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Remarks on Some Corvidae of Indo-Malaya and the Australian Region

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INTRODUCTION

An invitation to review the Corvidae of the Old World for the "Check-list of the birds of the world," begun by the late James L. Peters, gave me the opportunity to study some species from Indo-Malaya and the Australo-Papuan region. My previous studies of the Corvidae had been concerned with Palearctic species; the present ones deal with *Corvus enca*, *C. validus*, *C. woodfordi*, and the species of Australia. I am indebted to my colleagues Dr. Dean Amadon and Dr. Ernst Mayr for their kindness in reading and criticizing the manuscript.

CORVUS ENCA AND ITS RELATIVES

This group seems to be composed of four species: *enca*, *typicus*, *florensis*, and *kubaryi*, which inhabit Malaya, the East Indies, Philippines, and Marianas. Celebes has two species (*enca* and *typicus*), while *florensis* is restricted to Flores, and *kubaryi* to the Marianas. *Enca* is polytypic, but the other three are monotypic. They differ from *enca* in one or several characters which are discussed below.

It is convenient to review *enca* briefly before the other species are discussed. A new subspecies is described from the Sula Islands.

SPECIES CHARACTERS OF *enca*

This crow is medium or small in size and has a very rounded wing,

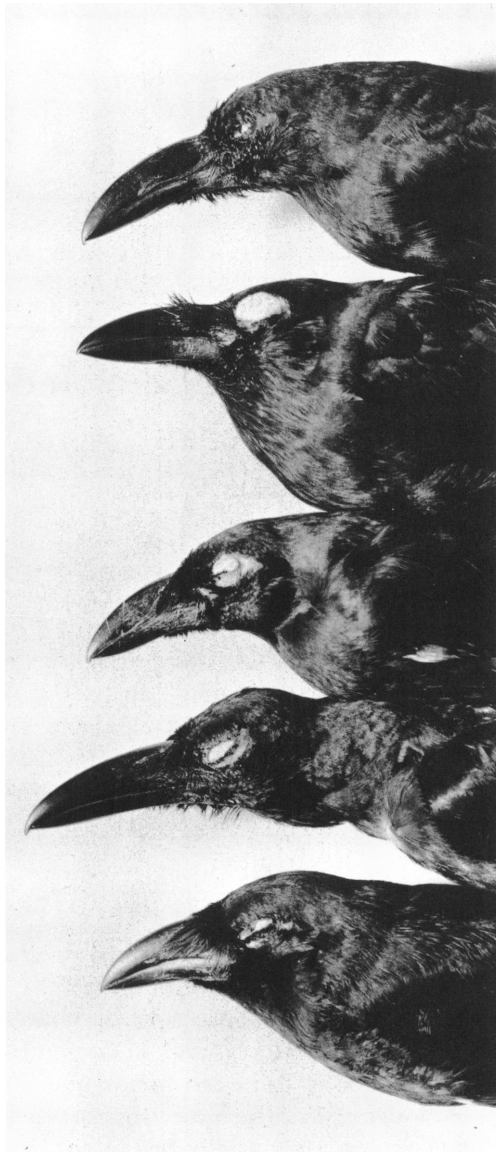


FIG. 1. Comparative size of the bill in some races of *Corvus enca*. Top to bottom: nominate *enca*, *celebensis* (type), *unicolor* (type), *mangoli* (type), and *violaceus*. $\times 2/5$.

with a long outer primary; its tail is relatively short, slightly rounded, and measures about half of the length of the wing. It is black, with a purplish luster, but not very glossy, and the bases of the feathers on the nape, breast, and abdomen are white or whitish; the feathers on the throat are somewhat elongated but not modified into true hackles, and a small, bare patch of skin is visible directly behind the eye. The bill (fig. 1) is not strongly modified and is bare at the base of the culmen. Geographical variation consists in differences of size or in the intensity and color of the gloss. The races seem to be as follows:

Corvus enca compiler Richmond, 1903

TYPE LOCALITY: Malacca.

This race is the largest (table 1) and is relatively well glossed. It inhabits Malaya, the Thio Archipelago, Sumatra, Simalur, Nias, and Borneo.

Corvus enca enca Horsfield, 1822

TYPE LOCALITY: Java.

