

## Ornithological Notes from the Raffles Museum, 5-8<sup>1</sup>

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### No. 5. A collection of Birds' Eggs from North Borneo.

The collection of eggs catalogued here was made by Mr. V. W. Ryves during parts of 1938 and 1939. Mr. Ryves's visits to Borneo took place at the time of his retirement after a number of years as a rubber planter in the Malay States. During this period he had gathered a fine collection of Malayan birds' eggs of which use was made in the production of the later volumes of *The Birds of the Malay Peninsula*. Both collections are now in the Raffles Museum. There is at present little data available on the eggs of the great majority of the Bornean birds, and in many cases no records have been published. It seems advisable, therefore, to catalogue the whole of the North Borneo material so that the information contained in it can be at the disposal of workers outside Malaya.

Mr. Ryves was in the neighbourhood of Sandakan, on the north-east coast of North Borneo, from the end of April to August 1938; the localities given here from this period of his collecting are Pulau Bai, Sandakan Estate, Sungei Batang and Tanjong Telok. From January to April 1939, he was in the vicinity of Jesselton, on the north-west coast; the localities given here are Kabayan, Kiau, Kota Belud, Kaung and Kuala Abai. In this period he also obtained two clutches of Megapode eggs from the Mantanani Islands, off Agal Bay. The order used here follows that of Chasen's *Handlist of Malaysian Birds* (Bull. Raff. Mus., 11, 1935); reference is given to the latter work where an amended name is employed in this list. Egg shell colours are described with reference to Ridgway's *Color standards & color nomenclature* (Washington, D.C., 1912).

#### Family Megapodiidae

*Megapodius freycinet cumingii* Dillwyn.

Megapode.

*Megapodius reinwardt cumingi*, Chasen 1935: 1.

Five sets taken in August 1938 and January 1939. Shape an elongated, regular oval. Surface rough. Colour white, but in most cases the egg is uniformly stained to some shade of light

1. No. 5 prepared April 1948, completed June 1949. Nos. 6 and 7 prepared May-June 1948. No. 8 prepared June 1949.

BIRDS' EGGS FROM NORTH BORNEO

brown. Dimensions (9 eggs); average,  $78.1 \times 47$ ; max.  $89 \times 47$ ,  $83.5 \times 49$ ; min.  $66 \times 46.5$ ,  $79.5 \times 44.5$ . Details; single egg, Tanjong Telok, Sandakan, 1/8/38,  $83.5 \times 49$ ; clutch of two, Sandakan, 5/8/38,  $79.5 \times 48.5$  &  $77 \times 47.5$ ; single egg, Kuala Abai, January 1939,  $66 \times 46.5$ ; clutch of two, Mantanani Island, 25/1/39,  $89 \times 47$  &  $73.5 \times 47$ ; clutch of three Mantanani Kechil, 26/1/39,  $78 \times 46$ ,  $79.5 \times 44.5$  &  $78 \times 47$ .

The Raffles Museum collection also contains a clutch of two, taken on Pulau Gaya, Jesselton, 24/6/21,  $80 \times 47.5$  &  $75.5 \times 49.5$ , collector not known.

Family Columbidae

*Ducula aenea polius* Oberholser. Green Imperial Pigeon.

*Ducula a. aenea*, Chasen 1935: 17.

Two single eggs taken at Kota Belud on 22 and 24 January, 1939. Shape a regular oval. Surface smooth and slightly glossy. Colour white. Dimensions;  $49 \times 33.5$ ;  $47 \times 33.5$ .

*Ducula b. badia* (Raffles). Mountain Imperial Pigeon.

Four single eggs taken between 13 February and 30 March. Shape a regular oval. Surface smooth and slightly glossy. Colour white. Average,  $42.9 \times 32$ . Details; Kiau, 13/2/39,  $43 \times 30.5$ ; Kota Belud, 16/2/39,  $44 \times 32$ ; Kota Belud, 30/3/39,  $42 \times 33$ ; *ibid*,  $42.5 \times 32.5$ .

