

## A MONOGRAPH OF THE GENUS COLLOCALIA.

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There is perhaps no other group of Swifts that equals in general interest the genus *Collocalia*. Some of the species build edible nests wholly or partly of saliva which is secreted in large quantities by salivary glands of unusual size; and the gathering and marketing of these nests has in some places and at some times grown to a traffic of considerable importance.

Owing to the great similarity of many of the species, and the obscurity of the characters separating them, the group is one of the most difficult in the entire family Micropodidæ. Published descriptions,<sup>1</sup> particularly those of the older authors, are often so brief and so lacking in mention of really diagnostic characters that it is hard, sometimes even impossible, to determine with certainty the form intended. Fortunately, perhaps, the sexes, except in a very few cases, are practically identical both in size and coloration. Notwithstanding the fact that some authors have minimized the importance of difference in size,

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<sup>1</sup> The most important papers on the genus are as follows:

- HORSFIELD, T., and MOORE, F.—Genus *Collocalia*. *A Catalogue of the Birds in the Museum of the Hon. East India Company*, I, 1854, pp. 98–106.
- BONAPARTE, C. L.—Note sur les Salanganes et sur leur nids. *Comptes Rendus de l'Académie des Sciences de Paris*, XLI, 1855, pp. 976–979.
- BERNSTEIN, H. A.—Beiträge zur näheren Kenntniss der Gattung *Collocalia* Gr. *Nova Acta Academiae Leopoldinae Carolinae Naturae Curiosorum*, XXVI, 1, 1857, pp. 13–32.
- BERNSTEIN, H. A.—Ueber die Nester der Salanganen. *Journal für Ornithologie*, 1859, pp. 111–119.
- WALLACE, A. R.—On the Identification of the *Hirundo esculenta* of Linnæus, with a Synopsis of the Described Species of *Collocalia*. *Proceedings of the Zoological Society of London*, 1863, pp. 382–385.
- GRAY, G. R.—A Synopsis of the Species of the Genus *Collocalia*, with Descriptions of New Species. *Annals and Magazine of Natural History*, Series 3, XVII, 1866, pp. 118–128.
- SALVADORI, T.—Osservazioni intorno ad alcune Specie del Genere *Collocalia*, G. R. Gr. *Atti della R. Accademia della Scienze di Torino*, XV, 1879, pp. 343–350.
- HARTERT, E.—*Collocalia*. *Catalogue of the Birds in the British Museum*, XVI, 1892, pp. 496–511.
- HARTERT, E.—Gen. *Collocalia* G. R. Gray. *Das Tierreich*, I, 1897, pp. 66–70.

this is often one of the very best and most appreciable distinctions between both species and subspecies.

One of the most surprising as well as interesting developments of our study has been the discovery of so many undescribed members of the genus, among which two entirely distinct species with wholly brownish lores like *Collocalia leucophaea* seem especially notable, as does also one from New Caledonia allied to *Collocalia leucopygia*. Most of the new forms are here elaborated from material recently collected, and upon which no published report has yet been made.

Much confusion has hitherto arisen because of failure properly to discriminate those birds which have the tarsus more or less feathered from those in which it is entirely bare. In some cases forms with feathered and others with unfeathered tarsi have been considered sub-specifically related or even identical! The difficulty vanishes, however, if all the birds with any feathering on the tarsus be considered apart from the rest and placed, as they apparently should be, and as they are in the following pages, in a separate subgeneric group. Indeed, it may be best to regard them as even generically distinct, though it is not here so done, because this character of tarsal feathering is the sole one separating the groups, and while very marked in such forms as *Collocalia innominata*, it is but slight, sometimes difficult to appreciate, therefore in a sense intermediate, in *Collocalia fuciphaga* and its allies; and because if there be any logical difference between a genus and a subgenus, the criterion of practical intergradation of characters through intermediate species should be so considered.

The proper generic name for the whole group seems to be *Collocalia*—the one of current usage. The name *Salangana* St.-Hilaire has been recently substituted<sup>2</sup> because supposedly of earlier date, but *Salangana* now proves first to have been employed simply in a vernacular sense,<sup>3</sup> and to be citable as a generic term only from a later article<sup>4</sup> which is posterior to the work containing *Collocalia* Gray.<sup>5</sup> There are no other synonyms.

The material used in the preparation of the present memoir aggregates 159 specimens, principally of recent collection, and represents very nearly all the recognized forms. It is in large part that of the United States National Museum, which is now, through the many donations from Dr. W. L. Abbott, of considerable extent and includes good series of many of the species. This has been supplemented by

<sup>2</sup> Richmond, *Proc. U. S. Nat. Mus.*, XXV, 1902, p. 301.

<sup>3</sup> "Salanganes," Saint-Hilaire, *l'Écho du Monde Savant*, IV, 1837, p. 84.

<sup>4</sup> *Rev. Zool.*, 1840, p. 145.

*List Gen. Birds*, 1840, p. 8.

the birds obtained by Mr. Charles H. Townsend during the Pacific cruise of the United States Fish Commission steamer "Albatross," in 1899-1900, and by specimens from the Academy of Natural Sciences of Philadelphia, the American Museum of Natural History, and the Bernice Pauahi Bishop Museum at Honolulu. To the authorities of these institutions, to Mr. Townsend, Dr. Charles W. Richmond, and Mr. Witmer Stone the writer's thanks are due for the courtesies which have made this paper possible.

Genus **COLLOCALIA** Gray.

*Collocalia* Gray, List Gen. Birds, 1840, p. 8 (type, *Hirundo esculenta* Linnæus).  
*Salangana* Lesson, Rev. Zool., 1840, p. 145 (type, *Hirundo esculenta* Linnæus).

*Chars. gen.*—Small and mostly rather plainly colored Swifts; outer and middle toes with normal number of phalanges; tarsus not at all or but sparsely feathered, and not shorter than the middle toe; wings long, reaching when closed far beyond end of the tail; tail short, nearly square to somewhat deeply emarginate, the shafts of the rectrices without spiny tips.

*Type.*—*Hirundo esculenta* Linnæus.

*Geographical range.*—India and Ceylon, south to the Seychelles Islands, east through the Malay Peninsula, the East India Islands, and Polynesia, to the Philippine, Mariana, Marquesas, Society and Tonga groups, and northern Australia.

KEY TO THE SPECIES AND SUBSPECIES OF COLLOCALIA.

- A.—Tarsus more or less feathered (subgenus *Aerodramus*).
- a.—Rump with a conspicuous white or brownish white band.
- b.—Centre of abdomen brownish gray like the breast; wing more than 120 mm., . . . . *Collocalia innominata*.
- b<sup>1</sup>.—Centre of abdomen white or nearly so; wing less than 120 mm.
- c.—Upper parts brownish black; throat and breast nearly pure white like the abdomen; posterior lower surface without conspicuous dark shaft lines,  
*Collocalia agnota*.
- c<sup>1</sup>.—Upper parts dull black, scarcely brownish; throat and breast brownish gray like chin, and much darker than abdomen; posterior lower surface with conspicuous dark shaft lines, . . . . *Collocalia leucopygia*.
- a<sup>1</sup>.—Rump without a conspicuous white or brownish white band.
- b.—Feathers of lores with brownish bases, . . *Collocalia ocista*.
- b<sup>1</sup>.—Feathers of lores with pure white bases.
- c.—Wing not less than 124 mm.
- d.—Larger; upper surface lighter; lower surface with conspicuous blackish shaft lines, *Collocalia lowi*.

*d*<sup>1</sup>.—Smaller; upper surface darker; lower surface without conspicuous blackish shaft lines,

*Collocalia brevirostris*.

*c*<sup>1</sup>.—Wing less than 124 mm.

*d*.—Larger (wing about 121 mm.); upper surface more brownish; rump noticeably paler than back,

*Collocalia fuciphaga elaphra*.

*d*<sup>1</sup>.—Smaller (wing 108–118 mm.); upper surface more blackish; rump not noticeably paler than back.

*e*.—Lower surface paler; upper surface somewhat more brownish, *Collocalia fuciphaga vestita*.

*e*<sup>1</sup>.—Lower surface darker; upper surface somewhat more blackish, *Collocalia fuciphaga fuciphaga*.

*B*.—Tarsus entirely unfeathered (subgenus *Collocalia*).

*a*.—Abdomen not white in sharp contrast to the breast, the lower surface nearly uniform brownish gray.

*b*.—Rump without a conspicuous white or brownish white band.

*c*.—Feathers of the lores with brownish bases,

*Collocalia leucophaea*.

*c*<sup>1</sup>.—Feathers of the lores with pure white bases.

*d*.—Larger (wing 127–140 mm.).

*e*.—Upper surface darker, much more blackish; lower surface darker, and uniform, *Collocalia originis*.

*e*<sup>1</sup>.—Upper surface lighter, much more brownish; lower surface lighter, the throat paler than the rest, . . . . . *Collocalia whiteheadi*.

*d*<sup>1</sup>.—Smaller (wing 109.5–123 mm.).

*e*.—Upper parts more brownish, more uniform; the pileum scarcely darker, the rump not lighter, than the back; throat not paler than abdomen.

*Collocalia unicolor unicolor*.

*e*<sup>1</sup>.—Upper parts less brownish, less uniform, the pileum darker, the rump usually lighter, than the back; throat paler than abdomen.

*Collocalia unicolor amelis*.

*b*<sup>1</sup>.—Rump with a conspicuous white or brownish white band.

*c*.—Feathers of lores with brownish bases,

*Collocalia thespesia*.

*c*<sup>1</sup>.—Feathers of lores with pure white bases.

*d*.—Smaller (wing 110–114 mm.).

*e*.—Abdomen and upper surface darker; light rump band with more conspicuous dark shafts; size smaller (wing 110–111 mm.),

*Collocalia francica terraeginae*.

*e*<sup>1</sup>.—Abdomen and upper surface paler; light rump band with less conspicuous dark shafts; size larger (wing 112–114),

*Collocalia francica francica*.

