

A REVIEW OF THE SUBSPECIES OF THE RUDDY KING-  
FISHER, *ENTOMOTHERA COROMANDA* (LINNAEUS).

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By HARRY C. OBERHOLSER,

*Of the Biological Survey, United States Department of Agriculture.*

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In order satisfactorily to identify some of the East Indian material collected by Dr. W. L. Abbott it has been necessary to work out the relationships of all the subspecies of *Entomothera coromanda* (Linnaeus). Since this has resulted in the necessity of recognizing several additional races, and in changing the diagnoses and distribution of some others, it seems worth while to put these conclusions on record. For this investigation there have been available some 60 specimens, including representatives of all the forms here admitted. For the use of this material the writer is indebted to the authorities of the United States National Museum, the Academy of Natural Sciences of Philadelphia, and the Museum of Comparative Zoölogy in Cambridge, Massachusetts; and also to Mr. J. H. Fleming, of Toronto, Ontario, Canada, whose collection of exotic birds far exceeds that of any private individual in America. Furthermore, Dr. Leonhard Stejneger, head curator of biology in the United States National Museum, has kindly allowed me the use of his manuscript notes on this species.

The names of colors here employed are based on Mr. Robert Ridgway's recently published Color Standards and Color Nomenclature.<sup>1</sup> The measurements are all in millimeters, and are taken as explained in a previous publication by the writer.<sup>2</sup> All the specimens examined are entered in the tables of detailed measurements, and those used in the diagnostic averages are indicated.

The literature of *Entomothera coromanda* is meager, and consists chiefly of scattered notes and mention in faunal or systematic papers. The most important notices of the latter kind are as follows:

SHARPE, R. B.—Monograph of the Alcedinidae, vol. 2, 1870, pp. 155-157, pl. 57.

SHARPE, R. B.—Catalogue of the Birds in the British Museum, vol. 17, 1892, pp. 217-221.

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<sup>1</sup> Ridgway, Color Standards and Color Nomenclature, 1912 (= January 16, 1913), Washington, D. C.

<sup>2</sup> Oberholser, Bull. U. S. Nat. Mus., No. 86, April 6, 1914, p. 2.

MEYER, A. B., and WIGLESWORTH, L. W.—The Birds of Celebes and the Neighbouring Islands, vol. 1, 1898, pp. 279–283.

HARTERT, ERNST.—Die Vögel der Paläarktischen Fauna, vol. 2, pt. 1, February, 1912, pp. 886–887.

The present species is very distinct from all of its allies, and easily recognizable by its nearly uniform rufous plumage. The female in color closely resembles the male, is of about the same size, and sometimes is not with certainty distinguishable. It differs, however, usually in being rather duller above, with a less pronounced tinge of magenta, and somewhat lighter below. There is apparently more evidence of the latter difference in some subspecies than in others.

The fully grown juvenal plumage differs from the adult stage as follows: Upper portion of head and body darker and duller, usually with little or no wash of magenta, the back, scapulars, rump, and lower cervix, dark sooty brownish or even somewhat blackish (in *Entomothera coromanda rufa* with as heavy a wash of magenta as the adult); median metallic rump feathers rich bright sapphire blue; wings and tail darker, duller, partly sooty brownish, with generally much less tinge of magenta; sides of head darker and duller, usually without magenta wash, the auriculars plain dark, more or less sooty, brown, the subocular and subauricular regions ochraceous, commonly mixed with whitish and spotted with dusky brown; sides of neck dusky brownish or blackish; lower surface, including the lining of wing, usually much paler, the throat more extensively whitish, the lower breast, abdomen, and crissum in nearly all the races very pale, even partly whitish, the breast very dull tawny; breast very thickly, abdomen more sparingly, marked with squamate feather-tips of dark brown or blackish; bill more or less dusky.

The "first autumn," or rather post-juvenal, plumage is in most respects more like the adult, from which it differs in nearly or quite lacking the magenta tinge of upper parts; in having sapphire blue median rump feathers; paler, often even partly whitish, lower surface; and dusky edgings to most of the feathers of throat, breast, and upper abdomen. These dark margins comparatively soon wear off, but the bird does not acquire the richly colored fully adult plumage until it is at least a year old, probably just before its first breeding season. The broad light stripe on the middle portion of lower back and rump, though usually silvery whitish, sometimes blue, in the adult, is always blue in the immature bird.

The molt of this species is not well illustrated by the series of specimens at hand. There are only two dated examples in molt: A male *Entomothera coromanda ochrothorectis*<sup>1</sup> (No. 22175, J. H. Fleming), taken, December 5, 1909, at Rio Butas, Mindoro Island, Philippine Islands, in post-juvenal plumage, just passing into the adult state;

<sup>1</sup> See p. 652.

and an adult male *Entomothera coromanda ochrothorectis*<sup>1</sup> (No. 233081, U.S.N.M.) taken, November 6, 1892, at Palanoc, Masbate Island, Philippine Islands, of which the wing-quills and tail-feathers are still partly in sheaths.

Individual variation in the adult bird consists chiefly in the color of the broad light median stripe of the lower back and rump, which ranges from (usually) silvery bluish white to (rarely) light turquoise blue; the amount and brilliancy of the magenta suffusion on the upper surface; the amount of magenta wash on the breast; the extent and paleness of the light color on the chin; and less conspicuously, the depth of the color of the lower surface. The range of individual variation seems hitherto to have been very little understood and to have been consequently considered much greater than it really is, for not a few of the differences due to sex, as well as to age and even geographical variation, have been accredited to this.

The principal characters which separate the subspecies of *Entomothera coromanda* consist in size, depth of color above and below, as well as the amount of magenta tinge present on both upper and lower surfaces. The color of the blue or whitish stripe on the rump seems also to be a subspecific character in some cases, though in others it amounts merely to individual variation.

The faunal distribution of *Entomothera coromanda* as a species lies chiefly within the Oriental Region, though it reaches also the southeastern edge of the Palaearctic Region. Geographically it ranges north to Japan, Korea, and Manchuria; west to eastern Nepal, Burma, and the Malay Peninsula; south to the Barussan Islands<sup>2</sup> and Java; and east to Borneo, Celebes, the Xulla Islands, Sangi Islands, and the Philippine Islands.

The number of subspecies here recognized is nine, of which only one is continental in distribution. As is so frequently the case with wide-ranging and plastic species, some of the far-separated races resemble each other more than they do the intervening forms. Thus, *Entomothera coromanda rufa*, from Celebes, is much more like *Entomothera coromanda mizorhina*<sup>3</sup> from the Andaman Islands than like *Entomothera coromanda coromanda* of the Malay Peninsula. Similarly *Entomothera coromanda ochrothorectis*<sup>1</sup> from the Philippine Islands more closely resembles *Entomothera coromanda major* from Japan than it does *Entomothera coromanda bangsi*<sup>4</sup> of the intervening Riu Kiu Islands. Also, *Entomothera coromanda pagana*<sup>5</sup> from the Pagi Islands is more like *Entomothera coromanda minor* from Borneo, in color at least, than it is like *Entomothera coromanda neophora*<sup>6</sup> on the neighboring and intermediate island of Sumatra.