This race is smaller and duller than *compiler* and inhabits the Mentawai Islands (Siberut and Sipora), Java, and Bali.

Corvus enca celebensis Stresemann, 1936

TYPE LOCALITY: Celebes.

This race, which inhabits Celebes, the Butung Islands, and the Tukang Besi Islands, is slightly more blackish, better glossed, and a little smaller than nominate *enca*. Its bill is a little shorter and less slender (fig. 1), but, as a rule, the difference is not so well marked as in the two specimens photographed.

Corvus enca unicolor Rothschild and Hartert, 1900

TYPE LOCALITY: Banggai.

This race seems to be restricted to the Banggai Archipelago off eastern Celebes and to be known from only two specimens collected by natives. It is the smallest race and is discussed at greater length below.

Corvus enca mangoli Vaurie, new subspecies

This new subspecies is based on two adult specimens collected by W. Doherty in October, 1897, on Sula Mangoli: a male selected for the type (A.M.N.H. No. 673950) and a female. These specimens have a very distinctly longer bill than all the neighboring populations of *enca*

TABLE 1
MEASUREMENTS OF ADULT MALES^a OF THE *Corvus enca* SPECIES GROUP

Form	N	Wing Length	Tail Length	Bill Length Measured from Skull	Bill Length Measured from Nostril	Bill Height ^b
<i>C. e. compilorator</i>	5	316-343 (322)	160-170 (165)	65-69 (66.4)	46-49 (47)	14-15.5 (15)
<i>C. e. enca</i>	6	282-293 (287)	139-151 (143.5)	55-60 (58)	36-42 (39.5)	12.5-13.5 (13)
<i>C. e. celebensis</i>	10 ^c	255-298 (277)	124-147 (136)	53-58 (55)	35-40 (38)	12-15 (13.7)
<i>C. e. unicolor</i>	2	210, ^d 213	105, 111 ^d	46, 46 ^d	31, ^d 32	12, 12 ^d
<i>C. e. mangoli</i>	2	260, ^e 275	133, 134 ^e	59, 63 ^e	41, 43 ^e	13, 14 ^e
<i>C. e. violaceus</i>	3	236-253 (245)	131-136 (134)	50-53 (51.3)	36-38 (36.7)	12-13.5 (13)
<i>C. e. pusillus</i>	2	255, 263	134, 136	51, 53	35, 38	13, 14
<i>C. e. samarensis</i>	3 ^f	215-225 (220.7)	102-113 (108)	50-53 (51)	35-37 (35.7)	All 13
<i>C. typicus</i>	6	203-214 (210)	108-117 (112)	45-47 (46)	32-34 (33)	11-13 (12.4)
<i>C. florensis</i>	1 ^g	226	164	48	31	12
<i>C. kubaryi</i>	6	225-242 (234.6)	150-162 (156.5)	53-57 (55.6)	38-42 (40)	11-14 (12.6)

^a Except for adult females or adult unsexed specimens mentioned in the footnotes.

^b Upper half of the bill measured at the level of the nostril.

^c The type of *celebensis*, an adult male, has the following measurements: wing, 280; tail, 136; bill from the skull, 53; bill from the nostril, 37; height of bill, 15.

^d Type of *unicolor*; both specimens are unsexed adults.

^e Type of *mangoli*, adult male; the other specimen is an adult female.

^f One male, one female, one unsexed, all adults.

^g This race is known also from only two specimens; the one measured is an adult female.

TABLE 2
 PROPORTIONS, EXPRESSED IN PER CENT OF THE LENGTH OF THE
 WING, OF THE FORMS IN TABLE 1

Form	Tail/Wing	Bill/Wing
<i>C. e. compiler</i>	0.51	0.206
<i>C. e. enca</i>	0.50	0.202
<i>C. e. celebensis</i>	0.49	0.197
<i>C. e. unicolor</i>	0.51	0.218
<i>C. e. mangoli</i>	0.50	0.228
<i>C. e. violaceus</i>	0.54	0.209
<i>C. e. pusillus</i>	0.54	0.201
<i>C. e. samarensis</i>	0.49	0.231
<i>C. typicus</i>	0.53	0.219
<i>C. florensis</i>	0.725	0.212
<i>C. kubaryi</i>	0.67	0.237

