Siargao, it forms a small part of the Eastern Rim of the Archipelago that directly borders the Philippine Deep.

Siargao Island, much smaller than Dinagat (area about 347 sq. km. or 134 sq. miles) is located at 9°55′ north latitude and 126°10′ east longitude. It is the largest of the Siargao Group and lies to the southeast of Dinagat Island and not far from it. It is immediately northeast of Surigao del Norte Province, in the northeastern projection of Mindanao Island. Together with Dinagat Island, it forms one of the smaller islands on the Pacific Ocean side of the Philippine Archipelago.

On Siargao, and especially on Dinagat, there are wide areas in the interior among the mountains where the soil is red, heavy, and metallic. Smith (1924) has identified this type of soil as laterite. He writes that "in the Philippines there is much laterite in various localities at both high and low altitudes. In Surigao Province, northeastern Mindanao, there is the greatest extent of this deposit yet found in the Philippines." Considering the fact that Dinagat and Siargao are supported by the same platform and actually represent a small portion of the submerged platform of the Eastern Rim, as it is found south of Samar Island, the same type of soil is to be expected on both small islands. In fact, at present there are iron and nickel mines in Surigao del Norte Province and in several localities on Dinagat and Nonoc Islands. Meanwhile, explorations for iron and nickel continue on Dinagat, Siargao, and other islands of the Dinagat and Siargao Groups.

Figure 1: Dinagat Island.

Table 1: Itinerary of the Dinagat-Siargao Biological Expedition

March 7, 1972	Departure from Mindanao State University, Marawi City, for Loreto, Surigao del Norte, on Dinagat Island.
March 8	Arrival in Cebu City. Purchase of supplies and materials needed in the operation of the expedition party on Dinagat and Siargao Islands; departure for Surigao, Surigao del Norte, by ship at 10:00 PM.
March 9	Arrival in Surigao, Surigao del Norte.
March 10	Departure for Loreto Municipality on Dinagat Island, Surigao del Norte, by motor launch; arrival at Loreto at 6:00 PM.
March 11	Established main headquarters and base camp in Barrio Kambinlio, Loreto, about 4 km. northeast of the town, at the base of Mt. Kambinlio, second highest mountain on the island. Camp located about 1 km. from sea coast and on the northern bank of a good-sized stream.
March 12 to April 24	Collections of terrestrial vertebrates and studies on the natural history of the area conducted in Kambinlio and the surrounding localities, including the hills and mountains comprising Mt. Kambinlio and Mt. Redondo.
March 27	Collecting team of eight members led by Quintin M. Bautista, Jr., established collecting subcamp in Sitio Omasdang ("Masdang" on most maps of the area), situated close to the northeastern end of Dinagat Island on the Pacific Ocean side.
March 27	Second collecting team of eight members led by Policarpio Dingal established another subcamp on the lower elevations of Mt. Kambinlio, on the western side, at Sitio Magkono, about 600 meters above sea level.
March 28 to 30	Sitio Magkono team made collections of terrestrial vertebrates, especially birds and mammals, on higher elevations of Mt. Kambinlio, but strong rains and winds forced them down to base camp at Barrio Kambinlio late in the afternoon of March 30.
March 28 to April 4	Collections of natural history specimens, especially terrestrial vertebrates, and studies on the natural history of the area conducted in Omasdang subcamp and the localities toward the interior.
March 31	Collecting team of eight members led by Roberto Lim established subcamp in Sitio Paragua, Barrio Esperanza, Loreto, on the slopes of the main peak of Mt. Kambinlio, about 250 meters above sea level.

April 1 to 8	Collections and studies conducted in the forested localities in and around the Sitio Paragua subcamp on the slopes of Mt. Kambinlio and toward the main peak.
April 5 to 6	Collections and studies continued in the localities around Barrio Kambinlio base camp; surveys made in the more interior localities toward Mt. Kambinlio and Mt. Redondo peaks for possible establishment of subcamp sites from which future collecting could be based.
April 7 to 17	Collections and studies conducted from Sitio Balitbiton subcamp; led by Quintin M. Bautista, Jr.
April 9	Sitio Paragua subcamp collecting team returned to Kambinlio base camp.
April 10	Team of eight members led by Roberto Lim established collecting subcamp in Barrio Plaridel, Albor, on the western side of Dinagat Island. Camp was established in a logged area in rolling country and low hills where there were still many patches of remnant dipterocarp forests in the surrounding localities.
April 11 to 24	Collections and studies conducted in Plaridel and surrounding localities, especially in the interior where forests were still dense.
April 25	Departure of main body of expedition party from Kambinlio main camp for Dapa on Siargao Island, Surigao del Norte. Plaridel collecting team joined party when launch that it took for Surigao passed Plaridel, Albor, on its way to Surigao. Party arrived in Surigao in early afternoon; purchased needed materials and supplies for operations on Siargao Island.
April 26	Departure for Dapa by launch, arriving there in early afternoon. Party proceeded immediately to Barrio Osmeña in the interior of the southern end of Siargao Island and established base camp in barrio meeting hall, a large building without walls but with good floor and roof.
April 27 to May 5	Collections and studies conducted on Siargao Island, including localities in and around Barrio Osmeña in the southern part of the island; Maasin, Pilar, in the southeastern part; Antipolo, Numancia, in the northwestern part; and San Isidro in the northeastern part.
May 6	Departure of expedition party from Barrio Osmeña base camp, Dapa, for Mindanao State University via Surigao, Cebu City, and Iligan City; arrival in Surigao late in afternoon.

May 7	Departure for Cebu City.
May 8	Arrival in Cebu City.
May 9	Departure for Iligan City.
May 10	Arrival in Iligan City; proceeded immediately to Mindanao State University.

Dinagat and Siargao are both predominantly hilly and mountainous. In many places the hills and mountains reach the sea, thus producing very much eroded steep cliffs against which the waves beat constantly. This phenomenon is well demonstrated on the Pacific Ocean side of Dinagat Island, where the entire east coast has high precipitous cliffs and only a few narrow strips of level, white sandy beaches, found only inside the very few well protected and almost totally enclosed small coves. The large waves of the Pacific Ocean cannot reach these well concealed areas.

Both Dinagat and Siargao, as well as the other small islands in these groups, have very rough and rocky terrain, with relatively small areas of flatlands that can be used for productive farming. On Dinagat Island most of the cleared areas, even on the less rough terrain on the western half, are planted to sweet potatoes, cassava, corn, and upland rice, with a very minor area devoted to wet-rice culture. Along the streams, which are mostly short and tidal and where the soil gets sufficient moisture, the inhabitants have planted Biga or Badiang (*Alocasia macrorrhiza* [Linn.]) in good quantities for use as food once the

Figure 2: Islet off the west coast of Dinagat Island.

Figure 3: Rock cliff on the west side of Dinagat Island.

reserves of rice, corn, camote, and cassava are exhausted. The plants are left to grow for as long as five years with little care. Usually they are not utilized for food so long as there are still regular food crops, but strong Pacific typhoons and northeast monsoons frequently subject these islands to long periods of bad weather and prevent the arrival of boats carrying food. For this reason the inhabitants of Dinagat and Siargao culture plants of the Araceae family in the places that are not utilized for planting other crops.

The human settlements on Dinagat and Siargao have been established in regions where there are flatlands and, frequently, where there are streams that drain the areas. It is only in these localities that wet ricefields, coconut groves, cornfields, and other farm areas for various crops can be developed most favorably. Thus, the present towns and large barrios on both Dinagat and Siargao are always situated in well drained flatlands, which coincide with the locations of valleys and small coastal plains, with low and gradually sloping hills in the hinterlands.

On the eastern half of Dinagat there is an extensive and continuous range of mountains (elevations 350–900 meters or slightly more) that is interrupted in only two places. First, a good-sized river drains more than two thirds of the entire east-west breadth of the island. Cutting across the middle region, this river starts in the mountainous regions on the western side and flows toward the eastern side. Second, there is an inland extension of the sea, a long and deep inlet that starts on the eastern side of the island and penetrates deep into the central interior at

the level of the northern one third of this island. Along much of these two inland bodies of water, there are extensive swamps that are covered with the mangrove forest type of vegetation and nipa palms.

The western half of Dinagat Island is likewise hilly and rough, but the hills are not very high and many of them have gradual slopes that are still suitable for cultivation. Thus, the cultivated areas on the western half of the island are definitely more extensive and contrast distinctly with the rough and heavily forested mountains on the eastern half.

Siargao, too, has very rough terrain throughout the entire island, but exceptionally so in its interior regions. Unlike Dinagat, however, the highlands of Siargao do not reach high elevations, being only about 100–275 meters above sea level. Many of the hills have easy and gradual slopes that permit extensive cultivation. As a result, large areas in the interior of Siargao are cultivated and farmed. The greater portion of the hinterlands of Siargao is really rolling country, already well cultivated and planted to various crops. Thus, there is a larger area under cultivation on Siargao Island than on Dinagat.

Ecologic and Biologic Features

Flora

Dinagat has large areas of untouched original forest vegetation that still thrive luxuriantly, especially on the higher elevations of hills and mountains in the eastern half. Large patches of various types of original forest can be found, especially on the sides, ridges, and tops of hills. In contrast, the areas of original vegetation on Siargao are no longer as extensive as those on Dinagat. Original vegetation areas are restricted to patches found on the sides, ridges, and tops of steep hills mainly in the interior. The hills close to the coasts average lower elevations and

Figure 4: River mouth and camp at the base of Mt. Kambinlio, Dinagat Island.

have gradually sloping sides, with plenty of rolling country among them; hence, they have been cleared and cultivated by the inhabitants. Except for the comparatively few, steep, inaccessible places on most of the hills close to the coast, the greater part of the countryside is well farmed.

On both Dinagat and Siargao there are large areas of grasslands occupying the hillsides and the slopes of mountains at lower elevations. In fact, sometimes entire hills and the greater part of a mountain are occupied by tall grass, mostly Kogon (*Imperata cylindrica* [Linn.] and *I. exaltata* Brongn.). After months or even years, these grasslands are burned, cultivated again, and planted to food crops.

At present, the following habitat types are found on the islands:

Original forest vegetation
- Mangrove forest
- Beach forest
- Dipterocarp forest
- Scrub forest
- Mossy forest

Secondary forest vegetation or second-growth forest
Parang vegetation
Grasslands and open-country vegetation
Cultivated areas

Original Forest Vegetation Type. Dinagat Island, at present, still possesses extensive areas of original forest vegetation that belong to several types. In some places, these original vegetation types are represented by only remnant patches, especially in the areas that people have cleared for use. These original vegetation areas or remnant patches are found from the coasts, at sea level, and into the interior in the highlands, as high as 950 or so meters above sea level. The mountainous regions, especially in the eastern half of Dinagat Island, are still covered with wide areas of scrub forests, which occupy the sides, ridges, and peaks of mountains. There are still small patches of remnant original dipterocarp forests on the lower elevations of hills and mountains in the central parts, as well as in the small valleys among the mountains. Along the coasts, especially on the western side of Dinagat, there are narrow strips of mangrove and beach forests still of the original types, in addition to the mixed remnant original mangrove and second growth of this forest type. Many swamps formerly occupied by mangrove forests are now cleared of all mangrove species and have been planted to nipa palms (*Nypa fruticans* Würmb.).

Figure 5: Ricefields at the base of Mt. Kambinlio, Dinagat Island.

Siargao Island also has good areas of some original forest vegetation types. The original dipterocarp forest vegetation type, however, is practically all gone on this island, except for some small patches of mixed remnant dipterocarp and second growth, with the least number of species belonging to the dipterocarps.

Mangrove Forest Type. Numerous patches of mangrove forest are still found in narrow strips along the coasts of Dinagat Island, especially on the western side. The favorite sites of the small patches of remnant original mangrove forest vegetation and of the mixed growths of remnant original mangrove and second-growth mangrove vegetation type are the shores along the coves and other well protected areas along the coasts. On the eastern side where steep cliffs reach the sea and no beaches are formed at all, the mangrove forest vegetation type is scarcely found, except in the concealed and well protected coves. On the average, the small patches of mangrove forests found in many places on Dinagat Island are no longer of the same type as the patches of original mangrove forest vegetation type found on the other islands of the Philippines, or even on the islands near Siargao, where they have been left untouched. In many places the swamps are occupied with dense growths of nipa palms (*Nypa fruticans* Würmb.) with which the inhabitants have replaced the original mangrove type of vegetation. The nipa palms supply the much-needed roofing and walling materials the people use when they build their houses. They also utilize the nipa palms as sources of a native drink and as vinegar.

Siargao Island has comparatively wider areas of original mangrove forests. There are also small islands lying close to Siargao that are covered with very dense growths of this type.

Characteristic of an original mangrove forest patch anywhere in the Philippines, a similar patch on Dinagat and Siargao contains the following plant forms:

Rhizophora spp.	RHIZOPHORACEAE
Ceriops spp.	"
Bruguiera spp.	"
Sonneratia spp.	SONNERATIACEAE
Avicennia officinalis Linn.	VERBENACEAE

In the drier and sandier areas of the mangrove swamps the following plant species may also be found growing side by side with the typical mangrove forest species:

Lumnitzera littorea (Jack)	COMBRETACEAE
Heritiera littoralis Dryand.	STERCULIACEAE
Xylocarpus spp.	MELIACEAE
Acanthus spp.	ACANTHACEAE
Caesalpinia spp.	LEGUMINOSAE
Hydnophytum formicarum Jack	RUBIACEAE
Myrmecodia echinata Gaudich.	"
Acrostichum aureum Linn.	POLYPODIACEAE

As a whole, the remnant mangrove forests on Dinagat Island are narrow strips along the coast, frequently extending into the sea for several meters. During high tides the sea covers the ground, and these forest patches appear like forests in the sea. This condition is very well observed along the western side of the island.

On Siargao there are still many remnant mangrove forest patches, some of them quite extensive, which are typical of this original vegetation type as found anywhere else in the Philippines.

Beach Forest Type. On both Dinagat and Siargao the beach forest vegetation type is found usually in small patches and in narrow strips of varying extents along the seashores, especially on the western sides of these islands. On both islands the larger parts of the areas that used to be occupied by original beach forests have already been cleared and planted to coconut (*Cocos nucifera* Linn.). In some places along the coasts, far from human settlements, there are still some remnant areas of original beach forests. On Dinagat Island, especially, there are unoccupied localities with some areas of lowlands that start at the base of the hills in the interior, about 0.5 km. inland, and extend to the sea, forming sandy beaches. Remnant patches of beach forests grow in them. Usually there are also areas of mangrove forests, either original patches or second-growth, that occupy certain parts of the beaches closest to the sea and extend into the water for several meters. During low tides

Figure 6: River and forest at the base of Mt. Kambinlio, Dinagat Island.

these areas go dry temporarily, thus leaving the entire mangrove forest patch out of water. The areas are not very wide and do not extend more than 20–25 meters inland.

In the localities where there are no beaches at all, where the hills meet the sea directly and form steep banks with rocky overhangs, there are still remnants of what used to be beach forest vegetation. Patches of this vegetation type grow on top of the rocky cliffs as high as 10 meters above sea level. They also occupy the steep banks and hillsides along the coasts of Dinagat Island.

The plant species growing on these modified locations are found in typical beach forest vegetation types and include the following:

Barringtonia spp.	LECYTHIDACEAE
Terminalia catappa Linn.	COMBRETACEAE
Vitex trifolia Linn.	VERBENACEAE
Casuarina equisetifolia Forst.	CASUARINACEAE
Pandanus spp.	PANDANACEAE
Cycas Rumphii Miq.	CYCADACEAE
Caesalpinia spp.	LEGUMINOSAE
Ipomoea pes-caprae (Linn.)	CONVOLVULACEAE
Acanthus spp.	ACANTHACEAE

Because of erosion most of the islets found along the western side of Dinagat Island have no more beaches. On top of these islets vegetations closest to the beach forest type also develop. Many of them look very attractive, with stands of *Casuarina equisetifolia* growing side by

side with some palms that look like species of *Oncosperma* and *Livistona*. Among them are some *Cycas Rumphii*. On Siargao Island the coasts also contain patches of beach forests, but not in large areas.

Dipterocarp Forest Type. On Dinagat there are still good-sized areas of dipterocarp forests found as large patches on the slopes of mountains on the eastern half of this island. Some large areas are found on the lower slopes of Mt. Redondo and Mt. Kambinlio, in the northeastern third of the island. On the western half there are also good-sized patches of remnant original dipterocarp forests growing on the hillsides and in the small valleys that have been built up by the rivers coming from the interior. In the lower hills at the bases of Mt. Kambinlio and Mt. Redondo, there used to be many areas of dipterocarp forests, but these have since been cleared by the "kaingineros," or slash-and-burn farmers.

In many localities on the western coast of Dinagat there are patches of logged dipterocarp forests, and these extend down to almost the very sides of the sea. Logging is still actively pursued on Dinagat Island in spite of the questions raised by some of the mayors concerning the legality of the activity, considering the fact that the areas being logged have been granted as concessions for mineral explorations and possible exploitation as mines but not as logging and lumber concessions. The argument still goes on at present; meanwhile, the loggers continue to cut down the dipterocarp forest areas.

It is interesting to note that the people on Dinagat Island consider the lumber from their dipterocarp, scrub, and other forests much harder than that taken from the same species on other islands, including that from mainland Mindanao. They claim this extraordinary hardness is caused by the excessive deposition of metals, notably iron, absorbed by the trees from the soil. The wood, which is known locally as "Magkono," is really very hard and easily breaks the cutting edges of bolos and axes.

The plants that are found in the remnant patches of original dipterocarp forests include the trees and other plants typical of original forests on Mindanao and other islands of the Philippines. The Forest Research Division of the Bureau of Forest Development, Republic of the Philippines, and the Philippine National Herbarium list the following species found on Dinagat and Siargao, which form the important components of the first and second stories in the remnant patches of original dipterocarp forests on these islands:

Dipterocarpus grandiflorus Blanco	DIPTEROCARPACEAE
D. vernicifluus Blanco	"
Shorea almon Foxw.	"
S. guiso (Blanco)	"

Figure 7: Dr. D. S. Rabor in front of the cut base of a dipterocarp tree, Mt. Kambinlio, Dinagat.

S. squamata (Turcz.)	DIPTEROCARPACEAE
S. negrosensis Foxw.	"
S. teysmanniana Dyer	"
S. astylosa Foxw.	"
S. polysperma (Blanco)	"
Hopea acuminata Merrill	"
H. plagata (Blanco)	"
Anisoptera thurifera (Blanco)	"
Pentacme contorta (Vid.)	"
Eugenia spp.	MYRTACEAE
Xanthostemon verdugonianus Naves	"
Neonauclea calycina (Bartl.)	RUBIACEAE
Artocarpus communis Forst.	MORACEAE
Ficus spp.	"
Mimusops parvifolia R. Br.	SAPOTACEAE
M. callophylloides Merrill	"
Diplodiscus paniculatus Turcz.	TILIACEAE
Koordersiodendron pinnatum (Blanco)	ANACARDIACEAE
Wrightia laniti (Blanco)	APOCYNACEAE
Alphonsea arborea (Blanco)	ANNONACEAE
Intsia bijuga (Colebr.)	LEGUMINOSAE
Albizzia acle (Blanco)	"
Afzelia rhomboidea Vid.	"
Diospyros pyrrhocarpa Miq.	EBENACEAE
D. mindanaensis Merrill	"
D. philippinensis Gurke	"
D. ferrea Engler	"
Vitex parviflora Juss.	VERBENACEAE
V. turczaninowii Merrill	"

The plant species forming the third story in a typical dipterocarp forest patch on Dinagat Island are mostly the typical forms found in the same forest type on other islands, especially on Mindanao. They include:

Laportea spp.	URTICACEAE
Macaranga spp.	EUPHORBIACEAE
Mallotus spp.	"
Ficus spp.	MORACEAE

On the trunks and branches of the taller tree species, the following plant species comprise the dominant epiphytes and climbers:

Calamus spp.	PALMAE
Pandanus spp.	PANDANACEAE
Freycinetia spp.	"
Phalaenopsis spp. and other Orchidaceae	ORCHIDACEAE
Schizostachyum spp. and other climbing bamboo species	GRAMINEAE

The typical three-story vegetation types found in the dipterocarp forests on Dinagat Island are also found on other islands of the Philippines. In the logged-over areas, however, most of the tall first-story tree species are frequently very much reduced in numbers, and the remaining forest type becomes more dense and tangled, with more growths on the forest floor. This is in contrast to the clean forest floor of the untouched dipterocarp forest vegetation type on other islands. The Dinagat undergrowth consists mainly of rattan and ferns.

On Siargao Island there are a few small patches of real original dipterocarp forests left. The inhabitants have already cleared up most of this forest vegetation type and utilized the lumber in constructing their buildings and for other articles made of wood. Inside some small valleys among the hills, especially along the areas drained by a stream, and up the basal portions of the adjacent hills, remnants of what used to be dipterocarp forests are found. On the higher elevations of the hills other types of vegetation are usually found.

Scrub Forest Type. On Dinagat Island many of the hills and low mountains in the interior are rocky, and the soil is usually dry. In these sites a type of forest vegetation is found that is characterized by the dense growth of low trees, averaging 6–7 meters in height and about 30–32 cm. in diameter in the middle of the trunk. There is only one height of trees growing in the area. A typical patch of this forest vegetation type resembles very closely the scrub forest vegetation type found on the larger islands of the Sulu Archipelago. Upon closer observation the resemblance is further shown by the presence of many plant forms that are either identical to or members of the same families.

In the small areas of low flatlands in the lowlands and among the bases of the hills and mountains, where streams come from the mountains in the interior and drain the sites, remnant patches of dipterocarp forests are found. In the same general locations but higher up, scrub forests grow and cover the entire sides, tops, and ridges of the hills and mountains. Immediately above the highest level of the real dipterocarp forest vegetation patches and immediately below the lowest level of the scrub forests, the vegetation type becomes very similar to the midmountain forest vegetation type, which is characteristic of mainland Mindanao highland areas. Unlike the Mindanao mainland or Leyte, however, there is no distinct zone on Dinagat Island where a real midmountain forest is found. At most, this region between the real dipterocarp forest vegetation type and that occupied by the scrub forest vegetation type is a transition area and shares the characteristics of both vegetation types.

The typical and ideal site for the scrub forest vegetation type is one that is rocky, has dry soil, and is exposed to strong winds from all

directions. The hilly and mountainous terrain of Dinagat Island provides many ideal sites for the scrub forest vegetation type to thrive in. In fact, starting from very close to the seacoast and proceeding into the interior and on up the hills and mountains, including the slopes, ridges, and tops, large areas on Dinagat Island are densely covered with scrub forests.

On the slopes of Mt. Redondo and Mt. Kambinlio, but not on the tops and ridges or even on the higher elevations of these two high peaks, large areas of scrub forests grow. At higher elevations another type of original forest vegetation replaces the scrub forests.

The following plant species are found in scrub forests on Dinagat Island:

Premna odorata Blanco	VERBENACEAE
Vitex spp.	"
Ficus ulmifolia Lam.	MORACEAE
Ficus spp.	"
Bauhinia malabarica Roxb.	LEGUMINOSAE

At the outskirts of scrub forests, especially where there are adjoining cleared areas or where second-growth vegetation patches have begun to develop, the following plant species are found:

Macaranga tanarius (Linn.)	EUPHORBIACEAE
Antidesma ghaesembilla Gaertn.	"
Lantana camara Linn.	VERBENACEAE
Tabernaemontana pandacaqui Poir.	APOCYNACEAE
Leucaena glauca (Linn.)	LEGUMINOSAE

In the upper elevations on the slopes of the higher peaks and on the tops and ridges, the vegetation changes in nature and differs from the scrub forest vegetation type. On the average, the trees become shorter (4–5 meters or less) and the diameter of the trunks at the middle becomes smaller (20 cm. or less). The trunks and branches are covered with dense layers of ferns and mosses, so that the trunks and branches appear double their actual size. Moreover, the trees have a tendency toward irregular forms compared to the average trees found in the typical scrub forest. As is characteristic of the higher elevations of Philippine mountains, the scrub forest vegetation type here blends imperceptibly into the mossy forest vegetation type.

Scrub forests grow extensively on the steep and very rocky parts of the hills on Siargao Island. On the tops and ridges of most of the higher hills, the scrub forests are found in large areas and remain almost untouched. The tops and ridges of the lower hills, especially the easily accessible elevations and those with gentle slopes, are mostly covered with grasslands or second growth. People use them for planting

their food crops, especially camote or sweet potato, cassava, corn, and once in a while even upland rice.

Mossy Forest Type. On Dinagat Island the scrub forests that grow in the higher elevations change imperceptibly to the mossy forest vegetation type. The distinctive characters of the vegetation in these elevations, especially on the exposed ridges and peaks of mountains, are:

1. the presence of dense growths of mosses, liverworts, and ferns, especially the first group of plants, on the trunks and branches of the trees, making these parts appear much larger than they actually are;

2. the marked decrease in the heights of the trees from the average of about 6–7 meters in the scrub forests at lower elevations to heights of about 3–4 meters in the mossy forest areas; and

3. the very irregular shapes of the trees, unlike those of identical species found in the scrub forests at lower elevations.

The mossy forest areas on Dinagat are not as extensive as those on the higher mountains of the larger nearby islands, such as Mindanao and Leyte; and the dense growths of mosses, liverworts, and ferns on the forest floor are found only in very restricted areas on the ridges and summits of the mountains at about 800 meters and above, especially on Mt. Redondo (929 meters above sea level) and Mt. Kambinlio (903 meters above sea level). These areas are frequently found in small gullies and other concavities where they are not affected by strong winds.

The real mossy forests are found only on the high ridges and summits of peaks in the very mountainous regions of the eastern half of Dinagat Island. There are no real and typical mossy forests on Siargao Island, even on the highest ridges and peaks of the hills: the hills on Siargao are not very high, reaching elevations of about 200–274 meters above sea level at most.

Secondary Forest or Second-Growth Forest Vegetation Type. Large areas on both Dinagat and Siargao are already covered with secondary forests. The rough and hilly western half of Dinagat contains extensive second-growth forests beginning from the coasts (and whatever lowlands there are between the coasts and the hills) and extending into the interior, including rolling country, hills, and the slopes of lower mountain peaks, especially where the slopes are gradual and fit for cultivation. The inhabitants of Dinagat have already cleared large tracts of the primary vegetation cover and have planted their crops in the cleared areas. After several years these cleared areas are abandoned and left to develop whatever plants flourish in them. Secondary forests eventually cover all these areas. Meanwhile, the slash-and-burn farmers, or "kaingineros" as they are called, have moved on and selected another area for clearing. Many of these areas are fertile and are made into regular farms eventually.

On Siargao Island there are also large secondary forests areas resulting from the activities of the inhabitants. As on Dinagat, these areas are found from along the coasts and deep into the interior, covering rolling country, flatlands, and hills. The cultivated areas, especially those on the sides and tops of hills, are frequently allowed to grow back to second-growth forests before they are cleared again after several years of this forested condition.