<sup>1</sup> See p. 652.<sup>2</sup> The chain of islands along the western coast of Sumatra.<sup>3</sup> See p. 645.<sup>4</sup> See p. 654.<sup>5</sup> See p. 648.<sup>6</sup> See p. 646.

The ruddy kingfisher is apparently a strictly resident species wherever found, with the possible exception of Japan, though it is known to winter even there, and we are aware of no authentic records of the Japanese race, *Entomothera coromanda major*, outside its known breeding range. In habits the bird is shy, living along the streams and about lakes and mangrove swamps near the coast, though found also in the forests away from water.

The present species is without much doubt generically distinct from *Alcedo senegalensis* Linnaeus, the type of *Halcyon* Swainson. It differs from *Halcyon senegalensis* as follows: Bill much larger in every way (relatively as well as actually); exposed culmen about half the length of the wing instead of much less as in *Halcyon senegalensis*; tip of culmen more distinctly decurved; gonys more up-curved; culmen less sharply ridged; gonys less sharply keeled; scutellae of tarsus much smoother; and first (outermost) primary much shorter than the seventh, at most not longer than the eighth. The proper generic designation for this group is *Entomothera* Horsfield,<sup>1</sup> the type of which is, by subsequent designation,<sup>2</sup> *Alcedo coromanda* Latham. This name is commonly cited from Horsfield's paper, Systematic Arrangement and Description of Birds from the Island of Java, published in the Transactions of the Linnaean Society of London, volume 13, May, 1821, but here the name occurs thus:

"This section [section 2] of the genus *Alcedo* (to the individuals of which the denomination of *Entomotheræ* 'Chasseurs' may be applied) holds a situation intermediate between *Alcedo* and *Dacelo*."<sup>3</sup>

The species included by Horsfield in this group are as follows:

*Alcedo tridactyla* LINNAEUS (= *Ceyx tridactylus* [LINNAEUS]).

*Alcedo leucocephala* GMELIN (= *Ramphalcyon capensis javana* [BODDAERT]).

*Alcedo coromanda* LATHAM (= *Entomothera coromanda* [LATHAM]).

*Alcedo chlorocephala* GMELIN (= *Sauropatis chloris* [BODDAERT]).

*Alcedo sacra* GMELIN (= *Sauropatis sacra* [GMELIN]).

*Alcedo melanoptera* HORSFIELD (= *Entomothera melanoptera* [HORSFIELD]).

It is evident from the above that "*Entomotherae*" is only a plural group term, and therefore uncitable as a generic name. The next year, however, Horsfield again refers to the matter,<sup>1</sup> this time applying the name *Entomothera* to the group previously designated by him as "*Entomotheræ*." The generic name *Entomothera* thus becomes available, but dates from the later place of publication.<sup>1</sup>

<sup>1</sup> Horsfield, Zoological Researches in Java and the Neighbouring Islands, 1822 (text to *Alcedo biru*).

<sup>2</sup> Sharpe, Monograph Alcedin., vol. 1, 1871, p. xiii.

<sup>3</sup> Trans. Linn. Soc. London, vol. 13, pt. 1, May, 1821, p. 173.

## ENTOMOTHERA COROMANDA COROMANDA (Latham).

- [*Alcedo*] *coromanda* LATHAM, Index Ornith., vol. 1, 1790, p. 252 ("Coromandela" [India]) (based on *Le Martin Pêcheur violet de la côte de Coromandel*, Sonnerat, Voyage Indes Orient., vol. 2, 1782, p. 212, pl. 118).
- Halc[eyon]*. *Coromandelicus* VIGORS, in Raffles' Mem. Life and Pub. Serv. Raffles, 1830, p. 654 (nom. emend. pro *Alcedo coromanda* Latham).
- [*Halcyon*] *lilacina* SWAINSON, Classif. Birds, vol. 2, 1837, p. 335 (intended to be based on the same plate of Sonnerat's as is *Alcedo coromanda* Latham, but misquoted as "pl. 218").
- A[leyon]*. *calipyga* HODGSON, in Gray's Zool. Misc., No. 3, June, 1844, p. 82 [Nepal] (*nomen nudum*).
- Halcyon coromandra* GRAY, Cat. Spec. and Draw. Mamm. and Birds Nepal and Thibet Pres. Hodgson Brit. Mus., 1846, p. 56 (nom. emend. pro *Alcedo coromanda* Latham) (Nepal).
- H[alcyon]*. *coromandeliana* ("Scopoli") GRAY, Gen. Birds, vol. 1, August, 1846, p. 79 (based on Sonnerat, Voyage Indes Orient., vol. 2, 1782, pl. 118; *Alcedo coromanda* Gmelin; and *Halcyon lilacina* Swainson).
- H[alcyon]*. *coramander* BLYTH, Cat. Birds Mus. Asiatic Soc., 1849, p. 47 (nom. emend. pro *Alcedo coromanda* Latham) (Tenasserim).
- H[alcyon]*. *callipyga* SHARPE, Cat. Birds Brit. Mus., vol. 17, 1892, p. 219 (nom. emend. pro *Aleyon calipyga* Hodgson).

*Chars subsp.*—Size medium; coloration pale, both above and below; forehead and breast with but a slight wash of magenta or with none.

*Description.*—Adult male, No. 153798, U.S.N.M.; Tyching, Trong, Lower Siam, April 24, 1896; Dr. W. L. Abbott. Upper surface, including sides of head and neck, cinnamon rufous, rather darker on wings and tail; everywhere, except on forehead, cheeks, lores, and orbital region, more or less suffused with magenta, most conspicuously on back, scapulars, nape, and wing-coverts; a long, broad stripe on the middle of the rump and lower back, silvery bluish white; lower parts, including lining of wings, tawny ochraceous, deepening into tawny on the sides of the breast, paling to very light ochraceous buff on the chin, and to ochraceous buff on the middle of abdomen; "orbital ring orange; bill red; feet red; claws orange yellow."

*Measurements.*—Male: Total length<sup>2</sup> (in flesh), 247.6 mm.

Probable male<sup>3</sup>: Wing, 111.5–119 (average, 116.5) mm.; tail, 63–67 (65.1); exposed culmen, 50–53 (51.7); tarsus, 14.5–17 (16.2); middle toe, 17.5–19 (18.5).

Probable female<sup>4</sup>: Wing, 110.5 mm.; tail, 66; exposed culmen, 50; tarsus, 16; middle toe, 18.3.

*Type-locality.*—Rangoon, Pegu.<sup>5</sup>

<sup>1</sup> An erroneous supposition that *Alcedo coromandeliana* Scopoli (Del. Flor. et Faun. Insubr., part 2, 1786, p. 89) is the same as *Alcedo coromanda* Latham; whereas its description does not fit at all, being that of some species of *Merops*, probably *Merops viridis* Linnaeus, though Scopoli quotes Sonnerat's Voyage Indes Orient., p. 212, pl. 118.

<sup>2</sup> One specimen.

<sup>3</sup> Six specimens, from southern China, northern India, and the Malay Peninsula.

<sup>4</sup> One specimen, from the Malay Peninsula.

<sup>5</sup> Here for the first time definitely fixed.