*Macropygia ruficeps nana* Stresemann. Small Cuckoo-Dove.

Eleven single eggs taken at Kiau between 18 February and 25 March. Shape a regular oval. Surface smooth, very slightly glossy. Colour white, or in three eggs a light ivory yellow. Dimensions (11 eggs); average  $28 \times 20.1$ ; max.  $31 \times 20.5$ ,  $27 \times 21$ ; min.  $26.5 \times 20$ ,  $28.5 \times 19.5$ . Details; taken 18/2/39,  $29 \times 20.5$ ; 19/2/39,  $28.5 \times 20$ ; 20/2/39,  $27.5 \times 20$ ; 21/2/39,  $31 \times 20.5$ ; 22/2/39,  $27.5 \times 20$ ; 24/2/39,  $27 \times 20$ ; 28/2/39,  $28.5 \times 20$ ; 3/3/39,  $26.5 \times 20$ ; 23/3/39,  $28.5 \times 20$ ; 24/3/39,  $28.5 \times 19.5$ ; 25/3/39,  $27 \times 21$ .

Family Rallidae

*Amaurornis phoenicurus javanica* (Horsfield).

Whitebreasted Water-Hen.

Three clutches of four and one of two, taken mostly at the end of January, with one clutch of four on 15 July. Shape, blunt egg-shaped, sometimes almost a regular oval. Surface smooth. Ground colour ranging from off-white to light buff, speckled or blotched, usually fairly thickly, with pale violet grey and auburn or raw umber. Dimensions (14 eggs); average,  $39.2 \times 29.1$ ; max.  $41 \times 30$ ; min.  $36 \times 27$ . Details; Kuala Abai, 21/1/39,  $37 \times 29$  &  $40 \times 28$ ; no locality, 22/1/39,  $39.5 \times 28$ ,

40 × 30, 41 × 29 & 39.5 × 30; no locality, 26/1/39, 39 × 30.5,  
38 × 27.5, 39.5 × 30 & 36 × 27; Sandakan Estate, 15/7/38,  
40 × 29.5, 38 × 29.5, 40 × 29 & 39.5 × 30.

Family Strigidae

*Otus bakkamoena lempiji* (Horsfield). Collared Scoops Owl.

Five clutches of two taken between 28 January and 21 March, mostly in March. Shape regular oval, almost spherical. Surface smooth and slightly glossy. Colour white. Dimensions (10 eggs); average, 33 × 28.6; max. 34 × 28.5, 33.5 × 29.5; min. 32 × 28, 34 × 27. Details; Kota Belud, 28/1/39, 33 × 29.5 & 32.5 × 29.5; Kiau, 6/3/39, 33 × 28 & 34 × 27; Kota Belud, 9/3/39, 34 × 28.5 & 34 × 28; Kota Belud, 16/3/39, 32 × 28.5 & 32 × 29; Kota Belud, 21/3/39, 33.5 × 29.5 & 32 × 28.

*Ninox scutulata borneensis* (Bonaparte). Bornean Hawk-Owl.

A single egg, taken at Kaung, 9 February, 1939. Shape a regular oval, almost spherical. Surface smooth and slightly glossy. Colour white. Dimensions, 35.5 × 32.

Family Alcedinidae

*Halcyon chloris cyanescens* (Oberholser).

Whitecollared Kingfisher.

One clutch of three eggs, taken on Sandakan Estate, 26 June, 1938. Shape a regular oval. Surface smooth and slightly glossy. Colour white. Dimensions, 29 × 24, 29 × 24 & 28.5 × 23.5.

*Halcyon concreta borneana* Chasen & Kloss.

Chestnutcollared Kingfisher.

One clutch of two eggs taken at Kiau, on 21 February, 1939. Shape a regular oval. Surface smooth and very slightly glossy. Colour white. Dimensions, 38 × 31 & 36.5 × 30.5.

Family Bucerotidae

*Anthracoceros malayanus* (Raffles).

Black Hornbill.