- d*<sup>1</sup>.—Larger (wing 114–124 mm.).
- e*.—Lower surface with distinct blackish shaft lines; light rump band with dark shaft lines very conspicuous.
- j*.—Upper and lower parts much paler; light rump band more conspicuous,  
*Collocalia francica germani*.
- f*<sup>1</sup>.—Upper and lower parts much darker; light rump band less conspicuous,  
*Collocalia francica inexpectata*.
- e*<sup>1</sup>.—Lower surface without distinct blackish shaft lines; light rump band with dark shaft lines almost obsolete.
- j*.—Upper surface with little or no greenish gloss; rump band more brownish; posterior lower parts darker,  
*Collocalia francica spodiopygia*.
- f*<sup>1</sup>.—Upper surface with a distinct greenish gloss; rump band more whitish; posterior lower parts paler, *Collocalia francica townsendi*.
- a*<sup>1</sup>.—At least the middle of abdomen white, in sharp contrast to the gray breast.
- b*.—Rump with a white band.
- c*.—Rectrices with white spots; white rump band without blackish shaft lines, . . . *Collocalia uropygialis*.
- c*<sup>1</sup>.—Rectrices without white spots; white rump band with conspicuous blackish shaft lines, *Collocalia troglodytes*.
- b*<sup>1</sup>.—Rump without a white band.
- c*.—Rectrices with white spots.
- d*.—Upper surface brighter and more bluish or purplish; rump, wing-quills, and wing-coverts without light grayish tips, . . . *Collocalia esculenta*.
- d*<sup>1</sup>.—Upper surface duller and more greenish; rump, wing-quills, and wing-coverts with light grayish tips.
- e*.—White spots on tail-feathers sharply defined; chin and upper throat paler; blackish shaft-markings of short lower tail-coverts smaller,  
*Collocalia neglecta*.
- e*<sup>1</sup>.—White spots on tail-feathers not sharply defined; chin and upper throat darker; blackish shaft-markings of short lower tail-coverts larger,  
*Collocalia natalis*.
- c*<sup>1</sup>.—Rectrices without white spots.
- d*.—Feathers of rump with broad white edgings,  
*Collocalia marginata*.
- d*<sup>1</sup>.—Feathers of rump without white edgings.
- e*.—Wing less than 95 mm.; upper surface much duller, . . . *Collocalia dodgei*.

- e<sup>1</sup>.—Wing more than 95 mm.; upper surface much brighter.  
 [f.—Upper parts much more bluish or purplish.  
 g.—Larger (wing averaging 104.6 mm.),  
*Collocalia linchi cyanoptila*.  
 g<sup>1</sup>.—Smaller (wing averaging 99.2 mm.),  
*Collocalia linchi affinis*.  
 f<sup>1</sup>.—Upper parts much more greenish.  
 g.—Larger (wing 103–105 mm.),  
*Collocalia linchi linchi*.  
 g<sup>1</sup>.—Smaller (wing 97–101.5 mm.).  
 h.—Upper surface duller, somewhat less bluish or purplish; size slightly greater, *Collocalia linchi isonota*.  
 h<sup>1</sup>.—Upper surface brighter, somewhat more bluish or purplish; size slightly less, *Collocalia linchi elachyptera*.

AERODRAMUS,<sup>6</sup> subgenus nov.

*Chars. subgen.*—Similar in proportions to the subgenus *Collocalia*, but tarsus more or less feathered.

*Type.*—*Collocalia innominata* Hume.

*Collocalia leucopygia* Wallace.

*Collocalia leucopygia* Wallace, Proc. Zool. Soc. Lond., 1863, p. 384.

*Chars. sp.*—Upper surface dull, slightly sooty black, with a weak metallic gloss, most evident on crown, the rump with a broad white band whose feathers have conspicuous blackish shaft lines; wings and tail black with some metallic sheen, the latter without white spots; sides of head and neck clove brown, the loreal feathers with white bases; chin and throat brownish gray; remaining lower parts pale grayish anteriorly, becoming brownish on sides of body, and whitish on abdomen, all the feathers with distinct darker shaft lines; longest under tail-coverts glossy blackish brown; thighs and lining of wing brownish black.

Wing, 95–99.5; tail, 45; exposed culmen, 4; tarsus, 8.5 mm.

*Type locality.*—New Caledonia.

*Geographical distribution.*—Loyalty Islands, New Hebrides Islands, and New Caledonia.

This species may readily be distinguished from all its congeners with feathered tarsi, excepting *Collocalia innominata* and *C. agnota*, by the white band on the rump; and from all but *Collocalia agnota* by the

<sup>6</sup> ἀήρ, aer; δραμεῖν, cursare.

white or whitish abdomen. In color it approaches rather near some species of the subgenus *Collocalia*, notably some forms of *Collocalia francica*, but the whitish abdomen is of course diagnostic.

*Collocalia agnota* sp. nov.

*Chars. sp.*—Similar to *Collocalia leucopygia*, but upper surface lighter, much more brownish; chin, upper throat, and sides of head much paler brown; ventral surface from the lower throat to anal region more purely white, the jugulum and breast white like the abdomen, and contrasting sharply with the grayish brown of the chin and upper throat; feathers of breast and abdomen without noticeably darker shaft lines; basal portion of rectrices much paler.

*Geographical distribution.*—Island of New Caledonia.

*Description.*—Type, adult female, No. 8,757, American Museum of Natural History; New Caledonia; Verreaux Collection. Upper parts brownish black, the pileum with some metallic greenish gloss, the back with a faint suggestion of the same, the cervix a little lighter and more brownish; rump with a broad band of pure white, the feathers of which have dark brown shaft lines; rectrices externally brownish black, with a slight bluish metallic sheen, internally more brownish, and proximally growing paler until at base they are quite light brown, but without white spots; wings brownish black with some metallic sheen, the inner margins of quills fuscous; lores, orbital region, and a narrow line across the forehead sepia brown, the feathers of the lores with pure white bases; sides of neck and breast grayish brown, much lighter than the cervix; chin and upper throat dull broccoli brown; rest of lower parts medially almost pure white, though just appreciably brownish anteriorly, the sides of body washed with brownish, the shorter lower tail-coverts pale brownish gray with darker shaft lines and whitish margins, the longest ones dark brown, with distally a metallic sheen; thighs brownish black; lining of wings dark brown.

Wing, 105; tail, 46; exposed culmen, 4; tarsus, 9 mm.

The relationships of this evidently distinct and apparently undescribed species are undoubtedly with *Collocalia leucopygia*, as is indicated by the conspicuously feathered tarsi, the white abdomen, and the white rump band with dark shaft lines. The only specimen known is the above described one in the American Museum of Natural History.

*Collocalia innominata* Hume.

*Collocalia innominata* Hume, *Stray Feathers*, I, 1873, p. 294.

*Collocalia maxima* Hume, *Stray Feathers*, IV, 1876, p. 223 (Mergui and Bankasoon, Tenasserim) (*nomen nudum*).

*Chars. sp.*—Quite different from *Collocalia leucopygia*: much larger;

entire lower surface dark brownish gray; upper parts more brownish, the light rump band decidedly less conspicuous.

Wing, 130-137; tail, 50-56; exposed culmen, 6; tarsus 12-12.5 mm.

*Type locality*.—Port Mouat, South Andaman Island, Andaman Islands.

*Geographical distribution*.—Southern Tenasserim to Lower Siam and Perak, Malay Peninsula; Mergui Archipelago; accidental(?) on South Andaman Island.

The large size, feathered tarsi, light brownish rump band with dark shaft lines, and the conspicuously darker mesial lines of the lower surface, which last are present in only a few forms of *Collocalia*, sufficiently distinguish this very strongly characterized species. An adult female taken by Dr. W. L. Abbott on September 5, 1896, at Trong, Lower Siam, proves its occurrence in that region.

***Collocalia ocista* sp. nov.**

*Chars. sp.*.—Similar to *Collocalia leucophaea*, but tarsi feathered; slightly smaller, except the tail which is longer; upper surface, including wings and tail, darker, more blackish (less brownish), and on head and back as well as elsewhere with a decided greenish metallic gloss; lower parts more grayish.

*Geographical distribution*.—Marquesas and Society Islands.

*Description*.—Type, adult female; Nukahiva Island, Marquesas Islands, September 16, 1899; Charles H. Townsend. Upper surface almost uniform dark sooty brown, slightly deeper on the pileum, a little lighter on the rump—neither of these differences very noticeable—and everywhere with a greenish metallic sheen; wings and tail darker, more blackish, with a bluish or purplish metallic gloss, the wing-coverts slightly more greenish, the innermost secondaries and inner margins of the quills, at least basally, lighter and more brownish—about the same color as the back; sides of head clove brown almost as dark as the crown, the lores quite so, the loreal feathers with lighter brown bases; lower parts nearly uniform deep brownish gray, only the chin and longest under tail-coverts somewhat darker; lining of wing clove brown.

This new and very interesting bird is superficially so much like *Collocalia leucophaea*, with the type of which it has been compared, that a specimen in the Academy of Natural Sciences, Philadelphia, collected long ago in the Marquesas Islands, and presented by Dr. Gambel, was so labelled; but the species may readily be separated by the characters above given. It is fully as dark below as *C. leucophaea*, and like that species is peculiar in possessing light brown bases to the



feathers of the lores. From *Collocalia fuciphaga fuciphaga*, which also to some extent it superficially resembles, it may be distinguished by its larger size and more brownish upper parts, as well as most trenchantly by the light brown instead of pure white bases of the loreal feathers. From *Collocalia fuciphaga elaphra*, a subspecies hereinafter described,<sup>7</sup> with which it agrees in size, and which it more closely approaches in the general color of the upper surface, it differs in being rather more blackish and more uniform above, the rump not so appreciably paler than the back; in having much darker lower surface; also, and most decidedly, in having the bases of the feathers of the lores light brown. This last character alone will separate it from all forms of the genus excepting *C. leucophaea* and *C. thespesia*.<sup>8</sup>

Three specimens of this new species were collected by Mr. Charles H. Townsend in 1899, during his recent Pacific cruise on the U. S. Fish Commission steamer "Albatross." One of these, the single specimen from Tahiti, is rather more brownish above, and a little paler on the crissum than the type, but is very different from *C. leucophaea*; another, from the Marquesas Islands, is more blackish above and slightly darker below; but the old specimen in the collection of the Academy of Natural Sciences of Philadelphia is practically identical with our type.

Measurements of *Collocalia ocista* are as follows:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♀	Nukahiva I., Marquesas Islands <sup>9</sup> .....	Sept. 16, 1899	121	65	5	8.5
—	Nukahiva I., Marquesas Islands.....	Sept. 15, 1899	119	61	4	9
—	Marquesas Islands.....		117.5	61	4.5	8.5
♂	Nukahiva I., Marquesas Islands.....	July 18, 1902	119	61	4.5	9
♂	Tahiti I., Society Islands.	Nov. 13, 1899	123	59	4	9
	Average.....		119.9	61.4	4.4	8.8

*Collocalia fuciphaga fuciphaga* (Thunberg).