*Geographical distribution.*—Permanently resident and breeding from sea level up to an altitude of about 5,000 feet in southeastern Asia, north to Amoy in southeastern China, Assam, Sikkim, and eastern Nepal; west to eastern Nepal, the Sundarbans, Burma, Tenasserim, and the Malay Peninsula; south to Malacca, southern Malay Peninsula; east to the eastern coast of the Malay Peninsula, to French Indo-China, and southeastern China.

*Remarks.*—This is the lightest-colored of the races of *Entomothera coromanda*, with the exception of *Entomothera coromanda ochrotho-rectis*,<sup>1</sup> though it is not much lighter than the Japan bird, *Entomothera coromanda major*.

It seems to have a wider geographical range than any other form of the species, and exhibits but little variation due to locality. With proper allowance for differences of age and sex, there is not a great amount of individual variation in this subspecies. A single adult from Amoy, China (No. 85712, U.S.N.M.), without doubt belongs here. Birds from Malacca are, as careful comparison shows, clearly referable to the present race, not to *Entomothera coromanda minor*, which, curiously enough, is the form of Singapore.

The earliest name for this species, and consequently for its typical subspecies, is *Alcedo coromanda* Latham,<sup>2</sup> based on "Le Martin Pêcheur violet de la côte de Coromandel" of Sonnerat,<sup>3</sup> supposedly from the Coromandel coast of southern India. The species, however, does not, so far as known, occur anywhere in the southern part of the peninsula of India, hence Sonnerat's locality is evidently wrong. In all probability the bird described and figured by Sonnerat really came from some other part of India, as already asserted by Dr. Ernst Hartert,<sup>4</sup> though Dr. R. B. Sharpe thinks that it "most likely" came from Malacca.<sup>5</sup> I do not, however, consider that the latter expression of opinion is definite enough to be regarded as fixation of the type locality. In making the present division of the species into races it is of considerable importance to have a definite type locality for the typical subspecies, *Entomothera coromanda coromanda*. Sonnerat's description<sup>3</sup> of his "Martin Pêcheur violet de la côte de Coromandel" is so worded that it furnishes no means of determining to which of the several races it applies; and in view of this Doctor Hartert was justified in restricting it to the bird of the Indian mainland. Furthermore, in order to make this restriction as definite as possible, we select as the type locality Rangoon, in Pegu, a place which Sonnerat visited.

<sup>1</sup> See p. 652.

<sup>2</sup> Index Ornith., vol. 1, 1790, p. 252.

<sup>3</sup> Voyage Indes Orient., vol. 2, 1782, p. 212, pl. 118.

<sup>4</sup> Vögel pal. Fauna, vol. 2, pt. 1, February, 1912, p. 886.

<sup>5</sup> Mon. Alcedinidae, vol. 2, 1870, p. 156.

Measurements of specimens of *Entomothera coromanda coromanda*.

Museum and No.	Sex.	Locality.	Date.	Collector.	Total length, <sup>1</sup>	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
					mm.	mm.	mm.	mm.	mm.	mm.
J.H.Fleming 2822 <sup>2</sup>	[Male]...	Sikkim.....	.....	.....	.....	111.5	66.5	52	16	17.5
U.S.N.M. 101992 <sup>2</sup> ..	[Male]...	do.....	June—, 1873	.....	.....	114	63	53	17	19
U.S.N.M. 101993 <sup>2</sup> ..	[do.]...	Darjiling, northeast- ern India.	.....	.....	.....	119	65	50.5	16.5	18.5
U.S.N.M. 85712 <sup>2</sup> ..	[do.]...	Amoy, China.	.....	.....	.....	118.5	.....	51.5	.....	.....
U.S.N.M. 101995 <sup>2</sup> ..	[do.]...	Malacca, southern Malay Pen- insula.	.....	.....	.....	117.5	67	50	17	19
U.S.N.M. 163798 <sup>2</sup> ..	Male....	Tyching Trong, Lower Siam.	Apr. 24, 1896	W. L. Ab- bott.	247.6	118.5	64	53	14.5	18.5
A.N.S. Phila. 21305 <sup>2</sup>	[Female]	Malacca, southern Malay Pen- insula.	.....	.....	.....	110.5	66	50	16	18.3
J.H.Fleming 4283..	Vix ad..	Darjiling, northeast- ern India.	Aug.—, 1870	W. T. Blan- ford.	.....	111	68	47	16.5	20
U.S.N.M. 101994...	Vix ad..	India.....	.....	A. Anderson	.....	113.5	59	44	16	18

<sup>1</sup> Measured in the flesh by the collector.<sup>2</sup> Used in measurement averages on p. 643.

## ENTOMOTHERA COROMANDA MIZORHINA, new subspecies.

*Chars. subsp.*—Similar to *Entomothera coromanda coromanda*, but bill much bigger; tarsus and middle toe somewhat longer; upper and lower parts much darker; and both breast and forehead more washed with magenta.

*Description.*—Type, adult [probably a male], No. 19247, collection of J. H. Fleming; North Andaman Island, Andaman Islands, January, 1905; C. Anderson. Upper parts, including sides of head and neck, rather dull cinnamon rufous, the wings and tail darker, between hazel and chestnut brown; everywhere more or less suffused with magenta, most conspicuously so on cervix, crown, back, scapulars, and wing-coverts; a long, broad stripe on the middle of the rump and lower back greenish beryl blue; lower surface mostly cinnamon rufous, paling somewhat on the middle of abdomen and on crissum, passing into ochraceous buff on the chin, and deepening into tawny on the breast and lining of wings; the breast somewhat tinged with magenta.

*Measurements.*—Probable male:<sup>3</sup> Wing, 114.5 mm.; tail, 67; exposed culmen, 58; tarsus, 17.5; middle toe, 20.

*Type-locality.*—North Andaman Island, Andaman Islands.

*Geographical distribution.*—Andaman Islands, and probably also the Nicobar Islands.

*Remarks.*—Although we have examined but two specimens of this new race, there is such a remarkable difference in the size of the bill

<sup>3</sup> One specimen, the type.

as compared with even the largest forms of the species that we have no hesitancy at all in separating it subspecifically. In color, however, it superficially very much resembles *Entomothera coromanda rufa*, from Celebes, much more so, indeed, than it does *Entomothera coromanda coromanda* from the adjacent Malay Peninsula. To this resemblance Doctor Hartert has already called attention.<sup>1</sup>

The juvenal plumage of *Entomothera coromanda mizorhina* is much darker, both above and below, than that of *Entomothera coromanda coromanda*.

The difference between birds from the Andaman Islands and the mainland of India (Sikkim and Tenasserim) has already been noted by Hume.<sup>2</sup>

*Measurements of specimens of Entomothera coromanda mizorhina.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
J. H. Fleming 19247. <sup>3</sup>	[Male] <sup>4</sup> .	North Andaman Island, Andaman Islands.	Jan. —, 1905	C. Ander- son.	mm. 114.5	mm. 67	mm. 58	mm. 17.5	mm. 20
J. H. Fleming 19248.	Juv. ....	Rutland, South An- daman Island, An- daman Islands.	Oct. 9, 1905	B. B. Os- maston.	111	68	59	19	21.5

<sup>3</sup> Used in measurements on p. 645.

<sup>4</sup> Type.