A typical patch of secondary forest on either Dinagat or Siargao resembles other patches of secondary forest in the Philippines. The plant growths in such a patch are typically a mixture of trees of various heights, shrubs, bushes, and even herbs, all growing together in different degrees of density in the various parts of a particular site. There is usually the sparse growth of tall trees, quite far from each other. Lower trees are more numerous and are found among the taller ones. Shrubs and bushes grow among the trees and form dense growths. In some places there is a dense covering of herbs on the forest floor. The lower growths, including the shrubs and bushes, may grow very close to one another in some areas, making progress on foot very difficult. In other sites, however, the plants are not close at all, and one can walk among them with no difficulty.

The following trees, shrubs, bushes, and herbs are found frequently in any second-growth forest patch on Dinagat and Siargao:

Premna odorata Blanco	VERBENACEAE
Vitex spp.	"
Macaranga tanarius (Linn.)	EUPHORBIACEAE
Antidesma ghaesembilla Gaertn.	"
Diospyros discolor Willd.	EBENACEAE
Ficus spp.	MORACEAE
Artocarpus spp.	"
Sterculia foetida Linn.	STERCULIACEAE
Sesbania grandiflora (Linn.)	LEGUMINOSAE
Leucaena glauca (Linn.)	"
Bauhinia malabarica Roxb.	"
Erythrina indica Lam.	"
Tabernaemontana pandacaqui Poir.	APOCYNACEAE
Datura metel Linn.	SOLANACEAE
Justicia gendarussa Burm.	ACANTHACEAE
Blumea balsamifera (Linn.)	COMPOSITAE
Andropogon spp.	GRAMINEAE
Coix lachryma-jobi Linn.	"
Amorphophallus campanulatus (Roxb.)	ARACEAE
Musa spp.	MUSACEAE
Areca catechu Linn.	PALMAE
Caryota Rumphiana Mart. var. *philippinensis* Becc.	"

Pandanus spp.	PANDANACEAE
Eugenia spp.	MYRTACEAE
Psidium guajava Linn.	"
Trema amboinensis (Willd.)	ULMACEAE
Melia candollei Juss.	MELIACEAE

In many places the secondary forest patches become surrounded by grasslands with sparse growth of nongrass vegetation; eventually the open countryside becomes an area of mixed grass and patches of tree-shrub-bush growths of varying sizes, giving rise to the parang vegetation type.

Parang Vegetation Type. The parang vegetation type is a mixture of grassland and second-growth forest. This vegetation type may be considered either as one where the grasslands are being invaded by patches of second-growth trees, or as one in which patches of second-growth forests are gradually being encroached upon and perhaps being taken over by grasslands. If fires are used repeatedly in clearing a particular area of secondary forest of its tree-shrub-bush growths, then the grasses belonging to the tall species group, such as Kogon, *Imperata exaltata* Brongn. and *Imperata cylindrica* (Linn.), and *Saccharum spontaneum* Linn. var. *indicum* Hack., develop and eventually become dominant. If the grasses are not burned in a particular area, then this area is quickly invaded by secondary forest species—trees first, followed by shrubs, and then by bushes. Eventually these tree-shrub-bush growths form larger and larger patches in the grasslands, and the site becomes a typical parang vegetation area. When the people leave a parang area free from burning for a long time, the secondary forest patch becomes larger and larger until a patch of secondary forest is formed. The grasslands around the second-growth forest patch will gradually be grown over, and eventually only the second-growth forest will be left. The area thus becomes a secondary forest patch.

On Dinagat and Siargao Islands, there are good-sized areas occupied by parang vegetation. In the same areas there are also good-sized grasslands and open country, as well as patches of varying sizes of secondary forests. In the interior regions of Dinagat and Siargao, the hillsides and the gentle slopes of low mountains are covered with mixed vegetation types of grassland, parang, and second-growth forest. Any one of these three vegetation types can develop into any of the other types if given time and the requisite conditions.

In a typical area covered with parang vegetation on Dinagat and Siargao, the following plant species are commonly observed:

Imperata spp.	GRAMINEAE
Saccharum spontaneum Linn. var. *indicum* Hack.	"
Andropogon spp.	"

Acacia farnesiana (Linn.)	LEGUMINOSAE
Bauhinia malabarica Roxb.	"
Leucaena glauca (Linn.)	"
Erythrina indica Lam.	"
Gliricidia sepium (Jacq.)	"
Mimosa pudica Linn.	"
Mucuna pruriens (Linn.)	"
Antidesma ghaesembilla Gaertn.	EUPHORBIACEAE
Macaranga spp.	"
Mallotus moluccanus (Linn.)	"
Trema orientalis (Linn.)	ULMACEAE
Eugenia spp.	MYRTACEAE
Psidium guajava Linn.	"
Artocarpus spp.	MORACEAE
Ficus spp.	"
Lantana camara Linn.	VERBENACEAE
Tabernaemontana spp.	APOCYNACEAE
Semecarpus cuneiformis Blanco	ANACARDIACEAE
Cordia dichotoma Forst.	BORRAGINACEAE
Canangium odoratum (Lam.)	ANNONACEAE
Pandanus spp.	PANDANACEAE

Grasslands and Open-Country Vegetation Type. Large portions of the rolling country, hillsides, and mountainsides in the interior regions of Dinagat and Siargao Islands are covered with grasslands and open-country vegetation type. A typical grassland area is a very monotonous part of the countryside to traverse, because of the sameness of the vegetation type.

The extensive tracts of grasslands and open-country vegetation on both islands are principally large areas of grasses composed mainly of Kogon grass, *Imperata exaltata* and *I. cylindrica*, and Talahib grass, *Saccharum spontaneum*. Both grass genera grow typically in dense, pure stands and cover wide extents unless prevented from doing so. There is a typical pattern of distribution of these grasses in any area of grass-

Figure 8: Coast of Siargao Island.

lands. At the base or in the lower elevations of a grass-covered hill or mountain slope closest to the base, pure stands of *S. spontaneum* predominate. These stands vary in their denseness, depending largely on the moisture content in the soil; the greater the moisture content in the specific site, the larger the area of the stand that grows on it and the more dense the grasses grow. The mature Talahib grass grows to about 2–3 meters in height.

At the bases of hills and mountains, streams are most likely to be found, especially if the area (including the hinterlands) is not yet cleared and its original forest vegetation still continues to flourish. In general, where the moisture content of the soil is higher than in the other parts of a particular area, especially at the base of a hill or mountain, *S. spontaneum* grows favorably and likely forms dense, pure stands. Higher on the hillsides and on the mountain slopes, there is likely to be less moisture content because the rains do not stay in these elevations long enough for the soil to absorb the water and store it. *Imperata* grows in dense stands in these areas, which are higher in elevation on the hillsides and mountain slopes. This grass also grows in pure stands and can cover very wide areas on hillsides, hilltops, mountainsides, and mountaintops, as well as the ridges. If there is a small stream or gully or a spring situated anywhere on the side of a hill or mountain, then another type of vegetation will develop in this particular site, and grasslands will develop in the drier areas. *S. spontaneum* grows abundantly in pure stands along these streams, springs, and gullies, where sufficient moisture is absorbed by the nearby soil.

In a typical grassland and open-country vegetation type on Dinagat and Siargao, as on the other islands in the Philippines, the principal grass species covering large areas include the following:

Imperata exaltata Brongn.	GRAMINEAE
I. cylindrica (Linn.) Beauv.	"
Saccharum spontaneum Linn. var. *indicum* Hack.	"

Other species of tall grass are also found, but they occur only in small patches mixed among the large tracts of *Imperata* spp. and *S. spontaneum*. The following species of grass are frequently seen in grassland areas:

Andropogon spp.	GRAMINEAE
Rottboellia spp.	"
Apluda sp.	"
Ischaemum spp.	"
Themeda triandra Forsk.	"
Paspalum spp.	"
Panicum spp.	"
Eragrostis spp.	"

Figure 9: Typical coconut grove on Siargao Island.

A number of trees, shrubs, and bushes also grow in grasslands and open-country vegetation areas, mixed with Kogon, Talahib, and other minor grass species. The trees and shrubs, especially those of the same species, frequently grow singly and occur far from one another. They do not form real patches of nongrass growths in the typical grasslands. The bushes, however, may form small clumps or patches, especially when growing in flat grassland areas or in gently rolling country. The following species of trees, shrubs, and bushes are frequently found in grasslands, mixed with the broad, dense stands of grass:

Antidesma ghaesembilla Gaertn.	EUPHORBIACEAE
Macaranga tanarius (Linn.)	"
Mallotus spp.	"
Ricinus communis Linn.	"
Jatropha curcas Linn.	"
Trema orientalis (Linn.)	ULMACEAE
Acacia farnesiana (Linn.)	LEGUMINOSAE
Bauhinia malabarica Roxb.	"
Leucaena glauca (Linn.)	"
Mimosa pudica Linn.	"
Pithecolobium dulce (Roxb.)	"
Sesbania grandiflora (Linn.)	"
Erythrina indica Lam.	"
Tabernaemontana pandacaqui Poir.	APOCYNACEAE
Lantana camara Linn.	VERBENACEAE
Eugenia cumini (Linn.)	MYRTACEAE
Psidium guajava Linn.	"
Melia candollei Juss.	MELIACEAE

Blumea balsamifera (Linn.)	COMPOSITAE
Pandanus spp.	PANDANACEAE

In grasslands where fires do not occur, accidentally or intentionally, and where the various plant species including the grasses, trees, shrubs, and bushes are left to grow naturally, there is the tendency for the nongrass species to form larger patches among the grasses. The time comes when the area becomes a real mixture of grasslands and patches of secondary growth among the dense grass growths, thus becoming a typical parang area.

When the same area is not touched at all for a long time, the patches of trees, shrubs, and bushes come together to form one large area in a given locality, surrounded mainly by grasslands. A typical area of secondary forest or second-growth vegetation type has eventually developed. Under present circumstances, however, this condition will no longer exist on Dinagat and Siargao because the inhabitants keep clearing whatever tree-shrub-bush growths there are. This practice keeps the particular site as grasslands and even increases the previous grassland area many times. Burning whatever secondary forest patches are already developed in grassland areas, after allowing the patch to grow for several years, and utilizing these areas as farms is very common practice on Siargao and Dinagat, as well as on most islands in the Philippines.

Cultivated Areas. The terrain on the western side of Dinagat Island is not as rough and as mountainous as that on the eastern side. The greater portion of the interior of this island is not ideal for farming or as sites for permanent fields for cultivation. This is especially true after about 1 km. from the western coast toward the interior and across the entire east-west breadth of the island to the extremely rocky eastern coast.

At present, practically all the flatlands, however narrow they are, are planted to various food crops. The crops include upland rice, corn, camote, cassava, beans, and mangos. All the flat and well watered areas, including the small valleys with streams that drain across them, are well developed as permanent ricefields devoted primarily to wet-rice culture. The narrow strips of flatlands along the coasts and the gradual slopes of the hills located close to the sea coast (in some places actually meeting the sea) are all planted largely to coconuts. In the more interior regions, especially along the banks of the streams and up the bases of the hills and lower slopes of the mountains, bananas and *Alocasia macrorrhiza*, both good substitutes for cereals, are raised. Practically all available land areas on Dinagat Island that can be cultivated for the production of food crops are at present utilized for the purpose.

As noted before in this paper, large areas that used to be covered with dense growths of original vegetation or second growth are cleared and utilized as cultivated fields for raising food crops. After several

seasons the fertility of the area declines; and the farmers leave these clearings, allowing them to fallow and to develop whatever type of vegetation cover flourishes.

On Siargao Island there are more cultivated areas than on Dinagat. Its less mountainous terrain, with hills of low elevations, more flatlands, and rolling country, favors the cultivation of a greater part of the island. The crops raised on Siargao are much the same as those on Dinagat.

On both islands, along the edges and sides of the cleared areas and between the clearings, various second-growth species grow. When these clearings are abandoned, the plants, including trees, shrubs, and bushes, serve as the main sources of the fruits and seeds that later germinate, grow, and eventually cover the once-cultivated areas with vegetation. They develop eventually into secondary forest patches.

For any area to develop secondary forest patches, it is imperative that the area be allowed to retain whatever vegetation cover it acquires once it is no longer utilized as a cultivated field. This newly developed vegetation cover should never be cut and burned; otherwise, with the use of fire, especially if applied several times, this particular area becomes grasslands instead of secondary forests. If an area that has been cleared of its vegetation cover previously is to develop into secondary forest preparatory to eventually becoming a patch of original forest of one type or another, then the natural succession of vegetation types should be allowed to proceed without any disturbance from man.

The following plant species, many of them belonging to typical secondary forest vegetation type, are frequently found growing along the edges and margins of clearings and in the areas between them, especially when these cleared areas are situated in flatlands, rolling country, and low hills:

Gliricidia sepium (Jacq.)	LEGUMINOSAE
Erythrina indica Lam.	"
Pithecolobium dulce (Roxb.)	"
Leucaena glauca (Linn.)	"
Sesbania grandiflora (Linn.)	"
Mimosa pudica Linn.	"
Mallotus moluccanus (Linn.)	EUPHORBIACEAE
Macaranga tanarius (Linn.)	"
Ricinus communis Linn.	"
Jatropha curcas Linn.	"
Trema orientalis (Linn.)	ULMACEAE
Eugenia cumini (Linn.)	MYRTACEAE
Muntingia calabura Linn.	TILIACEAE
Ceiba pentandra (Linn.)	BOMBACACEAE
Lantana camara Linn.	VERBENACEAE
Premna odorata Blanco	"
Blumea balsamifera (Linn.)	COMPOSITAE

Tabernaemontana pandacaqui Poir.	APOCYNACEAE
Ficus spp.	MORACEAE

The highly mineralized soils in most parts of Dinagat and Siargao Islands are not ideal for really productive farming, except in some few localities where the soils are more normal in their mineral contents. Also, the strong winds from the Pacific Ocean, both the northeast monsoons and the typhoons, make it very difficult to raise food crops sufficient to take care of the entire needs of the inhabitants of these two islands and the smaller islands and islets around them. Normally, additional food supplies have to come from the nearby Mindanao mainland in order to supplement the food raised on these two islands.

Fauna

Dinagat and Siargao Islands are located at the opening between the Pacific Ocean and the Mindanao Sea, the latter being a very important inland sea in the southern Philippines as it connects directly or indirectly with the other inland seas in the central and western Philippines and meets the China Sea indirectly. The very favorable location of these two islands in waters where embryonic forms of marine vertebrates and invertebrates pass through on their way from the inland seas to the Pacific Ocean is an index of the very interesting and rich marine fauna and flora to be found here. The terrestrial fauna inhabiting these islands, especially the vertebrates, should exhibit the closest affinities with those of Mindanao, the nearest larger island, and, to a lesser degree, with those of Leyte, Panaon, and perhaps even Samar. The close faunistic affinities between the Dinagat-Siargao Island Groups and nearby islands should be strongest between Dinagat Island and these other islands, because Dinagat is close to both Mindanao and the Panaon-Leyte-Samar complex.

The results of the present collections of birds and mammals on Dinagat and Siargao Islands indicate very strong affinities between the mammalian and avian forms of Dinagat and Siargao with those of Mindanao. As early as possible, a more thorough and detailed collecting of and studies on the terrestrial vertebrates should be made, especially in the southern half of Dinagat Island and in the interior regions of Siargao Island. The additional specimens and data obtained in such a project would help much in studies regarding the degree of closeness of the affinities that the terrestrial vertebrate faunas on Dinagat and Siargao have with each other and with those on Mindanao and on the Leyte-Panaon-Samar complex. Simultaneously, collections of terrestrial vertebrates should also be made on as many of the smaller islands and islets comprising the Dinagat and Siargao Island Groups.

A cursory examination of the land mammals and birds collected

on Dinagat and Siargao by the DMNH-MSU Biological Expedition points to the possibility of about three forms of mammals (a gymnure, a rat, and a tree shrew), or maybe even more, that may prove to be distinct from the forms (on the species and subspecies levels) that have been recorded from the highlands of Mindanao Island. A more thorough collecting of mammals from both Dinagat and Siargao and from the small islands and islets around them will no doubt yield more interesting results. Inasmuch as Dinagat and Siargao are islands, it is very possible that the speciation process has already proceeded to such extent that subspecies (and maybe even species) of terrestrial vertebrates have already been evolved on these small islands and that these are distinct from the forms found on the nearby islands of Mindanao, Panaon, Leyte, and Samar.

The problem in the determination of the actual degree of closeness in the affinities of the terrestrial vertebrate faunas between Dinagat and Siargao on the one hand and the mainland of Mindanao on the other is further complicated by the lack of thorough studies in the eastern Mindanao region. There have not been thorough collections of and studies on the terrestrial vertebrate fauna of Surigao del Norte, Surigao del Sur, and Davao Oriental—the provinces closest to the Dinagat and Siargao Island Groups. The same type of studies should be made on Leyte and Panaon Islands, and even on Samar. The knowledge gained from such studies will serve as a basis for comparing the affinities of the terrestrial vertebrate faunas on the various islands.

FAMILY **ARDEIDAE** HERONS

***Dupetor flavicollis flavicollis* (Latham, 1790)**

Siargao*

Late in the afternoons, during the first three days of our stay in the main camp at Barrio Osmeña, Dapa, we observed a pair of Black Bitterns regularly fly near the campsite. They always flew low over the ricefields nearby and were observed to come from the same direction every time. The two birds always came from a densely wooded low hill, one of several that formed the outer borders of the small valley where the barrio was located. This valley was already well cultivated, with the larger part devoted to wet-rice culture and a much smaller part still occupied by marshes covered with dense growths of tall reeds (*Phragmites*). The pair were regularly observed to alight among a dense patch of these reeds.

Later on in the week, one collector secured a Black Bittern that flew from the dense foliage on top of a tree of medium height, one

* Throughout the text, new records are indicated by an asterisk following the island name.

of many such trees that covered a low hill, forming a dense patch of woods. Another bird soon flushed from the top branch of another tree, also of medium height, and alighted on the top of a nearby tree. This bird was also collected. Immediately after, the collector discovered a nest with two noisy young bitterns in it, located on top of the tree where the second bittern was shot. The two young birds were taken from the nest and brought to the camp, but they lived for only two days on a diet of rat meat. The two adult birds collected in the immediate vicinity of the nest must have owned it. They must also have been the two Black Bitterns that were regularly observed during the first three days of our stay.

The nest was a well formed, roughly circular platform of sticks of various sizes, which was securely placed in the forking of two horizontal smaller branches of a larger top branch. The nest was about 8 meters from the ground. There was a shallow cavity at the center of the platform of sticks where the two young birds stayed securely.

Later in the collecting, another Black Bittern was flushed from a dense patch of tall reeds along a small stream located at the edge of the same small valley where the two adult and two nestling birds had been taken earlier.

This was the only locality on Siargao Island, of all the collecting localities, where several birds of this species were seen and collected. In fact, this was the only island of the many Philippine islands collected in where this species was observed in good numbers within only one small locality. The species had always been rare in collections. It may not be really rare, but its very secretive habits and its selection of a home among dense growths of tall reeds in marshes seldom permits people to see it and meet with it, much less to collect it.

***Ixobrychus cinnamomeus* (Gmelin, 1789)**

Siargao*

The Cinnamon Least Bittern was not a rare bird on both Dinagat and Siargao.

Bitterns of this species were observed several times, singly, in flight over the ricefields and marshy areas in Kambinlio, Loreto, on Dinagat, not far from our campsite. Occasionally, single birds of this species were flushed along the edges of the rivers and streams in Kambinlio and other localities.

On Siargao, birds of this species were seen flying singly over the ricefields and the marshy areas in the small, well cultivated valley in Barrio Osmeña, Dapa, where the main camp was located. Several times, bitterns of this species were disturbed among the tall grass and reeds in the marshy areas where there were small streams in the same small valley.

***Butorides striatus javensis* (Horsfield, 1821)**

Dinagat

The Little Mangrove Heron was quite common inside the patches of mangrove vegetation that were growing along many parts of the western coast of Dinagat. This heron was also frequently observed feeding in the open areas of the seashores close to the edge of the water during low tide and far from the nearest patch of mangrove vegetation. It was frequently observed running actively after some prey in the mud and sand of these exposed parts of the shores.

Occasionally, solitary birds of this species were encountered as far as 1 km. inland from the nearest shore, having followed the rivers or streams to feed on the small animals that were found along the edges of the water.

Several birds of this species were seen actively feeding along the rocky shores of Dinagat and the islets off the Dinagat coast.

From the launch that took us to Siargao Island, we observed several herons of this species on the beaches of Siargao and the islets off Siargao. These birds were flying low or alighting on the shores along the edge of the sea.

***Bubulcus ibis coromandus* (Boddaert, 1783)**

Dinagat*

On Dinagat the Cattle Egret was frequently seen in small groups of about four to six members, feeding actively among the grass and weeds in the newly harvested ricefields, usually in the vicinity of grazing cattle and carabaos. When disturbed, the birds in the group usually flew, one after another, toward the patch of trees growing around the margins of the ricefields, often perching as a group on top of one of the trees. Usually they stayed long on such perches and then flew toward other parts of the cultivated area where there were cattle and carabaos feeding. In this new site the birds resumed their feeding and could be seen actively running among the grass and weeds and even under the feeding cattle and carabaos. One bird or two were sometimes seen on the backs of these animals picking something from their hair. Sometimes a bird would run toward some cattle or carabao, stretch its neck, and pick something from the side or belly of the grazing bovine. This sight was very familiar in many localities, usually close to settlements where there were marshy flatlands fully cultivated and devoted to wet-rice culture.

On Siargao these egrets were seen in the same type of feeding sites as on Dinagat. Feeding groups were seen several times in the fallow ricefields in the small valley where our camp was located. Somehow, none of the collectors ever succeeded in approaching the egrets closely

enough for effective collecting of any of the feeding groups, even for only one specimen.

The Visayans in the areas collected in, both on Dinagat and Siargao, called this species "Talabong" or "Tabong," its common local name in Cebu and Bohol.

***Egretta sacra sacra* (Gmelin, 1789)**

Dinagat*

One of our four specimens is in the white phase.

The Reef Egret was commonly seen, but usually singly, along the rocky shores of Dinagat, Siargao, and the numerous other small islands and islets. In boat trips around Dinagat Island, and from Dinagat to Siargao, we observed reef egrets frequently perched singly on some rocks close to the edge of the sea. During low tides solitary birds were often seen feeding on the sandy beaches of the numerous islets, when the tide left these beaches exposed, if only temporarily.

FAMILY ANATIDAE DUCKS

***Dendrocygna arcuata arcuata* (Horsfield, 1824)**

Dinagat*

On Dinagat Island the Wandering Whistling-Duck was common in the marshy areas of Kambinlio and adjacent localities, just across the river from our main camp yet close to it. The species was also seen in good numbers in the marshy areas on Pulo Island, the islet located off the coast of Loreto and separated from Dinagat Island by a narrow strait hardly 0.5 km. wide. These two natural habitats of the ducks were barely 1 km. from each other.

The ducks went about their feeding activities in flocks of about one to two dozen members. Two or more such flocks were often observed flying about the marshy areas in Kambinlio at the same time, especially when disturbed by farmers nearby on their way to the ricefields. The flocks would eventually alight in one particular area in the marshes and join the members of other flocks that had come earlier. Frequently, as many as 100 birds or more could be seen feeding actively among the tall reeds and grasses, which were found in good patches all over the marshes. When disturbed, the birds usually flushed in large numbers; and after flying about for a time, they joined together and formed flocks. Soon after, the flocks would frequently leave the area at the same time but flying in different directions. Frequently one or more flocks headed for Pulo Island. The flocks that we disturbed on Pulo Island followed the same behavior pattern, and some of them proceeded in the direction of the marshes close to our campsite or to other marshes in nearby localities.

There were several other marshes along the western coast of Dinagat where these ducks were observed in good numbers. Sometimes they were seen in the newly planted ricefields in the flatlands between the coast and the hills on the western side of Dinagat Island.

Several ducks of this species were seen a few times in flight over the ricefields and marshy areas in Barrio Osmeña, Dapa, on Siargao Island. The inhabitants in the locality told us that there were flocks of wild ducks that could be found in the interior of the island, where there were extensive marshlands. Most likely they belonged to the present species.

The Wandering Whistling-Duck is known locally as "Ga-kit'."

FAMILY **ACCIPITRIDAE** HAWKS and EAGLES

***Pernis celebensis steerei* Sclater, 1919**

Siargao*

The Barred Honey Buzzard was rare on both Dinagat and Siargao. The single specimen of this species was collected on Siargao Island while it perched on one of the higher branches of a second-story tree that grew on the outer part of a small remnant patch of original dipterocarp forest. The patch was at the base of a low hill, one of several that surrounded a small cleared valley planted to rice. The bird had just come from a second-story tree in a patch of mixed remnant dipterocarp and second-growth forest that was found on the lower slopes of a hill on the opposite side. It took some time before the bird could be located from among the many branches that were well covered from the outside by dense foliage. Once the bird was located, one was amazed that he did not see it immediately: it was big enough, and it did not really attempt to conceal itself.

The species was encountered twice on Dinagat Island. In each instance the bird was seen as it flew across a small cleared area from a medium-high tree on the opposite side. On both occasions the bird flew directly into the dense foliage of the tree and settled inside, not on one of the prominent top branches, unlike many other species of birds of prey. On both occasions it was rather difficult to locate the bird from among the many branches of the perching tree. Once located, it did not tarry long but left immediately for another tree quite a distance away.

***Haliastus indus intermedius* Blyth, 1865**

Dinagat

On Dinagat and Siargao and on the other islands around them, large and small, the Brahminy Kite was a familiar sight as it soared on motionless wings, quite high over the sea yet close to the coasts of

these islands. It was always interesting to watch this kite plunge into the sea from quite some height and rise with a fish in its claws, then proceed immediately to a tall tree, usually a prominent one on some ridge along the rocky coast. Here the bird perched, preferably on a bare branch at the very top or close to the top. Frequently the bird was seen perching on the very apex of the tree, and from a distance appeared as if it were sitting on the very top of the green foliage at the center of the tree top. Its white breast could be seen for long distances.

At our campsites on both Dinagat and Siargao, a pair of these kites was staying close by, and in each locality each pair covered the marshy areas in the immediate surroundings of their nesting tree. The pair on Dinagat Island included as their hunting territories the nearby seas, even those around the small island off the coast. The same pair also included the expanse of river that ran close to our campsite for about a half kilometer.

Spilornis holospilus **(Vigors, 1830)**

Dinagat
Siargao*

On Dinagat and Siargao the Serpent Eagle was frequently seen and heard as it habitually soared high on motionless outstretched wings over the hilly and mountainous regions in the interior parts of both islands. The characteristic loud and piercing notes that this eagle gave out while in soaring flight carried far. The bird soared in wide circles over extensive areas. The circle that it followed in its soaring flight gradually kept on moving away from a particular reference point, until the bird had disappeared in the distance. The territory that it covered in its soaring flight usually included open country, marshy areas, cultivated fields, well wooded hills, and low mountains. After some time, the soaring bird usually selected for its perch a tall or moderately high tree, often one growing sparsely and quite far apart from any other. Dead trees that had been left standing inside newly burned clearings in the forests were favorite perches of this eagle. In addition, solitary tall coconut trees growing in well cleared and cultivated areas, usually on the outskirts of coconut groves immediately bordering cultivated fields, were frequently observed as favorite perches. On any one of these vantage points the eagle perched for some time and examined the surrounding areas; then suddenly the bird would dive downward and pounce on something on the ground. It had been observed many times that the bird stayed for as long as half a minute on the ground and even went among the grasses and weeds in certain sites, which were mixed with dried and partly burned twigs and branches of the trees. More often than not, the eagle flew back to its perch or one nearby

grasping a wriggling snake or lizard in its claws. Once on the perch the eagle usually began swallowing its prey. It usually took a while before the whole prey was consumed.