*Hirundo fuciphaga* Thunberg, K. Vet. Akad. Nya Handl., XXXIII, 1812, p. 153, pl. 4 (Java).

*Hirundo vanikorensis* Quoy and Gaimard, Voy. Astrolabe, Zool., I, 1830, p. 206, pl. XII, fig. 3 (Vanikoro Island, Santa Cruz Islands, Pacific Ocean).

<sup>7</sup> *Postea*, p. 188.

<sup>8</sup> *Postea*, p. 195.

<sup>9</sup> Type.

*Cotyle vanicorensis* Boie, Isis, 1844, p. 170 (nom. emend. pro *Hirundo vanikorensis* Quoy and Gaimard).  
*Hemiprocne salangana* Streubel, Isis, 1848, p. 368 (East Indies).  
*Cypselus inquietus* Kittlitz, Denkwürd. Reise, II, 1858, p. 26 (Ulalan Island, Caroline Islands, Pacific Ocean).

*Chars. subsp.*—Similar to *Collocalia leucophaea*, but decidedly smaller; tarsus sparsely feathered; bases of the loreal feathers pure white; upper parts very much more blackish, and rather more uniform, the rump not appreciably lighter than the back.

*Type locality.*—Java.

*Geographical distribution.*—East India Islands and western Polynesia, from Nias, Java, Borneo, and the Natuna Islands, northeast to the Philippine, Mariana, and Caroline Islands, east and southeast to New Guinea, Duke of York Island, Tonga (Friendly) and Loyalty Islands.

The birds of a good series, consisting of specimens from Java, the Philippine and Caroline Islands, and from Nias Island, off the western coast of Sumatra, are very uniform in size as well as in the dark lower surface and glossy blackish upper parts, indicating thus that the name *Hirundo vanikorensis* Quoy and Gaimard,<sup>10</sup> which was based on the bird from the Santa Cruz Islands, is synonymous with *Hirundo fuciphaga* Thunberg,<sup>11</sup> from Java. A single specimen from Guam Island is, however, much more brownish above than any of the others examined, and may represent an undescribed race. Much of the difficulty heretofore experienced in identifying this species and in segregating its various forms has arisen from confusing with it the birds with light lower surface and unfeathered tarsi, which occur in various localities, and most if not all of which are *Collocalia unicolor amelis*.

The tail in *Collocalia fuciphaga* is usually quite deeply emarginate, but this character varies greatly. Some specimens in our series have the tail almost even, and there is every gradation evident between this condition and that of greatest emargination, differences apparently to be accounted for only by individual variation. Care must therefore be exercised in using the shape of the tail as an absolute character to distinguish this species.

Measurements of *Collocalia fuciphaga fuciphaga* are as follows:

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<sup>10</sup> *Voy. Astrolabe*, Zool., I, 1830, p. 206, pl. XII, fig. 3.

<sup>11</sup> *K. Vet. Akad. Nya Handl.*, XXXIII, 1812, p. 153, pl. 4.

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♂	Nias Island.....	Mar. 16, 1903	114.5	54	4.5	8
	Mercedes, Mindanao, P. I.	Dec. 19, 1903	114	50	5	10
♀	Pantar, Mindanao, P. I.	Aug. 13, 1903	108	48	4.5	8.5
	Java.....		113	51	4.5	9.5
♂	Ualan Island, Caroline Is.	Feb. 8, 1900	114	54	4	9
	Ualan Island, Caroline Is.	Feb. 16, 1900	109	54	4	9
Average.....			112.1	51.8	4.4	9

**Collocalia fuciphaga vestita** (Lesson).

*Salangana vestita* Lesson, l'Echo du Monde Savant, ser. 2, VIII, 1843, p. 134.  
*Collocalia nidifica* Gray, Genera Birds, I, 1845, p. 55 (Sumatra).

*Chars. subsp.*—Similar to *Collocalia fuciphaga fuciphaga*, but entire lower surface much paler; upper parts rather lighter and more brownish.

*Type locality.*—Sumatra.

*Geographical distribution.*—Sumatra, Simalur Island, and southern part of Malay Peninsula.

The original *Collocalia fuciphaga* was based on the bird from Java, from which this western form differs as above said. For the latter the name *Salangana vestita* Lesson<sup>12</sup> seems to be available. This is founded on "*Hirundo esculenta* Lath. Gen. Syn. pl. Hab. les îles de la Malasie,"<sup>13</sup> which in both description and locality (Sumatra) is pertinent to the present form. Moreover, the only Sumatran specimen examined agrees with the birds from Simalur Island, upon which latter the present separation is primarily based. The Nias Island bird, however, is identical with that of Java, as already noted, and therefore must be called *Collocalia fuciphaga fuciphaga*. A single adult from Tanjong Silantei, on the east coast of Johore, southern Malay Peninsula, seems to be exactly like the birds from Simalur Island in color, but is considerably larger, the wing measuring 118 mm.; notwithstanding this it seems best referred, for the present at least, to *C. f. vestita*, although additional specimens may show it to be representative of a recognizable subspecies.

Measurements of *Collocalia fuciphaga vestita* are as follows:

<sup>12</sup> l'Echo du Monde Savant, ser. 2, VIII, 1843, p. 134.

<sup>13</sup> Latham, Gen. Synop., Suppl. II, 1801, p. 257, pl. CXXXV.

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♂	Tanjong Silantei, E. Coast					
	Johore.....	July 26, 1901	118	51	5	9
♀	Simalur Island.....	Dec. 7, 1901	111	51	5	9
♀	Simalur Island.....	Dec. 7, 1901	112.5	48	4.5	9
—	Sumatra.....		115	52	4	9.5
	Average.....		114.1	50.5	4.6	9.1

*Collocalia fuciphaga elaphra* subsp. nov.

*Chars. subsp.*—Similar to *Collocalia fuciphaga fuciphaga*, but decidedly larger; upper parts much more brownish, and less uniform, the rump being noticeably lighter than the back; lower surface decidedly paler.

*Geographical distribution.*—Seychelles Islands; Anamba Islands.

*Description.*—Type, adult, sex unknown, No. 119,779, U. S. N. M.; Mahé Island, Seychelles Islands, April 17, 1890; Dr. W. L. Abbott. Upper surface sooty brown, with a very slight greenish gloss, the pileum rather darker and more greenish, the rump much lighter brownish—but not whitish—this due partially to the lighter bases of the feathers; wings and tail darker, more blackish, with a dull bluish, greenish or purplish sheen, the wing-coverts decidedly greenish; sides of head and neck dark brown, darkest on the lores, where the feathers have pure white bases; entire lower surface rather deep brownish gray, somewhat paler posteriorly, darker on chin, the longest under tail-coverts slightly glossed with greenish; lining of wing blackish brown.

The specimens on which this race is principally established were collected by Dr. W. L. Abbott on Mahé, one of the Seychelles Islands. They differ so much from typical *Collocalia fuciphaga*, of which we have a considerable series from several localities, that it seems necessary to regard them as representatives of another subspecies.

The lighter colored rump, which seems to be one of the best characters of this race, is not sufficiently decided to give the impression of a whitish band such as exists in *Collocalia francaica* and its allies, but it is nevertheless quite different from the uniformly dark condition obtaining on the upper surface of *Collocalia fuciphaga fuciphaga*. From *Collocalia fuciphaga vestita*, which in some respects it resembles more closely than it does true *fuciphaga*, it may readily be distinguished by its greater size, lighter, more brownish, and less uniform upper surface, with the rump noticeably paler than the back. This new race, how-

ever, does not need special comparison with any further forms of the genus, even those possessing feathered tarsi.

Two adults from Pulo Jimaja, Anamba Islands, are somewhat less brownish above, as well as very slightly darker below, but nevertheless agree in all details of coloration quite closely with the birds from the Seychelles Islands, and differ thus quite remarkably from *Collocalia fuciphaga fuciphaga*, by whose range the Anamba Islands are pretty well surrounded. In all measurements excepting that of the wing these two specimens exceed the measurements of *fuciphaga* and equal or even surpass those of *elaphra*; but the wing-quills are molting and not fully grown, and there are indications from the relative length of the primaries that the length of the wing would have become when perfect almost if not quite as great as that of *elaphra*. In light of present knowledge, therefore, it seems best to refer to *elaphra*, with the above explanation, these two examples from the Anamba Islands, even though by so doing *elaphra* presents an anomalous geographical distribution. Should, however, a satisfactory series show the Anamba bird to be really much smaller than that from the Seychelles Islands, and reasonably constant in its slight color differences, it ought probably to be separated subspecifically.

Measurements of two adults of *Collocalia fuciphaga elaphra* are here given:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♀	Mahé I., Seychelles Is. ....	April 17, 1890	120.5	51	4.5	9
?	Mahé I., Seychelles Is. <sup>14</sup> ..	April 17, 1890	121	51	4	9.5
Average.....			120.8	51	4.3	9.3

***Collocalia brevirostris* (McClelland).**

*Hirundo brevirostris* McClelland, Proc. Zool. Soc. Lond., 1839, p. 155.

*Chars. sp.*—Similar to *Collocalia fuciphaga fuciphaga*, but much larger; tail less deeply emarginate; and rump noticeably lighter than the very dark back.

Wing, 124–127; tail, 55–59; exposed culmen, 5.5; tarsus, 10 mm.

*Type locality.*—Assam.

*Geographical distribution.*—Himalaya Mountains from Dalhousie, about 76° east longitude, east through Nepal and Sikhim to Assam and Manipur.

This form has been until comparatively recent years usually consid-

<sup>14</sup> Type.

ered identical with *Collocalia unicolor*, from which, however, it may readily be distinguished by its feathered tarsi, darker, less brownish upper surface, with rump appreciably lighter than the back. It is most closely allied to *Collocalia fuciphaga*, and by Dr. Hartert is considered a subspecies of this; but its large size and other characters, combined with its isolated range, so far as *C. fuciphaga* is concerned, quite clearly indicate its specific distinctness. Furthermore, there is, so far as is known at present, no intergradation in size between *Collocalia brevirostris* and any form of *Collocalia fuciphaga*; and the race of the latter, *C. f. elaphra*, which is zealous in size is most different in color. The so-called intermediate specimens from the western Himalayas, mentioned by Dr. Hartert,<sup>15</sup> have proved to be examples of *Collocalia unicolor*, a form belonging to the group without feathers on the tarsus, and have thus no bearing on the question. Therefore, until actual proof of intergradation with *Collocalia fuciphaga* be forthcoming, the present form should stand as a full species.