(fig. 1) and differ also from them in respect to other characters. *Celebensis* is darker and more glossy, *unicolor* much smaller, and *violaceus* from Ceram is duller and smaller, than *mangoli*. The new race resembles nominate *enca* in coloration and intensity of the gloss but has a longer bill, although it is a smaller bird. In fact, the long bill of *mangoli* is its most evident subspecific character. Only one other race (*compiler*) has a longer bill, but *compiler* is considerably larger and more robust. The bill of *mangoli* is proportionately larger than that of *compiler* or any other race with the exception of the very small *samarensis* (table 2).

Two other authors have commented on the birds of the Sulas. Meinertzhagen (1926) combined those of Bali, Celebes, and the Sulas in one variable form which he did not name, but, as shown above, the birds of Bali are nominate *enca*, and Stresemann has shown that those of Celebes are distinct, while those of the Sulas are quite distinct from those of Celebes. Van Bemmelen (1948) referred the birds of the Sulas to *celebensis* but added, "The few specimens I have seen seem to be intermediate between this form and topotypical *enca*." The two specimens from Mangoli discussed here are not intermediate in any respect.

The new subspecies probably inhabits Taliabu and Sanana also, the other two large islands of the Sulas, as these are separated from Mangoli only by very narrow straits varying from 1 to 4 kilometers in width. However, Meinertzhagen and Van Bemmelen did not mention any one island, and the only birds seen by me are from Mangoli.

Corvus enca violaceus Bonaparte, 1850

TYPE LOCALITY: Ceram.

This race is duller than the preceding ones and smaller than any of them with the exception of *unicolor*. According to Van Bemmelen (*loc. cit.*), it inhabits Ceram and perhaps also Buru.

Corvus enca pusillus Tweeddale, 1878

TYPE LOCALITY: Palawan.

This race inhabits Balabac, Palawan, and Mindoro and is similar in size to *violaceus* but more purplish and glossy.

Meinertzhagen (*loc. cit.*) believes the population of Mindoro represents a distinct subspecies "generally glossier [than *pusillus*] especially on the crown and forehead" but does not name it. Four adults from Mindoro that I have compared with four from Palawan and Balabac are a little more glossy, but the difference is extremely slight. Furthermore, in one specimen from Palawan that is molting, the new feathers growing on the head are just as glossy and purplish as in birds from Mindoro.

Corvus enca samarensis Steere, 1890

TYPE LOCALITY: Samar.

This race, which inhabits Mindanao and Samar, is the most glossy and purplish of all. It is possible that the base of its feathers averages less white than in the other races, as they are more grayish than white in two of the three specimens I have examined. *Samarensis* is quite small, its wing length averaging only a little longer than in *unicolor* while the tail length is the same.

Corvus enca unicolor AND *Corvus typicus*

The small *unicolor* (Banggai) has hitherto been considered a separate species, perhaps because of its small size, but it is a geographical representative of *enca* and shows every one of its species characters mentioned above. Size difference alone is clearly not a valid reason for specific separation in this group. The races of *enca* vary very widely in size and run a whole scale (table 1) from the very large *compiler* to the very small *samarensis*, the latter being very similar to *unicolor* in size.

Some authors have gone so far as to place *unicolor* in a different genus, probably following Rothschild and Hartert who described it in the genus *Gazzola* Bonaparte, 1854, which was renamed *Nesocorax*

by Riley (1921). Rothschild and Hartert did so on the ground that it was "Like *Gazzola typica* from Celebes in structure, size and form." The only character that distinguishes *typicus* from unicolor is its coloration (*typicus* being white rather than black on the nape, breast, and abdomen), but this difference, though of specific importance, is not fundamental, as the base of the feathers is white or tends to be white in all the races of *enca*.

Stresemann (1940, p. 16) suggested that *typicus* should be left in a monotypic genus, because Heinrich reported that it was unlike most crows in voice and habits. However, as mentioned by Amadon (1944), "great caution must be used in interpreting differences in behavior among members of the Corvinae." The members of the genus *Corvus* alone show a wide range in their habits or voice, and Stresemann grants that the structural similarities are such that Meinertzhagen (1926) may be correct in considering that *typicus* and *enca* belong in the same species group.