Four birds of this species were taken on the perch with their entire prey still tightly grasped in their claws. Three of the eagles had a snake, and one had a green long-tailed lizard, most likely *Calotes* sp.

***Accipiter trivirgatus extimus* Mayr, 1945**

Dinagat*
Siargao*

The Crested Goshawk was seldom met with on Dinagat and Siargao. The species was not really rare on these islands, but its secretive habits and its characteristic of staying quiet and motionless on its perch, usually one of many branches inside the semidarkness of the dense foliage, made it difficult to discover this bird, much less to collect it. All specimens were secured when they were accidentally disturbed among the branches and dense foliage of second-story and third-story trees. The trees grew inside patches of original dipterocarp and mixed dipterocarp and second-growth forests that were left on some of the hills and lower slopes of the mountains inland.

Twice during the collecting on Dinagat and once on Siargao solitary birds of this species were accidentally encountered at different times at the edges of small clearings in the small valleys inland, which were well surrounded by hills and low mountains. In each instance the goshawk was seen as it came from inside a medium-high second-story tree with dense foliage, one of many such trees at the edges of a patch of dipterocarp forest, and flew across a small clearing to another second-story tree at the edge of the clearing on the opposite side.

The flight of this goshawk consisted of alternating brief periods of fast wing beats and short glides on motionless and outstretched wings, until the bird reached the tree, about 100 meters away, where it flew directly inside. In a case like this, unless one knew exactly where the bird went, he would have a difficult time locating it from among the many branches and in semidarkness inside the tree.

It is interesting to note that the collection of more than one specimen of this uncommon species within a total collecting period of hardly eight weeks is an exception to our usual collecting results on other trips to the much bigger islands of the Philippines where this species occurs.

FAMILY **FALCONIDAE** FALCONS

***Falco severus severus* Horsfield, 1821**

Dinagat*

The Oriental Hobby was encountered only three times on Dinagat Island and was never met with on Siargao. One bird was seen perch-

ing on a top branch of a tall dipterocarp tree, one of a few left standing in a new clearing in a small valley surrounded by hills and low mountains well covered with good-sized patches of mixed remnant original dipterocarp and second-growth forests. This bird was the only specimen collected on Dinagat.

At another time a bird seemed to have materialized suddenly out of nowhere, and it was seen only as a blur as it plunged at great speed from a moderate height over a newly cleared area in otherwise still well forested country in the foothills. Just as suddenly, the bird rose and resumed its fast flight over the remaining part of the clearing toward the forest about 300 meters away. We did not see what object it pounced on, and it had nothing in its claws when it rose from the strike.

Still another time a bird suddenly plunged at high speed from a good height right into a flock of low-flying Chestnut Mannikins, *Lonchura malacca jagori*, over an open field planted to rice and located at the foothills of Mt. Kambinlio, Loreto. The victimized flock suddenly broke apart, but it was too late. The hobby secured one bird in its claws, and its speed in flight was very much reduced as it proceeded toward a tall dipterocarp tree at the edge of the field immediately adjoining the remnant dipterocarp forest at the base of a hill.

The species has been found to be widespread in the Philippines but never in large numbers in any given locality. Then, too, the bird is more often seen in fast flight than on a perch.

FAMILY **MEGAPODIIDAE** MEGAPODES

***Megapodius freycinet pusillus* Tweeddale, 1877**

Siargao*

The Megapode was well known to the inhabitants of both Dinagat and Siargao. Most of the people living close to the hills and mountains well covered with original dipterocarp forests or their remnants were familiar with the habits of this bird. In fact, quite a number of people who traveled regularly across the mountains and hills of Dinagat Island intentionally watched for the bird's characteristic mounds.

Many inhabitants on both Dinagat and Siargao occasionally found Megapode mounds with eggs inside, even in the small areas of flatlands close to the uninhabited coasts, which had been planted to coconuts in good numbers for many years. Most of the reports of Megapode mounds with eggs were on the western sides of both islands. Occasionally, however, people had also found them on the eastern side facing the Pacific Ocean.

The Megapode is not really rare on the numerous islands of the Philippines. It has been reported on both large and small islands. On the average, however, the bird is difficult to collect because of its preference for building its nest in the denser parts of the vegetation

where the light is dim. Furthermore, the bird is agile and runs very fast, alternating with its speedy flight, among the trees inside a forest. This bird, however, can be taken by surprise if the collector walks silently and carefully inside the forest.

FAMILY **PHASIANIDAE** PHEASANTS

***Coturnix chinensis lineata* (Scopoli, 1786)**

Siargao*

The Painted Quail was a common bird on Dinagat and Siargao, but it was very difficult to collect with the use of collecting guns: it was much easier to secure specimens with the use of traps. Unfortunately our collecting on Dinagat and Siargao was conducted during the period of the year when the rice crops were already harvested in the fields, which were mostly in the narrow coastal plains and in the small areas of flatlands among the inland hills. This small quail was frequently flushed in the harvested ricefields and in the closely adjoining grasslands, especially in the foothills.

The bird had the habit of lying low and very still among the short grass, weeds, and stubble of rice stalks in the newly harvested ricefields. It would flush suddenly almost from under the feet of anyone who came too close. The suddenness of the act, accompanied by the explosive, loud whirring sounds of the rapidly beating wings, often took the collector by surprise. More often than not, he was left standing motionless; even if he shot at the fast-flying bird, he was most likely to miss his target.

In the newly harvested ricefields adjacent to our camp in Kambinlio, Loreto, on Dinagat Island, and in the nearby localities, these small quails were often heard uttering their familiar calls, usually during early mornings and late afternoons. The notes sounded like "Pit-pit-tao," repeated two or three times with a pause between. The first two syllables were uttered in a high pitch, the last one being given in a much lower pitch. The call was repeated several times from one particular location in a field. Usually, these calls would be answered by similar calls from another site in the same general area but coming from quite some distance, but only from one direction, about 100-150 meters away. The exchange of calls lasted for just a few minutes, and then the birds stopped.

In the fields where the rice crops were still standing, the bird was occasionally met with walking on the raised paddies between adjoining fields, but it immediately disappeared among the rice plants nearby once it noticed the intruder. More often than not, it would not flush from among the dense growth of rice plants where it took cover, even if it was still in that particular site.

FAMILY **RALLIDAE** RAILS

Rallus torquatus torquatus Linné, 1766

Dinagat
Siargao*

The Barred Rail was a common bird on both Dinagat and Siargao and was frequently observed near the coastal areas as well as in the interior. It was often met with in dry open country, in grasslands, and in meadows that were located close to the coasts, as well as in those found inland. This rail preferred open country that was well grown to grass (of both the short and tall types), especially in areas that had patches of marshes distributed among the wide stretches of dry grasslands, with trees, shrubs, and bushes growing among the grass. This species was really a bird of the grasslands and parang country, vegetation types found in the narrow coastal plains and in the small valleys and flatlands among the hills and mountains inland.

This rail was also frequently observed in the abandoned clearings in the small valleys and flatlands among the hills, as well as in the clearings that were still in use and often planted to upland rice, sweet potato, corn, and other crops.

Upon being disturbed in some open areas where grass growths were sparse, this rail often flushed from the ground, flying low and fast, but for only comparatively short distances; it then alighted in the nearest patch of second-growth vegetation where it quickly disappeared, if only temporarily. If the observer kept still and well concealed, after some time the bird would frequently reappear in the more open areas and resume its normal feeding among the low growths on the ground.

The inhabitants on both islands trapped this bird extensively for their food.

Porzana pusilla pusilla (Pallas, 1776)

Dinagat* (1 ♀; April 4)
This species may breed in the Philippines; however, summer and immature specimens do not exist.

The Dwarf Rail was accidentally met with only once on Dinagat and was consequently collected. It was walking along the edge of a clearing in the foothills that had once been planted to rice but was now fallow and grown to Kogon grass. All around the clearing were second-growth forest patches, and close by were some marshes. The bird was not seen again on Dinagat and was not seen at all on Siargao Island.

Poliolimnas cinereus ocularis Sharpe, 1894

Dinagat
Siargao*

The White-browed Rail was common in the ricefields and marshy areas in the flatlands close to the coasts and in the interior on both

Dinagat and Siargao. It was frequently seen feeding along the edges of the ponds and small streams that were found in good numbers among the marshes and ricefields, especially along the western coast of Dinagat and in both the coastal marshy areas and the ricefields in the interior of Siargao.

Occasionally this small rail was observed swimming in the deeper portions of the marshes, in and out and around the clumps of reeds that grew in abundance in these areas. It was not at all a shy bird, and it allowed the observer to approach fairly close before it flushed or ran toward the dense patches of reeds or Kogon close by.

It was also frequently seen feeding on the mud inside the nipa swamps along the edges of streams, especially where the streams opened to the sea.

Amaurornis phoenicurus javanicus **(Horsfield, 1821)**

Dinagat*

The White-breasted Swamphen was quite common on both Dinagat and Siargao, but for some reason the species was successfully collected on only Dinagat, not Siargao.

This bird was often met with in the ricefields and marshes on both islands. It stayed usually in the immediate vicinity of the numerous freshwater streams and small ponds found in the ricefields and marshes. It preferred to stay close to the dense patches of mixed growths of tall grass, bushes, shrubs, and trees, mostly second-growth forest trees.

The species ranged from near the seacoasts, especially on the western side of Dinagat, and from all around the whole island of Siargao, including the foothills and even into the interior, especially in rolling country.

This swamphen was frequently observed feeding along the edges of the freshwater streams and ponds in the narrow flatlands and coastal plains along the western coasts on Dinagat Island. On Siargao Island the species was often observed feeding on the muddy bottoms of the marshes, as well as in the clean areas between the patches of the dense mixed growths of tall grass, bushes, shrubs, and trees found growing in strips along the freshwater streams and at the edges of ponds. The streams drained the regions among the mountains and hills in the interior of Dinagat and traversed the small valleys and flatlands among the hills. From there they continued their courses in the ricefields and marshes found in the foothills, finally ending at the sea. Some birds were observed walking sedately and jerking their tails from time to time as they fed on the muddy grounds in the nipa swamps.

In the early mornings and late afternoons, the loud notes of this species could often be heard issuing from some dense patch of mixed reeds, tall grass, bushes, shrubs, and a few trees, which lined the banks

of the good-sized river near our campsite in Kambinlio, Loreto, on Dinagat. The loud notes sounded like "Kor-wak-wak, Kor-wak-wak . . . ," repeated several times one after another, followed by a long interval of silence. Usually, when not disturbed, the bird followed the first set of notes with another set and then remained silent thereafter.

Occasionally, solitary birds were observed wading in the shallow waters of some freshwater stream, and from time to time picking up something from the water. With the least disturbance the birds immediately flushed into the nearest patch of vegetation growing on the river bank nearby.

***Gallicrex cinerea* (Gmelin, 1789)**

Siargao*

The Watercock was not really uncommon on Dinagat and Siargao because its characteristic notes, which carried rather far, were heard often enough coming from some dense clumps of reeds or tall grass (*Saccharum spontaneum*) in the marshes and ricefields near our main campsites on these islands. The notes were loud and resonant and sounded like "Toob-toob-toob . . . ," repeated several times, then stopped, then started again after some interval of silence. These loud, booming notes were usually heard at any time in the evening, at dawn, and during early morning.

On both Dinagat and Siargao, the Watercock was seen from a distance several times as it fed singly in the open spaces of the marshes and ricefields in the foothills, always in the immediate vicinity of dense patches of reeds or tall grass and usually adjacent to good-sized areas of dense second-growth forest vegetation that grew on the nearby hills.

Occasionally, on both islands, solitary birds were observed from quite some distance, each time standing on an unstable platform formed by the bent and broken ends of the reeds and tall grass, usually near the center of dense clumps of these plants far out in the marshes. In each instance the bird perched on this grass platform for some time, almost motionless but swaying with the wind, until it flushed and transferred to another site in the marshes or ricefields not far away.

The flight of the Watercock was not like that of most other marsh birds. When flying, it held its neck stretched out in front, reminding one of a wild duck in flight, but with the much longer legs stretched out behind it. Its flight was usually fast but appeared rather labored, resulting from the very rapid wing beats. The bird usually flew low over the tops of the reeds or grass, into which it immediately alighted and disappeared. It did not usually fly long distances, and in alighting it frequently selected sites close to dense patches of vegetation—reeds, tall grass, or mixed bush-shrub growths.

FAMILY **ROSTRATULIDAE** PAINTED-SNIPE

***Rostratula benghalensis benghalensis* (Linné, 1758)**

Dinagat* (1 ♀; March 23)

The Painted-Snipe was not commonly met with in the ricefields and marshes, both of which are ideal habitats for the species and both of which were plentiful on Dinagat and Siargao.

On Dinagat it was flushed twice from among the grass and weeds growing in the vacant ricefields, and three times it flew from the small open spaces among the clumps of reeds growing in the marshes close to the foothills. Both sites were in the immediate vicinity of our main camp in Kambinlio, Loreto, in the small coastal plain between the coast and the hills.

On Siargao the bird was flushed only once—in the marshes adjacent to the ricefields close to the foothills of Barrio Osmeña, Dapa, in the immediate vicinity of our main camp.

It is possible that the species is not really rare on both islands, but that the bird had the habit of just staying motionless among the reeds, grass, and weeds in the ricefields, open meadows, and marshes, not flushing unless approached too closely.

FAMILY **CHARADRIIDAE** PLOVERS

***Pluvialis squatarola* (Linné, 1758)**

Dinagat* (April 4)

The Black-bellied Plover, or Gray Plover, was met with only once —on an exposed tide flat during low tide on the coast of Dinagat. One bird was collected out of the four birds that formed the flock. This was the only occasion when the species was seen, yet at the time there were numerous migrant shore birds on the exposed portions of the shores, especially on Dinagat.

The species is a rare winter migrant in the Philippines and has been recorded on only very few islands, unlike the very common Pacific Golden Plover, *Pluvialis dominica fulva*.

***Pluvialis dominica fulva* (Gmelin, 1789)**

Dinagat*

The Pacific Golden Plover, one of the common winter migrants in the Philippines, was encountered several times in flocks of about a dozen members or slightly more. It fed among the short grass, weeds, and remaining rice stubbles in the recently harvested ricefields in Kambinlio, Loreto, and neighboring localities on Dinagat Island. Flocks of this species were also observed several times feeding among the low grass and weeds in the marshy areas close to the foothills of Kam-

binlio, not far from our main camp. During low tides this species was commonly seen in flocks of about a dozen or more members feeding on the exposed tide flats in the immediate vicinities of other shore birds that were also found in good numbers along the seashores during low tides.

Once, a small flock of about six members was seen feeding in a small clearing among the short grass and weeds mixed with foot-high upland rice on the lower slopes of a low mountain that was located in the interior toward Mt. Kambinlio.

The species was not observed in the ricefields and marshes on Siargao, although these places were most likely habitats. Perhaps its absence is attributable to the lateness of the season and the fact that most birds of this species were already on their way back to the breeding grounds in northern Asia.

***Charadrius mongolus mongolus* Pallas, 1776**

Dinagat* (1 ♀, March 29; 1 ♀, April 2)

The Mongolian Plover was met with several times in small flocks of six to 10 members as it fed during low tides on the exposed mud flats along the coast of Loreto and neighboring localities. Frequently the flocks of *Charadrius mongolus mongolus* and *Pluvialis dominica fulva* were seen feeding on the same mud flats, near each other and together with many other species of shore birds. Strangely enough, this species was never observed feeding in the marshy areas and ricefields just a little inland from the coast, such as those found in Kambinlio, Loreto.

On Siargao this migrant species was never observed in the marshes and ricefields, as is also true of the Pacific Golden Plover. The reason might have been the location of the ricefields and marshes where our collecting was carried on (in inland areas quite far from the coast), as well as the lateness of the season.

FAMILY **SCOLOPACIDAE** SANDPIPERS

***Numenius phaeopus variegatus* (Scopoli, 1786)**

Dinagat* (1 ♂, March 31; 1 ♀, April 1)

The Whimbrel was frequently seen feeding on the exposed sandy-muddy tide flats during low tides along the coast of Loreto on Dinagat Island. In our trips by motor launch between Surigao and Loreto, Whimbrels were frequently seen in pairs or in flocks of varying sizes feeding on the exposed tide flats along the western coasts of Dinagat Island and on the coasts of the small islands and islets nearby. During the low tides, when larger areas of the tide flats were exposed, the Whimbrels, usually singly or in pairs, were seen feeding with other species of shore birds.

In a few instances we observed large numbers of Whimbrels (50–60 birds) densely concentrated on some remaining small and narrow strip of sandy-muddy bottom, a short distance off the coast of some larger island. The birds were concentrated in quite large numbers by the tide as it covered what used to be a large exposed area of tide flat. As the area of exposed bottom gradually diminished, small groups of the Whimbrels (5–6 birds) took off in different directions, but always toward the beaches of the larger island nearby. Eventually all the Whimbrels left the site and by that time the fast-rising tide soon covered the whole area, leaving no trace of exposed land or bird.

The flight of a flock of Whimbrels is usually accompanied by their loud notes that can be easily heard quite a distance away. The notes are so characteristic of the species that once an observer has heard them, he can easily remember them and associate them with Whimbrels.

The local inhabitants of Dinagat, like those in many localities in other parts of the Philippines, hunt and trap the Whimbrel extensively for its ample and good-tasting meat.

***Tringa hypoleucos* Linné, 1758**

Dinagat*

The Common Sandpiper was frequently encountered singly along the numerous small streams in the ricefields, marshes, and open meadows in the lowlands, as well as along the small streams found in the densely wooded areas inland, among the hills and mountains in the Mt. Kambinlio localities, and other nearby areas. The bird often stayed along the edge of the water and, from to time, ran fast on the dry, sand-gravel stream bottom. It was also seen singly feeding in the more open parts of the ricefields and marshes, especially along the many small streams that abounded in these areas between the coast and the foothills. Occasionally, single birds were encountered in the narrow strips of sand-gravel shores along the coast of Loreto.

On Siargao the species was not really rare, even though no specimens were taken on this island. It was flushed many times along the small streams found in the interior, traversing the ricefields and marshes in the flatlands among the hills.

The rapid up-and-down movements of the head and tail as the bird walks or runs are identifying characteristics of this species of winter migrant shore bird. They easily differentiate it from several other winter migrant shore birds of very similar external appearance.

***Tringa incanas brevipes* (Vieillot, 1816)**

Dinagat* (1 ♂, 2 ♀, March 24–31)

The Gray-tailed Tattler was met with several times, usually in flocks

of a dozen or more members feeding on the exposed sandy-muddy tide flats during low tides along the coasts of Loreto and nearby localities on Dinagat. The flock often fed in the same site where quite a number of other species of winter migrant shore birds were also actively feeding. When disturbed, however, the flock flushed as one unit and usually transferred the site of feeding to another area not far from the former one.

This migrant shore-bird species was never met with in the ricefields and marshes in the interior parts of Siargao, even in the sites where other winter migrant shore-bird species were observed feeding regularly.

The Gray-tailed Tattler appeared to be more at home in the tide flats along the coasts than in the open marshy areas in the interior.

***Gallinago megala* Swinhoe, 1861**

Dinagat* (1 ♀, March 13)

The Marsh Snipe was flushed a number of times in the wetter parts of newly harvested ricefields and the adjoining marshes in the localities where our main camps were established on both Dinagat and Siargao. The bird was usually disturbed accidentally among the mixed low growths of grass, bushes, and weeds in the marshy areas, in the adjacent open meadows, and in some of the recently harvested ricefields which had more moisture than the others in the area. Occasionally, a bird was flushed among the mixed growths of low grass, bushes, and weeds that thrived luxuriantly along the banks of the small streams, which were common in the lowland areas and which came from the hills and mountains in the interior. On Dinagat these small streams were found in the narrow flatlands close to the coast; on Siargao they were in the interior in the small valleys and flatland areas surrounded by the hills far from the coasts.

The bird has the habit of flushing suddenly and unexpectedly when one gets close to it. Its fast start from the ground is usually accompanied by a soft croaking note that closely sounds like "Piak." The bird zigs and zags very fast until it reaches some distance away from the intruder, where it continues in a low and straight horizontal flight at a very high speed and then climbs upward. The bird usually doubles back and passes its former location, proceeds some distance away, and then suddenly swoops down and settles abruptly on the ground among a tract of mixed growths of low grass, bushes, and weeds in an open field, meadow, or marsh. All the while that it is flying overhead at a very fast speed, the bird gives out at irregular intervals its hoarse croaking note.

FAMILY COLUMBIDAE PIGEONS and DOVES

***Treron vernans vernans* (Linné, 1771)**

Dinagat*

Only one specimen of the Pink-necked Green Pigeon was collected on Dinagat and none was taken on Siargao, yet the species was not really rare, or even uncommon, on both islands. Somehow the collectors just did not have the opportunity to come upon any of the good-sized flocks that this pigeon species usually formed (as observed on the other Philippine islands). It is possible that during the time of the expedition on both Dinagat and Siargao the species was breeding; so the birds had not yet formed their flocks. Several times on both Dinagat and Siargao groups of three or four birds were observed flying around the countryside, but more frequently they were observed going about in pairs.

Several times pairs were seen perching on naked branches at the tops of some trees growing at the outskirts of small patches of secondary forests, or in grasslands, open country, parang vegetation, or even at the edges of the well cultivated fields and farms on both Dinagat and Siargao. The following tree species were the favorite perches of this pigeon species in open country: *Erythrina indica* Lam., *Sesbania grandiflora* (Linn.), *Ceiba pentandra* (Linn.), and *Nauclea junghuhnii* (Miq.).

Several times the species was observed feeding in pairs on the fruits of the following tree species that grew at the edges of the small patches of secondary forests, in parang, in grasslands and open country, inside small cleared areas on some of the hills at low elevations, and along the edges of cultivated fields and farms in the plains and foothills: *Antidesma ghaesembilla* Gaertn., *Muntingia calabura* Linn., and *Ficus* spp.

The local inhabitants, especially those living on the farms, reported that some nests of this pigeon species had been found a few times in the patches of mangrove forests along the coasts of Dinagat and Siargao. More frequently, however, the nests of this species were found in trees inside second-growth forests, which were found as small patches on the hills inland, in parang vegetation, in grasslands and open country, and even along the edges of the well cultivated fields and farms on both Dinagat and Siargao.

The Pink-necked Green Pigeon was known locally as "Punai."

***Phapitreron leucotis brevirostris* (Tweeddale, 1877)**

Dinagat
Siargao*

The White-eared Brown Fruit Dove was a common bird on Dinagat and Siargao. It was frequently met with singly in almost all the types of

vegetation, original or secondary, that were found on both islands. It was even observed quite often in well cultivated areas and farms, feeding among the fruiting trees that were part of the mixed growths of trees, shrubs, and bushes planted as hedges around the farms. It was not observed at all inside the mangrove forests on either island. On the other islands of the Philippines, however, this species was occasionally seen in the outskirts of mangrove forests, especially in the immediate vicinities of beach forests.

The bird showed decided preference for low and medium-high trees and shrubs with dense foliage, which grew among other trees and shrubs inside the good-sized patches of forest vegetations of almost all types on both islands. Its altitudinal range extended from sea level, among the hills and mountains, and up the mountain peaks, especially on Dinagat. At the higher elevations of the mountain peaks on Dinagat, such as Mt. Redondo and Mt. Kambinlio, the species was occasionally seen and heard among the dense growths of trees and shrubs at the bottoms of the deep ravines and along the high, sheer sides of the mountain streams in the places that were well sheltered from strong winds.

On Siargao, where the hills were rather low, this dove was usually encountered along the numerous small streams among the hills, as well as among the dense patches of second-growth forests that covered almost entirely most of the hills.

Occasionally, this bird was heard and seen as it perched on the frond of a coconut tree, one of many inside a grove in well cultivated lowland areas and up the lower elevations on the hills.

Even though the bird was not seen, its very characteristic mournful notes were often heard issuing from among the dense mixed growths of trees, shrubs, and bushes, which served as hedges in the well cultivated areas and farms.

The farmers and other inhabitants living among the hills and mountains of Dinagat and Siargao kept this dove as a cage bird. Frequently, two birds were found in one cage. Occasionally, the birds would call and other birds in the surrounding forest growths would respond and eventually come and perch on a nearby tree or shrub, close to the house where the cage birds called.

On Dinagat and Siargao the species was known as "Alimukon" or "Limukon," the common East Visayan name for it.

***Phapitreron amethystina mindanaoensis* Manuel, 1936**

Dinagat*

On Dinagat the Amethyst Brown Fruit Dove was encountered inside the patches of original dipterocarp forest and transition forest found in the lowlands, small valleys, and flatlands among the hills and mountains, as well as in the scrub forests on the slopes of these moun-

tains, although not as frequently as in the lower elevations.

This dove was usually observed perching among the branches of low and medium-high trees with dense foliage, where the bird stayed undetected unless it flushed when someone approached the perching tree accidentally. It was encountered often singly and less frequently in pairs. Occasionally, however, six to a dozen of the species were accidentally discovered feeding on fruiting trees, such as figs, but the birds always flew away singly or at most in pairs and proceeded in different directions.

Very rarely the bird gave out its mellow and mournful notes, which bore some resemblance to the notes of some local cuckoos.

The species was not seen on Siargao either in original vegetation or in second growth.

***Ptilinopus occipitalis* G. R. Gray, 1844**

Dinagat*

Rarely was the Yellow-breasted Fruit Dove actually seen on Dinagat Island, although its soft and mournful call was frequently heard inside the patches of dense original dipterocarp forest. The species was not seen or heard at all on Siargao.

Typically, the bird was frequently heard calling from a moderately high tree with dense foliage, one of the numerous second-story trees growing inside patches of original dipterocarp forest in the small valleys and narrow flatland strips among the hills and mountains. The call could usually be traced easily enough to the very tree where it came from, but it was always difficult to locate the bird itself from among the numerous branches, which were in the deep shade of the dense foliage of the perching tree. The call had a ventriloquial effect, so that even when the observer was under the very tree from which the call came, most of the time he would still not be able to see the bird on its perch. After some time of very careful search among the numerous branches, he would finally see the bird sitting very still on its perch. All the time that the observer had been trying his best to locate the bird, it was actually sitting motionless on a branch in full view. The calls, however, coming regularly but interspersed with intervals of silence, seemed to have come from a different direction. In most cases, especially if the observer was not very careful in concealing himself, the actual moment of discovering the bird would also be the time for the bird to fly away.

Unless disturbed, the calling bird usually stays on the same perch. Then it flies away, and soon its calls, which resemble the sound of "Whoo," are repeated in another tree some distance away, but in the same forest patch.

