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## BIRDS COLLECTED DURING THE WHITNEY SOUTH SEA EXPEDITION. XLIX<sup>1</sup>

### NOTES ON SOME NON-PASSERINE GENERA, 1

By DEAN AMADON

The present paper contains systematic notes on certain non-passerine Polynesian birds. It is based primarily on the study of collections made by the Whitney South Sea Expedition. All of the species treated here have been listed in Peters' valuable "Check-list of Birds of the World," volumes I to IV. The rich material available to me has shown that some changes should be made in the arrangement adopted in that work. Original citations of names are given below only when such changes have been made, since the others are given by

Peters. The ranges given are based on the material examined and upon records given in the several volumes of the British Museum's "Catalogue of Birds . . ." and in Wiglesworth's "Aves Polynesiae."

For permission to undertake the present studies I am grateful to Dr. Frank M. Chapman, to the late Mr. P. B. Philipp and to Dr. Ernst Mayr. To Dr. Mayr I am further indebted not only for the general supervision of my work but for innumerable specific aids and suggestions.

### THE RACES OF *PHALACROCORAX MELANOLEUCUS*

The Whitney Expedition discovered a small race of this cormorant on Rennell Island, Solomons, which was described by Mayr (1931, Amer. Mus. Novitates, No. 486, p. 3). Lack of comparative material kept him from determining the subspecific status of specimens from some of the other Solomon Islands and from Tucopia Island. This lack was met by the acquisition of the series in the Rothschild Collection. Examination of the more than one hundred and fifty skins now available shows remarkably little geographical variation in this species, except in New Zealand and Rennell Island.

Males of *P. melanoleucus* are somewhat larger than females, but so few of the skins are sexed that it has proved impossible satisfactorily to separate the measurements of the sexes. The bill was measured from the most anterior point on the hook of the

maxilla to the notch on the edge of the bill which marks the suture of the maxilla and quadratojugal bones. Many of the specimens studied are immature. The wing lengths of fully fledged juvenals, when compared among themselves, will show if significant differences occur in this length and may be used to supplement the comparison of adults.

#### WING LENGTHS OF *Phalacrocorax melanoleucus* Adults

Rennell Is.	196, 201, 203, 205, 205, 205, 206, 207, 208, 210, 213, 215, 217, 217, 217, 217
New Zealand Region	229?, 232, 236, 242
Victoria and South Australia	233, 238, 238, 240, 242, 244, 245, 247
New South Wales	232, 232, 232, 236, 236, 240, 244
Northern Australia	233, 235, 242, 255
Celebes	240?
Lesser Sunda, Kei and Moluccas Ids.	241, 241, 241, 242, 242, 243, 245
Papuan Region	233, 235, 241
Tucopia Is., Santa Anna Is.	229, 230?

<sup>1</sup> Previous papers in this series comprise American Museum Novitates, Nos. 115, 124, 149, 322, 337, 350, 356, 364, 365, 370, 419, 469, 486, 488, 489, 502, 504, 516, 520, 522, 531, 590, 609, 628, 651, 665, 666, 709, 714, 820, 828, 912, 915, 933, 939, 947, 977, 986, 1006, 1007, 1056, 1057, 1091, 1116, 1133, 1144, 1152 and 1166.

	Juvenals
New South Wales	222, 223, 224, 231, 232, 234, 235, 237, 238
New Caledonia	230
Palau Ids.	220, 225, 225
Tucopia Is., Guadalcanar	225, 226, 232, 232, Is. 235, 235, 239
Djampea, Lesser Sunda,	217, 222, 227, 230,
Molucca and Kei Ids.	233, 235

**Phalacrocorax melanoleucus  
melanoleucus (Vieillot)**

*Hydrocorax melanoleucus* VIEILLOT, 1817, Nouv. Dict. Hist. Nat., nouv. éd., VIII, p. 88, New South Wales.

*Carbo melanoleucus melvillensis* MATHEWS, 1912, Austr. Av. Rec., I, p. 74, Melville Island.

SUBSPECIFIC CHARACTERS.—Size large, under parts white.

TAIL.—Southern Australia: 149–163 (156). Northern Australia: 154–167 (160). Celebes Region: 157–165 (160). Papuan Region: 160, 162, 166. Tucopia Is.: 156. Guadalcanar Is.: 156 (juv.). Palau Ids.: 155, 159 (juvs.).

BILL.—Australia: 31–38 (35.5). Santa Anna Is.: 35. Tucopia Is.: 33, 35. Palau Ids.: 36, 37, 37, 38.

MAXILLA DEPTH.—6.5–9 (7.7).

RANGE.—Tasmania, Australia, East Indies west to Celebes and eastern Java, New Guinea Region, Palau Islands, Solomon Islands (Guadalcanar, Santa Anna), Santa Cruz Islands (Tucopia).

REMARKS.—Mayr (*loc. cit.*) suggested that the specimens from the Solomon (except Rennell) and Santa Cruz Islands might have peculiarities in the edgings on the back feathers. Additional material indicates that the differences he observed are due to the condition of the plumage. Possibly there is some geographical variation in the white plumules which appear on the head and neck in the breeding season, but so few specimens have these that it is impossible to draw conclusions. From Palau we have only molting or im-

mature specimens, and from Celebes and New Caledonia single, old mounts. As far as can be determined from this poor material, the populations of these outlying islands are typical *melanoleucus*.

**Phalacrocorax melanoleucus  
breviceauda Mayr**

SUBSPECIFIC CHARACTERS.—Size very small; wing short; maxilla as long or slightly longer than in nominate race, but slenderer; more white on head, white superciliary and white frontlet across base of maxilla usually broader.