Corvus florensis (FLORES) AND *Corvus kubaryi* (MARIANAS)

These two species depart from *enca* and *typicus* in several structural characters but, though more modified, appear to have been derived from the same ancestral stock. The shape of the wing and of the bill is the same and, as do *enca* and *typicus*, they have a naked patch of skin behind the eye. In *kubaryi*, however, this last character is becoming obsolete, as the bare patch is usually hidden by the ends of the feathers growing from the sides of the crown and cheeks.

The two most conspicuous structural differences are the proportions of the tail and the feathering of the bill. The tail is longer, being 72 per cent of the length of the wing in *florensis*, and 67 in *kubaryi*, as against about 50 in *enca* and *typicus*. The base of the culmen is covered by bristly feathers, not exposed. This last similarity between *florensis* and *kubaryi* was noticed by Baker (1951, p. 247), but the bristly feathers are not developed to the same extent, and *kubaryi* is about intermediate between *florensis* and the other two species. In *kubaryi* these feathers are quite short, but in *florensis* they are very well developed and cover about half of the length of the culmen. Perhaps, because of the thicker feathering, the nostril is set deeper in *florensis* than in *kubaryi*, *enca*, and *typicus*.

Other differences exist in the texture of the plumage and its coloration. In *florensis* the plumage is softer than in the other three birds, a difference that is probably correlated with the distribution of the gloss which is more uniform. Its coloration is purer and more purplish, less

"bluish." In *kubaryi* the texture of the plumage is similar to that of *enca* and *typicus*, but the luster is greenish.

CORVUS VALIDUS

A discussion of the *Corvus enca* group would be incomplete without a mention of *C. validus* which replaces this group in the northern Moluccas. I believe, with Meinertzhagen (1926), that *validus* is allied to the *enca* group, but it is strongly modified. The bill is more massive and much longer; the wing is more pointed, with a shorter first (outer) primary and longer second and third primaries; there is no bare patch behind the eye; and the plumage is more glossy, with a stronger contrast between the color of the head and back, the head being steel-blue in *validus* and the back and most of the wing a rich purplish violet. The contrast in the Moluccas is very great between *validus* of Obi, Batjan, Halamera, and Morotai and *C. enca violaceus* of Ceram, but these birds are probably allied despite their different appearance.

Five adult males of *validus* measure: wing, 345–365 (355); tail, 170–183 (178); bill from the skull, 80–85 (82); bill from the nostril, 59–61 (60); and height of the upper half of the bill at the level of the nostril, 16–18 (17). The proportions, however, are similar, the tail being 0.50 of the length of the wing, and the bill 0.232 of the wing.

THE CROW OF THE SOLOMON ISLANDS

Only one crow inhabits the Solomon Islands, where it is found on Bougainville and the neighboring Shortland Islands, Choiseul, Santa Isabel, and Guadalcanal. It is of medium size, with a relatively short, slightly rounded tail, and a handsome glossy plumage, dark greenish blue on the head and dark purple-violet on the back and most of the wing. Its bill is very large and powerful for a bird of its size, long, decurved, and high at the base but tapering to a very sharp tip. On Bougainville and the Shortlands this bill is wholly black and covered over the base of the culmen by bristly feathers. On the other islands it is pale and yellowish, with a black tip, and the base of it is exposed. The bristly feathers are developed to the same extent in all the populations, but in the pale-billed birds of Choiseul, Santa Isabel, and Guadalcanal these feathers divide at the base to leave the vertex uncovered.

These crows have hitherto been divided into two species: *meeki* Rothschild, 1904, type locality, Bougainville, for the black-billed birds of that island and the Shortlands; and *woodfordi* for the yellow-billed