***Ptilinopus leclancheri leclancheri* (Bonaparte, 1855)**

Siargao*

The Black-chinned Fruit Dove was not met with on Dinagat Island. The species was encountered only twice on Siargao; both times the birds were seen in pairs as they fed silently on the small fruits of a fruiting forest tree of medium height inside a patch of mixed dipterocarp remnant forest and second growth. On each occasion, the mixed dense forest patches were located in the interior of Siargao on the lower slopes of hills at the edges of a small valley that was well cultivated and planted with rice.

On the other Philippine islands where this species has been collected, the birds were frequently encountered through sheer chance. However, if the observer located a fruiting tree where this species had been observed feeding, and if he concealed himself well, most of the time birds of this species were seen visiting the tree to feed on its fruits. Several times, in fact, about three to four birds were observed feeding in the same tree at one time, but when disturbed, they flew singly or in pairs in different directions.

The species usually stays inside dense dipterocarp forest areas or patches on the various islands where it occurs.

***Ducula aenea aenea* (Linné, 1766)**

Siargao*

The Green Imperial Pigeon was seen several times on Dinagat, but always at a distance. It was also encountered several times on Siargao and was successfully collected.

On both islands the species usually went about in pairs or in flocks of six to a dozen members or slightly more. They were seen either flying over the densely forested hills and mountains or perched on some bare branches at the top of tall trees. Most often these trees were located at the edges of forest patches that were either dipterocarp or mixed dipterocarp and secondary forest types growing on the hills, especially the lower slopes.

On Dinagat pairs or flocks of this species were occasionally observed feeding on the fruits of tall fig trees, *Ficus* spp., which were growing around the edges of clearings in the forests, especially on the hillsides and lower mountain slopes in the localities of Mt. Kambinlio and Mt. Redondo. Usually, when the feeding or perching pigeons were disturbed, they flushed from the tree as one.

This species of Philippine pigeon cannot be mistaken for any other large pigeon species in the Philippines because it is the most widely distributed of the Philippine large pigeons that normally go about the

countrysides on most of the islands of the archipelago. The other Philippine species of large pigeons normally go about singly or, at the most, in pairs.

The species has a very characteristic loud call that is given out from time to time, usually while the bird is on a perch. Most often the call is soon answered by a similar loud call from another bird perching some distance away.

It is not uncommon to observe several birds of this species perching on the top branches of some tall tree on the high ridge of a hill. One will hear the characteristic loud call coming from this vantage point, and soon a similar loud answering call will come from another ridge of another hill. A careful examination of the surrounding hills will often reveal one, a pair, or several of this species perching on the top branches of some tall tree on a neighboring ridge. The exchange of calls may continue for some time, and then the bird or birds from one of the perching trees will flush and fly toward the other group, joining them among the top branches. These birds must actually belong to the same flock. In the course of their feeding, however, they get separated by some disturbance—hence the reunion of the members of the flock after locating one another.

The local name of this large pigeon is "Balud" or "Baud," the same local name given this species on many islands of the Philippines.

***Ducula poliocephala nobilis* (Hachisuka, 1931)**

Dinagat

On Dinagat Island the Pink-bellied Imperial Pigeon was actually seen only three times, but its characteristic low booming notes were heard many times inside the dipterocarp forest areas among the hills and mountains, expecially at different elevations in the Mt. Kambinlio and Mt. Redondo localities. The species was not seen or heard at all on Siargao Island.

All three actual sightings of this large pigeon on Dinagat were of single birds perched among the dense foliage of the top branches of tall fruiting trees. In all sightings of the bird, the fruiting trees were growing at the edges of small clearings on the slopes of hills and mountains at various elevations, but never where only scrub forests grew. These clearings were planted at the time with upland rice.

As on the numerous other islands where it had been recorded, on Dinagat this species was more often heard than seen. Unless the bird was actually observed as it flew from one branch to another in the same fruiting tree, it was always very difficult to discover among the foliage. Once located, however, it was easy enough to follow from branch to branch and from one feeding tree to another if these trees were not very far apart.

The bird normally went about its feeding activities singly or, at most, in pairs.

On the other islands where this species has been recorded, it is not unusual to find three to six, or even more, occasionally feeding actively on the fruits of the same feeding tree. When disturbed, the feeding birds usually fly one by one, or, rarely, in pairs, but they proceed in entirely different directions. When watched carefully, they were usually seen proceeding to different trees. The birds found feeding in the same fruiting tree were not really members of a flock, as in *Ducula aenea,* but were actually accidentally congregated in the same feeding tree at that particular time.

The inhabitants of Dinagat who came from the East Visayan islands, such as Cebu and Bohol, called this large pigeon as "Hagumhum" or "Agum-um," the local names by which the Pink-bellied Imperial Pigeon is known in the East Visayas.

***Columba vitiensis griseogularis* (Walden and Layard, 1872)**

Dinagat*

On Dinagat Island the Metallic Wood Pigeon was occasionally encountered singly or in pairs in some perching trees, typically tall ones with heavy foliage at the top. The trees grew inside the patches or areas of dense forest vegetation of various types found at all elevations on the hills and mountains in the localities of Mt. Kambinlio and Mt. Redondo. In most cases this pigeon, singly or in pairs, was disturbed accidentally among the branches of perching trees in the dense patches and areas of dipterocarp forest that grew in the small valleys and narrow areas of flatlands among the hills and mountains. It was also encountered in perching trees at higher elevations, such as in the transition dipterocarp-midmountain forests and in scrub forests on the higher slopes of the mountains.

The species was not encountered at all on Siargao in the areas where we collected, mostly in the interior of this island among the well vegetated hills. It is very possible that our collecting activities on this island were not as extensive and as thorough as they should have been, hence our failure to discover the species there. Most likely, more thorough collecting work will result in securing this pigeon species among the densely forested hills in the interior, considering that both the vegetation types and the habitat types where this pigeon species lives are present in most parts of Siargao Island.

The species was very secretive. Although one or a pair of these birds was staying in a feeding tree and had been there for some time, it was always by sheer chance that the collector ever discovered the bird among the branches and dense foliage of a particular tree. In some of the fruiting fig trees, this species was occasionally observed feeding on

the fruits with pigeons of other species, such as *Ducula aenea* and, more rarely, *D. poliocephala*. *D. aenea* was the easiest pigeon species to locate in a feeding tree where other pigeon species were feeding because of its frequent and active transfers from branch to branch, often even flying out of the tree in the process. *D. poliocephala* and *Columba vitiensis* were always difficult to locate in a feeding tree among other pigeon species because of their secretive habits, even in the course of feeding on fruits borne on the various branches. Both these latter species minimized their movements in the feeding tree.

On the other islands of the Philippines where this species occurs, small flocks of six to a dozen members are occasionally encountered as they fly from one feeding tree to another in a forest area, especially in typical midmountain forest, which grows at the higher elevations of mountain slopes.

***Streptopelia bitorquata dusumieri* (Temminck, 1823)**

Dinagat*

The Philippine Turtle Dove was a common bird on Dinagat and Siargao. On both islands this species was frequently encountered in the newly harvested ricefields and other cultivated areas of the lowlands, in the open meadows and rolling country of the foothills, and among the parang and grassland vegetation. The bird usually went about singly or in pairs, but occasionally as many as a dozen or more would be seen on the ground feeding on the fallen rice grains.

On both Dinagat and Siargao, as well as on the other Philippine islands, this dove was not shy at all: it readily allowed humans to come close to where it was feeding in a field. The bird frequently alighted on the ground in the newly harvested ricefields, even in places quite close to people who were then harvesting the rice crops in neighboring fields. When approached too closely, intentionally or accidentally, the bird would usually flush and alight on a branch or some low tree nearby, usually at the edge of the fields. After a short time it would fly and alight on the ground in a nearby field and resume its feeding on the fallen rice grains.

Once in a while a bird would be seen perching on the bare branch of a low or medium-high tree at the edge of a cultivated field or open meadow. It would then begin calling, its mournful notes resembling the syllables "Tuk-m-m-m, Tuk-m-m-m . . ." repeated several times; then it would stop. The bird would usually leave its perch, alight on the ground nearby, and begin feeding on seeds of the weeds and grass that grow there. Usually, other doves of the same species were already feeding in the site ahead of the bird that had just come to join them. When disturbed, they usually fly singly or in pairs toward different directions, showing that the birds feeding in the same site or close to

one another do not really belong to a regular flock. On the islands where they occur, the birds of this species have never been observed to form regular flocks as they go about their feeding activities.

***Streptopelia chinensis tigrina* (Temminck, 1810)**

Dinagat*
Siargao*

The Spotted Dove was a very common bird on Dinagat and Siargao. Like the Philippine Turtle Dove, *Streptopelia bitorquata dusumieri*, the Spotted Dove was frequently encountered in the cultivated fields (including ricefields), in open meadows, parang, and grassland vegetations, and in the open country as a whole—all in the lowlands and in the immediate vicinities of human settlements.

The ever-widening spread and distribution of the Spotted Dove among many islands in the Philippines within the last 30 years or so is a very interesting case history of the successful invasion by a bird species into a country where it used to be considered very rare. At present it is considered a very common and widespread species on many of the large islands in the region closest to its original home. On the larger islands of the Philippines located in the southern regions, such as Mindanao, Negros, and Cebu, the Spotted Dove has successfully established large populations in the same localities and habitats as the resident species, *S. bitorquata dusumieri*, and in densities that are now much higher than those of the native form. In many localities on Mindanao, Negros, and Cebu the Spotted Dove has become even more common and has replaced the local resident turtle dove species. The Spotted Dove has succeeded in gradually driving out the native form from most of the areas close to human habitations so that the native form is presently confined more to the areas far from man's settlements. As late as 15 years ago, when one traveled on the roads in the lowlands of Mindanao, Negros, and Cebu, he could meet many Philippine Turtle Doves on the roads and on the farms and open meadows along the roads. At present, one sees only the Spotted Dove: it is rare to meet with the Philippine Turtle Dove in these parts. In order to meet with good numbers of the Philippine Turtle Dove, it is necessary to go to the foothills, especially among the ricefields.

The invasion of the Spotted Dove into the Philppines started from the west-southwest via the islands of Balabac and Palawan and from the south-southwest via the southernmost islands of the Sulu Archipelago. From these two directions, the species gradually spread throughout the more northern islands. Thus, from the Sulu Archipelago the birds successfully reached the Zamboanga Peninsula, and from there spread throughout the entire island of Mindanao. A collecting expedition sponsored by the Field Museum of Natural History to Zamboanga

Peninsula noted that there were a number of Spotted Doves along the roads and in the open country along the roads toward the town of Pagadian in 1948 and along the roads toward the town of Katipunan in 1949. The Philippine Turtle Dove, however, was still the more common species in these parts.

It is possible that from Zamboanga Peninsula the Spotted Dove succeeded in migrating to Negros Island, and from the latter, to Cebu. The migration of the Spotted Dove from southern Negros to southern Cebu was actually proved by the results of the bird banding project carried on by the Migratory Animal Pathological Survey of the U.S. Armed Forces Institute of Pathology and later by the U.S. Army Research and Development Group (Far East). In addition, the Spotted Dove, being a common cage bird, could have been carried by man from island to island or from one part of an island to other parts. It did not take long for the species to become very common on Mindanao, Negros, and Cebu.

The present distribution of the Spotted Dove includes the islands of Balabac, Palawan, many islands of the Sulu Archipelago, Mindanao, Negros, Cebu, Leyte, and Dinagat and Siargao. More collecting will no doubt yield records of this species on Bohol and the numerous islands between Bohol and Cebu on one side and Bohol and Leyte on the other. The species should be recorded now on Panay and the other islands nearby.

On Dinagat and Siargao the present densities in the populations of *S. chinensis tigrina* and *S. bitorquata dusumieri* are still about equal. It will not be surprising if in another 10 or 15 years the Spotted Dove will become the more common form on these two islands.

The notes of the Spotted Dove are moderately loud and closely resemble the syllables "Tek-kuk-kurr" repeated several times after some intervals between calls. These notes are usually given from the branches of some low or medium-high trees that grow along the edges of cultivated fields or meadows in well cultivated localities close to human settlements. The Philippine Turtle Dove will gradually be driven into the foothills or among the clearings in the lowlands close to the hills. There will be some areas where the two species come together and where they will be about equal in population densities.

***Chalcophaps indica indica* (Linné, 1758)**

Dinagat*
Siargao*

The Green-winged Ground Dove was a common species on both Dinagat and Siargao, but its quiet and secretive habits as it went about singly on its feeding activities made it difficult to discover, even in its known habitats on the ground inside original or secondary forest areas

or patches or inside any dense patch of mixed tree-shrub-bush growths in otherwise well cultivated countryside. This ground dove was more often seen on the wing as it flew at good speeds, threading its way among the trees, shrubs, and other low growths in the forest in rather deep shade. One might accidentally come upon a bird as it fed singly on the ground along the bank of some small and shallow creek inside a forest patch. A bird might even be surprised as it fed on a dried-up streambed during the dry season, among quite heavy vegetation cover. On Dinagat and Siargao the species was frequently disturbed among the dense growths along the banks of heavily shaded streams.

On the other islands in the Philippines this dove was seen several times passing in fast flight through open windows of the small Kogon-bamboo huts located along the edges of the clearings in newly opened areas in the interior. Without reducing its speed in flight, the bird would fly through the open windows when the two windows on opposite sides of the small huts were open. Accidents sometimes happened, although rarely, when a fast-flying bird hit a wire strand on which abaca fibers or manila hemp were hung for drying.

This ground dove was also disturbed from the ground while feeding under coconut palms inside coconut groves close to human settlements, especially in the foothills.

The species is not really rare, but its shy and unobtrusive habits make it difficult to discover, unless disturbed accidentally. When so disturbed, it flushes from the ground and at a good speed flies to another feeding site, again on the ground, in some well covered spot inside a well vegetated area, quite far from the original place.

Gallicolumba luzonica criniger **(Pucheran, 1853)**

Dinagat*

On Dinagat Island the Bleeding-heart Pigeon, or Puñalada, was not really rare, although it was not as frequently encountered by the collectors as it should have been. The species had the habit of going about its normal feeding activities on the forest floor, singly and with the least disturbance of the conditions in the feeding site. It was usually by pure chance that a bird was discovered feeding actively on the forest floor, even considering the fact that all the time the pigeon was feeding in relatively clean areas with the least forest undergrowth, although the ground might have quite an amount of litter consisting mainly of dried leaves.

This pigeon was usually encountered alternately walking and running briskly on the forest floor in areas where the undergrowths were rather sparse. When the observer walked quietly and cautiously, a bird feeding nearby would usually continue its brisk alternate walking and running,

without flushing at all. Meanwhile, it would usually head in a direction away from the intruder. When the observer would stop following the bird, even if for only a very brief moment, he was very likely to lose it among the dry leaves and trunks of the trees. He would have a difficult time locating the bird again, yet the pigeon might have been near all the while.

The natural habitat of the Bleeding-heart Pigeon on Dinagat Island, as on the other islands of the Philippines where the species has been recorded, was inside the areas and large patches of original or remnant original forests, especially inside the dipterocarp and transition dipterocarp-midmountain types in the lowlands and in the lower elevations of the hills and mountains. The species was also encountered inside forests that grew on the slopes of the mountains in the localities of Mt. Kambinlio and Mt. Redondo up to about 400 meters above sea level, where the scrub forests covered practically the entire mountain slope. The bird seemed to prefer staying on the floor of the dense forests growing in the small valleys and small strips of flatlands among the hills and mountains.

When really disturbed, the bird usually took off, but only for short distances of about 5–10 meters. It then settled again on the forest floor and resumed its brisk walking alternated with running.

The species was not collected on Siargao, although with more extensive and intensive collecting inside the forests among the hills in the interior, the bird might still be taken there. It is true that the forests that would be ideal natural habitats for the species are already much reduced on Siargao, compared to those on Dinagat. Nevertheless, the fact is that the remnant patches of forests found on Siargao are the types most likely to serve as the natural haunts of the species.

This ground-loving species was not encountered as frequently as the species that normally perched among the branches of the trees in the same type of habitat. In general, ground-loving birds are missed more easily than actually seen, although all the time they might be inside a particular forest area feeding and carrying on all their normal life activities.

It is a wonder that the Bleeding-heart Pigeon is so inconspicuous, for its large and prominent blood-red spot on the chest should easily give the bird away as it alternately runs and walks on the forest floor.

FAMILY **PSITTACIDAE** PARROTS

***Kakatoe haematuropygia* (P. L. S. Müller, 1776)**

Dinagat*
Siargao*

On Dinagat and Siargao the Philippine Cockatoo was quite a com-

mon bird and was usually seen in pairs or in small flocks of about five to eight members, either flying about the immediate vicinities of forest areas with clearings in them or perching on the top branches of tall trees growing at the edges of the clearings. The birds were frequently seen in the immediate vicinities of original dipterocarp forest areas or remnant patches of this forest type.

Some of the members of a flock occasionally gave out the loud harsh notes of the species as they flew about an area. Then from the tall trees some of the birds perching there would give out their loud harsh notes, soon after to be answered by similar loud harsh notes from another direction inside the forest nearby.

Some farmers told us that occasionally flocks of this cockatoo, numbering about one dozen or more, had made regular visits to certain cornfields in the clearings among the hills where the crops were maturing and that the birds ate and destroyed large numbers of the maturing ears. A particular flock usually made it a habit to visit regularly certain cornfields in the hills of certain localities until the crops were harvested. During certain years the destruction of these corn crops was particularly severe.

We came upon a clearing inside an area of original dipterocarp forest on the lower slopes of one of the mountains near Mt. Kambinlio, in the interior of Dinagat. Here a few tall, dead trees were still left standing and the surrounding areas in the clearing were planted to corn. On the trunk of one dead dipterocarp tree, about 20 meters from the ground, a cockatoo was entering a hole and another was perching on the branch of a nearby tree watching. Apparently, the site we came upon was a regular nesting area of these cockatoos where they had bred before.

The Philippine Cockatoo was frequently kept as a cage bird on both islands. Locally the bird was known as "Katala" or "Abukay," both names being the common Cebuano names for this species.

***Loriculus philippensis apicalis* Souance, 1856**

Siargao*

The Philippine Hanging Parakeet was more often heard than actually seen on both Dinagat and Siargao. The species was not really rare on both islands because its musical notes were heard frequently enough in the coconut groves in the lowlands among human habitations, even along the seacoasts, and also in the coconut groves on the hills and mountains in the interior. Nevertheless, locating the bird among the coconut fronds and inflorescences was difficult.

Some farmers on both islands reported to us that this bird was occasionally taken among the leaf bases of the coconut palms after it had become helpless as a result of intoxication from drinking "Tuba," the

fermented sap of the coconut collected by the people in bamboo tubes attached to trimmed coconut inflorescences. The helpless bird would be hanging to the lip of the bamboo collector tube and would easily be collected by the "Tuba" gatherer and kept as a cage bird in his nipa hut.

On Dinagat the Philippine Hanging Parakeet was seen frequently enough but always from quite some distance while in flight in the lowlands, often in the immediate vicinities of the dipterocarp forest patches, in secondary forests, and in parang vegetation. The very characteristic notes of this species were also heard quite often in the scrub forests at the higher elevations of the hills and mountains in the interior, even on the ridges and summits of some of the peaks in the Mt. Kambinlio and Mt. Redondo localities.

On Siargao this bird was also more often seen in flight, and its notes were often heard in the coconut groves from the seacoasts into the interior and in second-growth vegetation that covered most of the hills in the interior.

Even from a distance the observer could easily identify the Philippine Hanging Parakeet through its characteristic undulating flight, usually accompanied by its loud whistling notes.

In the rural areas of Dinagat and Siargao, this species was a common cage bird, and in some farmers' homes as many as two or three birds were seen inside their cages. Once in a while the farmer owning a bird would hang it outside as a bait for attracting other hanging parakeets, which would be caught in a prepared snare nearby.

The Philippine Hanging Parakeet was known locally as "Kusi," the vernacular name by which the Cebu Visayans know this species.

FAMILY **CUCULIDAE** CUCKOOS

Cuculus micropterus micropterus Gould, 1837

Dinagat*

The Short-winged Cuckoo was rare on Dinagat and was never encountered on Siargao. Two specimens of this rare straggler in the Philippines were both taken on Dinagat and were secured inside dense remnant patches of dipterocarp forest in the foothills close to the edge of cultivated fields planted to rice. In both instances the trees were of moderate height and had dense foliage. Both birds were discovered accidentally among the branches in well shaded portions.

Up to the present only a few specimens of this straggler have been taken on very few islands in the Philippines.

***Cacomantis merulinus merulinus* (Scopoli, 1786)**

Dinagat*
Siargao*

The Plaintive Cuckoo was uncommon on both Dinagat and Siargao and was heard more often than seen. Occasionally its very distinctive and mournful notes were heard coming from the tops of sparse trees growing at the edges of cultivated fields and meadows in the lowlands and foothills.

The notes of this cuckoo were heard occasionally from the top of one of the tall trees inside the clearings in dipterocarp forest patches that covered the lower elevations of hills immediately adjacent to cultivated fields in the lowlands along the western coasts of Dinagat. On Siargao this bird was occasionally heard calling from the top of some trees at the edges of secondary forests, which covered the hills in the interior.

One could easily enough trace the cuckoo through its mournful notes, and he could even pinpoint exactly the very tree from which the bird called, but locating the bird among the dense foliage was often difficult.

The characteristic notes of the Plaintive Cuckoo resemble the syllables "Peet-to-peet . . . Peet-to-peet . . . ," etc., repeated four or more times in a gradually ascending pitch. The bird then keeps silent for a few minutes before resuming its mournful notes.

The Plaintive Cuckoo usually went about its daily activities singly.

***Cacomantis variolosus sepulcralis* (S. Müller, 1843)**

Siargao*

The Brush Cuckoo was rarer than the Plaintive Cuckoo on both Dinagat and Siargao. To one who is familiar with the notes of both species, it is easy enough to differentiate the calls of both species and to identify the owners of the calls at any time. Like the Plaintive Cuckoo, however, locating the Brush Cuckoo among the branches and dense foliage of the perching trees is a difficult task.

On Dinagat the Brush Cuckoo was heard three times calling from the tops of some tall trees growing inside the patches of original dipterocarp forests that covered the lower elevations of some of the mountain peaks near Mt. Kambinlio. Each time the bird could not be located from among the branches and dense foliage of the perching trees.

On Siargao the characteristic notes of the species were heard twice, and in each instance the notes came from the top of a tall tree that grew among other trees in a dense second-growth forest patch, one of

many such patches growing on the hills in the interior of Osmeña, Dapa, not far from the cultivated fields of the barrio.

***Eudynamys scolopacea mindanensis* (Linné, 1766)**

Dinagat*
Siargao*

The Koel was fairly common on Dinagat and Siargao. Its loud notes were frequently heard inside the dense patches of second-growth forests in the foothills and inside the remnant dipterocarp forest areas that covered the small valleys and narrow strips of flatlands in the lower elevations of hills and mountains in the interior, especially on Dinagat. Occasionally, pairs of this species were encountered in some of the trees in scrub forests on the hillsides and mountain slopes in the Kambinlio localities at about 300–400 meters above sea level.

The birds usually went about in pairs and frequently selected their perching sites in the upper parts of the crowns of first-story dipterocarp trees and in some trees of the second story.

The loud notes of the Koel sounded like the syllables "Ba-hao . . . Ba-hao . . . Ba-hao . . . ," etc., repeated several times, and then silence. Later on, another set of these loud notes would be given again. This sequence usually continued for some time, until the birds left the area.

The species was heard from near the seacoast and deep in the interior. The birds gave their loud notes during daytime as well as night.

Because of its call, the inhabitants know this bird as "Ba-hao" or "Kua-hao."

***Centropus viridis viridis* (Scopoli, 1786)**

Dinagat
Siargao*

The Philippine Coucal was a common bird on Dinagat and Siargao and was usually seen in open country among the dense growths of tall grass, especially Kogon (*Imperata* spp.) and Talahib (*Saccharum spontaneum* var. *indicum* Hack.). Other favorite habitat types were the dense bamboo thickets (*Bambusa* spp.), which were quite plentiful in the lowlands, even near human habitations, in the dense second-growth patches and parang vegetation, and close to the well cultivated areas in the lowlands and foothills.

From a distance one or a pair of this species were often observed in the middle of some grassland area containing tall grass with sparse growths of bushes and shrubs. When disturbed, one bird would flush from its swaying perch on the top of some tall grass; and with fast-beating wings alternated regularly with motionless gliding on out-

stretched wings, it would fly barely above the grass. After about 10–15 meters, it would dive into another dense patch of mixed growths of tall grass, bushes, and shrubs. If there were a pair of these coucals, the partner would immediately follow, and both birds would be seen diving into another patch.

Occasionally, one bird would be seen perching on top of a bush or shrub surrounded by grass in parang vegetation. When disturbed, the bird would immediately dive back into the tall grass and scramble and skulk among it.

On Dinagat and Siargao the Philippine Coucal was frequently met with either singly or in pairs, usually at the edges of cultivated fields adjacent to dense second-growth forest patches, which covered the low hills nearby. The species was never observed inside the patches of original dipterocarp forests that were still intact in the localities collected in, except along the edges of clearings that had been made inside these forest patches. On both Dinagat and Siargao the species was not encountered in the higher elevations of the hills and mountains, but most often it was observed at the bases of the hills and low mountains and on their slopes in the parang and grassland areas, up to elevations of about 300 meters above sea level.

The characteristic loud, mournful notes of the Philippine Coucal were heard frequently enough coming from the grassland and parang areas on the low hills on both islands. The notes closely resembled the syllables "Koo-koo-koo . . . ," etc., repeated several times at the same pitch and volume, followed by regular intervals of silence. Occasionally these mournful notes were heard at night.

When the bird got excited, after being disturbed in its feeding or nesting site by a human, this coucal made other notes that were not really loud but that could still be heard about 5–10 meters away from the bird. These notes resembled the syllables "Cha-gook-chook," repeated from time to time with intervals of silence between. The bird kept on giving these notes, always in a low, harsh and croaking manner, while it scrambled and skulked among the branches of bushes and shrubs in the dense patch that it passed through on its way to another area of tall grass, into which it dove and disappeared. The same notes were given out by a bird as it scrambled and skulked through dense bamboo thickets nearby and emerged on the other side, going to another perch in the same area.

The inhabitants on both islands know the bird locally as "Ko-kok" and "Sa-guk-suk," both local names based on the notes that the bird makes. The Cebuanos and other East Visayans use the same local names for this coucal.

***Centropus melanops* Lesson, 1830**

Dinagat*
Siargao*

On Dinagat and Siargao, as on nearby Mindanao, the Black-faced Coucal was never observed in the cultivated areas, grasslands, parang, or open country—the habitat types preferred by the Philippine Coucal. The Black-faced Coucal was encountered inside dense original and second-growth forests, especially in the dense thickets found inside these forests.

On Siargao this coucal was usually encountered inside the dense secondary forests that covered large areas of the hills in the interior, such as those in the hills of Osmeña, Dapa.