TAIL.—“10 ♂ 124–143 (132.3); 8 ♀ 116–132 (125.9)” (Mayr).

BILL.—33.5–40 (37.2).

MAXILLA DEPTH.—6–7 (6.3).

RANGE.—Rennell Island, Solomons.

REMARKS.—It is very surprising to find this distinct race on a single small island surrounded by islands inhabited by the widely distributed nominate race.

**Phalacrocorax melanoleucus  
brevirostris Gould**

SUBSPECIFIC CHARACTERS.—Like *melanoleucus*, but under parts more or less melanistic in many individuals.

RANGE.—New Zealand Region.

REMARKS.—I have been unable to find any size differences of the New Zealand population. Fifteen of eighteen skins in the American Museum are melanistic, while apparently all of the twenty examined by Ogilvie-Grant (1898, Cat. Birds, XXVI, p. 401) in the British Museum were more or less melanistic. Similar melanism has been known to occur in *P. m. melanoleucus* only once (1938–1939, Emu, XXXVIII, p. 367). Only field studies can determine the distribution, etc., of the melanistic birds in New Zealand. Fortunately the Ornithological Society of New Zealand has such a project under way.

**GEOGRAPHICAL VARIATION IN *NOTOPHOYX NOVAEHOLLANDIAE***

The American Museum of Natural History has recently received material of this heron from near the periphery of its range. This has permitted the present revision.

Eighty-two adults from almost all parts of the range were examined. I am indebted to Dr. A. L. Rand for permission to examine specimens of *N. novaehollandiae* col-

lected recently in New Guinea by the Archbold-Rand Expeditions.

Comparison of birds from all parts of the range, including both arid and humid points in Australia, has revealed no geographical variation in color. There is sufficient size variation, however, to justify the recognition of two subspecies. The wing feathers in this species seem unusually subject to wear, and many of the wing measurements are quite inexact.

**Notophoxyx novaehollandiae  
novaehollandiae** (Latham)

*Ardea novae Hollandiae* LATHAM, 1790, Ind. Orn., II, p. 701, New South Wales.

*Notophoxyx novaehollandiae parryi* MATHEWS, 1912, Novit. Zool., XVIII, p. 231, Parry's Creek, northwestern Australia.

SUBSPECIFIC CHARACTERS.—Size large; mean wing length in males about 330 mm.; in females, about 318 mm.

WING.—King Is., Victoria and southwestern Australia: ♂ 325, 325, 326, 328, 330; ♀ 305?, 305?, 319, 322, 323, 324. New South Wales: ♂ 320?, 320?, 325?, 330, 335; ♀ 300 (juv.), 312, 314. Northern Australia: ♂ 318?, 320?, 320?, 320?, 330, 330 (type *parryi*), 332, 335; ♀ 315, 318. New Zealand, Norfolk and Lord Howe Ids.: ♂ 316?, 320, 329, 330; ♀ 321. Lesser Sunda and Kei Ids.: ♂ 320, 320, 320, 325, 327, 330, 338, 338; ♀ 305, 308, 310, 310, 316, 320. New Guinea Region: ♂ 318?, 318?, 321, 327, 331, 332, 332, 334; ♀ 312, 317. Locality? (Australia?): ♂ 343.

TAIL.—King Is., Victoria and southwestern Australia: ♂ 126, 127, 128, 131; 6 ♀ 119–131 (125). New South Wales: ♂ 129, 131, 132; ♀ 112?, 118, 124, 130. Northern Australia: 6 ♂ 118–134 (126); ♀ 125, 125, 125, 127. New Zealand, Norfolk and Lord Howe Ids.: ♂ 125, 131; ♀ 117, 121, 128, 128. Lesser Sunda and Kei Ids.: 5 ♂ 121–134 (127); 10 ♀ 118–132 (124). New Guinea Region: 9 ♂ 122–137 (133); ♀ 119, 122, 132.

CULMEN.—New South Wales: ♂ 76, 79, 80, 82, 84; ♀ 73, 73, 78. Lesser Sunda and Kei Ids.: ♂ 80, 80, 82, 83, 83, 84, 85, 85, 85; ♀ 73, 74, 76, 77, 77, 78, 81, 81, 82.

TARSUS.—New South Wales: ♂ 96, 97, 98, 102; ♀ 85, 87, 93, 97. Lesser Sunda

and Kei Ids.: ♂ 91, 91, 93, 93, 93, 98, 101, 103, 105; ♀ 85, 87, 89, 91, 91, 92, 95, 95, 99.

RANGE.—Tasmania, Australia, New Zealand Region, Celebes (one record), Lesser Sunda Islands from Lombok eastward to Timor, Kei Islands, Aru Islands, southern and southeastern New Guinea, Rossel Island.

REMARKS.—Comparison of the above wing lengths shows no appreciable differences between series from the various localities. Rensch (1931, Mitt. Zool. Mus. Berlin, XVII, p. 501) records somewhat smaller measurements for a series from the Lesser Sunda Islands. Apparently his measurements are not comparable with those given above. The darkish coloration of the type of *N. n. parryi* Mathews is an individual variation matched by other birds from various parts of the range. Mathews himself later rejected this race.

**Notophoxyx novaehollandiae nana,**  
new subspecies

TYPE.—No. 428832, Amer. Mus. Nat. Hist.; ♂ ad.; Waiem River, Tao, northeastern New Caledonia; September 14, 1939; L. Macmillan, coll.

SUBSPECIFIC CHARACTERS.—Size small; mean wing length of males about 305 mm.; of females, about 290 mm.

WING.—New Caledonia: ♂ 303, 304, 308 (type); ♀ 284, 285, 292, 295, 295. Lifu, Loyalty Ids.: 300 (*vide* Brasil, 1916, Rev. Franc. d'Orn., IV, p. 199).