***Collocalia lowi*** (Sharpe).

*Cypselus lowi* Sharpe, Proc. Zool. Soc. Lond., 1879, p. 333.

*Cypselus labuanensis* ———, Ibis, 1879, p. 116, in text (*nomen nudum*).

*Chars. sp.*—Like *Collocalia innominata*, but rump without a well-defined light band.

Wing, 127–134; tail, 50–57; exposed culmen, 5; tarsus, 10–12 mm.

*Type locality.*—Labuan Island, northern Borneo.

*Geographical distribution.*—Northern Borneo; Palawan Island, Philippine Islands; Anamba Islands; accidental in Sumatra and on Nias Island (Hartert).

This species resembles *Collocalia leucopygia* and *Collocalia innominata* in possessing dark shaft lines on the lower surface, and in this it differs with them from all the other members of the subgenus. In color above and below—except for the lack of a light rump band—as well as in size and proportions, it is identical with *Collocalia innominata*. It is so much larger, and usually has the tail so much less deeply emarginate, than *Collocalia fuciphaga* and all subspecies of the latter that further comparison is unnecessary. One specimen in the United States National Museum has the tail by no means square, but considerably emarginated, from which it is evident that there is considerable individual variation in this regard.

Subgenus COLLOCALIA Gray.

*Chars. subgen.*—Tarsus entirely without feathers.

*Type.*—*Hirundo esculenta* Linnaeus.

<sup>15</sup> *Cat. Birds Brit. Mus.*, XVI, 1892, p. 502.

*Collocalia origenis* sp. nov.

*Chars. sp.*—Resembling *Collocalia whiteheadi*, but upper parts much darker, more blackish, and more uniform, the rump not appreciably lighter than the back; under surface darker, and throat not decidedly paler than abdomen.

*Geographical distribution.*—Mindanao, Philippine Islands.

*Description.*—Type, adult male, No. 192,162 U. S. N. M.; Mount Apo, 4,000 feet, Mindanao, Philippine Islands, July 4, 1904; Dr. E. A. Mearns. Upper surface uniform brownish black, the rump not lighter, but wings and the distinctly forked tail more brownish, their feathers paler along the inner margins; entire ventral surface uniform smoky hair brown, the throat not paler; sides of head and neck darker brown than the under parts; a blackish spot in front of the eye; lining of wing blackish brown.

This new species was discovered by Dr. Mearns during his recent trip to the island of Mindanao, the four adults obtained having been brought by natives who had found them in a cave on Mount Apo; and we are indebted to him for the privilege of describing them.

In its large size, deeply emarginate tail, and lack of tarsal feathering *Collocalia origenis* agrees with *Collocalia whiteheadi*, but is readily distinguishable by the dark colors, particularly on the upper parts which are even more blackish than in *Collocalia fuciphaga fuciphaga* from the Philippines. There is a slight sexual difference in this species, apparent in our series of two adult males and two adult females, but it is possibly not constantly distinctive: the females are somewhat more brownish above, and slightly paler below. A very young bird, with wings and tail but little grown, taken by Dr. Mearns, July 11, 1904, at Todaya, altitude 4,000 feet, on Mount Apo, is fully as blackish on the upper parts as the adults, and somewhat darker, decidedly more grayish on the ventral surface.

Measurements of the adults are as follows:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♂	Mt. Apo, Mindanao, P. I.	July 4, 1904	129	53	6	13
	“ “ “	“	138	60	5.5	14
	“ “ “	“	134	51	5.5	12.5
	“ “ “	“	130	54	5.5	14
Average.....			132.8	54.5	5.6	13.4

<sup>15</sup> Type.

**Collocalia whiteheadi** Grant.

*Collocalia whiteheadi* Grant, Ibis, 1895, p. 459.

*Chars. sp.*—Similar in color to *Collocalia lowi*, but dark shaft streaks on lower parts less distinct; averaging slightly larger, with unfeathered tarsi, and usually more deeply emarginate tail.

Wing, 127–140; tail, 50–57; exposed culmen, 5; tarsus, 11.5–13 mm.

*Type locality.*—Monte Data, highlands of Lepanto, northern Luzon, Philippine Islands.

*Geographical distribution.*—Islands of Luzon and Palawan, Philippine Islands.

This very distinct species may be easily distinguished from all the others with unfeathered tarsi, excepting *Collocalia origenis*, by its very large size, and from that form by the well-marked color characters already detailed. Specimens from Palawan are smaller than those from Luzon, touching the minimum of measurements above given, and also appear to be more brownish on the upper parts—differences which, should they prove reasonably constant, would entitle the Palawan bird to subspecific rank.

**Collocalia unicolor unicolor** (Jerdon).

*Hirundo unicolor* Jerdon, Madras Journ., XI, 1840, p. 238.

*Cypselus concolor* Blyth, Journ. As. Soc. Bengal, XI, pt. 2, 1842, p. 886 (nom. nov. pro *Hirundo unicolor* Jerdon).

*Chars. subsp.*—Resembling *Collocalia whiteheadi*, but much smaller; more brownish and more uniform above, the rump not appreciably paler than the back, the pileum but little if any darker; lower surface rather more brownish and more uniform, the throat usually not lighter than the abdomen; lining of wing lighter.

Wing, 112–120.5; tail, 50–56; exposed culmen, 4–4.5; tarsus, 9–10 mm.

*Type locality.*—Coonor Pass, Nilghiri Hills, southern India.

*Geographical distribution.*—Ceylon; and the western coast region of southern India, north to Vengurla; western Himalayas.

Although this species has commonly been either synonymized with *Collocalia fuciphaga* or treated as a subspecies of it, the entirely unfeathered tarsi are a character fully sufficient for specific recognition; and furthermore the upper surface is more brownish than in even the least blackish forms of *Collocalia fuciphaga*. In fact *Collocalia unicolor* is really more closely allied to *Collocalia whiteheadi* than to *Collocalia fuciphaga*! Dr. Hartert has given<sup>17</sup> as a reason for considering *C. unicolor* a subspecies of *C. fuciphaga* that some Celebes birds similar to *C. unicolor* in color, which he refers to *C. fuciphaga*, have no tarsal

<sup>1</sup> *Ibis*, 1896, p. 369



feathers; but these have hardly bearing on the question, for they without much doubt belong to *Collocalia unicolor amelis*. The present form is said to occur in the western Himalaya Mountains, but careful comparison of a satisfactory series from this locality with typical examples from southern India would possibly show subspecific differences. Immature birds of *Collocalia unicolor* are rather darker, more sooty than adults, both above and below.

*Collocalia unicolor amelis* subsp. nov.

*Chars. subsp.*—Similar to *Collocalia unicolor unicolor*, but less brownish and less uniform above, the rump usually appreciably paler than the back, the pileum decidedly darker; lower surface rather less brownish and less uniform, the throat usually decidedly lighter than the abdomen; lining of wing darker; tail usually rather less deeply emarginate.

*Geographical distribution.*—Philippine Islands; Island of Guam; ? Celebes; ? Louisiade Archipelago.

*Description.*—Type, adult male, No. 189,931 U. S. N. M.; Irisan, Benguet, Luzon, Philippine Islands, May 19, 1903; R. C. McGregor and A. Celestino. Upper parts dark sooty brown with a greenish tinge and but little gloss, the head darker, the rump slightly paler; wings and tail darker than the back—blackish brown with a greenish sheen, the inner webs of the wing-quills dull and paler brown; lower surface grayish brown, darkest on the lower tail-coverts, palest on the throat and jugulum; lining of wing blackish brown. "Iris brown, bill and claws black; legs dark reddish brown."

Several specimens of this new form, identified as *Collocalia whiteheadi*, were some time since received from the Philippine Museum by the U. S. National Museum. Notwithstanding the similarity of proportions (including the forking of the tail), the very great difference in size renders it easily distinguishable from *C. whiteheadi* on even superficial examination. From *Collocalia francica* and other light-rumped species *Collocalia unicolor amelis* is at once to be separated by its lack of the whitish band on the rump. Its nearest relative is, of course, *Collocalia unicolor unicolor* of southern India, from which, though similar in size, it differs as above mentioned; but comparison of a series of each of these forms shows none of the characters to be quite constant, hence *amelis* must rank as a subspecies. The tarsi in *C. u. amelis* are entirely devoid of feathers, therefore no special comparison is really necessary with *Collocalia fuciphaga* and its allies, except for specimens of *fuciphaga* that have accidentally lost the tarsal

feathering. In color *C. u. amelis* differs from *C. fuciphaga fuciphaga* by reason of paler ventral surface, particularly the throat, and more brownish upper parts, with lighter rump. It is paler, more brownish above than *C. f. vestita*, with the rump noticeably lighter than the back. Compared with *C. f. elaphra* it has the upper parts less brownish, the crown particularly more blackish, the rump less different from the back; lower surface less uniform, the posterior portion darker; and size somewhat less.

The small Celebes birds without tarsal feathering, mentioned by Mr. Grant,<sup>18</sup> belong probably to this subspecies, for they are evidently not *Collocalia fuciphaga*. Also the birds from St. Aigan Island, in the Louisiade Archipelago, said by Dr. Hartert<sup>19</sup> to be light below, to have unfeathered tarsi, and to build nests different from *C. fuciphaga*, are probably to be referred to *C. u. amelis*, though possibly subspecifically distinct. Aside from the above, *Collocalia u. amelis* is not at present certainly known except from the Island of Guam, where taken by Dr. E. A. Mearns, July 20, 1905, and from the Philippine archipelago, where it has been obtained on the Islands of Luzon, Verde, Cagayancillo, Sibuyan, Panay, Mindoro, Mindanao, and Palawan. It may, however, be quite generally distributed over the East India Islands, and may have been recorded as *Collocalia fuciphaga* from various localities, since hitherto it seems to have been confused with that species, because its unfeathered tarsi were not considered significant.