On Dinagat this coucal was frequently met with inside the dense patches of original dipterocarp forests that covered many of the small valleys and small areas of flatlands found among the hills and mountains near Mt. Kambinlio and Mt. Redondo. Occasionally, this coucal was observed singly or in pairs on the top branches of trees in scrub forests that covered the slopes of the mountains in the localities of Mt. Kambinlio and Mt. Redondo, up to elevations of about 400 meters.

This coucal preferred to stay among the top branches and dense foliage of the taller trees of secondary forests and the second-story trees inside dipterocarp forests.

The characteristic loud notes of this species were occasionally heard coming from the dense masses of foliage of the vines and lianas that climbed the trunks of first-story trees in the dipterocarp forest areas and patches near Mt. Kambinlio. These notes did not bear any similarity at all to the notes of the Philippine Coucal. After hearing these notes twice, one can identify the owner and trace the exact location of the bird among the dense branches and foliage of the forest tree where the bird is perching.

FAMILY **STRIGIDAE** OWLS

***Otus bakkamoena everetti* (Tweeddale, 1878)**

Dinagat*

The single specimen of the Oriental Screech Owl collected on Dinagat was the only specimen of this rare species that was seen on this island during the entire period of 44 days that the collecting expedition spent in the field. The single specimen was taken in a bird net at the edge of a clearing in the foothills, close to remnant original dipterocarp forest patches and secondary forest areas. The bird was very badly torn when it was recovered from the net early in the morning, and we never learned what animal had attacked it while it was struggling to free itself from the net. The species was never met with on Siargao.

***Mimizuku gurneyi* (Tweeddale, 1879)**

Dinagat*
Siargao*

The Giant Scops Owl was taken on both Dinagat and Siargao, but the species was uncommon on both islands, as on the nearby large island of Mindanao.

The Dinagat specimen was taken at night with the aid of a flashlight. At the time, it was perched in a tall tree at the edge of a clearing inside a logged dipterocarp forest area on a low hill. The locality was densely forested and not far from the coast.

We ascribed to this species the loud owl calls that we had occasionally heard at night coming from the small patches of remnant dipterocarp forest in the foothills. The patches were mixed with dense second-growth forests and were immediately adjacent to the cultivated fields in the lowlands of Barrio Kambinlio, Loreto. In previous collecting expeditions on Mindanao Island, we had also heard the same loud nocturnal owl calls in forests growing on low mountains in the interior, and in the few cases where the birds were successfully secured, always with the aid of head lanterns, they proved to be of this owl species.

On Siargao the same loud nocturnal calls were also heard occasionally coming from the dense patches of second-growth forests in the hills bordering the ricefields in Barrio Osmeña, Dapa. Here, too, the calls came from this species, as proved when it was successfully collected twice.

***Ninox philippensis spilocephala* Tweeddale, 1878**

Siargao*

The Philippine Boobook Owl was uncommon on both Dinagat and Siargao.

During our night-hunting excursions among the newly harvested ricefields adjoining the foothills in Barrio Kambinlio, Loreto, on Dinagat, we occasionally came upon solitary birds of this species perching on some bare branches of isolated trees at the edges of the ricefields. Rarely, we came upon solitary birds of this species perching on the ends of some of the bamboo posts used as supports for the crude and temporary threshing platforms made of bamboo, which were placed in a corner of a field. The strong and well concentrated light of the head lamp, upon hitting the eyes of the bird, made them glisten brightly. In all instances, however, the birds did not linger long enough on their perches to allow the collectors to come within collecting distance. No specimen of this little owl was taken during the night hunting on Dinagat. Moreover, none of the collectors had the opportunity to come upon this bird by accident as it perched during the day.

On Siargao this owl behaved in the same manner as on Dinagat; so it was never collected during the night hunting. However, specimens were collected during the daytime when the collectors came upon the species by sheer accident while the birds were on their daytime perch, usually a branch in the deeply shaded parts inside trees with dense foliage. Such trees grew in dense second-growth forest patches in the foothills bordering a small valley containing many ricefields.

The notes of this small owl sounded like the syllables "Book-kow-kow-kow . . . ," etc., with pauses between the first three or four notes and the last ones uttered closer to each other, becoming closer together at the last few notes.

Based on the notes that it produces, the inhabitants of the two islands call this little owl "Bu-kao." The same local name is widely used in many parts of Mindanao and the East Visayan islands.

FAMILY **CAPRIMULGIDAE** NIGHTJARS

***Eurostopodus macrotis macrotis* (Vigors, 1831)**

Dinagat*

On several occasions on both Dinagat and Siargao, just as the sun disappeared below the horizon, leaving some glow in the western skies, we saw and heard several Philippine Eared Nightjars in flight over the cultivated fields and open country in the interior, where the lowlands immediately adjoined the densely forested hills. As many as five to six birds were seen at one time, all in flight quite far from one another. They performed aerial acrobatics that consisted mainly of horizontally soaring on motionless, outstretched wings, dipping sharply and abruptly, then climbing steeply just as abruptly to resume their horizontal soaring again. All the while, the birds kept uttering their very characteristic, rather loud and high-pitched whistling notes that sounded like "Chee-weeo," repeated several times with regular intervals of silence between notes. The birds usually stayed in the immediate vicinities of our campsites for about 15 minutes, but all the while they kept moving away, until they finally disappeared from view and their whistling notes were hardly audible. Then, total darkness covered our area, and the birds could no longer be heard.

Occasionally, the same phenomenon was observed in both camps on both islands during very early mornings. Just as the glow of the rising sun barely brightened the eastern horizon yet darkness still remained in the locality, one or two birds were heard and seen performing the same aerial routine they had done after sunset, except that they did these characteristic acts within much shorter periods. Again, the birds performed their acrobatic flight to the accompaniment of their loud whistling notes, "Chee-weeo," repeated several times and then

ceased entirely. By that time it was already morning, and the sun was evident above the eastern horizon.

Very rarely this bird was disturbed singly from its daytime roost among the dry leaves on the forest floor, but not one was secured. It was easier to collect the bird while it was in flight, especially while it soared over the open fields, but even then, this opportunity rarely happened within effective collecting distance.

FAMILY **APODIDAE** SWIFTS

Collocalia vanikorensis amelis **Oberholser, 1906**

Dinagat*

Large numbers of swiftlets were always observed in flight over the cultivated areas and open country in the lowlands along the western coasts of Dinagat and even over the sea along the seashores. Many swiftlets were always seen in the immediate vicinities of the high precipitous cliffs that bordered the sea in many places along the western coast and around the high rocky islets, of which there are quite a number off the coasts of Dinagat.

Two species of swiftlets of the same size, the smallest of the species of swifts in the Philippines, were very common in the immediate vicinities of our main camp at Kambinlio, Loreto. They were the main catch of the bird nets set in the ricefields and open meadows in the foothills. The Glossy Swiftlet, *Collocalia esculenta marginata,* was the most common form along the western coasts of Dinagat, ranging from the seacoast up to the higher elevations in the localities of Mt. Kambinlio and Mt. Redondo. The Pygmy Swiftlet, *C. troglodytes,* was also common, although not as numerous in one area as *C. esculenta marginata.* The Gray Swiftlet, *C. vanikorensis amelis,* was rather uncommon and was seldom seen in flight in the same localities where the two other swiftlets were observed in large numbers.

In flight it was easy enough to distinguish *C. troglodytes* and *C. esculenta marginata* from the Gray Swiftlet and from each other. *C. troglodytes* had the distinct and glistening white rump very clearly seen, even in flight. *C. esculenta marginata* showed only a whitish rump but not as glistening and distinctly white as that of *C. troglodytes. C. vanikorensis amelis* was easily much larger and did not show any white or whitish rump when in flight; in addition, it was not so common as the other two forms.

The inhabitants of Siargao told us about many small swiftlets nesting inside caves in the interior hills. There were quite a number of swiftlets, of which the two smallest forms, *C. troglodytes* and *C. esculenta marginata,* were easily identified while in flight over the ricefields

and other cultivated areas near our main campsite in Barrio Osmeña. Strangely enough, our bird nets never caught any of these swiftlets.

The inhabitants gave all swifts, swiftlets, and swallows the name "Sayaw," the common vernacular name that the East Visayans call these birds. Some also knew the swiftlets as "Buta-buta."

***Collocalia troglodytes* G. R. Gray, 1845**

Dinagat*

On Dinagat and Siargao large numbers of both the Pygmy Swiftlet and the Glossy Swiftlet were usually observed in flight over the rice-fields and other cultivated areas, grasslands, and open country, from the lowlands into the hills, especially on Dinagat. Both forms were usually observed flying in large numbers inside the clearings in the forests in the hills and mountains near Mt. Kambinlio and Mt. Redondo.

Large numbers of both the Pygmy Swiftlet and the Glossy Swiftlet seemed to prefer the immediate vicinities of steep and precipitous cliffs from the seacoasts well into the mountainous interior on Dinagat Island. These localities were most likely ideal breeding places of these two swiftlets, considering that there were numerous caves, cavities, and overhangs among these cliffs.

***Collocalia esculenta marginata* Salvadori, 1882**

Dinagat*

The Glossy Swiftlet, together with the Pygmy Swiftlet, was frequently observed in flight in large numbers from the seacoasts (including the seas close to the shores of western Dinagat), as well as over the lowlands and deep into the interior among the mountains near Mt. Kambinlio and Mt. Redondo.

This species was easily the most numerous and most common swiftlet on both Dinagat and Siargao. On the other islands of the Philippines, this swiftlet had been found nesting inside caves, in shallow caverns, and even under overhangs among the rock in cliffs, including those on tiny precipitous and steep rock islets off the coasts of the larger islands.

FAMILY **TROGONIDAE** TROGONS

***Harpactes ardens ardens* (Temminck, 1826)**

Dinagat

On Dinagat the Philippine Trogon was quite a common bird inside the darker parts of the original dipterocarp forest areas and remnant patches, which were growing in the small valleys and narrow strips of flatlands among the hills as well as on the lower slopes of the hills and mountains near Mt. Kambinlio and Mt. Redondo.

The species usually went about either singly or in pairs and most often made no noise at all. Most of the time the male was discovered before the female, especially when it took flight from its low perch on one of the lower branches of a third-story tree, frequently one in the more deeply shaded areas of the forest. If not disturbed, the bird usually stayed on its perch and remained motionless for quite sometime. From its perch, the bird sallied forth after some insect nearby; then if it did not see any intrusion, it usually went back to its perch.

Oddly enough, in spite of the very bright colors of the male, the observer was most likely to miss it among the foliage and branches of the low tree where it perched. The female partner, too, was often missed, even if the male had already been seen on a tree and the female was perching nearby, perhaps on another branch in the same tree or in a nearby tree.

FAMILY **ALCEDINIDAE** KINGFISHERS

***Ceyx argentatus argentatus* Tweeddale, 1877**

Siargao*

In the interior of both Dinagat and Siargao, the Silvery Kingfisher was observed often enough along the streams inside the patches and areas of remnant dipterocarp forests and mixed dipterocarp and secondary forests. Unfortunately, not even a single specimen of this species was taken on Dinagat, yet it was not really rare on this island.

This small kingfisher usually went about singly and often perched on low branches of bushes growing along the streams. Occasionally, the bird perched on a rock in the middle of the shallow stream or along the side. In most cases the perching bird was difficult to discover because it remained motionless for long periods and appeared as part of its background. Most of the time, a collector discovered this little kingfisher only when it had already flown from its perch and moved farther along the stream. The bird usually uttered a soft, high-pitched "Cheet" as it left its perch.

On Siargao, three specimens of the bird were taken—all from along the streams inside dense forest growths, especially in the patches of mixed dipterocarp remnants and secondary forests.

***Pelargopsis capensis smithi* (Mearns, 1909)**

Dinagat

The Stork-billed Kingfisher was occasionally observed, singly or in pairs, as it perched on low bare branches or on the prop roots of mangrove trees growing along the seashores in Loreto, on the western coast of Dinagat, and in Omasdang, on the eastern coast or Pacific side of this island. A pair of this species of kingfisher was often observed

perching in different parts of the river in Barrio Kambinlio, sometimes in the vicinity of the main camp but more frequently in the portion of the river close to its opening to the sea.

This large kingfisher was never seen on Siargao in the localities in the interior where collections were carried on.

The inhabitants on Dinagat called the Stork-billed Kingfisher "Ba-ka-ka."

***Halcyon chloris collaris* (Scopoli, 1786)**

Dinagat
Siargao*

On both Dinagat and Siargao the White-collared Kingfisher was one of the most common birds, and the most common kingfisher. During low tides, this kingfisher, singly or in pairs, was often observed actively feeding on the exposed mud flats in Loreto, Dinagat, on the western coast. Very often, as many as a dozen or more of these birds were seen perching on the rocks in exposed mud flats during the low tides, and from time to time the birds picked up food items from the ground around their perches. After a bird had taken what it was after on the ground, it usually flew and perched on a rock nearby, not necessarily the same rock it had been on previously. When the tide came back and gradually covered the mud flat, the birds immediately left the area and flew toward a nearby islet or toward the coast to continue its feeding activities in these new places.

This kingfisher ranged all over the lowlands on both islands. It stayed along the seacoasts and ranged among the cultivated fields in the interior. It stayed in open country, parang, grasslands, and marshlands in localities in the lowlands and moderate elevations where there were no more forested areas, whether or not there were rivers and streams nearby. The bird stayed close to human habitations and often perched on the roofs of the nipa-and-bamboo huts in the lowlands. It was never observed inside the real forests or at high elevations in the mountain localities of Mt. Kambinlio and Mt. Redondo on Dinagat.

On Siargao this kingfisher was observed along the seashores in Dapa, very close to the wharf. It was also found in the cultivated fields, marshy areas, and coconut groves in the interior localities of the island, such as in the immediate vicinity of our main camp in Barrio Osmeña, Dapa.

Its loud and piercing notes were familiar sounds that could be heard in many localities, from the exposed tide flats along the seashores into the interior, especially in the cultivated areas and open country along the foothills, including the ricefields and the adjacent hills on both Dinagat and Siargao.

The White-collared Kingfisher is the most common species of several species of kingfishers in the Philippines. On the other islands of the Philippines, especially the larger ones, this kingfisher usually stays in well cultivated areas and farms, open meadows, grasslands, parang, marshlands, or almost anywhere in the lowlands that has been cleared of forests. The species does not stay inside the forests, except perhaps inside mangrove forests, although it may be found along the edges of forests when they are adjacent to well cultivated fields and open country. This kingfisher loves to stay inside coconut groves and makes its nest inside the nest of tree termites, which is usually attached to the trunk of a coconut palm tree or other trees.

The inhabitants of Dinagat and Siargao call this kingfisher "Ti-ka-rol," the local name by which this species is known all over the Eastern Visayas, especially on Cebu, Bohol, and Negros Oriental.

***Halcyon smyrnensis gularis* (Kuhl, 1820)**

Dinagat*
Siargao*

The White-throated Kingfisher was a very common bird on both Dinagat and Siargao and was usually encountered in almost all the habitat types where *Halcyon chloris collaris,* the most common kingfisher, was found. *H. smyrnensis gularis* was the second most common kingfisher species on both islands. The same was true on the other islands in the Philippines where collecting has been carried out during the last 35 years or so.

H. smyrnensis gularis, however, was found on Dinagat and Siargao in localities farther from any body of water, be it stream, river, pond, or sea, than the average habitat of *H. chloris collaris.* The White-throated Kingfisher was the species of kingfisher that was encountered more frequently in the kaingin clearings in the interior. These clearings were made inside original forest areas, especially in dipterocarp and scrub forests located in the hills and at the lower elevations of mountains in the interior.

H. chloris collaris, however, was more common along the coastal areas, including inside the mangrove forests and nipa swamps and on the exposed mud flats during low tides. *H. smyrnensis gularis* was seldom seen along the seashores on both islands. The same is true on the other islands of the Philippines.

Both species of kingfishers were observed perching on the branches of trees growing along the banks of streams and rivers in the lowlands and foothills on both Dinagat and Siargao. Although both species of kingfishers feed on insects and other small invertebrates and on lizards and other small terrestrial vertebrates, which they secure from the

ground, *H. chloris collaris* has more opportunity to feed on marine aquatic animals, including fishes, crustaceans, annelids, and mollusks, which are found in the sea and on the exposed tide flats during low tides. Conversely, *H. smyrnensis gularis* has more opportunity to feed on small terrestrial animals, both invertebrates and vertebrates.

The inhabitants on both islands called the White-throated Kingfisher "Ba-ka-ka," the same vernacular name they applied to the larger kingfisher, *Pelargopsis capensis smithi*. The Cebuano segment of the population called the White-throated Kingfisher "U-wak-ba-ta," the vernacular name by which this species is known in Cebu.

FAMILY MEROPIDAE BEE-EATERS

***Merops viridis americanus* P. L. S. Müller, 1776**

Dinagat*

The Chestnut-headed Bee-eater was seen occasionally in flight over the ricefields and nearby marshy areas in the lowlands close to our main camps on both Dinagat and Siargao. The birds usually went about their search for food in flocks of six to a dozen members. Inside clearings in the hills, near the cultivated areas in the lowlands of Barrio Kambinlio, small flocks of this bee-eater, composed of five to six members, were twice observed perching on the tops and branches of shrubs that had started to develop inside these clearings. From time to time, one or two birds left their perches and flew low over the clearing, swooping down on some insects among the bushes and grass in the clearing, then perching nearby.

The notes of this species closely resembled the sound of "Purok-purok," repeated from time to time as the birds soared low over the vegetation and pounced on insects.

On the larger islands of the Philippines, flocks of this species and those of a closely related species, *Merops philippinus philippinus*, or Blue-tailed Bee-eater, were observed to feed together in the same field or open meadow.

The inhabitants on the two islands called the Chestnut-headed Bee-eater "Purok-purok," after its characteristic notes.

Both species of bee-eaters in the Philippines have similar habits.

FAMILY CORACIIDAE ROLLERS

***Eurystomus orientalis cyanocollis* Vieillot, 1819**

Dinagat
Siargao*

On both Dinagat and Siargao the Dollar Bird was common and was often observed perching on some bare branch of tall and medium-

high trees growing along the edges of the cultivated fields, open meadows, parang, and grasslands in the lowlands. This species was also frequently seen perching on some of the trees growing inside clearings in forest areas, especially in dipterocarp forests in the hills and on the lower slopes of the mountains on Dinagat in the Mt. Kambinlio and Mt. Redondo localities.

From its tall perch a bird usually swooped down on insect prey, which were on the leaves of the plants or flying over them. It then returned to its perch after capturing the insect prey. Most often it stayed on this perch for long periods until disturbed by something or until it saw possible prey somewhere else, whereupon it left the perch for another one nearby or some distance away.

On several different visits to a particular clearing, one was most likely to see the same bird or pair of birds. Nesting birds were observed coming out of holes at the ends of rotting, broken branches near the tops of tall dead trees left standing in clearings.

The inhabitants on both islands called this species "Ba-li-sak-sak."

FAMILY **BUCEROTIDAE** HORNBILLS

***Penelopides panini affinis* Tweeddale, 1877**

Dinagat
Siargao*

The Tarictic Hornbill was very common on both Dinagat and Siargao. This small hornbill went about its daily activities usually in pairs, but occasionally as many as six to a dozen of this species were seen feeding at the same time on the fruits (especially figs, *Ficus* spp.) of certain trees.

On Dinagat this hornbill was often encountered inside the remnant original dipterocarp forests growing in the small valleys and narrow strips of flatlands among the hills immediately adjacent to ricefields and other cultivated areas in Barrio Kambinlio. Some birds were also met with inside the dense second-growth forest patches in the foothills and on the slopes, as well as inside the scrub forests on the lower slopes, of hills and mountains in the Mt. Kambinlio and Mt. Redondo localities. The species was also seen often in the forests in the hills of Omasdang, on the Pacific side of Dinagat.

On Siargao this species was frequently seen inside the dense second-growth forests and mixed dipterocarp remnant forest and second growth, which were growing on the hills immediately around the ricefields and other cultivated areas in the interior, such as in Barrio Osmeña, Dapa, and in other localities where collections were carried on.

The inhabitants on both Dinagat and Siargao called this hornbill "Tao-si" or "Talo-si."

Aceros leucocephalus leucocephalus (Vieillot, 1816)

Dinagat*

The Writhed-billed Hornbill was occasionally observed singly or in pairs among the higher branches of the first-story trees in original dipterocarp forest patches that grew in the small valleys and flatlands among the hills, on the hillsides, and on the lower slopes of some of the mountains in the Mt. Kambinlio and Mt. Redondo localities. Rarely, one or a pair of these hornbills was seen in some of the taller trees in the scrub forests that covered the hilltops and ridges of the hills and low mountains and on the slopes of the higher peaks at elevations of about 500–600 meters above sea level.

Occasionally, as many as five or six of this hornbill species were observed feeding on tall fruiting trees inside dense dipterocarp forest areas, but when disturbed, the birds flew in different directions. The birds were not really members of a regular flock, because these hornbills were never observed to form flocks, but they merely congregated in one fruiting tree as long as the fruits lasted.

Because of its silent habits, the Writhed-billed Hornbill, although a large bird, was likely to be missed among the branches and foliage of the trees where it perched and fed. The birds seldom made any unnecessary noise in the course of feeding, even when several of them happened to be feeding in the same fruiting tree. If it did, in fact, make sounds, the notes uttered were not easily heard because they were merely soft sounds that resembled the syllables "Ung-ngeek . . . ngeek . . .," etc., repeated several times but not really loud enough to attract the attention of the average observer.

In the interior of Siargao the bird was not seen in any of the localities that were collected in quite thoroughly. The dense areas and patches of mixed remnant dipterocarp forests and secondary forests that covered large parts of the hills were ideal habitats for this hornbill species, but the species was never encountered in them. However, the larger species of hornbill, *Buceros hydrocorax mindanensis,* the Mindanao form of the Rufous Hornbill, was observed frequently enough among the tall trees inside these mixed forests.

The inhabitants reported having seen the Writhed-billed Hornbill in some forests in other parts of Siargao. More thorough collecting in more localities on Siargao Island will doubtless prove the presence of the species on this island.

Buceros hydrocorax mindanensis Tweeddale, 1877

Dinagat*
Siargao*

The Rufous Hornbill was common on Dinagat and Siargao. It was frequently seen and heard inside the areas of original dipterocarp for-

ests and mixed remnant dipterocarp and secondary forests among the hills and mountains in the interior of both islands.

This largest species of the Philippine hornbills was well known by the rural inhabitants on both islands, especially by the farmers who had made clearings inside the forests in the interior. They frequently encountered this hornbill in the forests and, occasionally, even inside their forest clearings. They were also familiar with the bird's very loud, characteristic calls, which they often heard early in the morning, at noon, and late in the afternoon.

In many parts of the Philippines where this species occurs, it is considered the "clock-bird"; hence, the species is known as "Reloj-del-monte" (clock of the mountain). When the birds call early in the morning, the farmers consider it time to eat their breakfast, after which they start on their farm chores. When they hear the calls at noon, they decide that it is time to eat lunch; and in the late afternoon, when they hear the usual loud calls, they stop working, go home, and start preparing the evening meal.

The loud calls of this large hornbill could easily be heard 1 or more kilometers from the perching tree, especially if the calls came from a tree located on top of a ridge or peak. Frequently, when one hornbill called, several hornbills answered, and their calls came from different parts of the forests in the locality. Occasionally, several birds were heard calling from one tree. This usually happened in the early mornings and in late afternoons. Five or more birds of this species sometimes congregated in the same tall fruiting tree in a particular locality and took turns calling. Soon other birds were observed coming to the tree. This phenomenon usually took place late in the afternoon and the birds continued calling until darkness set in. Early the following morning, the birds commenced calling again, one after another. This period of calling usually lasted about 10–15 minutes, then ceased altogether. Later on, the birds left the roosting tree, singly or in pairs, and flew to different parts of the forests in the locality.

Occasionally, during the day, several birds were heard calling from a particular tall tree, usually a fruiting tree where the birds fed. Other hornbills answered the calls from different parts of the forests nearby, some quite far away. Soon other Rufous Hornbills came to the tree where the calls had originated. The calls must have been a means whereby the calling birds told other birds of the fruiting tree where they could feed.

Some of the collectors in the expedition party were expert at imitating the characteristic call of the Rufous Hornbill. When they did so from under some tall forest tree, inside the forest, the birds came and perched on the tall trees nearby or on the very tree where the

collectors stayed at the time. It was a sort of an unethical way of collecting these hornbills.

The inhabitants on both islands, as on the other islands where the species occurs, call this hornbill "Kaao," based on its loud call which resembles the syllable "Kaao" repeated several times with intervals.

FAMILY **PICIDAE** WOODPECKERS

***Dryocopus javensis multilunatus* (McGregor, 1907)**

Dinagat*

The White-bellied Black Woodpecker was seen many times on Dinagat, especially inside the original dipterocarp forests and in the clearings inside these densely forested areas. It was often seen on the trunks and branches of some trees growing at the edges of forests of mixed remnant dipterocarp and second growth among the hills and mountains in the interior mountainous regions of the Mt. Kambinlio and Mt. Redondo. Rarely, this species was observed on the trunks and branches of some trees in the scrub forests of Dinagat, as high as 600–700 meters above sea level.

The species was not really rare on Dinagat, but its habits of staying and feeding unobtrusively and silently on the trunks of trees among dense forest growths made it difficult to discover easily, even by one who happened to be nearby. It was only when the woodpecker made the characteristic loud and fast tapping sounds on the hollow, dead trunks that this woodpecker could be discovered. The usual tapping sounds produced by this woodpecker on the live trunks and branches were often dull and barely audible; so the bird could be in a site for some time without being discovered by someone nearby.

This woodpecker was not seen or encountered on Siargao, even inside the dense patches and areas of mixed remnant dipterocarp and secondary forests. It is very possible, however, that more thorough collecting may result in its discovery on Siargao.

The White-bellied Black Woodpecker was called "Ba-tok" by the inhabitants of Dinagat.

***Dendrocopos maculatus fulvifasciatus* (Hargitt, 1881)**

Dinagat*

The Pygmy Woodpecker was observed several times tapping vigorously on the trunks and branches of dead trees left standing in clearings inside patches of original dipterocarp and secondary forests. These patches are found among the hills and mountains in the interior of Barrio Kambinlio, Loreto, near Mt. Kambinlio and Mt. Redondo, on Dinagat. Occasionally, this small woodpecker was also observed tap-

ping among the branches of low and medium-high trees at the outskirts of mixed remnant dipterocarp and secondary forest patches that adjoined the cultivated areas in the lowlands, open country, and meadows.

The bird usually went about its daily feeding activities singly or in pairs. One or a pair might be hard at work tapping on the dead branches of a tree standing very close to an observer, without the latter ever discovering the bird or the pair until they flew to another tree nearby. At such times these birds often gave out their very characteristic notes. Once the bird or pair reached the next tree, it was very easy for them to get lost among the branches. To find them, the observer would have to look very carefully because they would be difficult to locate among the many branches.

This small woodpecker was not collected on Siargao, and it was not observed at all in the localities collected in, even in the most likely habitats of this species—among dead trees inside clearings in both secondary and original dipterocarp forest patches, as well as in the outskirts of these forests where they adjoined cultivated areas and open country. Large areas of the hills in the interior of the island were covered with these two types of vegetation, but unfortunately none of the collectors had the opportunity to meet with the species in them.