TAIL.—New Caledonia: ♂ 116, 122, 128 (type); ♀ 114, 114, 116, 119, 121.

CULMEN.—New Caledonia: ♂ 82 (type), 82, 89; ♀ 76, 77, 79, 80, 81.

TARSUS.—New Caledonia: ♂ 94 (type), 95, 99; ♀ 86, 88, 88, 91, 95.

WEIGHTS.—New Caledonia: ♂ 522 (type); ♀ 466, 472, 473, 528.

RANGE.—New Caledonia. A specimen has been taken on Lifu, Loyalty Islands (Brasil, *loc. cit.*), but Mr. Macmillan (MS) concluded that Lifu is unsuitable for this heron and that it would occur there, if at all, only as a temporary straggler from New Caledonia.

REMARKS.—The smaller average size of this heron is apparent even from gross comparison of skins. However, the tarsus and especially the culmen seem to be as long in *nana* as in the larger race.

A REVISION OF *NYCTICORAX CALEDONICUS*

When drawing up his valuable revision of the genus *Nycticorax*, Peters (1930, Proc. Bost. Soc. Nat. Hist., XXXIX, pp. 268-275) apparently had material of only two races (of the eight which he recognized) of the species *N. caledonicus*. For the present study, adults of all the forms except the little known *crassirostris* of the Bonin Islands were available. Hartert (1924, Novit. Zool., XXXI, pp. 199, 200) ably commented on some of the present material (Rothschild Coll.). However, the extensive recent collections made by the Whitney South Sea Expedition in such critical localities as New Caledonia, the Solomons and Palau Islands, and the Bismarck Archipelago have enabled me to revise the work of Hartert and Peters.

Peters begins his discussion with the statement, "No one seems to have pointed out that the color characters on which most of the subspecies of the Nankeen Night Heron are founded are due to dichromatism rather than to actual geographical variation." It has been impossible in the present study to confirm this assertion. On the contrary only moderate variation in color was found among specimens of any of the races examined. Peters, as a matter of fact, did not attribute excessive variation to the two races which he examined, but in trying to reconcile the conflicting descriptions of this heron given in the literature he concluded that two color phases occur in the races *minahassae*, *pelewensis*, and perhaps in others. We have found a series of the latter form to show only moderate variation. As to *minahassae*, it seems very probable, as shown below, that this name has been applied to an extremely variable population of hybrids between the darkest (*manillensis*) and palest (*hilli*) races of the species.

***Nycticorax caledonicus caledonicus***  
(Gmelin)

**SUBSPECIFIC CHARACTERS.**—Size medium; upper parts dull rufous chestnut, becoming grayish with wear; superciliary present, white more or less mixed with rufous; occipital plumes (in two skins)

white with blackish tips and bases and a dark shaft streak along entire length of plumes.

**WING.**—♂ 291, 304; ♀ 290, 295, 296, 301.

**TAIL.**—♂ 102, 108; ♀ 102, 104, 107, 107.

**CULMEN.**—♂ 77, 78; ♀ 68, 71, 71, 75, 75.

**WEIGHTS.**—♂ 884.

**RANGE.**—New Caledonia.

***Nycticorax caledonicus hilli*** (Mathews)

**TYPE LOCALITY.**—Parry's Creek, north-western Australia.

**SUBSPECIFIC CHARACTERS.**—Size medium; upper parts light rufous chestnut, lacking the dull undertone of *caledonicus*; superciliary present, usually white, sometimes mixed with rufous; occipital plumes white, rarely black-tipped.

**WING.**—52 ♂ 280-313 (296); 22 ♀ 267-297 (284).

The following are wing lengths of specimens from the western Bismarck Archipelago, below referred to *hilli* and included in the averages just given: ♂ 280, 287, 288, 290, 292, 292, 295; ♀ 267, 270?, 279, 280, 285. Long Is., New Guinea: ♂ 282; ♀ 278.

**RANGE.**—Australia, Lesser Sunda Islands, Moluccas, New Guinea, western Bismarck Archipelago (Admiralty, Ninigo, Anchorite Islands).

**REMARKS.**—All of the specimens examined from the western Bismarck Archipelago and two from Long Island off the north coast of New Guinea belong to *hilli*, as shown by their light coloration, large size and the presence of a superciliary stripe. Some of them, however, are slightly more richly colored and smaller than typical *hilli*. Two of the females with wings 267 and 270? are slightly smaller than the minimum (273) of *hilli* from elsewhere. Thus these birds show a slight trend toward the following race, *mandibularis*, of the Solomon Islands and eastern Bismarck Archipelago.

**Nycticorax caledonicus**  
**mandibularis** Ogilvie-Grant

*Nycticorax mandibularis* OGILVIE-GRANT, 1888, Proc. Zool. Soc. London, p. 203, Guadalcanar Is., Solomon Ids.

*Nycticorax caledonicus cancrivorus* NEUMANN, 1930, Ornith. Monatsb., XXXVIII, p. 18, Uatom Is., near New Britain Is.

SUBSPECIFIC CHARACTERS.—Size small; upper parts rich chestnut, much deeper than in *hilli*; chestnut extending around neck and across upper breast; superciliary lacking; occipital plumes white with black-

TAIL (OF ♂ ONLY).—Solomon Ids.: 16 skins, 93–102 (97.1). Eastern Bismarek Archipelago: 14 skins, 93–103 (96.9).

WEIGHTS.—SOLOMON IDS.: Choiseul: ♂ 800; Malaita: ♀ 600; San Cristobal: ♂ 700, 750 (subad.).

RANGE.—Solomon Islands and eastern Bismarek Archipelago. As shown below, specimens from New Hanover and New Britain show a slight trend toward the form *hilli*, which occurs in the western Bismarek Archipelago.