Measurements of part of the U. S. National Museum series of *Collocalia unicolor amelis* are as follows:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♂	Irisan, Benguet, Luzon,	May 19, 1903	113	53	5	9.5
	" " " [P. I.] <sup>20</sup>		113	50	5	10
	" " "	June 3, 1903	111.5	50	4.5	9.5
	" " "		120	49.5	5	9.5
	Mindanao, P. I. ....	Nov. 28, 1887	118	46	5	10
	Palawan, P. I. ....	Sept. 5, 1887	118	49.5	5	9.5
	Irisan, Benguet, Luzon,	June 3, 1903	117	50	5	10
	" " " [P. I.]		123	50	5	10.5
	" " "		109.5	50	4.5	10
	" " "		116.5	50	4	10
Average.....			116	49.8	4.8	9.9

<sup>18</sup> *Ibis*, 1895, p. 462.

<sup>19</sup> *Novit. Zool.*, VI, 1899, p. 211.

<sup>20</sup> Type.

**Collocalia leucophæa** (Peale).

*Macropteryx leucophæus* Peale, United States Explor. Exped., VIII, 1848, p. 178, pl. XLIX, fig. 3.

*Collocalia cinerea* Cassin, United States Explor. Exped., Mamm. and Ornith., 1858, p. 183, pl. XII, fig. 4 (Tahiti Island, Society Islands) (*nec* Gmelin).

*Chars. sp.*—Similar to *Collocalia unicolor unicolor*, but larger; upper parts, including wings and tail, more brownish, with less metallic sheen, and less uniform, the pileum somewhat darker, the rump paler, than the back; feathers of the lores with light brownish instead of white bases.

Wing, 120–127; tail, 56–59; exposed culmen, 4.5–5; tarsus, 9.5–10 mm.

*Type locality.*—Tahiti Island, Society Islands.

*Geographical distribution.*—Tahiti Island, Society Islands, Pacific Ocean.

This very distinct species is superficially somewhat like *Collocalia fuciphaga claphra* from the Seychelles, but lacks the tarsal feathers; is larger, more brownish above, with less metallic gloss; much darker, duller, more uniform on the lower surface; and has brownish in place of white bases to the loreal feathers. It is of course still more different from *Collocalia fuciphaga fuciphaga*, being much larger, decidedly more brownish, with scarcely any metallic gloss above, and having neither feathers on the tarsi nor white bases to the feathers of the lores. On the Island of Tahiti alone is this species positively known to occur, since all the specimens from the Marquesas Islands now at hand prove to belong to *Collocalia ocista*. All previous records of this species from the Marquesas Islands therefore need verification, though of course its occurrence there is by no means improbable.

Even if the name given to this species by Cassin—*Collocalia cinerea*<sup>21</sup>—were not, as has already been shown by Dr. Hartert,<sup>22</sup> a mistaken identification of his specimen with the *Hirundo cinerea* of Gmelin,<sup>23</sup> which is a swallow—*Atticora cinerea*—it would still not be the tenable name for the present species, since it is ten years posterior to the *Macropteryx leucophæus* of Peale,<sup>24</sup> and was based on the same type specimen which is yet in the U. S. National Museum.

**Collocalia thespesia** sp. nov.

*Chars. sp.*—Similar to *Collocalia francica germani*, but the wing slightly, the tail very much longer; upper parts lighter, more brownish;

<sup>21</sup> *United States Explor. Exped., Mamm. and Ornith.*, 1858, p. 183, pl. XII, fig. 4.

<sup>22</sup> *Cat. Birds. Brit. Mus.*, XVI, 1892, p. 502.

<sup>23</sup> *Syst. Nat.*, I, ii, 1788, p. 1026.

<sup>24</sup> *United States Explor. Exped.*, VIII, 1848, p. 178, pl. XLIX, fig. 3.

bases of the loreal feathers pale brown instead of pure white; sides of head and neck, together with entire lower surface, excepting the anal region, much darker and more uniform.

*Geographical distribution.*—Tahiti Island, Society Islands.

*Description.*—Type, female adult; Tahiti Island, Society Islands, November 14, 1899; C. H. Townsend. Pileum clove brown; cervix, back, upper tail-coverts, and part of rump rather lighter and slightly more rufescent with scarcely any metallic gloss; rump with a very light brown band, slightly whitish along the edges of the feathers, and similar to that of *Collocalia francica francica*, though apparently not quite so broad or so pale, the feathers with somewhat though not very conspicuously defined deeper brown shafts; wings and tail darker than upper parts, and somewhat blackish with a slight purplish or bluish sheen, but the basal portion of the rectrices and the inner edge of the wing-quills decidedly more brownish—much like the back; median and lesser wing-coverts with the tertials also rather lighter, more brownish than the quills, and somewhat glossed with greenish; sides of head clove brown almost as dark as the crown, the feathers of the lores with lighter brown bases; sides of neck brown like the cervix; lower surface the same, but lighter, becoming still a little paler on the abdomen, considerably so and appreciably more rufescent on the crissum; lining of wing clove brown.

Wing, 122; tail, 58; exposed culmen, 5; tarsus, 10 mm.

The single specimen of this new and remarkable species was obtained by Mr. Townsend during the cruise of the "Albatross" already mentioned. It differs very strongly from *Collocalia francica spodiopygia*, the light-rumped form from the Samoan Islands, in its larger size, lighter, much more brownish upper parts, rather more narrow rump band, darker, more uniform ventral surface, and especially, as from all other species of the entire genus excepting *C. leucophaea* and *C. ocista*, by the brownish instead of pure white bases of the loreal feathers. From *Collocalia leucophaea* it may of course be easily distinguished by the pale band across the rump, as well as by somewhat less brownish upper surface and decidedly paler anal region. From *Collocalia ocista* it differs in lack of tarsal feathers, in more brownish upper surface, pale rump band, and lighter anal region.

The only published name that can by any possibility apply to this species is *Hirundo peruviana* Forster,<sup>25</sup> based on a specimen said to have been obtained on Tahiti. But unless the description of this bird is very erroneous it cannot refer to *thespesia*, as the following quotation

<sup>25</sup> *Descript. Anim.*, 1844, p. 240.

will show: "Corpus totum supra cum remigibus, rectricibusque nigro-nitens. Uropygium, gula, pectus, abdomen, crissum cinereo-fuliginosa."<sup>26</sup> The upper surface in *thespesia* is by no means "nigro-nitens," being dark brown, scarcely more blackish than the same part in *Collocalia leucophaea*; while the rump is not of the same color as the dark gray ventral surface, but is very much paler, even whitish. The description of *peruviana* very much better fits *Collocalia francica spodiopygia*, to which it should probably be referred.

**Collocalia francica francica** (Gmelin).

*Hirundo francica* Gmelin, Syst. Nat., I, ii, 1788, p. 1017.

*Hirundo francisca* Vieillot, Nouv. Dict. d'Hist. Nat., XIV, 1817, p. 525 (Mauritius).

*Hirundo franciæ* Lesson, Traité d'Ornith., 1831, p. 270 (Mauritius).

*Chars. sp.*—Like *Collocalia unicolor amelis*, but somewhat smaller; rather more brownish above, with a distinct broad whitish or brownish white band across the rump; paler below, especially on the abdomen and crissum; lining of wing paler, more brownish.

Wing, 112–114; tail, 51–52; exposed culmen, 4–5; tarsus, 8.5–10 mm.

*Type locality.*—Mauritius Island.

*Geographical distribution.*—Islands of Mauritius and Bourbon; ?Ceylon.

This form bears some resemblance to *Collocalia innominata*, but is of course much smaller; more brownish above, with a paler rump band which has not conspicuously darker shafts; darker below, particularly posteriorly, without noticeably darker shaft lines; and lacks feathers on the tarsus. It seems to be confined to the Islands of Mauritius and Bourbon, for although several times accredited to Madagascar its occurrence there remains to be confirmed; and all the East Indian records belong to other subspecies.

**Collocalia francica townsendi** subsp. nov.

*Chars. subsp.*—Similar to *Collocalia francica francica*, but wing longer; upper surface darker, more blackish, and more glossed with greenish, the rump band on the contrary more whitish; lower surface darker.

*Geographical distribution.*—Tonga Islands.

*Description.*—Type, adult female; Eua Island, Tonga (Friendly) Islands, November 28, 1899; C. H. Townsend. Upper parts, including wings and tail, brownish black with a greenish metallic sheen, the inner webs of the rectrices, especially on their basal portions, and particularly the inner webs of the wing-quills, more brownish; a conspicuous

<sup>26</sup> *Ibid.*, p. 241.

brownish white—almost pure white—band on the rump, its feathers with slightly though not very noticeably dusky shafts; sides of head clove brown, the lores darker, with white bases; sides of neck somewhat lighter brown; lower surface brownish gray, darkest on chin and the longest lower tail-coverts, decidedly paler, even almost whitish, on lower abdomen and anal region; lining of wing clove brown.

From *Collocalia francica spodiopygia*, to which this form has heretofore been referred, it differs in considerably more greenish glossy upper surface, much more whitish rump, and paler posterior lower parts. It has the most whitish rump of any subspecies of *C. francica*, and seems furthermore to be one of the best marked of these. It is another of the novelties brought back by Mr. C. H. Townsend from his Pacific cruise in 1899–1900, and was obtained in only the Tonga group—on Eua, Vavau and Niue Islands.

Measurements of these specimens are as follows:

Ser.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
1003	Vavau I., Tonga Islands.	Dec. 4, 1899	116	52	4	9
	Niue I., " "	Nov. 25, 1899	116.5	54	4	9
	Eua I., " " 27	Nov. 28, 1899	117	50	4	9
Average.....			116.5	52	4	9

*Collocalia francica terræreginæ* (Ramsay).

*Cypselus terræ-reginæ* Ramsay, Proc. Zool. Soc. Lond., 1874, p. 601.

*Collocalia infuscatata* Salvadori, Atti R. Accad. Sci. Torino, XV, 1880, p. 348 (Ternate Island, Molucca Islands).

*Chars. subsp.*—Similar to *Collocalia francica francica*, but somewhat smaller; upper surface darker; posterior lower parts more deeply colored, imparting thus a more uniform appearance to the ventral surface; feathers of the light rump band with more conspicuously blackish shaft lines.

Wing, 110–111; tail, 48–53; exposed culmen, 5; tarsus, 8.7–10 mm.

*Type locality.*—Cardwell, Rockingham Bay, Queensland, Australia.

*Geographical distribution.*—Northern Queensland and southern New Guinea to Jampea Island, Ternate Island and probably also other islands of the Molucca group.