One clutch of three eggs taken at Kaung on 6 February, 1939. Egg-shaped. Surface smooth and fairly glossy. Colour white. Dimensions, 49.5 × 32, 46 × 32.5 & 46 × 33.

Family Micropodidae

*Collocalia esculenta cyanoptila* Oberholser.

Whitebellied Swiftlet.

Sixty-six eggs taken at Kabayan on 5 February, 1939. Egg-shaped. Surface smooth. Colour white. Dimensions (66 eggs); average, 18.2 × 11.8; max. 20 × 12, 17.5 × 12.5; min. 16.5 × 11.

Family Trogonidae

*Harpactes oreskios uniformis* Robinson.

Orangebreasted Trogon.

A single egg taken at Kiau, on 8 March, 1939. Egg-shaped. Surface smooth and glossy. Colour a uniform ivory yellow. Dimensions, 29 × 21.

Family Cuculidae

*Centropus sinensis eurycercus* Blyth. Large Crow-Pheasant.

Two single eggs. Shape a regular oval. Surface smooth and slightly glossy. Colour white. Dimensions; Kiau, 23/3/39, 27.5 × 23; Sandakan Estate, 24/8/38, 31 × 25.

Family Picidae

*Chrysocolaptes validus xanthopygius* Finsch.

Orangebacked Woodpecker.

A single egg taken at Sungei Batang, on 25 June, 1938. Egg-shaped. Surface smooth and glossy. Colour white. Dimensions, 29.5 × 23.

Family Eurylaimidae

*Calyptomena whiteheadi* Sharpe. Blackthroated Green Broadbill.

A single egg taken at Kiau, on 23 March, 1939. Shape pyriform. Surface fine matt. Colour uniform white. Dimensions, 33 × 26.

Family Pittidae

*Pitta granatina ussheri* Sharpe.

Garnet Pitta.

*Pitta venusta ussheri*, Chasen 1935: 158.

A clutch of two eggs taken at Sungei Batang, on 29 April, 1938. Egg-shaped. Surface smooth and glossy. Ground colour white, with a few fine spots and coarse blotches of gull-grey and fuscous, mostly at the broader end. Dimensions, 29.5 × 20.5 & 29 × 20.

Family Hirundinidae

*Hirundo tahitica abbotti* (Oberholser).

Resident Swallow.

A clutch of two eggs, locality not stated, taken on 4 April, 1939. Egg-shaped. Surface smooth. Ground colour white, finely and fairly thickly spotted with light violet grey and drab. Dimensions, 17 × 13 & 17 × 12.5.

Family Muscicapidae

*Muscicapa banyumas montana* Robinson & Kinnear.  
Hill Blue Flycatcher.

*Cyornis banyumas montana*, Chasen 1935: 167.

Two clutches of two eggs taken at Kota Belud, in March 1939. Egg-shaped. Surface smooth and glossy. Ground colour pale olive buff, almost completely obscured by a soft flecking of snuff brown. Dimensions; taken 11/3/39,  $22 \times 15.5$  &  $20.5 \times 15.5$ ; taken 23/3/39,  $22.5 \times 15.5$  &  $21 \times 15.5$ .

*Hypothymis azurea prophata* Oberholser.  
Blacknaped Blue Flycatcher.

A clutch of two eggs taken on Sandakan Estate, on 6 May, 1938. Egg-shaped. Surface smooth and slightly glossy. Ground colour off-white, finely speckled, mostly in a ring at the broader end, with kaiser brown, and, underneath, a few spots of light violet grey. Dimensions,  $19 \times 13.5$  &  $18.5 \times 13$ .

*Rhipidura javanica longicauda* Wallace.  
Pied Fantail Flycatcher.

A clutch of two eggs taken at Sungei Batang, on 8 July, 1938. Pyriform. Surface smooth. Ground colour off-white, speckled with light gull grey and a few spots of pale raw umber, the markings being almost entirely in a ring round the broadest portion. Dimensions,  $17 \times 13.5$  &  $17 \times 13$ .

*Terpsiphone paradisi borneensis* (Hartert).  
Bornean Paradise Flycatcher.