**ENTOMOTHERA COROMANDA NEOPHORA, new subspecies.**

*Chars. subsp.*—Resembling *Entomothera coromanda coromanda*, but wing and tail decidedly shorter; lower parts darker; and breast more washed with magenta.

*Description.*—Type, adult male, No. 179191, U.S.N.M.; Tapanuli Bay, northwestern Sumatra, February 19, 1902, Dr. W. L. Abbott. Upper parts, including sides of head and neck, rather dull cinnamon rufous, the wings and tail darker, between hazel and chestnut brown; everywhere more or less suffused with magenta, most conspicuously on cervix, back, scapulars, and wing-coverts; a long, broad stripe on the median portion of rump and lower back, silvery bluish white; breast and lining of wings cinnamon rufous, the former slightly washed with magenta; chin light ochraceous buff; remainder of lower surface light cinnamon rufous, palest on the middle portion of abdomen; "iris dark brown; eyelids red; feet and bill red."

*Measurements.*—Male:<sup>5</sup> Total length (in flesh), 254–255 (average, 254.5) mm.; wing, 100–103.5 (101.8); tail, 58.5–62 (60.3); exposed culmen, 50–51.5 (50.8); tarsus, 14.8–15.8 (15.3); middle toe, 17–19.5 (18.3).

<sup>1</sup> Vögel pal. Fauna, vol. 2, pt. 1, February, 1912, p. 887.

<sup>2</sup> Stray Feathers, vol. 3, January, 1874, p. 169; October, 1874, p. 494.

<sup>5</sup> Two specimens, from western Sumatra and eastern Sumatra.



Female:<sup>1</sup> Total length (in flesh), 251 mm.; wing, 103–111 (average, 107<sup>2</sup>); tail, 58.5–62.5 (60.5); exposed culmen, 52.5–54.5 (53.5); tarsus, 17; middle toe, 19.2–20.5 (19.9).

*Type-locality*.—Tapanuli Bay, northwestern Sumatra.

*Geographical distribution*.—Sumatra; and probably also the island of Banka.

*Remarks*.—This new race is readily distinguishable from *Entomothera coromanda mizorhina*, of the Andaman Islands, by reason of its much smaller size, decidedly paler lower parts, somewhat lighter upper surface, and less heavy magenta wash on the breast. These color differences appear to obtain in both young and adult. The juvenal plumage appears to be very similar in color to the same stage of *Entomothera coromanda coromanda*. One specimen, from Sumatra, but without date, in the United States National Museum (No. 113027), is in rather peculiar transition plumage. It is apparently a male, which has acquired the dark under surface, magenta-washed breast, heavily magenta-tinged cervix, back, and sides of neck, which characterize the adult; but still retains the deep blue rump, dull brownish crown, dull brownish wings and scapulars of the juvenal plumage.

Specimens of *Entomothera coromanda* from Sumatra have heretofore been considered identical with those from Borneo, but present comparison shows them to be subspecifically different. Since the type locality of apparently the only name that could by any possibility apply to the Sumatra form, *Alcedo coromanda minor* Temminck and Schlegel<sup>3</sup>, is Borneo, as hereinafter shown,<sup>4</sup> the Sumatra bird requires a new designation, which we have provided above.

*Measurements of specimens of Entomothera coromanda neophora.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Measurements					
					Total length, <sup>5</sup> mm.	Wing, mm.	Tail, mm.	Exposed cul- men, mm.	Tarsus, mm.	Middle toe, mm.
U.S.N.M. 179191 <sup>6</sup> .	Male ?	Tapanuli Bay, western Su- matra.	Feb. 19, 1902	W. L. Ab- bott.	254	100	62	50	14.8	17
U.S.N.M. 181097 <sup>6</sup> .	...do....	Rupat Strait, eastern Su- matra.	Mar. 2, 1906	.....do.....	255	103.5	58.5	51.5	15.8	19.5
U.S.N.M. 179192 <sup>6</sup> .	Female, vix ad.	Tapanuli Bay, western Su- matra.	Feb. 20, 1902	.....do.....	251	111	62.5	54.5	17	19.2
U.S.N.M. 181096 <sup>6</sup> .	Female, juv. <sup>8</sup>	Aru Bay, eastern Sumatra.	Dec. 11, 1905	.....do.....	.....	103	58.5	52.5	17	20.5
U.S.N.M. 113027..	[Male, vix ad.]	Sumatra.....	.....	.....	.....	99	58	52.3	.....	.....

<sup>1</sup> Two specimens, from western Sumatra and eastern Sumatra.

<sup>2</sup> Probably much too high, due to the abnormally large size of one of the two specimens measured.

<sup>3</sup> Fauna Japonica, 1842, p. 76.

<sup>4</sup> See p. 650.

<sup>6</sup> Measured in the flesh by the collector.

<sup>6</sup> Used in measurement averages on pp. 646–647.

<sup>7</sup> Type.

<sup>8</sup> Full-grown, though in juvenal plumage.

## ENTOMOTHERA COROMANDA PAGANA, new subspecies.

*Chars. subsp.*—Similar to *Entomothera coromanda neophora*, from Sumatra, but wing and tail averaging longer; lower parts and also upper parts darker.

*Description.*—Type, adult male, No. 179762, U.S.N.M.; North Pagi Island, western Sumatra, January 4, 1903; Dr. W. L. Abbott. Upper surface, including sides of head and neck, rather dull cinnamon rufous, the wings and tail darker, between hazel and chestnut brown; everywhere more or less suffused with magenta, most brightly on cervix, crown, back, scapulars, and wing-coverts; a long, broad stripe on the middle of the rump and lower back, silvery bluish white; lower parts chiefly cinnamon rufous, paling somewhat medially on the posterior portion, passing into ochraceous buff on the chin, and deepening to tawny on the breast and lining of wings; the breast somewhat washed with magenta; "bill and feet coral."

*Measurements.*—Male:<sup>1</sup> Total length (in flesh), 260 mm.; wing, 107; tail, 62.5; exposed culmen, 50; tarsus, 15; middle toe, 19.5.

Female:<sup>2</sup> Total length (in flesh), 253–270 (average, 261.5) mm.; wing, 105–106 (105.5); tail, 64–66.5 (65.3); exposed culmen, 52.5–53 (52.8); tarsus, 16; middle toe, 18.5–20 (19.3).

*Type-locality.*—North Pagi Island, Pagi Islands, northwestern Sumatra.

*Geographical distribution.*—The Pagi Islands and the Batu Islands, of the Barussan chain, off western Sumatra.

*Remarks.*—Additional material and a better understanding of the various forms of *Entomothera coromanda*, particularly those from Sumatra, Singapore, and the Malay Peninsula, show that the bird from the Pagi Islands, probably including also that of the Batu Islands, off the western coast of Sumatra, is an undescribed subspecies. The only example from the Batu Islands is in post-juvenal plumage, but it seems to belong to the same race as birds from the Pagi Islands. It is practically identical in color with a bird from the Andaman Islands (No. 19248, J. H. Fleming, Rutland, South Andaman Island, October 9, 1905), in corresponding plumage, though if anything rather darker.

The present subspecies is, in both adult and juvenal plumages, practically identical in color with *Entomothera coromanda mizorhina* of the Andaman Islands, but is distinguishable by its much smaller size, particularly of the bill.