*N. C. MANDIBULARIS*

ISLAND	WING		CULMEN	
	Solomons			
	♂	♀	♂	♀
Guadalcanar, San Cristobal	267?, 282	—	62, 62, 64, 65, 65, 66, 69	—
Ysabel, Choiseul, Bougainville	273?, 278, 280?, 281, 290	274 (imm.)	67, 69, 69, 70, 73, 74, 75	66, 67, 67, 67
Other Solomons	269?, 270, 275?	265	64, 66, 66, 67	58, 60, 61, 62, 62, 63, 63, 65
	Bismarek Archipelago			
Nissan	279, 283	264, 269?	69, 72, 74	64, 68
Tanga and Lihir Ids.	273, 278?, 278?	268	71, 73, 75	72
New Ireland and Feni Ids.	270, 273, 278, 280?	277	72, 73, 75, 76	70
New Britain	281	273, 281, 284	67, 71	63, 66, 67, 67, 70
New Hanover	282	—	—	—

ish tips, occasionally washed with blackish along entire length.

MEASUREMENTS.—The accompanying table is arranged to permit comparison of the southernmost islands of the Solomons (Guadalcanar, the type locality of *mandibularis*, and San Cristobal) with the three large islands in the north of the group. The intermediate smaller islands comprise a third group. For a complete list of these islands, see beyond under "Specimens Examined."

As will be noted in the above table, the series from near the type locality in the southern Solomon Islands seem to be slightly short-billed as compared with birds from the rest of the range. The difference is not great enough to justify subspecific separation. In fact the considerable individual variation in the size of the bill in this heron, and the possibility of mis-sexing may be the explanation of much of the difference noted.

REMARKS.—*N. c. cancrivorus* was described as similar to *mandibularis* in color but longer-winged. However, after measuring a series from the Solomons and from the eastern Bismarek Archipelago, the two groups proved to be almost identical in size, as the table shows. The belief that Solomon Islands birds are smaller is probably due to two factors: (1) Fully 90 per cent of our series from the Solomon Islands have the longest primaries molting. This is true both of the recent collections and of the older Rothschild material. Hartert's measurements of the latter (1926, Novit. Zool., XXXIII, p. 126) were affected by this poor condition of the material. This he probably suspected, for he said that more material was needed to confirm the apparently larger size of Bismarek Archipelago specimens. (2) As shown above, the Whitney Collections revealed that the larger (and differently colored) race, *hilli*, is the one occurring in the western Bis-

marck Archipelago, with a zone of hybridization between the two forms. Previously some of this hybrid material has been compared in error with true *mandibularis*.

Typical *mandibularis* always lacks a superciliary line, though there may be a suggestion of the anterior end of one. An adult from New Hanover has a complete superciliary; while of seven specimens from New Britain, one has a complete superciliary and two others an interrupted one. In this they show a trend toward *N. c. hilli*. However, since the birds from New Hanover and New Britain are much closer to those from the Solomon Islands in size and general coloration, they are here referred to *mandibularis*.

***Nycticorax caledonicus manillensis***  
Vigors

*Nycticorax Manillensis* VIGORS, 1831, Proc. Zool. Soc. London, p. 98, Manila, Philippines.

*Nycticorax minahassae* MEYER AND WIGLESWORTH, 1894, Jour. für Ornith., XLII, p. 115, Kema, Minahassa, Celebes.

**SUBSPECIFIC CHARACTERS.**—Size large (wing about 300–330 mm.); color like *mandibularis* except that the back is much darker (interscapular area rich maroon); under parts extensively washed with chestnut; superciliary absent or poorly developed, when present is chestnut more or less mixed with white; occipital plumes “smoky black, or whitish with dusky bases and tips” (Peters).

**RANGE.**—Philippine Islands and northern Borneo.

**REMARKS.**—Meyer and Wiglesworth described *minahassae* as nearest to *manillensis*. At the same time they referred three other Celebes specimens to the Australian race (*hilli*). Four years later (Birds of Celebes, II, pp. 842–845) they considered *minahassae* a synonym of *manillensis*, since they had seen intermediate specimens. They also discussed other specimens that were intermediate with the Australian form. In view of these facts they made the logical suggestion that, “Another possibility is . . . that we have to do with a mixed race.” This now seems very probable. Our only Celebes specimen (Lotta, Minahassa) is indistinguishable from typical

skins of the Australian race, *hilli*. Riley (1924, Proc. U. S. Nat. Mus., LXIV, pp. 30–31) described two Celebes skins as much lighter than *manillensis* but slightly darker than *hilli* and with the nuchal plumes black-tipped. This last character sometimes occurs in *hilli*. All this suggests that Celebes has a hybrid population showing every variation from typical (as to color) *manillensis* to *hilli*. The type of *minahassae* is described as very dark, like a melanistic *manillensis*. Probably this type is an abnormally dark individual.

***Nycticorax caledonicus pelewensis***  
Mathews

**SUBSPECIFIC CHARACTERS.**—Size medium; upper parts much duller than in *manillensis*; interscapular region dull maroon (“A dark purplish wash on the back . . .”—Wetmore, 1919–1920, Bull. Mus. Comp. Zool., LXIII, p. 172, describing a skin from Uala, Carolines); throat and mid-breast white; superciliary present, white more or less mixed with chestnut; occipital plumes often entirely white (7 skins), sometimes black-tipped (2 skins), rarely blackish along entire length of plume (1 skin).