The inhabitants of Dinagat and Siargao called this small woodpecker "Ba-tok," like the larger form of woodpecker.

FAMILY **EURYLAIMIDAE** BROADBILLS

***Eurylaimus steerii mayri* Salomonsen, 1953**

Dinagat
Siargao*

The Wattled Broadbill was fairly common on Dinagat and Siargao and was usually met with inside the dense patches and areas of remnant original dipterocarp forests and in mixed dipterocarp and secondary forests. On Dinagat, a bird or a pair, or even a small flock of five to six members, usually perched on the lower branches and undergrowths of the third story, which consisted mainly of low trees, shrubs, and bushes growing inside the typically three-storied dipterocarp forests. On Siargao, the species was observed usually staying inside the dense patches of mixed remnant original dipterocarp and secondary forests, which formed quite large patches on the hillsides in the interior. Occasionally, one or a pair was met with inside the scrub forests on both islands.

Five or six members of a feeding flock would be feeding among the branches of the lower growths inside a forest patch, but their quiet and unobtrusive habits made it difficult for an observer to discover them easily. The birds would usually perch motionless on the lower branches

of low trees, shrubs, or even bushes inside the dark sites of a forest patch. They would remain in this motionless state for some time while waiting for insect activities nearby. From time to time, some of the birds would leave the perch and chase after the insects that would be discovered among the branches and leaves of the perching tree or of one nearby. The birds would then go back to their original perch or to one close by. The birds in a flock would follow the same routine, but not all of them would go after insect food at the same time.

Once the observer or collector discovered the birds, it would be easy to collect them in a particular spot in the forest because, in spite of the noise produced by the first shot, the other birds would continue to perch in the same places they were in before being discovered. The other members of the flock would remain nearby and act stupidly. It would take some time before the group finally left the spot.

FAMILY **PITTIDAE** PITTAS

***Pitta sordida sordida* (P. L. S. Müller, 1776)**

Siargao*

The Black-headed Pitta was rare on both Dinagat and Siargao. The bird was seen in two instances, and its very characteristic notes were heard once coming from a dense patch of mixed remnant original dipterocarp and secondary forests inside a small valley among the hills in the interior of Dinagat. It was never collected on Dinagat, and only one specimen was successfully taken on Siargao. The bird was heard several times calling from the dense and dark parts of the secondary forest patches that covered many hills in the interior of Siargao, but it was very difficult to locate the bird among the dense growths.

The bird usually went about its feeding activities singly or, very rarely, in pairs. Locating it on the ground in the midst of the thick undergrowths and in the semidark places was a difficult job; usually, the bird would never be discovered. Strangely enough, the very bright and striking colors of its plumage did not help at all in trying to locate it.

Unlike many birds that stay often on the forest floor, this bird does not walk on the ground. It hops actively, covering long distances in the process—much better than if it walked or ran. It is very easy for it to disappear in the semidarkness of the forest undergrowth.

The Black-headed Pitta has very characteristic notes that sound like "Wow-ha . . . Wow-ha . . .," etc., repeated several times with good intervals between, followed by long silence. It would be quite a long time before the bird called again from the same site.

FAMILY **CAMPEPHAGIDAE** CUCKOO-SHRIKES

***Lalage nigra chilensis* (Meyen, 1834)**

Siargao*

The Pied Triller was very common on Dinagat and Siargao. It was usually observed feeding on the insects found among the foliage of trees and shrubs in the farms and other cultivated areas, in meadows and open country, in second growth and parang vegetation, in coconut groves, and even in the gardens near the houses in the barrios and other well settled areas. This species was also met with in mangrove and beach forests close to the coasts.

The bird usually went about its feeding activities singly or in pairs, but occasionally as many as a dozen birds were observed feeding in the same tree or shrub. When disturbed, the birds would leave the feeding plant singly or in pairs and proceed in different directions.

During certain seasons of the year large numbers of caterpillars attack some plants, including such species as "Arbol de fuego" (*Delonix regia* [Boj.]). Large numbers of this species are planted along the streets in cities and towns because it has very bright and colorful flowers. The caterpillars feed on the leaves in great numbers, and during these times as many as a dozen individuals of the Pied Triller would congregate on the affected tree to feed on the caterpillars. It was not exceptional to see several birds of this species feeding together in the same tree along the streets of Manila, Cebu, Iloilo, and in the other busy cities of the Philippines.

The bird's mellow notes were often heard coming from the branches of trees and shrubs growing at the edges of ricefields and other cultivated fields in the lowlands of Barrio Kambinlio, Loreto, on Dinagat Island and in Barrio Osmeña, Dapa, on Siargao.

The rural inhabitants of both islands called this bird "Bu-ga-ongon," the same name that the inhabitants of Mindanao, Cebu, Leyte, and Negros Oriental applied to this bird in their native regions.

FAMILY **ORIOLIDAE** ORIOLES

***Oriolus chinensis chinensis* Linné, 1766**

Dinagat
Siargao*

On Dinagat and Siargao the Black-naped Oriole was easily one of the most common birds observed in the well cultivated areas close to the barrios. The bird was frequently seen, singly or in pairs, in coconut groves, either feeding actively on the flowers of the coconut palms or just perching on the fronds. The species was also met with often among the trees in secondary forest patches, in parang vegetation, and

in the trees and shrubs growing as hedges along the edges of farms and cultivated fields. This oriole was also seen frequently among the trees at the edges of patches and remnant areas of original dipterocarp forests that were found in the foothills, immediately adjoining the ricefields and other well cultivated farms in the lowlands, especially along the western coasts of Dinagat.

On Siargao the Black-naped Oriole was often observed singly or in pairs feeding very actively among the branches of fruiting trees in secondary forest patches, which covered the hills in the interior of the island and immediately bordered the ricefields and other well cultivated fields.

The very characteristic loud and musical call of the species was often heard among the vegetation where the bird happened to be feeding at the time. The pleasingly musical notes resembled the syllables "Tu-li-hao," repeated from time to time with intervals of silence between.

The bird was frequently kept in cages, and usually male and female birds were placed together and fed bananas and other fruits, such as papayas. However, they do not live very long as pets or cage-birds.

The rural inhabitants of Dinagat and Siargao called this oriole "Tu-li-hao" or "An-tu-li-hao," based on its very well known notes. The same names for this species are used locally by the inhabitants of the Eastern Visayan islands and Mindanao.

FAMILY **CORVIDAE** CROWS

***Corvus macrorhynchos philippinus* (Bonaparte, 1853)**

Dinagat*
Siargao*

The Large-billed Crow was another very common bird on Dinagat and Siargao. It was frequently observed in pairs and occasionally in small groups of six to eight, staying in coconut groves and secondary forests, along the edges of remnant original dipterocarp forest patches adjoining farms and cultivated fields, inside groves of mixed trees, shrubs, and bushes in parang vegetation, and in open country and grasslands where there were trees and shrubs growing, even if sparsely. Occasionally, as many as a dozen or more crows were observed feeding on the exposed tide flats along the western coasts of Dinagat. They were seen actively chasing crabs and other animals living among the rocks in the tide flats.

The crow was not liked at all by the rural inhabitants of Dinagat and Siargao, chiefly because of its habits of preying on the chicks of domestic poultry and of robbing eggs from chicken nests, even if these nests were placed under the nipa huts of the farmers. Farmers in dif-

ferent parts of the Philippines have the same attitude toward the crow; as a result, the species is very much persecuted all over. In spite of these unfavorable factors against the species, the crow is still one of the most common and widely spread species in the Philippines; and, strangely enough, the bird still stays close to human habitations.

The inhabitants of Dinagat and Siargao, and in all parts of the Philippines, called this species "U-wak," based on its very characteristic notes. The loud and harsh notes of this crow sound similar to the syllables "U-wak . . . U-wak . . . U-wak . . .," etc., repeated several times with regular intervals between notes, hence the local name.

FAMILY **RHABDORNITHIDAE** CREEPERS

***Rhabdornis mysticalis minor* Ogilvie-Grant, 1896**

Dinagat*

The Striped-headed Creeper was uncommon on Dinagat and was not met with at all on Siargao.

The bird went about the daily feeding activities usually singly or in pairs, creeping on the trunks and branches of trees of moderate heights inside patches of remnant original dipterocarp forests and in dense patches of secondary forests. Occasionally, this creeper was observed feeding in the trees inside patches of mixed secondary forest and remnant original dipterocarp forest, which were found in the foothills and deep in the interior of the Mt. Kambinlio localities, among the hills and mountains. Rarely, the species was encountered in scrub forests in the higher elevations, but not more than 500 meters above sea level.

Occasionally, a pair was seen feeding on something at the ends of the small branches, the birds alighting on the small twigs nearest the leaves containing the food items the birds were interested in. In this manner of feeding there was no creeping action at all; the birds behaved like ordinary perching bird species. The tendency of the species, however, is to creep on the branches and trunks of trees where it may happen to feed. It is possible that when the bird feeds like other ordinary birds on the flowers and fruits at the ends of twigs, it does not need to creep; but when it is after insect food, it creeps and examines the branches and trunks for possible tidbits.

FAMILY **TIMALIIDAE** BABBLERS

***Stachyris capitalis capitalis* (Tweeddale, 1877)**

Dinagat

The Black-crowned Tree-babbler was fairly common among the lower branches of second-story and third-story trees, which formed the

lower growths inside patches of remnant original forests and also inside the logged forest areas on Dinagat. The species was not observed at all on Siargao, even inside the large patches of secondary forests and mixed secondary forest and dipterocarp forests in the hills in the interior of the island.

The bird usually went about in pairs, although occasionally small feeding flocks of about six to eight members were seen among the branches and foliage of the lower growths in original dipterocarp forest patches. The bird was very difficult to discover among the dense foliage of a tree, even if a flock were feeding in it.

The Black-crowned Tree-babbler was not really rare in the forests on Dinagat, but its silent ways of feeding and going about its search for food made it easy to miss.

Macronous striaticeps

Although this species has been recorded from Bohol, Leyte, Mindanao, and Samar and has been attributed to *mindanensis* Steere, 1890, the population from Dinagat and Siargao, heretofore unrecorded, is distinctly different and may be called:

Macronous striaticeps alcasidi new subspecies

Type DMNH 20366, ♂ Omasdang, Loreto, Surigao del Norte, Dinagat Id., P. I., March 30, 1972. Wing 68; tail 61; bill 16; tarsus 23.

Diagnosis: Differs from *mindanensis* by having the brown of the upperparts greener, borders of white shaft streaks of back plumes less blackish, less contrasting; underparts in series less heavily streaked, resulting in a whiter appearance, with some individuals coming close to *mindanenis*; sides, flanks, and under tail-coverts colder and less rufescent; flank plumes longer and better developed than *mindanensis* or *kettlewelli*. Also, wing in series averages longer.

Differs from *kettlewelli* in having ground color of crown black, not dark brown; heavier white streaking on crown; dorsal plumes more slender, white shaft streaks narrower, less broadly outlined in blackish; upper tail-coverts and edges of rectrices darker, less reddish brown; underparts paler.

Range: Dinagat and Siargao.

Specimens examined: *kettlewelli*—Tawitawi, Sulu Archipelago 5 ♂, 1 ♀. *mindanensis*—Leyte 2 ♂, 3 ♀; Mindanao 4 ♂, 4 ♀; Samar 7 ♂, 3 ♀. *alcasidi*—Dinagat 13 ♂, 8 ♀; Siargao 19 ♂, 12 ♀.

Etymology: This new subspecies is named for Dr. Godofredo L. Alcasid, Director of the Philippine National Museum, for his continued interest in and contributions to ornithology in southeast Asia.

REMARKS: On Dinagat and Siargao the Brown Tit-babbler was a very common bird in both the original and secondary forests and in the patches containing mixed growths of original and second-growth forests.

This species usually went about in small flocks of six to a dozen members as it searched for food inside patches of dense vegetation of various types.

In the course of searching for food, the members of a flock usually followed a certain pattern, especially in the particular direction they traveled inside the forest and trees in which they fed. Once a feeding flock of this species is discovered feeding in a particular site inside the forest, it is interesting to watch the activities of the members. One notes immediately the thoroughness with which the members of the flock go over the individual component growths, including trees, shrubs, bushes, and vines. They take care not to miss the branches and leaves in a particular growth so as not to overlook any possible insect food. The members of a feeding flock usually pursue carefully any possible food item, such as insects. After they finish working over very thoroughly the branches and leaves of a certain plant, they transfer to the nearest growth that is located in the particular direction that the flock is following in its feeding at that particular time.

The feeding birds usually distributed themselves among the different parts of a particular plant, or on several plants in the site, which the members considered as possible sources of food items. Some of the birds stayed and worked the trunk and branches near the ground. If the feeding growth was a vine, some birds usually started their search for food at the base of the vine very close to the ground. Other members worked on the other branches higher up the plant and gradually worked to the very tips of the individual branches, including the leaves. The birds then flew to the next plant and followed the same procedure. If the next growth was too small, only a few birds worked in it and the others proceeded to the other plants in the direction the flock was following.

As soon as there were no more plants in the direction that the flock was taking in its feeding, the birds flew to plants nearest to those that they had already finished searching in. When there was a stream in the course of the feeding flock, the birds flew across this stream and proceeded to work in a tree, shrub, bush, or vine on the other bank, but always on one that was closest to the last plant visited. The birds then proceeded with the feeding activities in particular directions. Several times feeding flocks were followed as far as they allowed observations. A flock would start feeding on growths on a hillside, then proceed in a direction up the hill. Upon reaching the top or ridge, the group would go down the other side of the same hill until they reached the base. From there the flock would follow a new direction

to continue the feeding, and it would usually continue up a new hill until it reached the top or ridge, then follow a certain direction and continue the feeding.

On the other islands the feeding flocks sometimes were joined by other bird species, and a temporary feeding flock consisting of several species of small birds was formed.

FAMILY **PYCNONOTIDAE** BULBULS

***Pycnonotus urostictus philippensis* (Hachisuka, 1934)**

Dinagat
Siargao*

On Dinagat and Siargao the Wattled Bulbul was very common, especially among the trees growing at the edges of forest patches, both the dipterocarp and scrub forests. The bird was also observed inside the clearings made in dipterocarp forests, inside the patches of secondary forests, and in the groves of trees, shrubs, bushes, and vines in parang vegetation. Rarely, a pair was seen feeding in the trees, shrubs, and bushes growing at the edges of cultivated fields as hedge growths.

The species ranged from the lowlands up to about 500–600 meters above sea level. Several pairs were observed feeding among the branches of the sparse growths of trees inside and along the edges of the clearings on the hills and mountain slopes, within the extensive areas of scrub forests, especially on Dinagat.

Occasionally, about five or six birds were seen feeding on the tiny fruits of a fruiting tree inside a clearing in the forest. When disturbed, they flew in different directions into the surrounding forest growths, showing that the birds were not really members of a regular feeding flock, but merely happened to congregate in the same fruiting tree at the same time to feed on the fruits.

***Pycnonotus goiavier suluensis* Mearns, 1909**

Dinagat*

On Dinagat the Yellow-vented Bulbul was very common and was frequently met with among the trees, shrubs, and bushes that formed the hedges of cultivated fields in the lowlands and that grew along the edges of farms. The bird was common in the well settled areas.

A good number of this species were observed coming together late in the afternoons and roosting in particular sites in open country and grassland areas, where dense growths of tall grass were found with sparse mixtures of trees, shrubs, and bushes. In a particular locality the birds usually selected one site close to well cultivated areas, and large numbers of this bulbul would roost in this site. Early the next morning, the bulbuls habitually left the area, flying in different direc-

tions, usually in pairs, until none of the birds were left in the roosting site. Late in the afternoon, when the sun was about to set, the birds, again usually in pairs, returned to the roosting site to spend the night. These roosting places were not permanent and did not last for long periods. The birds stayed there only for a time and then transferred their roosting sites.

Pairs of this bulbul were frequently observed feeding in the plants in the gardens of the houses in the barrios. This species was really a bird of the farms, well cultivated fields, and open country, unlike *Pycnonotus urostictus philippensis,* which preferred to stay inside tree growths or close to forest areas.

The bird was also frequently met with inside the small patches of secondary forests, which were located close to cultivated and cleared areas, and inside the groves and patches of mixed growths of trees, shrubs, and bushes in parang vegetation. It was even observed feeding on the flowers of the coconut palms inside coconut groves, especially at the outskirts of the barrios.

Strangely enough, the species was not observed in the various localities collected in on Siargao. The ideal habitat types of the species were found well developed on Siargao, but we never met with the species in them.

The notes of the species were heard at all hours during daytime, even in places in the barrios and surrounding farms. The notes sounded like the syllables "Cul-cul-cul . . .," etc., repeated several times, followed by intervals of silence, then a series of calls again. In the late afternoons and early mornings, the birds that roosted in particular sites usually answered one another, before eventually leaving the roosting area.

The inhabitants of Dinagat called this bulbul "Cul-cul" or "Tangulul," local names based roughly on the characteristic call of the species.

***Hypsipetes everetti everetti* (Tweeddale, 1877)**

Dinagat
Siargao*

The Plain-throated Bulbul was very common on both Dinagat and Siarago. On Dinagat it was always encountered in pairs inside the original forests, including dipterocarp and scrub forest types, ranging from the lowlands and foothills, deep into the interior, in forests in the hills and mountains, and up to the ridges and peaks of the mountains in the Mt. Kambinlio and Mt. Redondo localities. The bird was also fairly common in the hills in the interior of Siargao, in the scrub forests, and in the patches of mixed remnant dipterocarp and secondary forests that covered many of the hills.

On both islands the Plain-throated Bulbul had taken over the ideal

habitat types that the more widely distributed species, *Hypsipetes philippinus*, would have occupied, but strangely enough the latter was never observed on these two islands. The favorite habitat types of the present species of bulbul included the edges of farms and cultivated fields in the lowlands, which were adjoining patches of original forests, the clearings made inside the forests, the secondary forest patches, parang vegetation, and the groves of mixed tree-shrub-bush growths in open country and grasslands. This bulbul was also frequently met with feeding in the fruiting trees of all stories inside the logged-over dipterocarp forest areas, especially those found on the hillsides and mountain slopes.

The distributions of *H. everetti everetti* and *H. philippinus philippinus* on Mindanao is very interesting. In some localities in the provinces of Lanao del Sur, Lanao del Norte, and Misamis Oriental, the two species occur side by side in the same habitat types. Toward the eastern portion of Mindanao the two species occupy different habitat types and altitudinal requirements. *H. philippinus philippinus* occupies the areas rich in forests in the lowlands and at the lower elevations of hills and mountains in the area. *H. everetti everetti* occupies the higher elevations, preferably in well forested localities. There is a transition zone in mountain localities where the dipterocarp forests and midmountain forests come together. In general, however, *H. philippinus philippinus* prefers the lowland forests and the edges of original forests, especially dipterocarp forests, where they come in contact with clearings and cultivated areas. *H. everetti everetti* prefers to stay deeper inside original forests, including dipterocarp, midmountain, and the transition type of forest between these two.

Another very interesting phenomenon in the distribution of bulbuls on Mindanao is manifested in connection with *H. philippinus philippinus, H. everetti everetti,* and a third species, *H. rufigularis.* The last-named form occurs mainly on Zamboanga Peninsula or in western Mindanao, but its range extends across the narrow neck between Pangil Bay and Pagadian Bay, eastward to Lanao del Norte, Lanao del Sur, and a very small part of Misamis Oriental, west of an imaginary straight line that runs in a north-south direction along the western borders of Lake Lanao. In a transition area between the main bulk of eastern and northern Mindanao and the area immediately after the narrow neck that connects the greater eastern-northern portions of Mindanao with the Zamboanga Peninsula or southwestern Mindanao, there is a narrow zone of overlap in the distributions of *H. philippinus philippinus, H. everetti everetti,* and *H. rufigularis.* The three forms were collected in the forested localities in the eastern portion of Lake Lanao, but the zone of overlap in their ranges is not broad. All three forms occur in the same localities that are found in this narrow zone of

overlap, which includes part of Lanao del Sur, Lanao del Norte, and a small portion of Misamis Oriental, very close to the boundary line of Misamis Oriental and Lanao del Norte.

The rural inhabitants of Dinagat and Siargao called this bird "Tag-ma-ya" or "Tag-ba-ya," the same vernacular names they apply to *H. philippinus philippinus*. These same names are in common use in the parts of Mindanao where Cebuano Visayan is spoken as the main dialect.

FAMILY **IRENIDAE** LEAFBIRDS

***Irena cyanogaster hoogstraali* Rand, 1948**

Dinagat*

The Philippine Fairy Bluebird was common inside the dense patches and areas of original dipterocarp forests, especially those growing in the small valleys among the hills and mountains in the mountainous interior of Dinagat near Mt. Kambinlio and Mt. Redondo. It was also met with inside both the dipterocarp and scrub forests that covered the hills and mountains throughout the island of Dinagat.

It was strange that the species was not observed at all on Siargao, especially in the localities in the interior where the hills were covered with dense growths of secondary forests and with small patches of mixed remnant dipterocarp and secondary forests.

The species was usually seen in pairs among the branches of fruiting trees inside the patches of forests, especially in fruiting fig trees. Occasionally, several birds of this species came together and fed in the same feeding tree. When sufficiently disturbed, they usually flew in pairs in different directions, showing that the birds feeding in the same fruiting tree were actually not members of a regular feeding flock: they just happened to come together in one fruiting tree at the same time.

Some of the members of the collecting party were experts at imitating the very characteristic calls of this bird. They attracted some of the birds to their campsite, which was usually under some trees of moderate height with dense foliage and in full fruit at the time. After several repetitions of the call by the collector, the closest bird or a pair of birds usually came to the site where the caller had stationed himself.

On the other islands of the Philippines the Fairy Bluebird was frequently observed feeding in fruiting trees inside the forests, usually in company of a group of monkeys, *Macaca* spp. Many of the local native guides who helped us in the collecting expeditions on the various islands had told us about this interesting association between the Fairy Bluebird and the monkeys; so whenever the collectors saw this bird or a pair of them actively flying about a particular site, they were on the look-

out for the monkeys. In many cases we observed the monkey-bluebird association to be true.

On the islands where this bird was observed accompanying feeding monkey bands, it was called "Su-nod A-mô" by the native inhabitants living in the forested areas. Translated literally, the name means "follows the monkey."

FAMILY **TURDIDAE** THRUSHES

***Copsychus saularis mindanensis* (Boddaert, 1783)**

Dinagat*
Siargao*

The Dyal Thrush, or Magpie Robin or Dominico, was a fairly common bird inside the bamboo thickets and in the coconut groves near human habitations, even right in the barrios on Dinagat and Siargao. Several times it was observed inside the gardens near the houses of the people. The bird was also most likely to be met with in the patches of secondary forests and in the mixed groves of tree-shrub-bush growths in parang vegetation, and even in open country and grasslands with tree-shrub-bush growth occurring as hedges between cultivated fields and as sparse patches among the grass. As on the other islands of the Philippines, the species was fairly common on both islands, but not inside dense original forests.

The bird would often stay on the low branches of a bush close to the ground; once in a while it would hop on the ground after some food items. It does not walk on the ground like other regular ground birds, which walk and run. The Dyal Thrush progresses on the ground by hopping.

The male, with contrasting black and white plumage, would usually keep jerking his tail, opening and closing it as he perched on the low branch of a bush, shrub, or low tree. From time to time the bird would give out a low, harsh note, which it repeated several times but with quite long intervals in between. It would then change to a very melodious and complicated song. This bird is easily one of the most beautiful singers among Philippine birds.

The inhabitants of Dinagat and Siargao called this bird "Sa-la-man-ti-gon" or "Lan-ti-gon."

***Monticola solitarius philippensis* (P. L. S. Müller, 1776)**

Dinagat*

The Blue Rock Thrush was rarely seen on Dinagat and was not met with at all on Siargao. It is very possible that the time of collecting on Siargao, which was in late April until early May, was quite late to encounter this winter visitor to the island. Normally, about early April

the winter visitors in the Philippines begin to be scarce because the migrants are on their way back to their more northern breeding quarters.

Occasionally, single birds or, rarely, pairs were seen perching among the rocks and cliffs along the sea, especially in places along the western coasts of Dinagat where high and precipitous cliffs border the seacoasts.

FAMILY **SYLVIIDAE** OLD WORLD WARBLERS

***Megalurus palustris forbesi* Bangs, 1919**

Siargao*

The Striated Canegrass Warbler was fairly common on both Dinagat and Siargao, but somehow no specimen was taken at all on Dinagat although it was seen often enough on this island.

On many occasions the bird was observed going about its feeding activities singly, usually on the ground in newly harvested ricefields in the lowlands of Dinagat. Close to our campsite in Barrio Kambinlio, Loreto, on Dinagat Island, this bird was observed many times, walking and feeding on the ground in vacant ricefields and in nearby areas where some carabaos were staked in open grass to pasture. Then, too, the bird was observed as it perched singly on the bare branches of low trees and shrubs growing along the edges of ricefields where they came close to the river and the hills. The bird was also heard frequently on both islands as it perched on the tops of the tall grass or reeds in marshy and swampy areas in the lowlands and small valleys among the hills and in the ricefields. It gave out its loud and very characteristic warbling notes, which could be heard for some distance around the area. A very favorite site for this bird to perch on and sing from was the top bare branches of the sparse growths of low trees at the edges of ricefields and other cultivated areas, or from the low trees growing sparsely inside the open, marshy fields that were otherwise grown to grass.

The notes include a series of warbles varied from time to time with syllables that sound like "To-to-riok," "Tor-to-riok," or "Tin-ti-riok," depending on how the human hearer interprets them.

The rural inhabitants of Dinagat and Siargao called this bird locally "Tor-to-riok" or "Tin-ti-riok," the most common names of this species given in many localities in the Philippines. In the Tagalog regions in central Luzon, the bird's local name is based on its habit of feeding and following the grazing carabaos in grassland areas and pasturelands, hence the name "Su-nod ka-la-bao," literally meaning "follows the carabao."

***Cisticola exilis semirufa* Cabanis, 1872**

Dinagat*
Siargao*

On Dinagat and Siargao the Golden-headed Fantail Warbler was occasionally observed in the grasslands and open country, which were covered mainly with Kogon grass, *Imperata cylindrica* and *I. exaltata,* with sparse growths of low trees, shrubs, and bushes. In the wetter portions of these flatlands, taller grass species such as *Saccharum spontaneum* var. *indicum* were found in good stands.

When one walked along any of the trails that cut through the extensive grassland vegetation and open country covered with Kogon grass, areas which were common in the hills and rolling country on both Dinagat and Siargao, he was very likely to meet with a tiny bird that flushed suddenly and fast from among the dense growth of tall grass, its feeding site. The tiny bird would fly fast straight into the air for about 4 or 5 meters and then dive back into the dense growth of grass and disappear, not very far from the site where it had been disturbed originally. This tiny active bird was the Golden-headed Fantail Warbler.

The species preferred the drier grassland areas on Dinagat and Siargao and, for that matter, on the other numerous islands of the Philippines where it occurs; so it would be most likely encountered in grasslands and open country covered with tall grass in the lowlands and hills.