This race may be distinguished from *Collocalia francica spodiopygia* chiefly by its much smaller size, more conspicuously blackish shaft

<sup>27</sup> Type.

lines on the feathers of the light rump band, and by more glossy upper surface. From *Collocalia francica townsendi* it differs in shorter wing, less whitish rump band with conspicuous blackish shaft lines, and darker abdomen.

The subspecific separation of the present form is made principally on the basis of the bird from Ternate Island, described by Count Salvadori as *Collocalia infuscata*,<sup>28</sup> which is certainly different from both *francica* and *spodiopygia*, although considered by Dr. Hartert as inseparable from the latter.<sup>29</sup> Although no specimens from northern Queensland, the *Cypselus terraereginae* of Ramsay,<sup>30</sup> have been examined in the present connection, the characters of size and coloration assigned them agree apparently best with this form, for which therefore *terraereginae* by priority becomes the proper subspecific name. Should, however, the birds from Queensland, which are undoubtedly not to be referred to *spodiopygia*, and probably not to *francica*, ultimately prove to be different from those of the Molucca Islands, the latter must stand as *Collocalia francica infuscata* Salvadori.

**Collocalia francoica spodiopygia** (Peale).

*Hirundo peruviana* Forster, Descript. Anim., 1844, p. 240 (Tahiti Island, Society Islands) (*nec* Gmelin).

*Macropteryx spodiopygius* Peale, United States Explor. Exped., VIII, 1848, p. 176, pl. XLIX, fig. 2 (Upolu Island, Samoa Islands).

*Herse forsteri* Hartlaub, Journ. f. Ornith., 1854, p. 169 (nom. nov. pro *Hirundo peruviana* Forster).

*Chars. subsp.*—Like *Collocalia francica francica*, but wing longer; upper parts more blackish and less glossy; also lower surface, particularly the abdomen, darker; rump band less whitish.

Wing, 116–117; tail, 48–54; exposed culmen, 4–5; tarsus, 8–9 mm.

*Type locality.*—Upolu Island, Samoa Islands.

*Geographical distribution.*—Solomon, Samoan, and Fiji Islands; Tahiti Island.

This dark form from western Polynesia certainly deserves recognition on good average characters as distinguished from *Collocalia francica francica* with which it has heretofore been synonymized. It is, indeed, both in color and size, apparently nearer *Collocalia francica inexpectata*, from which it differs chiefly in its smaller size, less glossy upper surface, lighter rump band, and obsolescence, usually absence, of dark shaft lines on rump and under parts. Peale's type of

<sup>28</sup> *Atti R. Accad. Sci. Torino*, XV, 1880, p. 348.

<sup>29</sup> *Cat. Birds Brit. Mus.*, XVI, 1892, p. 504.

<sup>30</sup> *Proc. Zool. Soc. Lond.*, 1874, p. 601.

*spodiopygia* is still in the United States National Museum, and fairly well preserved.

The name *Hirundo peruviana* Forster,<sup>31</sup> based on specimens from Tahiti, seems recently to have been pretty generally ignored or overlooked; but that it in all probability applies to this form, as some authors have indicated, notwithstanding that there is no other record from Tahiti, may easily be seen by examination of the excellent original description.<sup>32</sup> It is, however, unavailable for use in the present case, since it is preoccupied by *Hirundo peruviana* Gmelin,<sup>33</sup> which is certainly some other bird. The *Herse forsteri* of Hartlaub<sup>34</sup> is, as he states, a renaming of Forster's *Hirundo peruviana*, but is antedated by *Macropteryx spodiopygius* Peale.<sup>35</sup>

***Collocalia francica inexpectata* Hume.**

*Collocalia inexpectata* Hume, Stray Feathers, I, 1873, p. 296.

*Chars. subsp.*—Similar to *Collocalia francica francica*, but larger; upper surface decidedly darker, less brownish, and with more metallic greenish gloss; wings and tail with more metallic bluish and purplish tinge; rump much darker, making its light band less well defined, the feathers with much more distinct blackish shaft lines; lower parts, particularly abdomen and crissum, darker, more uniform, and with more evident dusky shaft lines.

Wing, 114–124; tail, 50–54; exposed culmen, 4.5–5; tarsus, 9.5–10.5 mm.

*Type locality.*—Button Island, Andaman Islands.

*Geographical distribution.*—Southern Andaman Islands; Nicobar Islands; Pulo Tioman; and both coasts of the southern part of the Malay Peninsula; ? accidental in Amherst, Tenasserim (Hartert).

This race may be distinguished from *Collocalia f. townsendi* by somewhat larger average size, much darker rump band with blackish shaft lines more conspicuous, and decidedly more deeply colored posterior lower parts, with evident darker shaft lines; from *Collocalia f. terraereginae* by much greater size, darker rump band, and more noticeable dark shaft lines on abdomen and crissum. It differs from *Collocalia francica spodiopygia* in its somewhat greater size, more glossy upper surface, more bluish and purplish metallic sheen on wings and tail, presence of appreciably dusky shaft lines on the posterior lower parts,

<sup>31</sup> *Descript. Anim.*, 1844, p. 240.

<sup>32</sup> *Ibid.*

<sup>33</sup> *Syst. Nat.*, I, ii, 1788, p. 1025.

<sup>34</sup> *Journ. f. Ornith.*, 1854, p. 169.

<sup>35</sup> *United States Explor. Exped.*, VIII, 1848, p. 176, pl. XLIX, fig. 2.



and in duller, less well-defined rump band, the feathers of which have much more conspicuous dark shaft lines.

Birds from the southern part of the Malay Peninsula—both eastern and western sides—as well as from Pulo Tioman, off the east coast, average larger than those from the Andaman and Nicobar Islands; but this is apparently too slight and inconstant, in the absence of any accompanying color difference, to warrant recognition by name. In *C. f. inexpectata* as in other forms there is considerable individual color variation, evident in this case chiefly on the lower parts and the light rump band. The single specimen of *inexpectata* recorded by Dr. Hartert<sup>36</sup> from Amherst, Tenasserim, is possibly rather to be referred to *Collocalia f. germani*, for it is more probably an unusually dark example of the latter, whose home is near by, than a stray from the far-off southern Andaman Islands.

***Collocalia francoica germani* Oustalet.**

*Collocalia germani* Oustalet, Bull. Soc. Philom. Paris, 1876, pp. 1-3.

*Collocalia francoica*, subsp.  $\beta$ . *merguensis* Hartert, Cat. Birds Brit. Mus., XVI, 1892, p. 506 (Mergui, Tenasserim).

*Chars. subsp.*—Similar to *Collocalia francoica francoica*, but larger; upper surface more glossed with metallic greenish; light rump band with more evident blackish shaft lines; posterior lower surface darker, and with more conspicuous dark shaft lines.

Wing, 115-121.5 (average, 118.3); tail, 49-52.5 (average, 51.3); exposed culmen, 4.5-5 (average, 4.9); tarsus, 9-11 (average, 10) mm.<sup>37</sup>

*Type locality.*—Condore Island, China Sea, off the southeastern coast of Cochin China.

*Geographical distribution.*—Mergui Archipelago; Tenasserim; Malay Peninsula south to Lower Siam; Condore Island, Cochin China; Philippine Islands.

Like many of the forms of *Collocalia*, this race is, on account of individual variation, difficult to determine satisfactorily without a sufficient series, but it is nevertheless worthy of recognition. It is distinguishable from *Collocalia f. spodiopygia* by its lighter, more greenish glossy upper surface, more metallic bluish and purplish sheen on wings and tail; well-defined blackish shaft streaks on the feathers of the light rump band; paler lower parts, with dark shaft streaks on abdomen; and somewhat larger size. From *Collocalia f. townsendi* it may be separated by rather greater size; lighter, more brownish upper

<sup>36</sup> *Cat. Birds Brit. Mus.*, XVI, 1892, p. 505; *Tierreich*, I, 1897, p. 69.

<sup>37</sup> Ten specimens.

parts; less whitish rump band and darker abdomen, both with more distinct dusky or blackish shaft lines. From *Collocalia j. terraereginae* it may be distinguished by its much larger size, lighter, more brownish upper surface, and more conspicuous dark shaft lines on the posterior lower parts. From *Collocalia j. inexpectata* it differs in its decidedly paler under surface; lighter, more brownish upper parts; and more prominent, less brownish, light rump band; but occasional intermediate individuals occur that are difficult to distinguish. The dark shaft lines of the lower surface vary much in different individuals, being apparently most evident in immature birds. The measurements of this form given by Hartert<sup>38</sup> are rather too large, as may be seen by reference to the above averages, but were probably taken from a limited number of specimens. A series of birds from Trong, Lower Siam, and another from the Philippine archipelago seem to be identical, and together are certainly all referable to this race, although a few of those from Cagayan Sulu, in the southwestern Philippines, are more blackish above and show in this, but not in size, some vergence toward *Collocalia francica terraereginae*. There are examples in the United States National Museum from the following islands of the Philippines: Panay; Cagayan Sulu; and Cagayancillo, in the Cagayanes group. It has also been recorded as *Collocalia francica* from Cuyo, Negros and Calamianes. All Philippine records of both *francica* and *inexpectata* refer of course to *germani*.

The identity of *Collocalia germani* Oustalet and *Collocalia francica merquiensis* Hartert may be considered as conclusively established, for Dr. Hartert assures us<sup>39</sup> that he has compared the types. That *germani* is rightly considered a subspecies of *Collocalia francica* seems to be equally certain, for Dr. R. Bowdler Sharpe, who at our request carefully examined the series of *merquiensis* in the British Museum, informs us<sup>40</sup> that there is not the slightest indication of tarsal feathering on any of the specimens.

**Collocalia troglodytes Gray.**

*Collocalia troglodytes* Gray, Gen. Birds, I, 1845, p. 55, pl. 19.

*Chars. sp.*—Very much smaller than *Collocalia francica francica*; upper parts, including wings and tail, black with a metallic greenish or bluish gloss; a pure white, well-defined rump band, the feathers of which have blackish shafts and most of them dark tips; abdomen

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<sup>38</sup> *Cat. Birds Brit. Mus.*, XVI, 1892, p. 506; *Tierreich*, I, 1897, p. 69.

<sup>39</sup> *In litt.*

<sup>40</sup> *In litt.*

white or whitish in contrast to most of the remaining more or less deeply brownish lower parts; under tail-coverts like the back; lining of the wing rather more brownish.