**REMARKS.**—In worn plumage *pelewensis* becomes dull grayish chestnut above and is then very similar to worn specimens of *caledonicus*, as Hartert (1924, *op. cit.*) remarked. In fresh plumage the tone of the upper parts of the two races is different. Apparently the occipital plumes are more heavily pigmented in *caledonicus*. Finsch (1875, Jour. Mus. Godeffroy, III, p. 165) said of seven adults from Palau that the occipital plumes when present had blackish tips which were sometimes indistinct and in one skin only faintly suggested.

**WING.**—Palau: ♂ 287, 289, 290, 293, 295; ♀ 272, 273, 277, 284, 284, 284, 285. Ruk: ♂ 293. Uala: ♀ “280” (Wetmore, *loc. cit.*).

**TAIL.**—Palau: 95–110 (99). Ruk: ♂ 103. Uala: ♀ “97.”

**CULMEN.**—Palau: 66–77 (71). Ruk: ♂ 75.

**RANGE.**—Palau Islands and Caroline Islands (Ruk and Uala, Ruk Group).

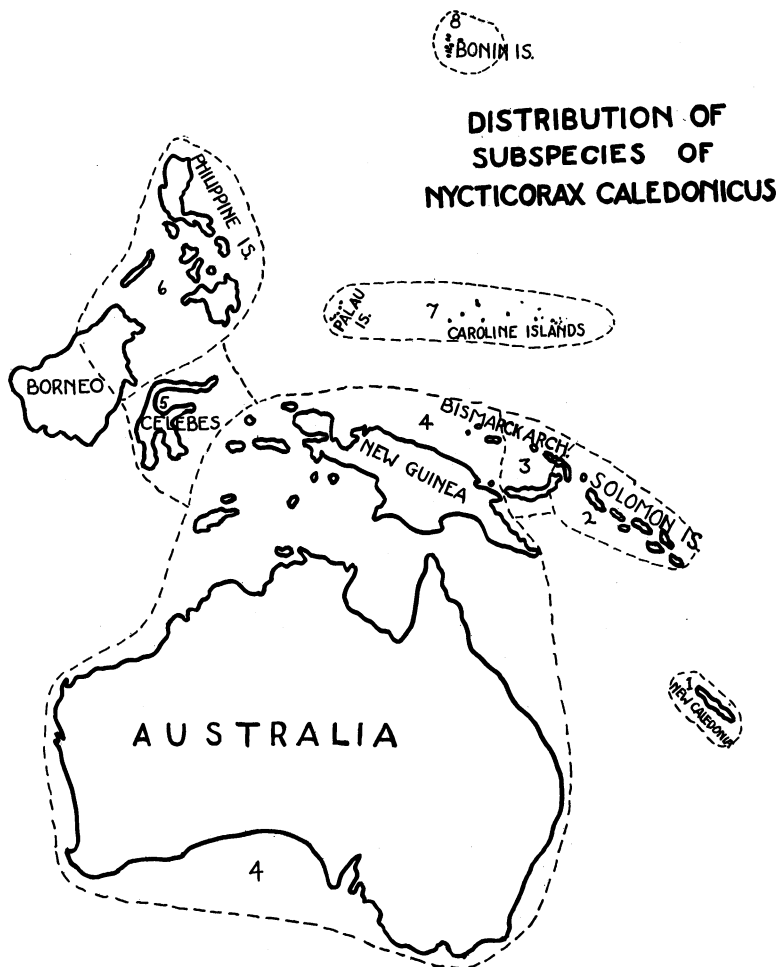


Fig. 1. Distribution of subspecies of *Nycticorax caledonicus*: 1, *caledonicus*; 2, *mandibularis*; 3, *mandibularis* × *hilli* (hybrid population); 4, *hilli*; 5, *hilli* × *manillensis* (hybrid population); 6, *manillensis*; 7, *pelewensis*; 8, *crassirostris*.

***Nycticorax caledonicus crassirostris*  
Vigors**

**SUBSPECIFIC CHARACTERS.**—(No specimens seen.) Probably much like *pelewensis* in color, but type with a very long bill.

**RANGE.**—Bonin Islands.

**REMARKS.**—No critical color comparison has been made with the other races. Seebohm (1890, *Ibis*, p. 106) described *crassi-*

*rostris* as vinous gray above. This suggests similarity to *pelewensis*.

I have converted the measurements given by Seebohm into millimeters and compared them with measurements of *hilli* and *pelewensis*. It will be noticed that only the type of *crassirostris* differs from *pelewensis*. Further comparison of birds from Palau and the Bonin Islands as regards both coloration and bill size is needed.

*N. c. crassirostris*  
" " *pelewensis*  
" " *hilli*

**CULMEN LENGTH**  
71, 84 (type)  
66–77 (15 skins)  
66–80 (59 skins)

**DEPTH OF BILL AT  
BASE OF NOSTRIL**  
22.9, 25.4 (type?)  
20–25 (7 skins)  
19–23 (7 skins)

*Nycticorax caledonicus* subspecies?

A. Hoogerwerf recently found (1936, Ornith. Monatsber., XLIV, p. 25) three pairs of *N. caledonicus* nesting in a large colony of *N. nycticorax* on a small island near Soerabaja in eastern Java. No specimens were taken. Since it is thus uncertain whether these birds represented a small endemic population, or a recent or sporadic extension of range by one of the other races, Java has not been included on the accompanying map.

DISCUSSION.—*Nycticorax caledonicus* shows geographical variation in both color and size, but the latter is relatively unimportant in separating the races. There is a large race, *manillensis*; four medium sized ones, *hilli*, *caledonicus*, *pelewensis* and *crassirostris*; and a small one, *mandibularis*. There is so much overlap in size that only *manillensis* and *mandibularis* could be separated on the basis of size alone. Variation in proportions, especially in the size of the bill, among races of the same general size does not occur to the extent believed by some earlier writers. If the birds of the Bonin Islands (*crassirostris*) do eventually prove to have decidedly larger bills than the other medium-sized races, this will be the only well-marked example of such variation in this species.