TABLE 3
MEASUREMENTS AND PROPORTIONS^a OF ADULTS OF *Corvus woodfordi*

Race and Island	N	Wing Length	Tail Length	Bill Length ^b
<i>C. w. meeki</i>				
Bougainville	10♂	285-311 (295)	130-149 (138)	66-73 (70)
Bougainville	5♀	285-295 (290)	127-142 (135)	65-68 (66)
Shortland	1♂	278	133	71.
<i>C. w. woodfordi</i>				
Choiseul	8♂	280-293 (287)	131-145 (140)	64-66 (65)
Choiseul	5♀	265-278 (272.5)	128-136 (132.4)	61-64 (62.4)
Santa Isabel	3♂	288-300 (294)	140-148 (145.3)	69-70 (69.7)
Santa Isabel	5♀	285-290 (287)	130-140 (135)	66-69 (68)
Guadalcanal	9♂	268-282 (275)	124-136 (129.5)	59-67 (64)
Guadalcanal	5♀	263-279 (271)	124-134 (130.4)	61-63 (61.6)

^a Proportion of the length of the tail to that of the wing expressed in per cent: Bougainville, 47; Shortland, 48; Choiseul, 49; Santa Isabel, 48; Guadalcanal, 48.

^b Height of the bill at the level of the nostrils (the measurements of the males and females are combined): Bougainville, 22-26 (24.3); Shortland, 25; Choiseul, 23-26 (24.3); Santa Isabel, 24-29 (26); Guadalcanal, 22-24 (23).

birds of the other islands. The latter is subdivided into two subspecies: nominate *woodfordi* Ogilvie-Grant, 1887, type locality, Guadalcanal; and *vegetus* Tristram, 1894, type locality, Bugotu, the native name of the southern part of Santa Isabel. The birds of Choiseul are usually referred to nominate *woodfordi*.

Mayr in a recent paper (1955) considers that *meeki* and *woodfordi* form a superspecies, but it seems to me that these geographically representative forms are so closely related that the most satisfactory taxonomic treatment is to recognize only a single species (*woodfordi*), with two well-differentiated subspecies: the black-billed *meeki* and the pale-billed nominate *woodfordi*.

The differences in the color of the bill and its feathering are striking, but these characters do not appear to be of specific importance, as all the other characters are similar. The latter vary from island to island but to the same degree within a narrow range. The measurements (table 3) of many individuals are the same, though the average measurements of the populations may differ, but without showing any apparent trend, as the pale-billed birds of Santa Isabel appear to be as large as those of Bougainville. The wing formula is identical, the pro-

portions are probably so, and the coloration is similar. The birds of Bougainville (*meekei*) are the most glossy and richly colored, but the difference between them and those of Guadalcanal and Santa Isabel, which are the duller, is bridged by the birds of Choiseul which are intermediate. Among the two duller populations, the one of Guadalcanal averages a little more glossy and richly colored than the one of Santa Isabel.

We see that the three populations with a pale bill are not identical in their coloration and that they differ also somewhat in their measurements (table 3). However, these differences are relatively slight, and it seems to me that it would be misleading to recognize *vegetus* (a conclusion anticipated by Mayr in 1955) which becomes a synonym of nominate *woodfordi*, or to separate nomenclaturally the population of Choiseul. If, as I believe, the populations with a black bill are probably conspecific with those with a pale one, such nomenclatural splitting obscures that relationship. It is desirable to recognize only the well-differentiated *meekei* and nominate *woodfordi*.

THE AUSTRALIAN CROWS

The Australian crows are a difficult group and have been the subject of much discussion, but it seems sufficient to mention only the paper by Stresemann (1943) which is the most up-to-date and gives references to the other papers.

The current consensus is to recognize three species (*coronoides*, *bennetti*, and *orru*), the first two of which are monotypic and restricted to Australia, *coronoides* ranging to Tasmania. Stresemann recognizes these three species but also describes a fourth on the basis of a single specimen which he named *difficilis*. The purpose of the present note is to discuss the status of *difficilis* which represents, I believe, a form of *coronoides*, probably a subadult or perhaps an aberrant specimen.

The type of *difficilis* is a male collected on February 27, 1938, at Malbon, "about 21.05 S. Lat. by 140.10 E. Long." in Cloncurry District, northwestern Queensland. Stresemann believes that it was at least one and a half years old; the wing was still molting but apparently the new primaries were nearly full grown. He states that this specimen resembles *coronoides* more than it does the other two species, but that it differs from *coronoides* by having a very small bill, similar to that of *bennetti*, and by having the base of the feathers paler, whitish gray on the back and lower breast and dirty white on the upper breast and neck. The feathers of the throat are said to be lanceolated in shape but short, reaching a length of 25 mm. Stresemann believes that this speci-

men is not *bennetti*, saying that its long wing with a more pointed tip excludes this possibility.