Wing, 86-96; tail, 38-42; exposed culmen, 3.5; tarsus, 9-9.5 mm.

*Type locality*.—Philippine Islands.

*Geographical distribution*.—Philippine Islands.

This very distinct species differs markedly from all the preceding forms with unfeathered tarsi in its small size, deeply blackish upper surface, white abdomen, and peculiar white rump band. It is superficially very similar to *Collocalia leucopygia*, but aside from the lack of tarsal feathers is easily distinguished from that species by its more greenish upper surface, broad blackish tips to the white feathers of the rump band; and more extensively blackish lower tail-coverts. There is considerable variation in the wing-length of *C. troglodytes*, but this does not seem to be correlated with different geographical areas.

The species has been obtained on the following islands of the Philippine archipelago: Mindanao, Palawan, Siquijor, Cebu, Masbate, Negros, Guimaras, Panay, Romblon, Sibuyan, Mindoro, Luzon, Marinduque, Samar, Leyte, and Ticao.

***Collocalia uropygialis* Gray.**

*Collocalia uropygialis* Gray, Ann. and Mag. Nat. Hist., ser. 3, XVII, 1866, p. 123.

*Chars. sp.*—Similar to *Collocalia troglodytes*, but rather larger; feathers of the white band on the rump without blackish shafts or tips; most of the rectrices usually with white spots on the basal portion of inner webs; some of the under wing-coverts and lower tail-coverts with whitish tips or margins.

Wing, 89-99; tail, 38-44; tarsus, 7 mm.

*Type locality*.—Aneiteum Island, New Hebrides Islands.

*Geographical distribution*.—New Caledonia and New Hebrides Islands.

Readily distinguished from all the other light-rumped forms of the genus by the white spots on the tail-feathers; with the remaining species it needs no special comparison.

***Collocalia marginata* Salvadori.**

*Collocalia marginata* Salvadori, Atti R. Acad. Sci. Torino, XVII, 1882, p. 448.

*Collocalia cebuensis* Kutter, Journ. f. Ornith., 1882, p. 171 (Cebu Island, Philippine Islands).

*Chars. sp.*—Somewhat like *Collocalia uropygialis*, but larger; rather more greenish above; rump without a white band, but its feathers with conspicuous white edgings; rectrices never with white spots.

Wing, 103-107; tail, 41-43; exposed culmen, 3.5-4; tarsus, 7.5-9 mm.

*Type locality*.—Cebu Island, Philippine Islands.

*Geographical distribution*.—Philippine Islands.

This interesting bird, supposed until recently to be very rare, bids fair to be found distributed pretty generally throughout the Philippine archipelago. Up to the present time it has been ascertained to occur on the following islands: Cebu, Masbate, Luzon (*McGregor*), Mindoro, Calayan, and Sibuyan.

It scarcely needs close comparison with any other member of the genus except *Collocalia linchi*, and to distinguish it from this there should be no difficulty. The white margins of the brownish gray feathers of the throat and breast are usually broad and conspicuous, but occasionally in even unworn specimens are almost obsolete.

*Collocalia linchi linchi* Horsfield and Moore.

? *Hemiprocne fucivora* Streubel, Isis, 1848, p. 369 (East Indies).

*Collocalia linchi* Horsfield and Moore, Cat. Birds Mus. East Ind. Comp., I, 1854, p. 100 (Java).

*Chars. subsp.*—Very much like *Collocalia marginata*, but feathers of the rump without white margins; upper surface usually more brightly colored; throat and breast generally with less conspicuous white edgings.

*Type locality*.—Java.

*Geographical distribution*.—Java; Lombok; Kangean Islands; Sumatra, including the islands along its western coast; Singapore, and the southern part of the Malay Peninsula; Borneo(?).

This species is shown by the considerable amount of material from various parts of its range now in the United States National Museum to be divisible into several recognizable races which are diagnosed below. Aside from the evident geographical variation there are some differences that seem to be due to wear of the plumage and to obtain alike in all the forms. The color of the upper parts changes little through sex, age, or season, although there is a normal but not very considerable amount of individual variation. The deep gray of the anterior lower parts is decidedly more brownish when the feathers become old; and the white or whitish margins that in fresh plumage are often very conspicuous on throat, breast, and under wing-coverts sometimes almost entirely disappear through abrasion. Likewise the broadly white edgings of sides, flanks, and lower breast wear off and ultimately allow much of the slate gray bases of the feathers to show, in this way decidedly darkening the general appearance of the parts.

This form of *Collocalia linchi*, as compared with the other sub-

species, is characterized by large size, and by very greenish upper parts, including wings and tail, with but slight tinge and very little or no admixture of bluish. The United States National Museum possesses a fair series from Sikakap Strait, North Pagi Island, off the western coast of Sumatra; and a specimen from Singapore is also identical. Borneo is doubtfully included in the range of this race, as we have examined no specimens from that island, and its bird may be like that of either the Natuna Islands or even the Philippines, or may prove to be an endemic form.

Measurements of *Collocalia linchi linchi* are as follows:

Ser.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
10500 ? ? ? ?	Sikakap Str., No. Pagi I.	Nov. 12, 1902	105	44	4.5	8.5
	" "	" "	103	43	4.5	9
	" "	" "	105.5	42	4.5	9
	" "	" "	104.5	42	4.5	8.5
	" "	" "	103.5	42.5	4.5	8.5
	Singapore .....	Aug. 28, 1879	105	42	4.5	9
Average.....			104.4	42.6	4.5	8.8

*Collocalia linchi cyanoptila* subsp. nov.

*Chars. subsp.*.—Similar to *Collocalia linchi linchi*, with which it agrees in size, but upper surface of head and body much more bluish in shade, and with considerable admixture of bluish purple; wings, and particularly the tail, decidedly more bluish.

*Geographical distribution.*.—Natuna Islands and Linga Island.

*Description.*.—Type, adult female, No. 174,688, U. S. N. M.; Bungan Island, Natuna Islands, July 1, 1900; Dr. W. L. Abbott. Upper parts metallic dark bluish green, much mixed with bluish purple, most noticeably so on posterior portion; tail bluish green decidedly tinged with purplish; wings sepia brown, dull metallic purplish on most of their exposed portions, the coverts more brightly colored, and mixed with dark green; sides of head and neck, throat, breast, flanks, and sides of body brownish slate, the feathers of the lores with cottony white bases, those of throat and breast with inconspicuous pale gray or whitish tips, those of lower breast, sides, and flanks broadly margined and terminated with white; median portion of abdomen white with some narrow slaty shaft streaks; lower tail-coverts dark bluish metallic green, the longer ones immaculate, the shorter ones margined with white; lining of wing dull dark metallic green.

This new race is quite different from true *Collocalia linchi*, the only form of the species with which it agrees in size, and it may readily be distinguished on even superficial comparison by the difference in the color of the upper parts. The best and most uniform character is the always much more bluish or purplish color of the upper surface of the tail. A single adult male from Linga Island, southeast of Singapore, is intermediate between *cyanoptila* and *linchi*; but there is so much purplish and bluish in the color of the upper parts, and the tail is so nearly like that of *cyanoptila*, that the specimen must apparently be referred to the latter, although this island is far from the Natuna group, and in a location where *linchi* is the form we should naturally expect to find. Further examples from Linga may, however, show that the average characters of the bird found there will place it with *linchi*.

Measurements of the adults of *Collocalia linchi cyanoptila* are as follows:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♀	Bunguran I., Natuna Is. <sup>41</sup>	July 1, 1900	107	41	4.5	7.5
♀	"	"	102	41	4.5	8.5
♀?	"	July 11, 1900	108	43	4.5	8
♂?	Linga Island.....	July 10, 1899	101.5	40	4	7.5
Average.....			104.6	41.3	4.4	7.9

***Collocalia linchi affinis* Beavan.**

*Collocalia affinis* Beavan, Ibis, 1867, p. 318 (ex Tytler MS.).

*Chars. subsp.*—Similar to *Collocalia linchi cyanoptila*, but very much smaller.

*Type locality.*—Port Blair, South Andaman Island, Andaman Islands.

*Geographical distribution.*—Andaman and Nicobar Islands.

This form, long ago described from the southern Andaman Islands by Beavan, has hitherto usually been considered the same as *linchi*. The satisfactory series obtained by Dr. W. L. Abbott in the Nicobar Islands, however, now conclusively establishes its claim to recognition. It differs from true *linchi* in its much smaller size, and the decidedly bluish or purplish shade of the upper surface, particularly the tail-coverts and tail.

<sup>41</sup> Type.

Measurements of *Collocalia linchi affinis* are as below:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♀	Little Nicobar I., Nicobar					
	" "	[Is. Mar. 2, 1901	98	40	4	8.5
	" "	" "	98	41.5	4	8.5
	" "	Feb. 26, 1901	99	39	4	8
	" "	" "	100	41	4	8
	" "	Feb. 27, 1901	101	39.5	4	8
	" "	" "	99	38	4	8
Average.....			99.2	39.8	4	8.2

*Collocalia linchi elachyptera* subsp. nov.

*Chars. subsp.*—Similar to *Collocalia linchi affinis*, but more greenish on all the upper parts, particularly on back, wings, and tail.

*Geographical distribution.*—Islands of the Mergui Archipelago.

*Description.*—Type, adult male, No. 173,028, U. S. N. M.; Bentinck Island, Mergui Archipelago, March 9, 1900; Dr. W. L. Abbott. Upper parts deep metallic green, with an appreciable bluish purple tinge, particularly on the upper tail-coverts; tail the same, but more bluish; wings fuscous, the exposed portion of quills and primary coverts with a dull metallic purplish sheen, the other superior coverts like the back; lores dark brown, the feathers with pure white bases; rest of sides of head and neck, with chin, throat, and breast, dull brownish slate color, the feathers of the throat and upper breast with pale grayish or whitish tips; lower breast, sides, and flanks brownish slate with a slight metallic greenish sheen, the feathers all broadly margined with white which much obscures the darker color; middle of abdomen white with shaft markings of dusky; exposed portions of lower tail-coverts dark metallic greenish, the shortest brownish, all but the longest broadly bordered with white; lining of wing dark brown, glossed with metallic green. "Bill black; iris dark brown; feet dark fleshy brown."