The rural inhabitants of Dinagat and Siargao called this bird "Pi-rot," the same vernacular name used by the inhabitants of Mindanao, Cebu, Leyte, Bohol, and Negros Oriental, where Cebuano Visayan is spoken. Another closely related bird, the Common Fantail Warbler, *Cisticola juncidis tinnabulans,* frequently occurs in grasslands located in wetter situations but not very far from where *C. exilis semirufa* is found.

***Locustella certhiola ochotensis* (Middendorff, 1853)**

Siargao*

The Asiatic Grasshopper Warbler was accidentally met with only once on Siargao and not at all on Dinagat. It was skulking among the dense growths of tall grass that had taken over an abandoned clearing that had been planted to upland rice quite a while back. This clearing was situated on the side of one of a cluster of hills surrounding a small valley that was planted to wet rice, and it was surrounded by good growths of secondary forests.

On the other islands where this species was observed and even collected, the bird had the habit of skulking quietly among the dense tall grass in open grasslands and open country, especially on hillsides

and low mountain slopes. Discovery of the bird was often difficult and, in most cases, accidental.

This small warbler is a rare winter visitor in the Philippines.

***Phylloscopus olivaceus* (Moseley, 1891)**

Dinagat*

The Philippine Leaf Warbler was encountered only inside the areas and patches of original dipterocarp forest and in scrub forests that were growing among the hills and mountains of Loreto, Dinagat, especially in the Mt. Kambinlio and Mt. Redondo localities.

The bird, singly or in pairs, usually stayed and fed among the branches and foliage of the trees of the lowest story. Occasionally, however, it was also observed in the crowns of the second-story and first-story trees inside dipterocarp forests.

This bird was not met with on Siargao. On the other islands of the Philippines where the species has been recorded, we observed that frequently a pair or more of this small leaf warbler went along as members of the mixed feeding groups of birds we commonly encountered among the trees of the lower stories, inside typical dipterocarp forests.

***Phylloscopus borealis* ssp.**

Dinagat*
Siargao*

The Arctic Willow Warbler was a very common winter visitor on Dinagat and Siargao, as on the other islands of the Philippines.

The bird usually went about its daily activities singly, and rarely in pairs. It was often observed feeding actively among the foliage of bushes, shrubs, and trees. This small warbler could be found in low trees, medium-high trees, and tall trees. It was met with in the lowlands, at medium elevations on the sides of hills and mountains, and even among the growths on the ridges and peaks of the hills and mountains on Dinagat and Siargao. The species was encountered in vegetation of all types, both original forests and second growth, and even in bushes, shrubs, and trees that were found in cultivated areas and grasslands. Along the coasts the species was observed inside patches of mangrove forests and also in beach forests. As on the other islands of the Philippines, this small warbler could be found almost in all kinds of vegetation, including inside gardens near the houses in the barrios.

The Arctic Willow Warbler is easily one of the most common and most widely spread species of all the bird species that regularly migrate to the Philippines during autumn and stay there during winter and spring. In spite of its being very common on the numerous islands and its being widely distributed in all kinds of vegetation, this tiny bird is most likely to be missed because of its noiseless and unobtrusive habits

as it goes about its normal activities. One or a pair of this tiny warbler species may be feeding actively among the foliage of a bush, shrub, or tree; but the bird or the pair may not be discovered at all by the ordinary observer, even if he is very close to the plant.

***Orthotomus atrogularis frontalis* Sharpe, 1877**

Dinagat
Siargao*

On both Dinagat and Siargao, the Common Tailor-bird was one of the most common birds among the various bird species found in the cultivated areas, in secondary forests, and along the edges of the patches of original dipterocarp forests where they bordered open country and grasslands. In many cases this tiny bird was not seen at all, but its very characteristic loud notes were frequently heard coming from some growths. In fact, the bird was more often heard than actually seen. It would take quite some time and a very thorough and careful search among the foliage of the plant where the notes came from before the bird was seen at all.

The bird would usually stay inside the dense and tangled growths of bushes, shrubs, and thickets, including bamboo thickets, and would usually select the lower branches of the plant, close to the ground, where it would perch. It would hunt for possible food items among the dense foliage of bushes and other low growths. Its notes could be heard coming from the mixed growths of bushes, shrubs, and trees that serve as hedges between farms and other cultivated fields, as well as from patches of mixed tree-shrub-bush growths in parang vegetation. Many times on Dinagat and Siargao the loud notes of this tailor-bird were heard coming from dense thickets of bamboos, which were growing in well cultivated areas and very close to houses in the barrios. Hearing the notes was entirely different from locating the bird exactly from among the dense bamboo growths.

The notes of this species closely resembled the syllables "Tig-wa-teet . . . Tig-wa-teet . . .," etc., repeated several times as the bird moved from perch to perch among the branches and foliage of bush, shrub, tree, or thicket.

The rural inhabitants of Dinagat and Siargao called this bird "Tig-wa-ti," based on its very common call. The same vernacular name is used for this species by the Cebuano-speaking East Visayans on Mindanao, Cebu, Leyte, Negros, and other small islands in the eastern Visayas.

***Orthotomus nigriceps nigriceps* Tweeddale, 1877**

Dinagat*
Siargao*

The Black-headed Tailor-bird was fairly common on Dinagat and Siargao. It was frequently heard, if not actually seen, inside the dense

undergrowths and lower growths in patches of original dipterocarp forests, secondary forests, and scrub forests, as well as in the mixed growths of remnant dipterocarp and secondary forests.

The bird was more frequently met with on the lower elevations of hills and mountains on both islands. On Dinagat the species was often observed in the forests that grew in the small valleys and narrow flatland strips among the hills in the interior. On Siargao, the bird was frequently met with inside the dense patches of mixed remnant dipterocarp and secondary forests among the hills in the interior.

In several collecting expeditions in various regions of the much larger island of Mindanao, we found this tailor-bird species rare and very seldom met with. Strangely enough, the species was met with much more frequently on the small islands of Dinagat and Siargao than in any particular locality on the much larger island of Mindanao.

The present tailor-bird species and its close relative, *Orthotomus cinereiceps*, which we collected in the Mt. Malindang area and in the interior localities of the Lanao del Sur, Lanao del Norte, and Misamis Oriental, have very similar habits and habitat preferences.

FAMILY **MUSCICAPIDAE** OLD WORLD FLYCATCHERS

***Rhipidura javanica nigritorquis* Vigors, 1831**

Dinagat

On both Dinagat and Siargao the Malaysian Fantail was not really a rare species. The members of the collecting party observed birds of this species a number of times in several localities on both Dinagat and Siargao. The bird was seen several times in the gardens near the houses of the farmers, which were located on the edges of the barrios close to the cultivated fields. It was met with a number of times inside the mixed growths of trees, shrubs, and bushes, which were growing as hedges between cultivated fields in the foothills. This bird was even seen in coconut groves and bamboo thickets near the houses close to the barrios.

The bird would keep opening and closing its tail, as if opening and closing a fan, all the while accompanying these actions with a continuous stream of harsh and scolding notes. At the same time, it would keep flying from one perch to another nearby in the same site.

The bird did not mind the presence of people near its home area. It would just continue to stay in different perches and keep on with its scolding harsh notes.

It would usually stay in an area of about 2 hectares; and when breeding season came, a pair would stay in this particular area as the territory of the breeding pair. The pair usually selects a site with varied vegetation, often including bamboo groves, different species of trees, cultivated fields of corn or rice, banana groves, coconut palms,

and other plants that are very common around the immediate vicinities of houses. A breeding pair would usually stay in a particular grove of trees inside the home territory and would limit their feeding activities within the immediate surroundings of this particular site. The breeding pair would usually not stray from the home area unless unnecessarily disturbed by other animals.

The rural inhabitants on both islands called this bird "Ba-li-a-la" or "Ba-li-a," the same common local names that the Cebu Visayans and others who speak the Cebuano dialect apply to this species.

***Rhinomyias ruficauda samarensis* (Steere, 1890)**

Dinagat*

The Rufous-tailed Jungle Flycatcher was uncommon on Dinagat and was not observed at all on Siargao.

This flycatcher usually stayed in the dark places inside original dipterocarp forests, which were growing in the small valleys among the hills and on the lower elevations of the hillsides and mountain slopes in the Mt. Kambinlio and Mt. Redondo localities. The bird usually perched on the lower branches of trees of the third story and on other lower growths inside the dipterocarp forests.

The species was also observed among the branches of trees growing on the hillsides and mountain slopes in the interior of Dinagat, especially among the lower growths of the scrub forests.

Its quiet and secretive habits and its preference for the lower growths as its perching sites, as well as its preference to stay in the darker and deeply shaded parts of the forests, usually made it difficult for this flycatcher to be easily discovered. A bird or a pair might be perching and feeding among the branches of a low tree, yet a casual observer coming very close to the site could still easily miss discovering one or both of these birds.

***Ficedula basilanica basilanica* (Sharpe, 1877)**

Dinagat*

The Little Slaty Flycatcher was very rare on Dinagat, and the two specimens collected on this island were the only birds of this species met with during the entire four weeks of collecting. In both instances the birds were discovered accidentally among the branches of low trees, which were part of the dense lower growths in deeply shaded and dark sites of original dipterocarp forest.

The quiet and secretive habits of this bird, as well as its preference for perching on branches close to the ground and the forest floor, make it difficult to discover a small bird like this species, except by sheer chance.

Muscicapa griseisticta (Swinhoe, 1861)

Dinagat*

The Gray-spotted Flycatcher was fairly common on Dinagat and was met with twice on Siargao, but no specimen was taken on the latter island.

On Dinagat the species was usually observed perching singly on the bare branches of trees of moderate height that grew at the edges of the clearings inside the forests, including dipterocarp, scrub, and secondary forests. Occasionally, a bird was seen perching on a bare branch of a medium-high tree in open country, in one of the sparse tree-shrub-bush mixed patches in otherwise open grasslands, or along the sides of cultivated fields.

In each of the two encounters on Siargao, the bird was observed perching on bare branches, and it was not seen again during the short stay on this island.

This migratory flycatcher prefers to perch on bare branches at or near the tops of trees of moderate height, which are usually growing at the edges of clearings made inside the original and second-growth forests. From its perch the bird usually swoops down on some insect prey. More often than not, it returns to its former perch after catching the insect and consumes it there. Unless the bird is disturbed unnecessarily, it stays for long periods on the same perch and catches insects that happen to fly in the immediate vicinity of the perching area.

The Gray-spotted Flycatcher is one of the most common and widespread winter visitors in the Philippines. It is likely to be met with on most of the islands of the archipelago. However, its habits of staying singly in one site and of going about its daily activities quietly and unobtrusively, coupled with its characteristic of perching motionless on one perch for quite long periods, make the bird difficult to discover in its normal habitats; thus, it seems uncommon or even rare in most localities.

Hypothymis azurea azurea (Boddaert, 1783)

Siargao*

The Black-naped Blue Monarch, strangely enough, was met with only once on Siargao and not at all on Dinagat. The only specimen taken on Siargao was accidentally discovered perching motionless on a branch of a low tree, part of the lower growths of a dense patch of mixed remnant dipterocarp and secondary forest. In this instance the patch was one of several that grew on the lower slopes of some hills in the interior, but not very far from a small valley with cultivated fields planted to rice.

On the other islands of the Philippines, the Black-naped Blue Monarch is a common bird in secondary forests, in the patches of mixed

tree-shrub-bush growths in parang vegetation, in the small stands of trees, shrubs, and bushes scattered sparsely in grasslands and open country, and in the hedge growths between cultivated fields. Usually, this small bird stays silently and goes about its feeding activities unobtrusively, so that even if one or a pair is feeding among the lower growths of a patch, it can easily be missed. If he carefully watches the lower growths for any bird movements, an observer will most likely meet a pair of these birds not far from the edges of a patch of dipterocarp forest, especially in the sites where the forest adjoins a cultivated field or any cleared area.

***Hypothymis helenae agusanae* Rand, 1970**

Dinagat*
Siargao*

The Short-crested Blue Monarch was fairly common on Dinagat but was uncommon on Siargao.

In our previous collections of birds in various localities on Mindanao, we found this species to be rare; yet, strangely enough, it was fairly common in several localities on Dinagat. It was observed fairly frequently inside patches of remnant original dipterocarp forests, occasionally inside scrub forests, and once in a while even inside patches of mixed remnant dipterocarp and secondary forests.

The bird was usually seen feeding among the lower branches of trees in the third story inside dipterocarp forests and among the lower trees in scrub forests. It usually preferred to stay among the lower branches of the lower tree growths in deeply shaded parts of the forests. The bird usually went about singly or in pairs, and it carried out its feeding activities quietly and with the least disturbance. This was one species that could easily be missed in its natural habitats.

***Terpsiphone cinnamomea cinnamomea* (Sharpe, 1877)**

Dinagat*
Siargao*

The Rufous Paradise Flycatcher was uncommon on both Dinagat and Siargao. On Dinagat the bird was met with several times, either singly or in pairs, inside the dense areas and patches of original dipterocarp forests, especially in those that were growing in the small valleys and narrow strips of flatlands among the hills and mountains in the interior of the Mt. Kambinlio and Mt. Redondo localities. On Siargao the species was met with several times inside the dense patches of mixed remnant dipterocarp and secondary forests that covered some of the hills in the interior. The species was rarely met with in scrub forests at higher elevations of the interior localities on Dinagat.

This flycatcher had a very characteristic, loud whistling call that consisted of the same notes repeated many times with brief intervals between the notes. It was monotonous in both volume and pitch. Between one set of repetitions there were quite long intervals of quiet. The bird usually stopped calling when there were some disturbances close by.

Pachycephala philippinensis apoensis **(Mearns, 1905)**

Dinagat
Siargao*

The Yellow-bellied Whistler was a common bird inside the forests of Dinagat and Siargao. It was frequently observed going about in pairs and perching among the branches of trees of the lower stories in dipterocarp forests and among the trees in scrub forests that were growing in the higher elevations of hills and mountains in the interior of Dinagat. On both Dinagat and Siargao, this whistler was also met with inside the dense patches of secondary forests and in the mixed dipterocarp remnants and secondary forests in the hills in the interior, especially where there were cleared and cultivated areas nearby.

The birds went about their activities quietly and were most likely to be overlooked among the dense foliage of the trees where they were staying at the time.

FAMILY **MOTACILLIDAE** PIPITS

Motacilla flava simillima **Hartert, 1905**

Siargao* (1 ♂)

The Yellow Wagtail was met with only once on Dinagat. A flock of about five birds was disturbed among the sparse low growths in a wide marshy area between the wet ricefields and the hills in Barrio Kambinlio, Loreto. The species was never encountered again on Dinagat.

On Siargao a flock of seven birds was seen in a marshy area at the edges of the wet ricefields in the valley in Barrio Osmeña, Dapa, in the interior of the island. The species was not met with again in the various localities where collections were made.

On other islands of the Philippines, especially on nearby Mindanao Island, this winter migrant species had always been observed to be more rarely encountered than the much more common winter migrant wagtail, *M. cinerea*. Also, this present species is often observed in small flocks, usually of about five to eight members, frequently feeding on flat marshy areas or newly prepared ricefields to be used for wet-rice culture.

On both Dinagat and Siargao the Yellow Wagtail was locally known

as "Bang-ki-yod" and "Sid-yo-sid-yot," based on the rapid up-and-down flicking movements of the tail as it runs. The same local names are applied to the Gray Wagtail.

Motacilla cinerea robusta (Brehm, 1857)

Dinagat*
Siargao*

On Dinagat the Gray Wagtail was met with usually singly along the numerous small and shallow streams that originated in the mountains in the interior of the Mt. Kambinlio and Mt. Redondo localities. These streams usually flowed down to the lowlands along the western coasts.

On Siargao this bird was usually observed singly on the banks of small streams and along the beds of streams that came down from the cluster of hills surrounding the small valleys in the interior. These small streams flowed into the well cultivated valleys, which were devoted mainly to wet-rice culture. The Gray Wagtail was frequently flushed from the short grass that covered the marshier parts of the valley.

The bird usually went about its search for food singly, staying on the exposed streambeds and, at times, even in the shallow waters at the sides of the flowing stream. In looking for possible food items among the gravel and sand of the streambeds, the bird would keep running erratically in one direction, picking up food items on its way. It would spend its time walking and running along the streambed until it was disturbed; then it would fly away to another site, usually along the river- or streambed, alight there, and resume its routine of looking for food items. Each time it was flushed from a site, it would give out its very characteristic notes and transfer to another site not very far away.

The Gray Wagtail has the habit of flicking its tail vigorously up and down as soon as it alights on the ground. The frequency of the vigorous tail movements then lessens as the bird walks and runs to look for its various food items.

In the course of its feeding along the shallow streams, it would occasionally alight on an exposed rock in the deeper part of the stream, with the water running on both sides of the rock. Here the bird would stay for some time, occasionally flicking and wagging its tail vigorously and walking around the dry parts of the rock picking up items from the flowing water. Eventually, it would transfer either to the exposed streambed close by or to another exposed rock in the middle of the stream. There it would do the usual routine of flicking and wagging its tail vigorously, moving around its perch and picking up food bits from the rock and flowing water. It would not stay at this site very

long before it flew to a site either nearby or perhaps far away, but still along the course of the stream.

This wagtail was also frequently observed walking and running on roadbeds, looking for food along the small dirt roads on the western coasts of Dinagat. Occasionally this bird was seen feeding on the sandy seashores, especially during low tides.

The bird's flight is undulating: it goes upward a short distance, then downward a short distance, alternating up and down.

When this wagtail is followed along a stream and is disturbed as it feeds on the streambed, it flies away from the site in its usual undulating manner but not far above the ground. It follows the course of the stream for some distance; and, upon reaching a favorable spot, most likely a curve, it swerves to one side and then cuts through the growths along the banks, leaving the stream for a short distance. The bird then doubles back to its original site by following the banks of the stream but hidden by the vegetation growths along the banks from any one who may happen to be in the stream. At some distance from the original site, the bird may come back toward the stream again and alight on the streambed in some spot. However, when the disturbance is excessive, the bird flies upward quite high and completely leaves the place for another area some distance away.

The Gray Wagtail is one of the winter migrants that are very widely distributed among the numerous islands of the Philippines, but never in very large numbers in a given area.

The inhabitants of Dinagat and Siargao called this bird "Bang-ki-yod" or "Sid-yo-sid-yot," based on its characteristic of flicking the tail vigorously as it runs.

Anthus novaeseelandiae lugubris (Walden, 1875)

Dinagat*
Siargao*

Richard's Pipit was very common on Dinagat and Siargao and was frequently observed on the ground in newly harvested ricefields, in newly plowed fields, and even in the pasturelands covered with very short grass. Such areas covered many hills in the interior of both islands.

Usually, a dozen or more of this species of pipit were observed actively feeding on the ground in open country and open meadows grown to short grass, or without any vegetation at the time. The birds did not really form regular flocks, but many birds from different places sometimes congregated together for feeding on some food items that happened to be abundant at a particular place. On both islands a favorite site for such temporary feeding groups of pipits was a par-

ticular grazing area of cattle and carabaos on some hillside in the interior, but not very far from the cultivated fields in the lowlands.

The inhabitants on Dinagat and Siargao called Richard's Pipit "Sid-yo-sid-yot," the same local name given to the Gray Wagtail.

Anthus gustavi gustavi Swinhoe, 1863

Dinagat*

The Petchora Pipit was a common winter visitor that was observed quite often on Dinagat and Siargao. However, the species was not collected on Siargao.

On Dinagat, this bird was usually observed feeding singly on the forest floor among the dense forest undergrowths. It often walked and ran in and out of the dense growths and, temporarily, into the clear areas between the larger forest trees, then back again into the dense undergrowths. One had to be familiar with the habits of this bird in order to be able to discover it among the dense growths in its favorite habitat. Frequently the ordinary observer would easily miss this small ground bird because of its quiet ways in the course of feeding and searching for food. Even if one were already close to a feeding bird, he might easily miss it.

The bird was frequently met with inside the original forests, both the dipterocarp and scrub forest types. Occasionally, it was also met with inside patches of secondary forests and in the mixed remnant original dipterocarp forest and secondary forest among the hills in the interior of Dinagat.

Once seen walking and running on the forest floor, this bird would be very difficult to follow among the dense undergrowths, into which it would immediately run. Once in a while, it would flush, fly low (but for only short distances), and then return to the forest floor and immediately run fast into the nearest undergrowth. If one followed the bird into this particular site in order to locate it for observation, he would usually not find the bird because it runs very fast and often proceeds far into the forest.

The species was never met with outside of dense forest cover.

FAMILY ARTAMIDAE WOOD-SWALLOWS

Artamus leucorhynchus leucorhynchus (Linné, 1771)

Dinagat*
Siargao*

The White-breasted Wood-swallow was very common on Dinagat and Siargao. It was frequently met with close to human habitations and the cultivated fields nearby. A solitary bird, or several of them, was a common sight as it soared in flight over the fields and meadows

that adjoined the barrios or as it perched on some bare branches of trees growing along the edge of the farms, some of which served as hedges between cultivated fields. Sometimes a group of six or more birds perched on the fronds of coconut palms in and around the barrios.

During the months of March, April, and May, the wood-swallows on the various islands of the Philippines were observed either in pairs or in groups of five to seven members as they soared over the fields around a particular site or perched on some bare tree branches or on the fronds of a coconut palm, often very close to one another. Most often the group was a family consisting of the parents and the young birds of the season, which for some time would be going together and staying together in a particular site close to the nesting spot.

The White-breasted Wood-swallow is not really a large bird, but it is easily the most fearless and aggressive of all the Philippine bird species, including even the large birds of prey. During the breeding season, especially, the mating pair, singly or together, is not afraid to attack any larger bird, or even mammal, that comes within the limits of the nesting territory. The small birds are not minded much, but birds bigger than the wood-swallows are immediately attacked if they happen to trespass the area of the nest. Crows, hawks, owls, orioles, hornbills, and any other large species of birds are immediately attacked by the mating pair. On one occasion a mating pair attacked a Monkey-eating Eagle that was crossing a cleared area in a heavily forested locality in Miatan, a mountain barrio of Katipunan Municipality in Zamboanga del Norte. The eagle unwittingly passed close to the nesting tree of a pair of wood-swallows, which at the time were both perching on the top branch of the nesting tree itself. Both birds immediately attacked the eagle, flying higher than the eagle and swooping down on its head. Every time one of the birds hit the head of the flying eagle, a feather came off. The poor eagle could do nothing, so it had to leave the area as fast as it could. It entered the nearest dense patch of dipterocarp forest, and the wood-swallows returned to their nesting tree.

When they trespass within the nesting area, carabaos, cattle, any grazing animal, and even man himself are attacked by these fierce little birds. The pair would not hesitate to swoop down and peck a man's head, often inflicting wounds on the scalp and pulling off some hair. The White-breasted Wood-swallow is primarily a bird of the cultivated areas and open country. It may be found in the vicinity of forested areas if there are clearings inside these areas, which may still be surrounded by forests.

The characteristic notes of the species closely resemble the syllables "Git-git-git . . ." or "Gik-gik-gik . . .," etc., repeated several times by

the bird while in flight or on perch. The bird is beautiful to see when it is soaring on motionless wings over a clear field while uttering its very characteristic notes.

The inhabitants of Dinagat and Siargao called this bird "Git-git" or "Gik-gik," the same vernacular names used by the Cebuano-speaking inhabitants of Mindanao, Cebu, Bohol, Leyte, and many other islands. Some of the inhabitants of Luzon also call this bird "Gik-gik" or "It-it."

FAMILY **LANIIDAE** SHRIKES

***Lanius cristatus lucionensis* Linné, 1776**

Dinagat*
Siargao*

On Dinagat and Siargao the Brown Shrike was observed to be fairly common, in spite of the lateness in the bird migration season when collections were carried on, especially on Siargao. Starting in April, this migratory species begins to be uncommon, especially in the easternmost and southernmost areas of the Philippines because by this time the birds begin to be on the migration trip back to their summer breeding quarters.

The birds that were seen were usually observed perching singly on the branches of some low trees, shrubs, bushes, or even the tops of fence posts along the sides of cultivated fields or farms. This shrike was also seen quite often perching on the top of the plants inside the gardens close to the houses in the barrios and farm areas.

The Brown Shrike usually went about its feeding activities singly and frequently stayed in one particular site for some time until disturbed or until it was time to leave on its migration trip somewhere else.

The species is one of the most common and widespread forms of winter visitors in the Philippines. From about the last week of September, the shrike begins to appear in the northern islands of the Philippines; by middle of October the species can be met with on most of the islands in the southern regions of the archipelago. Migration within the archipelago is quite rapid.

This shrike is met with even in the very centers of the large and busy cities, such as Manila, Cebu, Iloilo, and others, where it stays in the trees that line the streets. It is also found in the gardens, in the densely settled areas as long as there are some plants to perch on and feed in, and in the parks and public gardens in the cities and towns. The bird is most common in the rural areas, in the farm regions, and in the hills.

This species emits very characteristic, harsh notes that are easy to remember because they are simple: "Kee-kee-kee," etc., given out in

variable lengths, sometimes just a few repetitions and sometimes many. From October to March these loud, harsh notes are frequently heard in many places. About the beginning of March another type of notes that comprise the whisper song can be heard from some birds. In order to hear the whisper song, one has to be really close to a bird that is perching singly on a low branch or a fence post at the edge of a farm, where it is not being disturbed. Given a chance, the bird will give out its whisper song, a beautiful combination of notes and varied sounds uttered softly, as if the bird meant it only for the listener close by.

The inhabitants of Dinagat and Siargao set traps for this bird and quite a number were taken. Every year the people do this not only on these two small islands but also on many other islands all over the Philippines. The odd thing about the practice is that the people do not really depend on the bird as an important food item, unlike in Taiwan where this species is sold in great numbers in the markets to be eaten.

The Brown Shrike was called "Ti-ba-las" or "Ti-bas" by the inhabitants of Dinagat and Siargao. The same names are used by the inhabitants of Mindanao, Cebu, Bohol, Leyte, and other localities where the Cebu Visayan dialect is spoken.

FAMILY **STURNIDAE** STARLINGS

***Aplonis panayensis panayensis* (Scopoli, 1783)**

Dinagat*
Siargao*

The Philippine Glossy Starling was very common on Dinagat and Siargao. The bird was usually met with in flocks of about a dozen or more members. On the average, each flock always included both the old birds and the young birds of the season.

A particular flock flew around certain localities. They fed on the fruits of wild fruiting trees of various species, including several forms of figs, which were growing in various sites. Among the feeding sites were the edges of the patches of remnant original dipterocarp forests, in places where they adjoined cultivated areas; the fruiting trees, shrubs, and bushes found growing inside the gardens near houses in the barrios; the mixed growths of trees, shrubs, and bushes that formed the hedges between the cultivated fields and farms; the patches of mixed growths of trees, shrubs, and bushes growing in parang vegetation and open country; and the sparse growths of fruiting trees frequently found around farm houses and in the other areas of cultivated countryside.

On the numerous islands of the Philippines, the Philippine Glossy Starling is not really a bird of the deep forest, but more of the forest edge, secondary growths, farms and cultivated areas, and open country.