It seems to me, however, that the color of the feathers or the shape and length of the throat feathers are not diagnostic. In adult *coronoides* the base of the feathers is normally grayish or pale ashy, rather than white, but it is not unusual to find specimens in which they are whitish, with a complete gradation from the white base to the black tip. These specimens with paler feathers would seem to correspond more or less to *difficilis*, and this is acknowledged by Stresemann. In specimens of *coronoides* that are not fully adult the feathers of the throat are more narrowly lanceolate in shape than in the adult and shorter, varying from about 25 mm. to 35 mm. in length. One may add that in adult *bennetti* the base of the feathers is usually pure white, with a rather abrupt transition between the white and the black, or purer white in the subadult than in specimens of *coronoides* with pale feather bases.

The measurements of *difficilis* are identical with those of some specimens of *coronoides*, with the exception of the length of the bill. The latter is distinctly shorter than in adult *coronoides*, but it is similar to the bill of some subadult specimens of *coronoides* (see below). The measurements of *difficilis* given by Stresemann are: "culmen," 45; wing, 345; tail, 189; difference in length between the fourth and seventh primaries, 85; and between the first (outer) primary and longest secondary, +17. These were compared to the measurements of one specimen of *coronoides* and two of *bennetti*. The measurements that I have taken are those of 10 adult males. The latter are as follows:

Coronoides: Culmen (measured from the anterior border of the feathers), 54, 55, 55, 55, 56, 57, 57, 58, 59, 60; wing, 343, 345, 347, 350, 353, 357, 358, 360, 362, 371; tail, 188, 190, 195, 200, 203, 205, 208, 210, 214, 215; difference between the fourth and seventh primaries, 73, 75, 77, 78, 80, 81, 82, 83, 85, 88; difference between the first primary and longest secondary, 0, 3, 5, 8, 10, 14, 15, 18, 20, 25.

Bennetti: Culmen, 45, 46, 48, 49, 49, 50, 50, 50, 51, 52; wing, 292, 305, 307, 308, 310, 310, 318, 322, 326, 335; tail, 163, 165, 166, 170, 171, 172, 175, 179, 180, 185; difference between the fourth and seventh primaries, 58, 59, 60, 65, 66, 66, 68, 68, 72, 76; difference between the first primary and longest secondary, -5, -3, -2, 0, 0, 2, 5, 6, 8, 8.

It is apparent that the measurements of *difficilis* are more similar to those of *coronoides*, with the exception of the length of the bill. Some measurements are identical, including the wing length, even though the primaries were not quite fully grown.

The small bill may be aberrant, if the specimen was really adult, but the possibility that it was subadult cannot be dismissed. Most subadults of *coronoides* have a longer bill, but a search for subadult males with a small bill among the large series of about 125 *coronoides* of both sexes in the collection of the American Museum of Natural History has produced three males with a culmen of 45, 47, 47, and a wing length of 338, 340, 345, the lanceolated feathers of the throat measuring about 25 mm. These specimens are from Budgerum, Bael Bael, and Lake Charm, all in Victoria, where the population shows a tendency to have a slightly shorter bill than in Queensland, but we may grant that small-billed birds may occur also in Queensland.

The possibility that *difficilis* represents a hybrid of *coronoides* and *bennetti* should be considered also, as is suggested by Mayr (1957, p. 34) who favors this interpretation, adding that *difficilis* is "certainly not the representative of a new species."

In short, the more conservative taxonomic treatment of the crows of Australia still seems to be to recognize only three species, *coronoides*, *bennetti*, and *orru*, considering *difficilis* an individual form of *coronoides*, or a hybrid as suggested by Mayr. I believe that *orru* can be excluded in a discussion of the status of *difficilis*, as *orru* has a distinctly more massive bill than *coronoides* or *bennetti*, the base of its feathers is always purer white, and it has a distinct wing formula. Its wing is more rounded, the second primary being considerably shorter than the sixth, instead of longer as in *coronoides*, or longer or equal to the sixth in *bennetti*.

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