<sup>1</sup> One specimen, from North Pagi Island, western Sumatra.

<sup>2</sup> Two specimens, from North Pagi Island, western Sumatra.

Measurements of specimens of *Entomothera coromanda pagana*.

Museum and No.	Sex.	Locality.	Date.	Collector.						
					Total length. <sup>1</sup>	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
U.S.N.M.179762 <sup>2</sup> .	Male <sup>3</sup> ...	North Pagi Island, Pagi Islands, western Sumatra.	Jan. 4, 1903	W. L. Abbott.	m.m. 260	m.m. 107	m.m. 62.5	m.m. 50	m.m. 15	m.m. 19.5
A.N.S.Phila.56146	Male, juvenal.	Pulo Tana Masa, Batu Islands, western Sumatra.	Aug. 13, 1896	J. Z. Kannegieter.	.....	102	61	48.5	16	17.8
U.S.N.M.179763 <sup>2</sup> .	Female	North Pagi Island, Pagi Islands, western Sumatra.	Jan. 6, 1903	W. L. Abbott.	253	105	56.5	53	16	18.5
U.S.N.M.179761 <sup>2</sup> .	...do.....	.....do.....	Jan. 1, 1903	.....do.....	270	106	64	52.5	16	20

<sup>1</sup> Measured in the flesh by the collector.

<sup>2</sup> Used in measurement averages on p. 648.

<sup>3</sup> Type.

## ENTOMOTHERA COROMANDA MINOR (Temminck and Schlegel).

*Alcedo (Halcyon) coromanda minor* TEMMINCK and SCHLEGEL, Fauna Japonica, 1842, p. 76 (Borneo and Sumatra).

*Chars. subsp.*—Resembling *Entomothera coromanda pagana*, but wing shorter; and lower surface, particularly the posterior portion, darker.

*Measurements.*—Male:<sup>4</sup> Total length (in flesh), 247–254 (average, 250.5) mm.; wing, 98.5–103 (100.3); tail, 59–61.5 (60.2); exposed culmen, 48.5–52.5 (50); tarsus, 15–16 (15.6); middle toe, 17.5–18.5 (17.8).

Female:<sup>5</sup> Wing, 100–104 (102) mm.; tail, 58–62 (60); exposed culmen, 51–51.5 (51.3); tarsus, 15.5–16 (15.8); middle toe, 19.3–19.5 (19.4).

*Type-locality.*—Pontianak, Borneo.<sup>6</sup>

*Geographical distribution.*—Borneo, together with Labuan and doubtless other of its coastal islands; Tawi Tawi Island, Philippine Islands; Singapore Island; and probably Java.

*Remarks.*—The principal characters which separate the present form from *Entomothera coromanda coromanda*, dark coloration and small size, have had notice from several authors, but since the original description of *Entomothera coromanda minor*,<sup>7</sup> not until 1912<sup>8</sup> did they receive due formal recognition. However, a very marked difference in both size and color is at once observable on comparison of specimens from northeastern India and from Borneo. In addition

<sup>4</sup> Three specimens, from Borneo and Singapore Island.

<sup>5</sup> Two specimens, from Borneo and Labuan Island.

<sup>6</sup> Here for the first time definitely restricted. See p. 650.

<sup>7</sup> *Alcedo (Halcyon) coromanda minor* Temminck and Schlegel, Fauna Japonica, 1842, p. 76.

<sup>8</sup> Hartert, Vögel pal. Fauna, vol. 2, pt. 1, February, 1912, p. 887.

to the generally darker coloration, the breast of *Entomothera coromanda minor* is more suffused with magenta than in *Entomothera coromanda coromanda*. The Borneo race is also much darker both above and below than is *Entomothera coromanda neophora* from Sumatra, with more magenta suffusion on the breast, and, furthermore, averages slightly smaller. It is smaller than *Entomothera coromanda pagana*, and has darker lower parts. The colors of the unfeathered portions, taken from a Singapore specimen, are as follows: "Iris dark brown; eyelids, bill, and feet red."

Birds from the island of Singapore are apparently the same as those from Borneo, if anything a little darker; and thus decidedly different from the light-colored *Entomothera coromanda coromanda* from Malacca on the near-by mainland of the Malay Peninsula. This bears out what we have noted in some other groups of birds regarding the tendency of Singapore to have faunal affinity with Sumatra or Borneo rather than with the Malay Peninsula, a very interesting fact, in view of the proximity of the Malay Peninsula and the comparative remoteness of both Sumatra and Borneo. A single immature specimen from Tataän, on Tawi Tawi Island, in the southwestern part of the Philippine Archipelago, is apparently typical of *Entomothera coromanda minor*.

The only name applicable to the present subspecies is *Alcedo (Halcyon) coromanda minor* Temminck and Schlegel.<sup>1</sup> This was based on specimens from Borneo and Sumatra, but without designation of type or type locality. By reason of the present subspecific separation of the Sumatra bird from that of Borneo,<sup>2</sup> it becomes necessary to restrict the name *Alcedo coromanda minor* to one or the other of these. In order to determine, if possible, which locality Doctor Schlegel considered typical, I wrote to Dr. E. D. van Oort, who is now in charge of the famous ornithological collection of the Leyden Museum, asking if the type of *Alcedo coromanda minor* was in the museum. His reply is as follows:

The type-specimens of '*Dacelo coromandeliana minor*' Schlegel are the three ones mentioned on page 26 of Schlegel's Catalogue of the 'Alcedines' of the Mus. d'Hist. Nat. des Pays-Bas. None of them is marked by him as 'type.'

Since the two most important characters given by Temminck and Schlegel<sup>1</sup> to separate their *Alcedo coromanda minor* from their *Alcedo coromanda major* of Japan—small size and dark rich coloration—best apply to the bird from Borneo, it therefore seems best to fix on this the name *Alcedo coromanda minor*; and we accordingly designate Pontianak, Borneo, as the type locality, which is the locality of the second of the three specimens catalogued by Schlegel,<sup>3</sup> as mentioned above in the quotation from Dr. E. D. van Oort.

<sup>1</sup> Fauna Japonica, 1842, p. 76.

<sup>2</sup> See p. 646.

<sup>3</sup> Mus. d'Hist. Nat. Pays-Bas, vol. 3, Mon. 17, Alcedines, 1863, p. 26.

Measurements of specimens of *Entomothera coromanda minor*.

Museum and No.	Sex.	Locality.	Date.	Collector.	Total length. <sup>1</sup>	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
					<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
U.S.N.M. 181696 <sup>2</sup>	Male....	Pasir, eastern Borneo.	Jan. 15, 1909	W. L. Abbott.	247	98.5	59	49	15.7	17.5
U.S.N.M. 170448 <sup>2</sup>	...do....	Selitar, 9 miles from Singapore Island, Straits Settlements.	May 18, 1899	.....do....	254	99.5	60	52.5	16	18.5
U.S.N.M. 15908 <sup>2</sup>	[Male]..	Singapore, Singapore Island.	.....	U. S. Expedition to Japan.	.....	103	61.5	48.5	15	17.5
U.S.N.M. 181906 <sup>2</sup>	Female .	Segah River, eastern Borneo.	Dec. 3, 1912	H. C. Raven	.....	100	58	51.5	15.5	19.5
U.S.N.M. 145136 <sup>2</sup>	[Female]	Labuan Island, northern Borneo.	—, 1877	H. Low ...	.....	104	62	51	16	19.3
U.S.N.M. ....	Female juvenal. <sup>3</sup>	Tataän, Tawi Tawi Island, Philippine Islands.	Oct. 30, 1891	D. C. Worcester and F. S. Bourns.	.....	102	59.5	49.5	17	18

<sup>1</sup> Measured in the flesh by the collector.    <sup>2</sup> Used in measurement averages on p. 649.    <sup>3</sup> Full grown.