Two clutches of two eggs taken at Sungei Batang on 13 May, 1938. Egg-shaped. Surface smooth and glossy. Ground colour capucine buff, faintly or strongly spotted with light purplish grey and chestnut, mostly at the broader end. Dimensions,  $23.5 \times 15.5$  &  $23 \times 15.5$ ;  $22.5 \times 16$  &  $22 \times 16$ .

*Rhinomyias o. olivacea* (Hume). Hume's Jungle-Flycatcher.

Three clutches of two eggs and one of three taken at Kota Belud, in March 1939. Egg-shaped. Surface smooth and glossy. Ground colour olive buff, thickly flecked with fawn or wood brown, the markings often being concentrated round the broader end, sometimes so thickly as to cover it completely. Dimensions (9 eggs); average,  $19.7 \times 14.8$ ; max.  $20 \times 15$ ,  $19.5 \times 15.5$ ; min.  $19 \times 15$ ,  $19.5 \times 14.5$ . Details; taken, 23/3/39,  $19.5 \times 14.5$ ,  $20 \times 14.5$  &  $20 \times 14.5$ ; 25/3/39,  $19 \times 15$  &  $19.5 \times 15.5$ ; 28/3/39,  $20 \times 15$  &  $20 \times 14.5$ ; 31/3/39,  $19.5 \times 15$  &  $19.5 \times 15$ .



*Rhinomyias u. umbratilis* (Strickland).

Whitethroated Jungle-Flycatcher.

A clutch of two eggs taken at Kota Belud on 22 March, 1939. Egg-shaped, rather elongated. Surface smooth and glossy. Ground colour pale olive buff, almost completely obscured by a soft flecking of fawn. Dimensions,  $23.5 \times 15$  &  $23.5 \times 15.5$ .

Family Camphegagidae

*Lalage nigra schisticeps* Neumann.

Pied Cuckoo-Shrike.

A clutch of two eggs taken at Pulau Bai, Sandakan, on 5 June, 1938. Egg-shaped. Surface smooth. Ground colour yellowish glaucous, with a few spots of gull grey (underneath) and thickly flecked with olive brown (above). Dimensions,  $23.5 \times 16.5$  &  $22.5 \times 17$ .

Family Pycnonotidae

*Criniger ochraceus ruficrissum* Sharpe.

Crested Bulbul.

*Criniger gutturalis ruficrissus*, Chasen 1935: 196.

A clutch of two eggs taken at Kota Belud on 30 March, 1939. Egg-shaped rather elongated. Surface smooth and slightly glossy. Ground colour white, finely and rather sparsely spotted with light violet grey (underneath) and mahogany red (above), the markings being thicker at the broader end, where the ground colour is almost completely obscured. Dimensions,  $25.5 \times 16$  &  $25 \times 16.5$ .

*Pycnonotus zeylanicus* (Gmelin).

Yellowcrowned Bulbul.

*Trachycomus zeylanicus*, Chasen 1935: 198.

A single egg taken at Kiau on 10 March, 1939. Egg-shaped. Surface smooth, very slightly glossy. Ground colour off-white, speckled and spotted with gull grey, russet and burnt umber, the markings being thicker at the broader end. Dimensions,  $25.5 \times 19$ .

*Pycnonotus goiavier gourdinii* (Jacquinot & Pucher).

Yellowvented Bulbul.

A single egg and a clutch of two taken in March and April. Egg-shaped. Surface smooth and slightly glossy. Colour white or off-white, speckled with light neutral grey and claret brown or maroon. The colouring is indistinguishable from that of some examples of *P. g. personatus* (Hume) taken in the Malay Peninsula. Dimensions; Kota Belud, 24/3/39,  $23.5 \times 16.5$ ; Sandakan Estate, 28/4/40,  $22 \times 16$  &  $23 \times 16$ .

*Pycnonotus simplex perplexus* Chasen & Kloss.

White-eyed Brown Bullbul.