This race is of course intermediate between *Collocalia linchi affinis*, from the Andaman Islands, and *Collocalia l. isonota*,<sup>42</sup> from the Philippines; but the differences that characterize it are readily appreciable in a series, as well as in a large proportion of individual specimens, and seem, particularly when its isolated range is taken into account, quite sufficient for its recognition by name. It is readily distinguishable from true *linchi* by reason of its much inferior dimensions

<sup>42</sup> *Postea*.

and more bluish or purplish upper parts, especially wings and tail; from *cyanoptila* by its small size and more greenish upper surface, including wings and tail. So far as known it does not occur outside the Mergui Archipelago, where it has been taken on only Bentinck Island; but it undoubtedly is to be found on other islands of the group, while there would seem to be no improbability of its occasional if not regular occurrence on the adjacent mainland.

Measurements are subjoined:

Sex.	Locality.	Date.	Wing.	Tail.	Exposed Culmen.	Tarsus.
♂	Bentinck I., Mergui Arch.	Mar. 10, 1900	101	41	4	8.5
	" " " <sup>43</sup>	Mar. 9, 1900	98.5	39	4.5	8
	" " "	" "	100	42.5	4.5	8.5
	" " "	" "	100.5	41	4.5	9
	" " "	" "	97	39	4.5	8.5
Average.....			99.4	40.5	4.4	8.5

*Collocalia linchi isonota* subsp. nov.

*Chars. subsp.*.—Resembling *Collocalia linchi elachyptera*, but averaging slightly larger; color of upper parts decidedly duller and somewhat less bluish or purplish.

*Geographical distribution.*.—Philippine Islands.

*Description.*.—Type, adult male, No. 192,610, U. S. N. M.; Irisan, Benguet, Luzon, Philippine Islands, June 3, 1903; R. C. McGregor and A. Celestino. Upper surface dull, dark, metallic green, the crown and upper tail-coverts with a slight bluish tinge; tail of the same color, scarcely more bluish; wings fuscous, the exposed surface of the quills dull greenish blue with but little metallic sheen, the superior coverts like the back; lores dark brown, the feathers with pure white bases; sides of head and neck, chin, throat, breast, sides, and flanks brownish slate color, the throat and breast feathers with margins of pale grayish or whitish, those of lower breast, of sides and flanks so broadly bordered with white that the ground color is largely overlaid; median portion of abdomen white, with very fine dusky shaft lines; longest lower tail-coverts dull, dark, metallic green, slightly or not at all margined with whitish, the shorter ones brownish with ample white edges, or nearly all white with a dusky shaft-stripe; lining of wing dark brown, slightly glossed with metallic greenish.

This race differs from *Collocalia linchi linchi* in its smaller size and

<sup>43</sup> Type.



much duller, slightly more bluish upper parts; from *C. l. cyanoptila* in inferior size and much duller, more greenish upper surface; and from *C. l. affinis* in somewhat longer wing, slightly shorter tail, and decidedly duller, more greenish upper parts, particularly the tail.

Birds in juvenal plumage, even before their wings and tails are fully grown, seem to be exactly like the adults in color above, and not appreciably different below except for possibly broader, more evident white margins on lower breast, sides, flanks, and lining of wing.

This form of *Collocalia linchi* appears to be confined to the Philippine archipelago, and has been taken on only Luzon, Mindoro, Mindanao, and Bongao.

Measurements of three adults are as under:

<i>Sex.</i>	<i>Locality.</i>	<i>Date.</i>	<i>Wing.</i>	<i>Tail.</i>	<i>Exposed Culmen.</i>	<i>Tarsus.</i>
♂	Irisan, Benguet, Luzon,	[P. I. May 17, 1903	101.5	37	3.5	8.5
	“ “ “ “	June 6, 1903	100	39.5	4	9
	“ “ “ “	May 8, 1903	100.5	36.5	4	9
	Average.....			100.7	37.7	3.8

***Collocalia dodgei* Richmond.**

*Collocalia dodgei* Richmond, *Smithson. Quart.*, II, 1905, p. 431.

*Chars. sp.*—Resembling *Collocalia linchi isonota*, but very much smaller; upper parts still duller, more sooty, with an even more greenish metallic gloss.

Wing, 88.5;<sup>45</sup> tail, 33; exposed culmen, 3.5; tarsus, 7 mm.

*Type locality.*—Mount Kina Balu, northeastern Borneo.

*Geographical distribution.*—Mount Kina Balu, northeastern Borneo.

*Description.*—Type, adult, sex unknown, No. 191,575, U. S. N. M.; Mount Kina Balu, Borneo, spring of 1904; George H. Goss and H. D. Dodge. Upper parts dull brownish black with an appreciable oil-green metallic gloss, the pileum slightly darker; tail and superior tail-coverts darker greenish, somewhat shaded with bluish and without trace of white markings; wings like the tail, but inner margin of quills brownish with little or no metallic sheen, and upper wing-coverts, with innermost secondaries, more greenish like the back; sides of head and neck, chin, throat, breast, sides, and flanks brownish slate, darkest

<sup>44</sup> Type.

<sup>45</sup> Dr. Richmond's measurement of the wing is too great (*loc. cit.*).

on sides of head, the feathers of lores with pure white bases, those of middle of lower throat and breast slightly, of the sides and flanks more or less broadly, margined with whitish; centre of abdomen white; lower tail-coverts dusky with a slight greenish gloss, the longest ones narrowly, the shorter ones conspicuously edged all around with white, some of the shortest entirely white save for a narrow dusky shaft line; under wing-coverts blackish with the dull oil-green gloss of the upper surface; a few of the dark brown axillars tipped with white.

This remarkably distinct species continues to be known from only the type specimen, which was obtained by Messrs. Goss and Dodge during their recent expedition to Mount Kina Balu. This example is fully adult and in perfect plumage.

By reason of its white abdomen, uniform greenish upper parts, with lack of any white on the rump and also of white markings on the tail, *Collocalia dodgei* needs special comparison with none of its congeners unless it be *C. linchi*. From the typical form of the latter species it differs even more than from *C. l. isonota*, the one to which it seems to be most closely allied, but from which, however, it is specifically distinct. Whether the previous records of *Collocalia linchi* from Mount Kina Balu and from other parts of Borneo belong to this newly described species or to some form of *linchi* we are unable with our present material to determine, and this will be an interesting question for future investigation.

***Collocalia esculenta* (Linnaeus).**

*Hirundo esculenta* Linnaeus, Syst. Nat., ed. 10, I, 1758, p. 191 ("China" locality wrong; Amboina is the proper type locality).

*Collocalia hypoleuca* Gray, Proc. Zool. Soc. Lond., 1858, p. 170 (Aru Islands).

*Collocalia viridimitens* Gray, Ann. and Mag. Nat. Hist., ser. 3, XVII, 1866, p. 120 (Celebes).

*Collocalia spilura* Gray, Ann. and Mag. Nat. Hist., ser. 3, XVII, 1866, p. 120 (Batchian).

*Chars. sp.*—Resembling *Collocalia linchi*, but averaging decidedly smaller; most of the rectrices with large white spots on the basal portion of their inner webs.

Wing, 69–103; tail, 38–44; exposed culmen, 3.5–4; tarsus, 8 mm.

*Type locality.*—Amboina Island, Molucca Islands.

*Geographical distribution.*—East India Islands from Celebes and Sumbawa Island to the Solomon Islands and the Louisiade Archipelago, including New Guinea; Cape York, Queensland, Australia.

Dr. Hartert is undoubtedly correct in his identification and adoption of Linnaeus' *Hirundo esculenta*,<sup>46</sup> even though the latter author gives

<sup>46</sup> *Syst. Nat.*, ed. 10, I, 1758, p. 191.

the locality wrong, since the description given by Rumphius,<sup>47</sup> whom Linnæus cites, refers without doubt to the present species.

There seem to be at least two forms included under the name *esculenta* as now current, but the material at our disposal does not permit a satisfactory segregation of these.

***Collocalia neglecta* Gray.**

*Collocalia neglecta* Gray, Ann. and Mag. Nat. Hist., ser. 3, XVII, 1866, p. 121.

*Chars. sp.*—Similar to *Collocalia esculenta*, from which it differs in the much duller, and greenish instead of bluish or purplish upper surface; rump, wing-quills, and wing-coverts with light grayish tips that are, however, sometimes obsolescent, particularly in old or worn birds. Wing, 88–97; tail, 41–43; exposed culmen, 3.5–4; tarsus, 6.5 mm.

*Type locality.*—Eastern Timor.

*Geographical distribution.*—East Indian Islands of Timor, Savu, Alor, Dammer, Roma, Kisser, and Wetter.

In the specimens from Timor examined the upper parts are dull grayish metallic green, the wings and tail slightly more bluish; the anterior lower parts, including the breast, brownish gray, the feathers tipped with grayish white, producing a mottled appearance, the middle of the breast and jugulum having most white, the chin scarcely any; abdomen nearly pure white; feathers of the sides with brownish gray centres and whitish margins much like the breast; lining of wing dark brown slightly mixed with whitish.

Judging from Dr. Hartert's remarks,<sup>48</sup> birds of this species from Timor are not just like those on the neighboring islands, and the latter may as he suggests be subspecifically separable. This species is very different from all members of the genus excepting *Collocalia natalis* and *C. esculenta*, and may easily be distinguished by its dull greenish upper parts combined with white-spotted tail-feathers. It is of course near *Collocalia esculenta*, but apparently quite distinct enough to stand as a species, although Dr. Hartert is of opposite opinion.<sup>49</sup>

***Collocalia natalis* Lister.**

*Collocalia natalis* Lister, Proc. Zool. Soc. Lond., 1888, p. 520.

*Chars. sp.*—Similar to *Collocalia neglecta*, but white markings of tail not sharply defined; chin and upper throat darker, almost black-

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<sup>47</sup> *Herb. Amboin.*, VI, 1750, p. 183.

<sup>48</sup> *Novit. Zool.*, IV, 1897, p. 268.

<sup>49</sup> *Novit. Zool.*, XI, 1904, p. 203.

ish; blackish shaft markings of the shorter under tail-coverts larger; feathers of the rump with somewhat broader white edgings.

Wing, 122 mm.

*Type locality*.—Christmas Island, Indian Ocean, south of western Java.

*Geographical distribution*.—Christmas Island, Indian Ocean.

This little known form we have not seen; but it is apparently recognizable, though very much like *Collocalia neglecta*, of which it is possibly but a subspecies.