## ENTOMOTHERA COROMANDA RUFa (Wallace).

*Haleyon rufa* WALLACE, Proc. Zool. Soc. Lond., 1862, p. 338 (Makassar, Celebes).

*Chars. subsp.*—Much like *Entomothera coromanda minor*, but decidedly larger throughout; sides and flanks more noticeably washed with magenta; and median light stripe of lower back and rump darker, more bluish.

*Measurements.*—Male:<sup>4</sup> Wing, 107 mm.; tail, 68.5; exposed culmen, 46.5; tarsus, 17.7; middle toe, 20.2.

Female:<sup>5</sup> Wing, 112–113 (average, 112.5) mm.; tail, 67; exposed culmen, 53.5–54 (53.8); tarsus, 16.5–18 (17.3); middle toe, 19–20 (19.5).

The following measurements are abstracted and averaged from Meyer and Wigglesworth's table,<sup>6</sup> juvenal and immature birds omitted, and no distinction made with regard to sex:<sup>7</sup>

Wing, 110–127 (average, 117.2)<sup>8</sup> mm.; tail, 68–75 (71); bill from nostril, 43–51 (47.6); tarsus, 15–18 (16.3).

*Type-locality.*—Makassar, Celebes.

*Geographical distribution.*—Celebes and neighboring islands: North to the Sangi and Talaut Islands; and east to the Xulla Islands; including the Peling Islands, the Togian Islands, and the islands of Buton, Talissi, and Lembeh.

*Remarks.*—While I have been unable to examine a large series of specimens of this form, and have taken its measurements chiefly from Meyer and Wigglesworth,<sup>6</sup> it has been so well described by other

<sup>4</sup> One specimen, from Celebes.

<sup>5</sup> Two specimens, from Celebes.

<sup>6</sup> Birds of Celebes, vol. 1, 1898, p. 281.

<sup>7</sup> Seventeen specimens, from Celebes and its islands.

<sup>8</sup> The apparent great wing-length of these specimens may be due, in part at least, to a different method of measuring.

authors that there is no doubt of its distinctness. It so greatly exceeds *Entomothera coromanda minor* in size that there is no difficulty at all in distinguishing it, even though in color it appears not to differ to any important extent. From both *Entomothera coromanda coromanda* and *Entomothera coromanda major* it departs conspicuously in its dark rich colors, both above and below. It is, curiously enough, very close in appearance to *Entomothera coromanda mizorkhina*, but in the adult differs in having darker lower parts, particularly posteriorly; darker, more bluish light rump-stripe; more heavily magenta-tinged breast, sides, and flanks; and a much larger bill. Immature birds are also darker below than those of the Andaman race. The present subspecies seems to be confined to Celebes and the surrounding islands. Immature birds are very dark, almost as dark as adults, the difference much less than in a majority of the races.

*Measurements of specimens of Entomothera coromanda rufa.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
A.N.S.Phila.50104 <sup>1</sup>	Male, vix ad.	Likupang, Celebes.	Sept. —, 1895	C. Hose....	mm. 107	mm. 68.5	mm. 46.5	mm. 17.7	mm. 20.2
J.H.Fleming 11004 <sup>1</sup>	Female..	Bojat, Minahasa, Celebes.	June —, 1899	A. Weigall.	113	67	54	16.5	19
J.H.Fleming 11005 <sup>1</sup>	...do.....	Totok, Minahasa, Celebes.	Jan. —, 1899	.....do.....	112	.....	53.5	18	20

<sup>1</sup> Used in measurement averages on p. 651.

**ENTOMOTHERA COROMANDA OCHROTHORECTIS, new subspecies.**

*Chars. subsp.*—Similar to *Entomothera coromanda coromanda*, but decidedly larger throughout, and somewhat less suffused with magenta on the upper surface.

*Description.*—Type, adult male, No. 233081, U.S.N.M., Palanoc, Masbate Island, Philippine Islands, November 6, 1892; D. C. Worcester and F. S. Bourne; original number, 820. Upper parts, including sides of head and neck, cinnamon rufous, rather darker on wings and tail; everywhere, except on extreme forehead, more or less suffused with magenta, though but slightly on sides of head, most conspicuously on cervix, back, scapulars, and wing-coverts; a long, broad stripe on the middle of the rump and lower back, partly silvery bluish white, somewhat mixed with light turquoise blue; lower surface, including lining of wings, dull tawny ochraceous, deepening into tawny on the sides of the breast, and paling to light buff on the chin, to warm buff and light buff on the middle of the abdomen.

Iris dark brown; bill, legs, and feet, bright scarlet; nails reddish brown.

*Measurements.*—Male:<sup>2</sup> Total length (in flesh), 279.4 mm.

Female:<sup>2</sup> Total length (in flesh), 273.

<sup>2</sup> One specimen.

Male:<sup>1</sup> Wing, 121–122 (average, 121.5) mm.; tail, 68–70.5 (69.5); exposed culmen, 53–55.5 (53.8); tarsus, 16.2–19 (17.6); middle toe, 19–20.2 (19.8).

Female:<sup>2</sup> Wing, 119 mm.; tail, 68–72.5 (70.3); exposed culmen, 50.8–55 (52.9); tarsus, 17–17.5 (17.3); middle toe, 19–20 (19.5).

*Type-locality*.—Palanoc, Masbate Island, Philippine Islands.

*Geographical distribution*.—Philippine Archipelago. Reported from the following islands: Batan, Calayan, Camiguin, Guimaras, Luzon, Masbate, Mindanao, Mindoro, Palawan, Sibuyan, and Tawi Tawi.

Compared with *Entomothera coromanda rufa* the present race differs in its larger size, paler, less magenta-tinged upper and particularly lower parts, and more whitish rump-stripe. In immature plumage it is also paler, especially below. From *Entomothera coromanda minor* it may be distinguished by its much greater size, lighter coloration, particularly below, and by less suffusion of magenta on breast and upper surface.

This bird seems to be pretty well distributed throughout the Philippine Islands, and permanently resident, though not common. Examples from the various islands appear to be identical. Immature examples of this subspecies are very much paler below than are the adults, the difference comparable to that in *Entomothera coromanda major*.