A single egg taken at Kota Belud, on 28 February, 1939. Egg-shaped. Surface smooth and fairly glossy. Ground colour white, finely and fairly evenly flecked with mouse grey and mahogany red. Dimensions, 18 × 14.

Family Timaliidae

*Garrulax mitratus treacheri* (Sharpe).

Chestnutcapped Babbling-Thrush.

*Rhinocichla mitrata treacheri*, Chasen 1935: 206.

Four clutches of two eggs and a single egg taken at Kiau in February and March 1939. Egg-shaped. Surface smooth and glossy. Colour an immaculate light glaucous blue. Dimensions (9 eggs); average, 26.6 × 19.8; max. 28 × 19.5, 27.5 × 20.5; min. 25.5 × 20, 26 × 19. Details; taken 18/2/39, 26 × 20 & 25.5 × 19.5; 16/2/39, 26.5 × 20 & 25.5 × 20; 2/3/39, 27 × 19.5 & 26 × 20; 20/3/39, 27.5 × 20.5 & 26 × 19; 28/3/39, 28 × 19.5. The Raffles Museum collection also contains a clutch of two eggs of *R. m. mitrata* (S. Muller), taken at Siolak Daras, Korinchi, Sumatra (alt. 3,000 ft.), March 1914, collector not known; 25 × 20 & 26 × 20, shape surface as above, but colour an immaculate white.

*Pomatorhinus montanus bornensis* Cabanis.

Chestnutbacked Scimitar-Babbler.

Three clutches of three eggs, one of two and a single egg, all taken at Kiau in February and March 1939. Egg-shaped. Surface smooth and slightly glossy. Colour white. Dimensions (12 eggs); average, 23.8 × 17.3; max. 25 × 17.5, 23 × 18; min. 23 × 17.5, 23.5 × 16.5. Details; taken 13/2/39, 23 × 17.5, 23 × 17.5 & 23.5 × 17.5; 19/2/39, 24.5 × 17 & 25 × 17; 28/2/39, 24 × 17, 25 × 17.5 & 25 × 17; 5/3/39, 23 × 18, 23.5 × 17.5 & 23 × 18; 24/3/39, 23.5 × 16.5.

*Malacocincla pyrrhogenys canicapilla* (Sharpe).

Temminck's Jungle Babbler.

*Aethostoma pyrrhogenys canicapillum*, Chasen 1935: 212.

Three clutches of two and a single egg taken at Kiau in March 1939. Egg-shaped. Surface smooth and slightly glossy. Ground colour etain blue or dull opaline green, fairly thickly spotted with light purplish grey and prout's brown or argus brown, the brown predominating and the spots sometimes thicker towards the broad end. Dimensions (7 eggs); average, 20.1 × 15; max. 21 × 15.5; min. 19.5 × 15, 20.5 × 14.5. Details; taken 4/3/39, 19.5 × 15; 11/3/39, 20.5 × 14.5 & 19.5 × 15; 27/3/39, 21 × 15.5 & 21 × 15; 30/3/39, 19.5 × 15 & 19.5 × 15.

*Stachyris nigriceps borneensis* Sharpe.

Greythroated Tree Babbler.

Two clutches of two eggs, six of three and one of five, all taken at Kota Belud, 6-29 March, 1939. Egg-shaped. Surface smooth and slightly glossy. Colour white. Dimensions (27 eggs); average,  $19.8 \times 14.9$ ; max.  $21 \times 15$ ,  $20.5 \times 16$ ; min.  $19 \times 14.5$ .

*Macronus gularis montana* (Sharpe).

Yellowbreasted Tit Babbler.

*Mixornis gularis montana*, Chasen 1935: 226.