Comparison of additional juvenals of *hilli* and *mandibularis* does not tend to support Hartert's statement (1924, *op. cit.*) that the latter have the throat and chest less streaked. Nor can I find any other subspecific characters peculiar to the juvenals, but they generally foreshadow the adult characters sufficiently to permit identification. A juvenal *manillensis* from northern Borneo is conspicuously large (wing 310), and richly colored dorsally;

juvenal *mandibularis* are much smaller and have considerable chestnut across the breast. Young of *hilli* are pale above and below. One juvenal and a subadult of *caledonicus* are dull and grayish above, like the adults, and are washed with light buff below; a juvenal *pelewensis* is similar but the grayish, streaked under parts are without a trace of buffy coloration.

## SPECIMENS EXAMINED

*Nycticorax c. caledonicus*.—New Caledonia, 6 ads., 2 imm.

*N. c. hilli*.—BISMARCK ARCHIPELAGO: Ahu-Ninigo Group, 5 ads., 2 imm.; Manus and Rambutyo, Admiralty Ids., 5 ads., 5 imm.; Anchorite Is., 1 ad. NEW GUINEA REGION: New Guinea, 3 ads., 5 imm.; Long Is., 2 ads., 1 imm.; Jobi Is., 1 ad.; Salawati Is., 1 ad.; Waigeu Is., 2 imm.; Aru Ids., 3 ads., 1 imm. EAST INDIES: Tenimber Ids., 4 ads.; Teor (Ceram Laut Group), 1 ad.; Amboina, 1 imm.; Buru, 1 ad.; Kei Ids., 7 ads., 1 imm.; South West Ids., 9 ads., 4 imm.; Savu and Timor, 3 ads., 2 imm.; Djampea, 1 imm. AUSTRALIA: Western Australia, 3 ads., 4 imm. (including type); Northern Territory, 5 ads., 3 imm.; central Australia, 1 ad.; Queensland, 4 ads., 4 imm.; New South Wales, 5 ads.; Victoria, 5 ads., 6 imm.; South Australia, 1 ad., 1 imm.

*N. c. mandibularis*.—SOLOMON GROUP: 28 ads., 16 imm. from San Cristobal, Guadalcanar, Russel (Pavuvu), Savo, Tulagi, Malaita, Murray, Rendova, New Georgia, Vella Lavella, Ysabel, Faro, Choiseul, Mono (Treasury) and Bougainville Ids. BISMARCK ARCHIPELAGO: Nissan, 5 ads.; Lihir Is., 1 ad., 1 imm.; Masahet Is. (Lihirs), 1 ad.; Tabar Is., 1 imm.; Boang Is. (Tangas), 2 ads.; New Ireland, 1 ad.; Feni Is. (off N. Ireland), 4 ads., 4 imm.; New Hanover, 1 ad., 3 imm.; New Britain, 7 ads., 4 imm.

*Nycticorax caledonicus manillensis*.—Philippine Ids., 2 ads.; Borneo, 1 imm.

*N. c. manillensis* × *hilli*.—Lotta, Minahassa, Celebes, 1 ad.

*N. c. pelewensis*.—Palau Ids., 15 ads., 1 imm.; Ruk Is., Carolines, 1 ad.

The distribution of the six races is outlined in the accompanying map.

## NYROCA AUSTRALIS SUBSPECIES?

A female of this duck from Tanna, New Hebrides, has wing 201 mm. This measurement falls between those given by Mayr (1940, Amer. Mus. Novitates, No. 1056, p. 7) of the two known subspecies, *extima* of the Banks Islands (5 ♀ wing 189–196), and *australis* of Australia (5 ♀ wing 203–212). The Tanna specimen was incubating

a clutch of eggs when found. The collector, Mr. L. Macmillan, in his notes (MS) from the nearby island of Erromango states "... saw only one *N. australis* during my two visits ... natives say an odd one occasionally nests." He did not encounter this species in the Loyalty Islands or New Caledonia.



## THE POLYNESIAN MEGAPODES

Mayr's review (1938, Amer. Mus. Novitates, No. 1006) of the Papuan forms of the genus *Megapodius* furnishes the much-needed foundation for systematic notes on other members of the genus. He (p. 15) presents a tabular comparison of the five most important variable characters as each occurs in the Papuan forms. The same five characters are described below for each form considered, to permit comparison.

***Megapodius freycinet layardi* Tristram**

SUBSPECIFIC CHARACTERS.—Feet red, forehead bare, back blackish only slightly tinged with brown, bend of wing gray, crest short, bare skin of head and neck red. In the few other races in which the plumage of the upper parts is equally blackish the bare skin on the head is blackish.

WING.—Efate: ♂ 243, 248, 251, 254, 256; ♀ 236, 238, 238, 238, 247, 247. Epi: ♂ 248. Mai: ♂ 256. Malekula: ♂ 237?, 243. Pentecost (Arag): ♀ 250, 251. Ureparapara (Bligh): ♂ 260; ♀ 252. Valua: ♀ 257.

TARSUS.—New Hebrides: ♂ 64–69.5 (66.4); ♀ 59–67 (63). Banks Ids.: ♂ 71; ♀ 64, 66, 68.

RANGE.—Northern New Hebrides (Efate, Epi, Mai, Malekula, Pentecost [Arag], Espiritu Santo, Tongoa), Banks Islands (Ureparapara [Bligh], Gaua, Valua).

REMARKS.—Birds from the various islands appear identical in color. The four from the Banks Islands are slightly larger, but the series is not large enough to rule out individual variation.