*Measurements of specimens of Entomothera coromanda ochrothorectis.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Total length, <sup>3</sup>	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
J. H. Fleming 22175. <sup>2</sup>	Male, vix ad.	Rio Butas, Mindoro Island, Philippine Islands.	Dec. 5, 1909	J. J. Mounsey.	.....	m m. 121	m m. 70	m m. 53	m m. 19	m m. 20
U.S.N.M. 191457 <sup>4</sup>	.....do.....	Pasonanca, Mindanao Island, Philippine Islands.	Dec. 21, 1902	E. A. Mearns.	.....	122	70.5	.....	16.2	20.2
U.S.N.M. 233081 <sup>4</sup>	Male <sup>5</sup> ...	Palanoc, Masbate Island, Philippine Islands.	Nov. 6, 1892	D. C. Worcester and F. S. Bourne.	.....	.....	.....	53	17	19
U.S.N.M. 210972 <sup>4</sup>	Male, vix ad.	Dinampun, Batan Province, Luzon Island, Philippine Islands.	Nov. 7, 1904	A. Celestino and Canton.	279.4	121.5	68	55.5	18	20
J. H. Fleming 22176. <sup>4</sup>	Female, vix ad.	Laguna de Naujan, northern Mindoro Island, Philippine Islands.	Dec. 2, 1909	J. J. Mounsey.	.....	119	68	55	17.5	19
U.S.N.M. 210973 <sup>4</sup>	Female	Calayan Island, Philippine Islands.	Oct. 9, 1903	R. C. McGregor and A. Celestino.	273	.....	72.5	50.8	17	20
M.C.Z. 12168.....	Vix ad.	Manila, Luzon Island, Philippine Islands.	.....	.....	.....	123	69	51	16	21.5

<sup>1</sup> Four specimens, from the islands of Luzon, Mindoro, Masbate, and Mindanao.

<sup>2</sup> Two specimens, from the islands of Mindoro and Calayan.

<sup>3</sup> Measured in the flesh by the collector.

<sup>4</sup> Used in measurement averages on p. 653.

<sup>5</sup> Type.

ENTOMOTHERA COROMANDA BANGSI,<sup>1</sup> new subspecies.

*Chars. subsp.*—Resembling *Entomothera coromanda ochrothorectis*, but tail decidedly longer; bill shorter; coloration darker, particularly below; upper parts and breast more brightly suffused with magenta.

*Description.*—Type, adult male, No. 40990, Museum of Comparative Zoölogy; Ishigaki Island, Yaeyama Group, Riu Kiu Islands, Japan, April 23, 1899; Ishidi Zensaku. Upper surface, including sides of head and neck, rather dull cinnamon rufous, the wings and tail darker, between hazel and chestnut brown; everywhere more or less suffused with magenta, most conspicuously on cervix, crown, back, scapulars, and wing-coverts; a long, broad stripe on the middle of the rump and lower back, silvery bluish white; lower parts mostly cinnamon rufous, paling somewhat on the median portion posteriorly, passing into ochraceous buff on the chin, and deepening to tawny on the breast and lining of wings; the breast somewhat tinged with magenta.

*Measurements.*—Male:<sup>2</sup> Wing, 117.5–126.5 (average, 123.6) mm.; tail, 68–79 (74.8); exposed culmen, 48–56.5 (52); tarsus, 16.3–18.5 (17.5); middle toe, 19–22 (20.9).

Female:<sup>3</sup> Wing, 117.5–123.5 (121.5) mm.; tail, 72.5–75 (74.3); exposed culmen, 46.5–55 (50); tarsus, 16.8–18 (17.4); middle toe, 19–21.3 (20.2).

*Type-locality.*—Ishigaki Island, Yaeyama Group, Riu Kiu Islands, Japan.

*Geographical distribution.*—Riu Kiu Islands, Japan, and probably also the island of Formosa.

*Remarks.*—This new race is of practically the same colors throughout as is *Entomothera coromanda mizorhina* from the Andaman Islands, but has a much longer wing and tail, with a decidedly shorter culmen. It resembles *Entomothera coromanda minor*, but is much larger throughout, and has somewhat paler lower parts with less of a magenta wash on the breast. Compared with *Entomothera coromanda rufa* it is larger, lighter on the lower surface, with less of magenta tinge on breast, sides, and flanks, and has a paler bluish rump-stripe. Dr. L. Stejneger many years ago noticed<sup>4</sup> the difference between the birds from the Riu Kiu Islands and those from Japan, but for lack of material was unable satisfactorily to work out their relationships.

In this fine series of 20 adults there is comparatively little individual variation. Some specimens, however, have a more conspicuous

<sup>1</sup> Named for Mr. Outram Bangs, through whose kindness the writer is privileged to publish the present description.

<sup>2</sup> Fifteen specimens, from the Riu Kiu Islands, Japan.

<sup>3</sup> Five specimens, from the Riu Kiu Islands, Japan.

<sup>4</sup> Proc. U. S. Nat. Mus., vol. 10, 1887, p. 403.



magenta suffusion on the breast; others are more brilliantly magenta on the upper surface; and there is some difference in the general depth of the rufous color both above and below. The most important variation exists in the broad light stripe on the median portion of the rump, which is in some examples silvery white, in others light turquoise blue. As in other races of the species, the females are somewhat lighter and duller than the males.

*Measurements of specimens of Entomothera coromanda bangsi.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.		Exposed culmen.	Tarsus.	Middle toe.
					mm.	mm.			
M.C.Z. 40990 <sup>1</sup> .....	Male <sup>2</sup> .....	Ishigaki Island, Riu Kiu Islands, Japan.	Apr. 23, 1899	I. Zensaku..	122.5	75	53	17	19
M.C.Z. 40991 <sup>1</sup> .....	do.....	do.....	do.....	do.....	123	74	55	18.5	21
M.C.Z. 40995 <sup>1</sup> .....	do.....	do.....	Apr. 30, 1899	do.....	123	75	55	18	21.5
M.C.Z. 40994 <sup>1</sup> .....	do.....	do.....	do.....	do.....	122.5	77	48	16.5	20.2
M.C.Z. 40988 <sup>1</sup> .....	do.....	do.....	Apr. 6, 1899	do.....	126.5	79	52.2	18.2	21.5
M.C.Z. 40989 <sup>1</sup> .....	do.....	do.....	Apr. 20, 1899	do.....	124	77	52	17	19.5
M.C.Z. 40992 <sup>1</sup> .....	do.....	do.....	Apr. 23, 1899	do.....	120.5	75	48.5	17	20.5
M.C.Z. 40993 <sup>1</sup> .....	do.....	do.....	Apr. 25, 1899	do.....	125.8	75.2	53.2	17.5	21
M.C.Z. 37361 <sup>1</sup> .....	do.....	do.....	do.....	do.....	124.8	76	51	16.3	20.5
M.C.Z. 40997 <sup>1</sup> .....	do.....	do.....	June 1, 1899	do.....	124.8	78	49.2	17	22
M.C.Z. 40996 <sup>1</sup> .....	do.....	do.....	do.....	do.....	124	68	56.5	18	21.2
M.C.Z. 40999 <sup>1</sup> .....	do.....	do.....	June 2, 1899	do.....	123	70.5	56.5	17.5	21.5
M.C.Z. 41000 <sup>1</sup> .....	do.....	do.....	do.....	do.....	117.5	73.5	54	17	22
M.C.Z. 41002 <sup>1</sup> .....	do.....	do.....	June 7, 1899	do.....	120.5	74	52	18.5	21
M.C.Z. 41003 <sup>1</sup> .....	do.....	do.....	June 10, 1899	do.....	123.5	75	50	18	21
U.S.N.M. 110972	Male vix ad.	Yaeyama Islands, Riu Kiu Islands, Japan.	Feb. 3, 1887	J. Nishi..	124.5	75.5	53	17.5	21
M.C.Z. 40986 <sup>1</sup> .....	Female..	Ishigaki Island, Riu Kiu Islands, Japan.	Apr. 5, 1899	I. Zensaku..	122.5	74.5	55	17	19
M.C.Z. 40987 <sup>1</sup> .....	do.....	do.....	do.....	do.....	122	75	48	17	19.5
M.C.Z. 37362 <sup>1</sup> .....	do.....	do.....	Apr. 25, 1899	do.....	123.5	74.5	49.5	18	20.5
M.C.Z. 40998 <sup>1</sup> .....	do.....	do.....	June 1, 1899	do.....	122	72.5	46.5	18	21.3
M.C.Z. 41001 <sup>1</sup> .....	do.....	do.....	June 2, 1899	do.....	117.5	75	51	16.8	20.8