Seven clutches of two eggs and one of three, taken mostly at Kiau in February and March 1939. Egg-shaped. Surface smooth and very slightly glossy. Ground colour white, finely and sparsely spotted with purplish grey (a few spots) and chestnut or burnt sienna, the markings usually being thicker, or even forming an almost continuous band, round the broader end. Dimensions (17 eggs); average,  $18 \times 14$ ; max.  $20 \times 14$ ,  $19.5 \times 15$ ; min.  $16 \times 13$ . Details; Kaung, 11/2/39,  $18 \times 15$  &  $19.5 \times 14$ ; Kiau, 23/2/39,  $17.5 \times 14$  &  $18 \times 14$ ; Kiau, 7/3/39,  $16 \times 13.5$ ,  $16 \times 13$  &  $16 \times 13.5$ ; Kiau, 25/3/39,  $20 \times 14$  &  $19 \times 14$ ; Kiau, 20/3/39,  $20 \times 14$  &  $19 \times 14$ ; Kiau 27/3/39,  $18 \times 14$  &  $19.5 \times 15$ ; Kiau, 28/3/39,  $18 \times 13.5$  &  $18 \times 13.5$ ; Kiau 31/3/39,  $18 \times 14.5$  &  $17 \times 14$ ; Sandakan Estate, 15/6/38,  $19 \times 13.5$  &  $18 \times 15$ .

*Siva castaniceps everetti* (Sharpe).

Chestnutheaded Siva.

*Staphida castaniceps everetti*, Chasen 1935: 228.

Four single eggs, six clutches of two, three clutches of three, one clutch of four, three clutches of five and two clutches of six, all taken at Kiau between 17 February and 31 March, 1939. Egg-shaped. Surface smooth and slightly glossy. Ground colour white, rather sparsely spotted with light purplish grey and auburn or vandyke brown, in which the brown predominates; in some cases the markings are distributed fairly evenly, but in the majority they are rather thicker round the broader end. Dimensions (56 eggs); average,  $18.2 \times 14$ ; max.  $19.5 \times 14.5$ ,  $18.5 \times 15$ ; min.  $16.5 \times 13.5$ ,  $18 \times 13$ .

Family Turdidae

*Copsychus saularis niger* Wardlaw Ramsay.

Magpie Robin.

One clutch of three eggs taken at Kota Belud, on 3 March, 1939. Egg-shaped, but rather elongated. Surface smooth and glossy. Ground colour a water green, fairly evenly flecked with pale purplish grey and auburn. Dimensions,  $27.5 \times 17.5$ ,  $27 \times 17.5$  &  $26 \times 17.5$ .



Family Sylviidae

*Seicercus superciliaris schwaneri* (Blyth).

Bamboo Flycatcher-Warbler.

*Abroscopus superciliaris schwaneri*, Chasen 1935: 253.

One clutch of three eggs taken at Kiau, on 29 March, 1939. Egg-shaped. Surface smooth and slightly glossy. Ground colour white, thickly flecked with mahogany red, more densely round the broader end, and a few spots of light purplish grey (beneath). Dimensions, 16.5 × 12, two eggs broken.

Family Artamidae

*Artamus l. leucorhynchus* (Linné).

Swallow-Shrike.

One clutch of three eggs and one of four, both taken in April, 1939. Egg-shaped. Surface smooth and very slightly glossy. Ground colour white with a few coarse blotches of pale purplish grey, antique brown and finer spots of raw umber; in most cases the majority of the markings are concentrated round the broader portion of the egg. Dimensions (7 eggs); average, 23.1 × 17.8; max. 24 × 18; min. 22.5 × 17.5. Details; Kota Belud, 7/4/39, 22.5 × 18, 23 × 18 & 23.5 × 17.5; Sandakan Estate, 26/4/39, 24 × 17.5, 22.5 × 18, 24 × 18 & 22.5 × 17.5.

Family Dicaeidae

*Dicaeum concolor borneanum* Lönnerberg.

Plain Flowerpecker.

One clutch of two eggs taken at Kiau, 23 March, 1939. Egg-shaped. Surface smooth. Ground colour pale orange pink, thickly flecked towards the broader end with burnt sienna, with in addition a few fine spots of chestnut. Dimensions, 14 × 11 & 13.5 × 11.

Family Nectariniidae

*Leptocoma jugularis microleuca* (Oberholser).

Yellowbreasted Sunbird.