***Megapodius laperouse***

SPECIFIC CHARACTERS.—Size small; crown differently colored from remainder of upper parts.

*M. laperouse* is best considered a distinct species because of the above characters, and especially because there are two subspecies which are much more closely related to each other than they are to any form of *M. freycinet*. The range of *laperouse* is quite distant from that of *freycinet*. With respect to the general variable characters of the genus, *M. laperouse* may be described as follows: feet yellowish brown, forehead

feathered, back brownish olive, bend of wing gray, crest medium, bare skin of head and neck red.

***Megapodius laperouse laperouse***

Gaimard

SUBSPECIFIC CHARACTERS.—Crown medium gray, maxilla blackish.

TARSUS.—♂ 50, 52.5, 53; ♀ 48, 48.5.

RANGE.—Marianne Islands (specimens examined from Asuncion, Saipan and Guam).

REMARKS.—Only a few old specimens in poor condition were available. The wing in all of these was molting and could not be measured.

***Megapodius laperouse senex***

Hartlaub

SUBSPECIFIC CHARACTERS.—Crown light pearly gray, maxilla yellowish. Finsch (1875, Jour. Mus. Godfrey, III, p. 162) believed *senex* to have the legs and feet more yellowish and the crest longer than in the nominate race. The material compared by me (admittedly poor in the case of *M. l. laperouse*) does not show these differences.

WING.—♂ 189?, 190?; sex? 190, 192.

TARSUS.—♂ 54, 54, 55; ♀ 50, 53, 55, 55; sex? 52, 56.

RANGE.—Palau Islands.

***Megapodius pritchardii* G. R. Gray**

SPECIFIC CHARACTERS.—Size very small; coloration pale, with more or less white in the wing and tail; upper parts without the olive tinge characteristic of both *M. freycinet* and *M. laperouse*.

The amount of white in the wing and tail is variable. It is not entirely lacking in any of the twelve specimens examined with the exception of one small chick. The following description will aid in the comparison of *pritchardii* with other forms of the genus: feet yellowish red, forehead feathered, back rufous brown, wing-bend partly gray, crest short.

WING.—♂ 181+, 184+, 187, 192; ♀ 193, 195; sex? 185?

TARSUS.—♂ 54, 54, 54; ♀ 53, 53, 55.

RANGE.—Niuafof Island, central Polynesia.

## THE POLYNESIAN BLACK RAIL

Murphy (1924, Amer. Mus. Novitates, No. 124, p. 4) reported on specimens of this rail collected during the earlier years of the Whitney South Sea Expedition. Arrival of material from other important Polynesian localities and the availability of the comparative material in the Rothschild Collection permitted a further study of this species. Specimens of all the races except *filipina* and the high altitude race, *richardsoni*, recently described from New Guinea by Rand were examined.

Although this small rail presumably is a rather weak flier, it occurs over an immense range, yet shows very little geographical variation. Wetmore (1925, Ibis, p. 825) found this uniformity so surprising that he suggested that *P. tabuensis* had been carried from island to island by the Polynesian natives. When we find that this lack of variation extends to the populations of Tasmania, western Australia and other remote localities, Wetmore's suggestion cannot be accepted.

I have found no variation in color that is unquestionably geographical. However, wear and fading proceed rapidly in this species. As a result few museum skins are suitable for critical color comparisons. Even the race occurring on Luzon Island, Philippines, differs in size only, according to Hachisuka (1932, Bds. Phil. Ids., I, p. 234).

Geographical size variation does occur. Many islands have populations which differ slightly in average wing length from those of other islands, as shown in the following table. Males probably average slightly larger than females, but it seemed best not to attempt to tabulate the wing lengths of the sexes separately.

## PORZANA TABUENSIS

LOCALITY	NUMBER OF	
	SKINS	WING
Marquesas Ids.	5	78-85 (82.8)
Tuamotu "	19	78-86 (82.5)
Tahiti, Society Ids.	1	84
Austral Ids.	8	83-87 (84.8)
Tonga "	4	78, 79, 79, 79
Niue Is.	1	78
Fiji Ids.	4	73.8, 76, 76.1, 77 <sup>1</sup>
Samoa Ids.	6	72-79 (75.5)

<sup>1</sup> Two from Wetmore (1925, Ibis, p. 825).

Santa Cruz Ids.	7	79-84 (82.3)
New Hebrides	3	81, 82, 84 <sup>2</sup>
New Caledonia	3	75, 75, 77 <sup>3</sup>
Sunday Is., Ker- madec	1	81? (type <i>oliveri</i> )
Norfolk Is.	10	79-88 (82.9) <sup>4</sup>
New Guinea	17	76-84 (80.8) <sup>5</sup>
Teeor Is.	1	80 (juv?)
Luzon "	?	69-78 <sup>6</sup>
New Zealand	4	80, 85, 90, 90
Chatham Ids., Tas- mania and southern Australia	16	81-92 (86.4)

Most of the size groups in the table are randomly distributed geographically. However, the birds from the southern part of the range are uniformly large and may be recognized under the name

**Porzana tabuensis plumbea**  
(J. E. Gray)

*Crex Plumbea* J. E. GRAY, 1829, in Griffith, Anim. Kingd., VIII (Aves, III), p. 410, New Zealand designated by Mathews.

*Gallinula immaculata* SWAINSON, 1838 (1837), Anim. in Menag., p. 337, Tasmania.

SUBSPECIFIC CHARACTERS.—Size larger, wing measuring 80 mm. or more, averaging over 85 mm.

RANGE.—Chatham Islands, New Zealand, Tasmania and (southern) Australia.