<sup>1</sup> Used in measurement averages on p. 654.

<sup>2</sup> Type.

ENTOMOTHERA COROMANDA MAJOR (Temminck and Schlegel).

*Alcedo (Halecyon) coromanda major* TEMMINCK and SCHLEGEL, Fauna Japonica, 1842, p. 75, pl. 39 (Japan).

*H[alcyon]. schlegeli* BONAPARTE, Cons. Avium, vol. 1, 1850, p. 156 (Japan).

*Chars. subsp.*—Similar to *Entomothera coromanda bangsi*, but tail averaging shorter; coloration lighter, especially on the under surface; breast and upper parts less overlaid with magenta.

*Measurements.*—Male:<sup>3</sup> Wing, 120.5–126 (average, 123) mm.; tail, 69–72 (70.8); exposed culmen, 49–52.5 (50.8); tarsus, 16.5–17.5 (17.1); middle toe, 19–20 (19.6).

*Type-locality.*—Japan.

*Geographical distribution.*—Eastern Asia, north to Yezo Island in Japan, Seoul in Korea, and to southern Manchuria; west to the mouth

<sup>3</sup> Three specimens, from Japan.

of the Yangtse-Kiang River; south to the mouth of the Yangtse-Kiang River and Kiusiu Island, Japan; and east to Hondo Island, Japan.

*Remarks.*—This race may readily be distinguished from *Entomothera coromanda minor* by its much greater size, paler colors, and less tinge of magenta on breast and upper surface. From *Entomothera coromanda rufa* it is separable by its greater size, decidedly lighter coloration, both above and below, less magenta tinge on breast, sides, flanks, and upper parts, and more whitish rump-stripe. In immature plumage it is also much paler throughout. It more resembles *Entomothera coromanda ochrothorectis*, but has a slightly longer tail and wing, a somewhat shorter bill, and darker coloration, especially below. This northern race is very similar in color to *Entomothera coromanda coromanda*, and some specimens are scarcely distinguishable in this respect; but its large size is of course distinctive. The characters which serve for the separation of the present race from the other forms of *Entomothera coromanda* have been mentioned by various authors, but usually, at least until within a few years, without being considered of subspecific significance. It has, however, received credit for being paler than it really is, since proper allowance has apparently not been made for differences due to age. In *Entomothera coromanda major* the immature birds are very decidedly paler, particularly below, than are the adults, this difference much greater than in some of the other races of the species; consequently, adult birds are necessary for satisfactory comparisons.

The type-specimen or specimens of this subspecies were obtained in Japan by Doctor Bürger, but are without further locality data.<sup>1</sup>

*Measurements of specimens of Entomothera coromanda major.*

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe.
J.H. Fleming 22019 <sup>2</sup>	Male, vix ad.	Hakodate, Yezo Island, Japan.	—, 1902	A. E. Wil- man.	mm. 126	mm. 71.5	mm. 52.5	mm. 17.3	mm. 19
U.S.N.M. 91393 <sup>2</sup> ...	do.....	Chiussenji Lake, Japan.	Sept. 2, 1882	P. L. Jouy..	120.5	69	49	16.5	20
U.S.N.M. 110485 <sup>2</sup> ..	[Male] vix ad.	Nikko, Japan...	.....	.....do.....	122.5	72	51	17.5	19.8
U.S.N.M. 109404...	Female, vix ad.	Sagami, Japan..	May 9, 1884	.....	118.5	66	44.5	17.5	19.2

<sup>1</sup> See Temminck and Schlegel, *Fauna Japonica*, 1842, pp. 75, 76, pl. 39; Schlegel, *Mus. d'Hist. Nat. Pays-Bas*, vol. 3, Mon. 17, Alcedines, 1863, p. 25.

<sup>2</sup> Used in measurement averages on p. 655.

KEY TO THE SUBSPECIES OF ENTOMOTHERA COROMANDA, BASED ON ADULT MALES.

- a<sup>1</sup>. Larger (wing usually not less than 120 mm.; averaging more than 120 mm.).
  - b<sup>1</sup>. Lighter; and somewhat smaller (wing averaging 121.5 mm.).
    - Entomothera coromanda ochrothorectis* (p. 652).
  - b<sup>2</sup>. Darker; and somewhat larger (wing averaging about 123.5 mm.).
    - c<sup>1</sup>. Paler, particularly on lower parts; breast and upper surface less overlaid with magenta. . . . . *Entomothera coromanda major* (p. 655).
    - c<sup>2</sup>. Darker, particularly on lower parts; breast and upper surface more overlaid with magenta. . . . . *Entomothera coromanda bangsi* (p. 654).
- a<sup>2</sup>. Smaller (wing usually less than 120 mm.; averaging less than 120 mm.).
  - b<sup>1</sup>. Upper and particularly lower parts lighter.
    - c<sup>1</sup>. Lower surface darker; breast more washed with magenta; size smaller (wing usually less than 110 mm.; averaging 101.8 mm.).
      - Entomothera coromanda neophora* (p. 646).
    - c<sup>2</sup>. Lower surface paler; breast less or not at all washed with magenta; size larger (wing usually more than 110 mm.; averaging 116.5 mm.).
      - Entomothera coromanda coromanda* (p. 643).
  - b<sup>2</sup>. Upper and particularly lower parts darker.
    - c<sup>1</sup>. Exposed culmen more than 55 mm. *Entomothera coromanda mizorhina* (p. 645).
    - c<sup>2</sup>. Exposed culmen less than 55 mm.
      - d<sup>1</sup>. Lower parts lighter. . . . . *Entomothera coromanda pagana* (p. 648).
      - d<sup>2</sup>. Lower parts darker.
        - e<sup>1</sup>. Larger (wing averaging about 117 mm.); sides and flanks more washed with magenta; median stripe of lower back and rump darker, more bluish. . . . . *Entomothera coromanda rufa* (p. 651).
        - e<sup>2</sup>. Smaller (wing averaging 100.3 mm.); sides and flanks less washed with magenta; median stripe of lower back and rump lighter, more whitish. . . . . *Entomothera coromanda minor* (p. 649).