On many other islands of the Philippines where we had carried on bird collections during past years, we observed many times that the Philippine Glossy Starling roosted regularly in particular sites in a locality in large numbers, frequently including 100 or more birds. The roosting birds were composed of several flocks that came to this particular site only during late afternoons in order to roost. The favorite site for this starling roost was often inside coconut groves or in stands of Buri palms (*Corypha elata* Roxb.) located in cleared or cultivated areas, but not very close to houses. The starlings would roost in this roosting site regularly, until they were very much disturbed, most often by man; then they would transfer somewhere to another site, often not close to the former site.

With the sun still much above the horizon, about 2 hours before actual sunset, it was observed in one roosting site that the starlings would start arriving in flocks of various sizes, coming from different directions. A flock would locate itself immediately, and the members would alight on the fronds of palm trees and give forth an incessant stream of notes, resulting in a din of sounds. The intensity would continue to increase as more of the birds arrived. When darkness began to set in, the din gradually decreased until it would really be night before the birds would keep quiet. The next morning there was a resumption of the din resulting from the notes of the birds in the roost which would be very actively moving about the immediate vicinity of their particular roosting site. By the time the sun was quite high, practically all the flocks had left the roosting area and the roosting site was silent again until the first flock arrived late in the afternoon to roost.

On some of the islands we came upon particular sites where this starling nested in great numbers. Again, the sites were either in coconut groves or in stands of Buri palms. The birds placed their nests in the axils of the coconut leaves or Buri palm leaves. Usually the inhabitants in the barrio where Buri palms are found cut the leaves regularly, leaving only the basal parts of the leaf bases still attached to the large trunk. The Buri palms usually selected by the starlings for nesting were still young and growing trees; so the leaf bases were still attached to the trunk and afforded ideal sites for the nests. The starlings placed their nests in the deep pocketlike structures produced by the leaf bases (which were cut short) and the trunk of the Buri palm, and the nests were very securely placed inside. It was most interesting to watch the birds come out of the narrow space between the leaf bases and the trunk of the palm. When the nesting season was quite advanced and the parent birds could perch on the cut ends of the leaf bases, one was reminded of many human beings staying in apartment houses with many floors.

Frequently, man has made use of the glossy starling's habit of nesting together in large colonies. Whenever he discovers a large number of nesting glossy starlings, he immediately prepares long bamboo culms, each about 5–6 meters long, and provides a circular opening near one end of each internode. He then places these bamboo culms securely in horizontal positions between any two coconut palms that are closest to each other or ties the bamboo culms among the long-petioled leaves of the Buri palms. Almost as soon as the bamboo culms are in place, the nesting birds immediately claim one internode each for the nest site of a pair. The birds line the internodes with grass and fibers and lay their eggs inside the culms. The human operator usually waits until the young birds are old enough and of sufficient size, and then he gathers them in large numbers for food. Normally the human operators of the nesting colony will not gather all the young birds, but will leave a good number to continue to develop and eventually reach maturity and breed. The birds usually continue to breed in the man-prepared nesting sites, in addition to the natural nesting sites among the coconut palms and Buri palms.

In many localities this species was observed nesting on the ends of the branches and trunks of decaying forest trees left standing at the edges of cultivated fields or inside the clearings made in forest patches. Only a small number of birds nested this way.

The inhabitants of Dinagat and Siargao called this glossy starling "Ga-lan-ciang" or "Gan-ciang," the two most commonly used local names for this species in many parts of the Philippines, especially in the southern region where Cebuano Visayan is spoken extensively.

***Sarcops calvus melanonotus* Ogilvie-Grant, 1906**

Dinagat*
Siargao*

The Coleto was a fairly common bird in the cultivated areas and open country close to and in the hills in the interior, on both Dinagat and Siargao.

The species usually went about in pairs in its feeding activities. A pair usually fed on fruiting trees growing at the edges of patches of remnant original dipterocarp forests and secondary forests, inside the patches of mixed tree-shrub-bush growth in parang vegetation, and in the trees and shrubs that formed the hedges between cultivated fields and farms.

Sometimes several pairs of Coletos would come together in the same fruiting tree and form a temporary flock that would go about as such and feed as one flock. Eventually, after some time, the member pairs of the temporary flock would resume their feeding in pairs or, at most,

in small family groups, especially during the latter part of the breeding season when the young birds of the season would feed with the parents for some time before being on their own.

The nests of this starling were frequently made inside rotting branches or trunks of decaying trees left standing inside a clearing or even in cultivated areas. Other favorite nesting sites of the Coleto included the decaying and broken trunks and branches of large trees that were still standing inside the clearings made in otherwise dense patches or areas of original dipterocarp forests, inside the dense patches of secondary forests, and inside the dense patches of mixed remnant original dipterocarp and secondary forests that were growing on the hillsides and mountain slopes in the interior.

The Coleto has a very characteristic clicking sound, followed immediately by loud and high-pitched metallic notes, which, once heard, cannot be easily forgotten. These sounds are not produced by any other Philippine bird species, and no similar sound is made by other birds.

The inhabitants of Dinagat and Siargao called this bird "Sal-ing" or "I-ling." Both these local names are also used for the same species on Mindanao, Cebu, Bohol, and Leyte and in other localities where the people speak Cebu Visayan.

FAMILY **NECTARINIIDAE** SUNBIRDS

Anthreptes malacensis griseigularis (Tweeddale, 1877)

Dinagat*
Siargao*

The Plain-throated Sunbird was a common species on Dinagat and Siargao. It was usually observed feeding in pairs among the inflorescences of coconut palms inside coconut groves. It was also frequently met with feeding on flowering trees at the outskirts and edges of remnant original dipterocarp forest patches, inside the patches of mixed tree-shrub-bush growths in parang vegetation, among the flowering trees and shrubs that formed the hedges of cultivated fields, and among the sparse growths of flowering trees in open country and grasslands, usually with tall grass and scant growths of bushes. This sunbird was seldom met with at the higher elevations in the Mt. Kambinlio and Mt. Redondo localities, although occasionally one or a pair of this species was observed feeding among the flowers of some of the trees in scrub forests on the hilltops and ridges of the lower mountains in the interior of Dinagat.

Quite frequently the Plain-throated Sunbird was observed feeding in pairs in the same flowering trees where other species of sunbirds were also feeding at the time, including *Nectarinia jugularis jugularis* and *N. sperata sperata*.

On Dinagat and Siargao the Plain-throated Sunbird and all the other species of sunbirds were called "Tam-si" by the rural inhabitants, including the species of *Nectarinia* and *Aethopyga*. The same local name is given to all sunbirds by the rural inhabitants of Mindanao, Cebu, Bohol, Leyte, and other islands of the Eastern Visayas.

***Nectarinia sperata sperata* (Linné, 1766)**

Dinagat
Siargao*

Van Hasselt's Sunbird, a colorful species, was very common on both Dinagat and Siargao. It was observed staying in a wide variety of habitat types. It was met with in the lowlands, usually in pairs, feeding on the flowers of the coconut palms in coconut groves and often in the company of *Nectarinia jugularis jugularis* and *Dicaeum australe australe*. It was also common among the mixed tree-shrub-bush growths that formed the hedges between cultivated fields and farms, and among the sparse growths of trees and shrubs in open country and grasslands. It was frequently observed inside the mixed tree-shrub-bush patches in parang vegetation, inside secondary forests, inside the patches of remnant original dipterocarp forests, and inside the scrub forests that covered the higher elevations of the hillsides and mountain slopes in the interior, especially on Dinagat. This colorful sunbird also frequently visited the flowering plants in the gardens near the houses, which were built on the sides of farms and other cultivated areas, especially among the foothills.

In many localities on Dinagat and Siargao, the present species occurred side by side with *N. jugularis jugularis*, a phenomenon not common on the larger islands in the Philippines where both species occur, including Mindanao, Luzon, Negros, and a few other islands, especially in the Eastern Visayas. On these larger islands *N. sperata sperata* and *N. jugularis jugularis* were observed occurring in the same localities, but they usually did not stay together in the same habitat types. On Dinagat and Siargao both species were frequently observed feeding side by side on flowers of the same flowering trees. Such trees grew along the edges of the patches of remnant dipterocarp forests, inside secondary forests, in the patches of mixed tree-shrub-bush growths in parang vegetation, among the trees, shrubs, and bushes in the hedges between fields, and in flowering trees growing in open country and grasslands. Occasionally both species were even met with inside mangrove and beach forests along the seashores on both Dinagat and Siargao.

The inhabitants on Dinagat and Siargao called this sunbird "Tamsi," the same name they applied to the other species of sunbirds.

***Nectarinia jugularis jugularis* (Linné, 1766)**

Dinagat
Siargao*

The Olive-backed Sunbird was the most common of the several sunbird species found on Dinagat and Siargao. It was frequently observed in pairs feeding on the flowers of coconut palms inside the coconut groves in many localities on both islands. It was also seen frequently among the plants in the gardens near houses in the barrios, and even inside the towns. This sunbird was very common among the flowering trees, shrubs, and bushes that grew as hedges between the cultivated fields in the lowlands and on the hillsides in the interior. It was often met with among the flowering trees, shrubs, and bushes growing in the open country and grasslands. The bird was very common inside mangrove and beach forests along the coasts of both islands.

On the other islands of the Philippines, especially on the larger ones, the Olive-backed Sunbird is primarily the species that stays in gardens near the houses inside the regular settlements, as well as in the open country, cultivated areas, coconut groves, and cultivated areas where human activities are frequently found. This sunbird does not mind the presence of man; so it is commonplace for a pair to locate their nest inside a garden close to the house. In addition, the birds frequently enter houses to get cobwebs from the walls and corners.

On Dinagat and Siargao the two sunbird species, *Nectarinia jugularis jugularis* and *N. sperata sperata,* were observed occurring side by side, in the same habitats in the more open situations, except that *N. jugularis jugularis* was more frequently met with inside the mangrove and beach forests along the coastal areas. *N. sperata sperata,* on the other hand, was more often seen in the deeper parts of original dipterocarp and scrub forests, which were found growing in the hills and mountains in the interior.

The Olive-backed Sunbird is the real and original species that the native inhabitants on most islands in the southern Philippines call in the vernacular "Tam-si." This is especially true of the settlers from Cebu, Bohol, western Leyte, Negros Oriental, and where the Cebuano dialect is spoken.

The Olive-backed Sunbird is one of the Philippine bird species that possess a beautiful and intricate song. Its ability to sing a beautiful song is often dealt with in the vernacular poetry.

***Aethopyga pulcherrima pulcherrima* Sharpe, 1876**

Dinagat
Siargao*

The Mountain Sunbird was fairly common, especially on Dinagat, but it was uncommon on Siargao. It was usually observed going about

in pairs among the lower tree growths inside dense patches and areas of original dipterocarp forests and inside scrub forests found in the hills and mountains in the interior. Occasionally, a pair was met with inside the dense patches of secondary forests and mixed remnant original dipterocarp and secondary forests, among the hills and mountains in the interior of both Dinagat and Siargao. On Siargao this species was occasionally observed, singly or in pairs, inside the scrub forests that grew on the ridges and at the higher elevations of hills in the interior.

The Mountain Sunbird was rarely observed in the cultivated areas and open country in the lowlands on both islands. This species was really more a bird of the forest growths in the higher parts of hills and mountains in the interior.

The casual observer would most likely miss this tiny bird, or a pair of them, among the dense foliage and green background of the lower forest growths.

***Aethopyga shelleyi bella* Tweeddale, 1877**

Dinagat*
Siargao*

The Lovely Sunbird was uncommon on both Dinagat and Siargao. On Dinagat the species was usually met with in pairs, actively feeding on the flowers of trees and shrubs of the lowest story inside the patches and areas of remnant original dipterocarp forests, as well as among the lower trees inside scrub forests, which were found in the higher elevations of the hills and mountains in the interior near Mt. Kambinlio and Mt. Redondo. Occasionally, a pair was observed feeding among the flowering trees in secondary forests and inside the patches of mixed remnant dipterocarp and secondary forests among the hills in the interior of Siargao.

This sunbird usually preferred to feed on the flowers of low trees and shrubs, and occasionally even on the flowers of the flowering bushes, which were part of the undergrowths inside the much taller types of vegetation. A bird or a pair of them could be easily missed among the dense foliage of a tree, shrub, or bush on which the bird, or the pair, might be feeding all the while.

***Arachnothera longirostra flammifera* Tweeddale, 1878**

Dinagat*

The Little Spider Hunter was a rare bird on Dinagat and was not met with at all on Siargao. This species was seen only a few times, either singly or in pairs, usually at the edges of dense patches of remnant original dipterocarp forests. It often stayed among the branches of the low trees and other growths that formed the third story.

The Little Spider Hunter often flew quite low, not far from the forest floor, and at a fast rate. It was very adept at flying fast in and

out among the numerous trunks inside the forest without hitting any of them accidentally.

It was usually by pure chance that a single bird or a pair of this species was met with. On Dinagat a pair was once observed actively feeding on food items found among the leaves of a young tree, one of the sparse growths that had started to flourish inside a small abandoned clearing. The clearing was located inside a patch of dipterocarp forest on top of a low hill in the interior of the Mt. Kambinlio localities. This was about the only instance when this species was observed in a clearing, although the site was well surrounded by dense growths of original dipterocarp forests; otherwise, the normal habitat type of this bird was the interior parts of dense forests.

On Bohol, Leyte, and Samar, the Little Spider Hunter was very rarely encountered; and, when met with, it was always inside dense original dipterocarp forests.

FAMILY **DICAEIDAE** FLOWERPECKERS

Prionochilus olivaceus olivaceus Tweeddale, 1877

Dinagat

The Olive-backed Flowerpecker was quite common on Dinagat but was not observed at all on Siargao. It was usually observed singly or in pairs inside the patches and areas of remnant original dipterocarp forests or along their edges. Occasionally, the species was met with among the trees in scrub forests on the higher elevations of hills and mountains in the interior of Mt. Kambinlio and Mt. Redondo localities. Rarely, this flowerpecker was met with in some fruiting trees inside the dense patches of secondary forests among the hills in the interior.

At the edges of patches of dipterocarp forests that adjoined cleared areas and open country, we observed this flowerpecker on several occasions as it fed singly or in pairs, each time on the fruiting trees, including those of the first, second, and third stories. On Dinagat the bird was also observed feeding on the fruits of some shrubs that were part of the dense lower growths inside patches of dipterocarp forests. Occasionally, this flowerpecker was seen feeding singly or in pairs on the fruits of fruiting trees of the first, second, and third stories growing inside abandoned clearings in dipterocarp forests.

Frequently, this flowerpecker fed in the same feeding trees where other species of flowerpeckers were also feeding at the same time. On several occasions pairs of this flowerpecker were seen feeding in the same fruiting tree as pairs of *Dicaeum australe australe* and *Dicaeum hypoleucum pontifex* and several *Zosterops everetti basilanica*. The trees were located at the edges of dense patches of remnant original dipterocarp forests that adjoined clearings inside the forests.

The three forms of the Olive-backed Flowerpecker that have been recorded on the various islands of the Philippines have been observed to be always rare or uncommon, and this species has always been considered as such. In our previous bird collecting on the various islands where any forms of this species occur, the species has always been poorly represented among the birds collected.

During recent collecting on Dinagat and Siargao, some interesting facts have been observed in connection with the occurrence of several species of birds on these two islands. Strangely enough, but it was observed to be the case, several bird species that had always been considered rare on the much larger islands where they had been recorded proved to be very common, common, or fairly common on the two small islands of Dinagat and Siargao. The species also showed wider distribution in terms of the broader range of habitat types and the wider altitudinal ranges that these species occupied when traced from the lowlands to the highest elevations on the islands where they had been recorded. The relative sizes of the islands where the various species occur may have much to do with the interesting phenomena of distribution as observed on Dinagat and Siargao.

One interesting observation is that rare bird species on the larger islands are not as rare in their occurrence on the small islands. Another interesting observation is that bird species with very restricted distributions on the large islands, because of their highly specialized habitat type preferences, have been found to be much more widely distributed among a much greater variety of habitat types on the small islands. Still another interesting observation is that some bird species have very restricted altitudinal ranges on the larger islands: some species are found only at high elevations, others only at moderate elevations, and still others only at the lower elevations. Some of the bird species with very restricted altitudinal ranges on the large islands have been found to occur from the lowlands up to the highest elevations on the small islands. Of course, the highest elevations on Dinagat and Siargao are not as high as those on the large islands we had collected in prior to our work on the two small islands. Nevertheless, the phenomena are interesting and certainly warrant further study.

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

Dinagat*

The Bicolored Flowerpecker was rarely met with on Dinagat and was not seen at all on Siargao.

On three different occasions one pair of this species was seen feeding on tall fruiting trees of the first story at the edge of a dense patch of remnant original dipterocarp forest, which adjoined large clearings made on a hillside in the interior localities of Mt. Kambinlio. On two other

occasions, one pair each of this flowerpecker was observed among the top branches of trees in scrub forest on the lower slopes of mountains in the interior of the Mt. Kambinlio localities.

The species was not met with in the more open situations among the cultivated areas.

Dicaeum australe australe **(Hermann, 1783)**

Dinagat
Siargao*

The Philippine Flowerpecker was the most common flowerpecker species on both Dinagat and Siargao. It was observed going about its feeding activities usually in pairs. In many instances several flowerpeckers of this species were seen feeding together at the same time in the same fruiting trees, shrubs, or bushes, together with other species of flowerpeckers and some other birds belonging to different groups. Thus, in many instances we observed *Dicaeum australe australe, Prionochilus olivaceus olivaceus,* and *D. hypoleucum pontifex* in the same fruiting tree feeding on the fruits. Also observed feeding in the same fruiting plants were *Zosterops everetti basilanica* and, occasionally, *Hypsipetes everetti everetti.* These different species of birds fed together without any signs of conflict among them. When disturbed unnecessarily, the feeding birds usually flew in pairs and in different directions.

The Philippine Flowerpecker was found in many types of habitat on Dinagat and Siargao and had a very wide range all over the two islands. It was found in the lowlands, where the greatest numbers were found, and up in the higher elevations among the forests there, but only in small numbers. It was frequently met with among the flowering trees, shrubs and bushes that were growing along the edges of the cultivated fields and farms in the lowlands and into the hills. It was also observed in the mixed growths of trees, shrubs, and bushes in open country and in grasslands; in patches of dense mixed growths of trees, shurbs, and bushes in parang vegetation; in secondary forests; and at the edges of original forests, including beach forests, dipterocarp forests, and scrub forests. This species was even observed at the edges of mangrove forests at the coasts. But the most likely habitat types of the Philippine Flowerpecker were coconut groves, gardens close to houses at the edge of the barrios and close to farms, and other places not really inside forests.

This flowerpecker produces the very well known notes by which the rural inhabitants, whether on Dinagat, Siargao, or on any other island in the Philippines, recognize the species and know of its presence in a fruiting tree.

Some of the rural inhabitants of Dinagat and Siargao called this flowerpecker "Si-wit," and others called it "Pa-na-gô-tô." The latter vernacular name is very widely used as the local name for this flowerpecker and for the other forms of flowerpeckers that may be found in many localities on Mindanao, Cebu, Bohol, Leyte, Negros, and other smaller islands in the Visayas and Mindanao regions, where the Cebu Visayan dialect is spoken by the inhabitants.

***Dicaeum hypoleucum pontifex* Mayr, 1946**

Dinagat*

The White-bellied Flowerpecker was fairly common on Dinagat but was not met with at all on Siargao. It was usually observed singly or in pairs feeding on the fruiting trees of the first and second stories inside patches of remnant original dipterocarp forests. These patches grew in the small valleys among the hills and on the lower portions of hillsides in the interior localities of Mt. Kambinlio and Mt. Redondo. Occasionally, the species was seen feeding among the trees in the scrub forests at the higher elevations of hills and mountains in the Mt. Kambinlio localities. A number of birds of this species were observed feeding in tall and medium-high fruiting trees that were growing inside the abandoned forest clearings made in scrub forests areas among the hills and mountains in the interior of Dinagat. Rarely, this flowerpecker was seen feeding on fruiting trees in secondary forests, especially inside patches that adjoined remnant areas of original dipterocarp forests in the hills.

On the other islands of the Philippines where the various races of this species occur, the habitat types in which the birds are found are more restricted and not as widely varied as those on Dinagat, where the present form occurs. On Dinagat the habitat types of this form embraced those in the lowlands and those in the interior that extended up into the higher elevations in the hills and mountains, including practically all the kinds of possible habitat types found throughout the entire island.

FAMILY **ZOSTEROPIDAE** WHITE-EYES

***Zosterops everetti basilanica* Steere, 1890**

Dinagat
Siargao*

Everett's White-eye was common on Dinagat and Siargao. It was usually observed in pairs, in small flocks, or in feeding groups, as it went about and fed in a very wide variety of habitat types. On both Dinagat and Siargao, pairs or small feeding flocks of six to a dozen

members were often observed feeding actively among the foliage and branches of the bushes, shrubs, and low trees growing in irregular patterns inside the neglected fields and abandoned clearings in the lowlands close to the cultivated fields in the foothills. Pairs or small groups were observed feeding among the various growths inside secondary and dipterocarp forests and in clearings made in them. The bird was also seen feeding in pairs and in small flocks occasionally inside scrub forests growing on the hillsides and slopes of mountains in the interior of Dinagat.

It was amazing that, on Dinagat and Siargao, Everett's White-eye was observed to stay in a very wide variety of habitats as its normal range. On the other islands of the Philippines, this same form or other forms of the same species were found only in a much more restricted variety of habitats and altitudinal ranges. This same phenomenon in bird distribution had been observed to be true for several other species of small birds on Dinagat and Siargao.

FAMILY **ESTRILDIDAE** MANNIKINS

***Lonchura leucogastra manueli* Parkes, 1958**

Dinagat*
Siargao*

The White-breasted Mannikin was fairly common on Dinagat and Siargao. It was met with usually in small feeding flocks in the grasslands and in abandoned clearings on the hillsides and mountain slopes in the interior of the Mt. Kambinlio and Mt. Redondo localities and among the hills in the interior of Siargao. In the normal range of this mannikin on Dinagat and Siargao, its distribution and the density of its population in any one locality was never as high as that of *Lonchura malacca jagori*. The White-breasted Mannikin was definitely not as common or as widespread on Dinagat and Siargao as the Chestnut Mannikin. This fact was very noticeable, especially in the northern half of Dinagat, including the localities of Loreto on the west coast, from the seacoast and into the hills and mountains in the interior, clear across to the Pacific Ocean side of Dinagat.

The White-breasted Mannikin usually went about in small flocks of six to a dozen members and preferred to stay among the tall grass that was growing and taking over the idle and abandoned fields and clearings in the hills, close to the patches of original forests, especially remnant original dipterocarp forests and scrub forests, and also close to secondary forests and mixed secondary and original dipterocarp forests. In the abandoned clearings among the scrub forests in the higher elevations of hills and mountains, both on Dinagat and Siargao, small flocks of *L. leucogastra manueli* were more frequently met with

than *L. malacca jagori*. In the lowlands, however, the latter was more often encountered in the grassland areas, ricefields, and open country. Moreover, it was found in much larger flocks than *L. leucogastra manueli*.

Several times, on both Dinagat and Siargao, small flocks of the White-breasted Mannikin were observed inside dense forest vegetation, but not really very deep inside the woods. The birds usually perched and fed among the bushes and tall grass growing inside the patches of forests, usually not far from the clearings made inside them.

The local inhabitants called this mannikin "Ma-ya," a name given also to the more common and better known mannikin *L. malacca jagori*.

***Lonchura malacca jagori* (Martens, 1866)**

Dinagat*
Siargao*

The Chestnut Mannikin was very common on Dinagat and Siargao. Flocks of about a dozen or more members were frequently observed feeding on the ripening rice grains in the ricefields that occupied the greater parts of the lowlands from near the seashores into the interior toward the hills, on both Dinagat and Siargao. Sometimes several flocks came together as they went around the ricefields feeding on the ripening grain, frequently in the same ricefields in a particular locality. The total number of feeding birds in cases like this could easily be several hundred, or even several thousand. When such large numbers fed on particular ricefields, the amount of destruction could be great. This union of feeding flocks of the Chestnut Mannikin was observed in localities where some particular ricefields had matured much ahead of the others in the same general area, or where the fields had matured much later than the others. Naturally, the birds concentrate in a much-limited area to feed when the crops do not mature at the same time. The farmers on both islands, as on the other islands in the Philippines, are careful to plant their fields at about the same time and use the same variety of rice. Any other variety that matures much before or after the others in the same general area would be very much victimized by the Chestnut Mannikin.

In order to minimize the depredations of this mannikin on the rice crops, the farmers in the localities where rice was close to ripening set up various devices to drive away the birds. Scarecrows were used in good numbers, but these had very limited effectiveness. The most common device was the network of hemp strings and ropes that were tied to bamboo and wood posts. The posts were planted at given distances from one another and had long strips of white cloth (spaced about a half meter apart) tied to the strings and ropes, which were about the average man's height from the ground. All the strings and ropes in

a network were connected to a main rope that could be pulled from a strategic location at one corner of a particular field. On this site a low platform, slightly higher than the network system, was built; and on this platform a man was regularly assigned to pull the main rope connecting the strings and ropes all over the ricefields. When he did, all the white strips of cloth would immediately wave simultaneously, thus frightening the mannikins. Movement of the white cloth strips in the wind also frightened the birds. This same method is widely used throughout the Philippines.

On Siargao and especially on Dinagat, there were a few particular sites in tall grassland areas that were observed to be the regular roosting places for hundreds, and even thousands, of Chestnut Mannikins. As early as four o'clock in the afternoon, when the sun was still high enough but was soon to go down below the horizon in an hour or two, numerous flocks of Chestnut Mannikins, numbering about one to two dozen members in each flock, on the average, would start arriving and settle down in a particular area of tall grass. They usually alighted on the upper parts of the grass stems. The favorite locations of these roosting sites were the marshy areas that were covered with dense stands of tall grass and were situated close to the ricefields in the lowlands and also close to the foothills with dense second-growth vegetation covers. The numerous flocks would continue to arrive from different directions, and each flock would immediately proceed to particular sites. These sites would be their roosting areas. Very early the next morning, the birds of the various flocks would start moving about in the immediate vicinities of their respective roosting places. As the sun got higher, the different flocks eventually left the roosting area and headed in different directions. In the afternoon the numerous flocks would come back to the roosting area one after the other. A particular roosting area would remain as such as long as the birds were not greatly disturbed or the site was not tampered with radically, such as by cutting down and clearing the grassland area or by burning it.

The local inhabitants on Dinagat and Siargao set all kinds of traps and other catching devices to get the birds in large numbers, mainly for food.

On these two islands the Chestnut Mannikin was called "Ma-ya," the same name given to the White-breasted Mannikin. In order to differentiate the two forms, some of the people called the Chestnut Mannikin "Ma-yang Bungol," literally meaning "deaf Maya." These two local names are widely used by the people in the southern Philippines who speak Cebu Visayan. In many other places in the Philippines, especially in the Tagalong provinces on Luzon, the local name for the mannikins in general is "Ma-ya," usually accompanied by the local word that modifies and describes the particular form of mannikin.

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