REMARKS.—I do not believe the reasons advanced by Mathews (1911, Bds. Aust., I, p. 217) in selecting New Zealand as the type locality of *plumbea* are valid, but the designation may be allowed to stand. Comparison of the material in the Mathews Collection from the localities given in the above range has not revealed any geographical variation. Hartert (1930, Novit. Zool., XXXVI, p. 122) wrote, "His [Mathews] various subspecies from Australia are indistinguishable."

**Porzana tabuensis tabuensis**  
(Gmelin)

*Rallus tabuensis* GMELIN, 1789, Syst. Nat., I, pt. 2, p. 717, no. 20, Tonga Tabu.

*Porzana vittensis* HARTLAUB, 1854, Jour. für Ornith., II, p. 169, Ovalau, Fiji.

<sup>2</sup> Two from Hachisuka (1930, Cont. Phil. Birds, II, p. 153, and 1932, Bds. Phil. Ids., I, p. 234).

<sup>3</sup> Two from Brasil (1917, Bull. Mus. Nat. Hist. Paris, XXIII, p. 440).

<sup>4</sup> A series in the Mathews' Collection, although he overlooked it in his book on the birds of Norfolk Island (1928) and in the later supplement (1936).

<sup>5</sup> In part from Rand (1940, Amer. Mus. Novitates, No. 1072).

<sup>6</sup> From Hachisuka (1932, *loc. cit.*).

*Porzana tabuensis caledonica* BRASIL, 1917, Bull. Mus. Nat. Hist. Paris, XXIII, p. 440, New Caledonia.

? *Rallus tenebrosus* G. R. GRAY, 1862, Ibis, p. 239, Norfolk Island.

? *Porzanoiidea plumbea oliveri* MATHEWS AND IREDALE, 1914, Austr. Av. Rec., II, p. 114, Sunday Island, Kermadecs.

? *Porzana plumbea filipina* HACHISUKA, 1932, Bds. Phil. Ids., I, p. 234, Luzon, Philippine Islands.

SUBSPECIFIC CHARACTERS.—Smaller; wing averaging less than 85 mm., usually about 80 mm.

CULMEN.—Marquesas Ids.: ♂ 18, 19; ♀ 18, 18. Tuamotus: 13 ♂ 18–20.5; 12 ♀ 17–19. Tahiti, Society Ids.: ♀ 17. Austral Ids.: ♂ 18.5, 19; ♀ 17.5, 18; sex? 20. Niue Is.: sex? 17. Tonga Ids.: ♂ 18, 19; ♀ 18, 18. Fiji Ids.: ♂ 16; ♀ 17, "18.3; sex? 17.5" (Wetmore, *loc. cit.*). Samoa Ids.: 4 ♂ 17.5–19; 4 ♀ 16.5–18. Santa Cruz Ids.: 6 ♂ 17.5–19; ♀ 16.5. New Hebrides: ♀ 18. New Caledonia: ♂ 18.

TARSUS.—Marquesas Ids.: ♂ 27, 28, 28; ♀ 26, 28. Tuamotus: 14 ♂ 25.5–30; 11 ♀ 25.5–29. Tahiti: ♀ 28. Austral Ids.: ♂ 28.5, 32; ♀ 29, 30, 30, 31. Niue Is.: sex? 27. Tonga Ids.: ♂ 29.5, 30; ♀ 26, 27. Fiji Ids.: ♂ 25.5; ♀ 26 "27; sex? 25.7" (Wetmore, *loc. cit.*). Samoa Ids.: 4 ♂ 30–32; 4 ♀ 28.5–31. Santa Cruz Ids.: 6 ♂ 27.5–29.5; ♀ 28.5. New Hebrides: ♀ 28. New Caledonia: ♂ 27.

WEIGHTS.—New Caledonia: ♂ 41.5. Anggi Lakes, Arfak, New Guinea: ♂ 42, 43.5, 44, 44, 45; ♀ 38.5, 43, 43.

RANGE.—Marquesas Islands (Nukuhiva, Hatutu), Society Islands (Tahiti), Tuamotu Islands (Manui, Manihi, Raraka, Mangareva, Hiti, Apataki, Aratika, Toau,

Tickahau, Marutea Atoll, Oeno), Austral Islands (Tubuai, Rapa), Niue Island, Tonga Islands (Tongatabu, Late, Honga Hapai, Fanua Lai), Fiji Islands (Viti Levu, Ovalau, Ngau, Kandavu), Caroline Islands (Kusaie), Samoa Islands (Tau), Santa Cruz Islands (Tinakula), New Hebrides (Tanna, Aneiteum), New Caledonia, Uatom Island (near New Britain), New Guinea (several localities), Teor Island (Ceram Laut Group). Tentatively under this race may be listed the birds from Luzon, Philippines; Sunday Island, Kermadecs; and Norfolk Island. Probably this secretive little rail occurs on other islands also.

REMARKS.—Study of the accompanying table of wing lengths shows that the size differences of the various island populations here assigned to *P. t. tabuensis* are too slight and too randomly distributed to permit any useful subdivision based on this character. Wetmore (*loc. cit.*) has already concluded that the Fiji birds, often separated under the name *vitiensis* Hartlaub, are best united with *tabuensis*, with which I agree. Brasil (*loc. cit.*) said the New Caledonian birds have very short tarsi, and he named them *caledonica*. He gives tarsal lengths of two specimens as 25 and 25.5, but some Fiji and Tuamotu specimens measure only 25.5, and a difference in the method of measurement might account for a millimeter or two. Moreover, our only skin from New Caledonia has the tarsus 27 and agrees in all respects with Tonga birds. The measurements given by Hachisuka (*loc. cit.*) for *filipina* are no smaller than those of some Polynesian birds. Since he ascribes no color characters to these birds, they may be tentatively placed with *P. t. tabuensis*.