One clutch of two eggs taken at Sandakan Estate, 27 March, 1939. Egg-shaped. Surface fine matt. Ground colour white but almost completely obscured with a fine speckling of light olive grey, with a few spots of mummy brown. Dimensions, both 16 × 11.

*Arachnothera affinis everetti* (Sharpe).

Greybreasted Spider-hunter.

A clutch of two eggs taken at Kota Belud on 28 February, 1939. Egg-shaped. Surface smooth and glossy. Colour an uneven, flecked olive brown, rising to clove brown in a ring round the broader end. Dimensions, 21 × 15.5 & 21.5 × 15.

Family Ploceidae

*Munia atricapilla minuta* (Meyen). Blackthroated Munia.

A clutch of six eggs taken at Kota Belud on 17 January, 1939. Egg-shaped. Surface fine matt. Colour white. Dimensions,  $16 \times 11.5$ ,  $16 \times 11$ ,  $16 \times 11$ ,  $15.5 \times 11.5$ ,  $15.5 \times 11.5$  &  $15.5 \times 11.5$ .

*Munia fuscans* (Cassin). Brown Munia.

A single egg, a clutch of four and a clutch of five eggs taken at Sandakan Estate between 27 March and 6 April, 1939. Egg-shaped. Surface fine matt. Colour white. Dimensions (10 eggs); average,  $14.5 \times 10.7$ ; max.  $15.5 \times 11$ ; min.  $13.5 \times 10$ .

Family Dicuridae

*Dicurus leucophaeus stigmatops* (Sharpe). Ashy Drongo.

Two clutches of two eggs taken at Kiau at the end of March, 1939. Egg-shaped. Surface fine matt. Ground colour white, or very slightly tinged with light ochraceous-buff, with a few spots of pale purplish grey, auburn and raw umber, in some cases mostly at the broader end. Dimensions; taken 27/3/39,  $26 \times 18.5$  &  $25.5 \times 17.5$ ; taken 29/3/39,  $22.5 \times 17$  &  $24 \times 18$ .

*Dicurus hottentottus borneensis* (Sharpe). Spangled Drongo.

One clutch of two eggs taken at Kaung on 11 February, 1939. Egg-shaped. Surface rough. Colour white, coarsely blotched with pallid neutral grey, pale purplish grey and mahogany red, the markings occurring mostly at the broader end. Dimensions,  $28.5 \times 20$  &  $29 \times 20$ .

Family Corvidae

*Kitta chinensis minor* (Cabanis). Green Magpie.

A clutch of three taken at Kiau, on 14 February, 1939, and a single egg taken in the same locality on 10 March, 1939. Egg-shaped. Surface smooth, but coarsely pitted. Ground colour white finely flecked with pale neutral grey and medal bronze. Dimensions; taken 14/2/39,  $30 \times 24$ ,  $30 \times 23$  &  $31 \times 23$ ; taken 10/3/39,  $32 \times 22$ .

No. 6. Nesting notes on the Streaked Fantail Warbler, *Cisticola juncidis malaya* Lynes.

The Streaked Fantail Warbler<sup>1</sup> is common and widespread over open grassland throughout the lowlands of the Malay States.

<sup>1</sup>. Malayan Checklist No. 466.

It is also particularly plentiful in similar areas on Singapore Island. The greater part of the original data recorded here was obtained in the Sime Road Internment Camp on the outskirts of Singapore in 1944-45. The site of the camp is adjacent to a golf course and a few records made subsequently in the latter area are also included in this note.

#### General Habits.

Females and non-breeding males normally keep to the undergrowth, and when disturbed fly for only a short distance before dropping down to the grass again. Breeding males are much more conspicuous and they quickly demonstrate the presence of the species in any particular area. At fairly frequent intervals the male rises steeply into the air to a height of 60-120 feet over or in the vicinity of its mate, calling loudly as it does so. The upward flight may take the form of a spiral. More usually the bird climbs in a zig-zag of inclined planes, one approximately above the other. It may descend in a similar manner, but it generally comes down in a long dipping sweep which carries it some distance from the spot over which it was displaying. On these occasions it usually calls as it comes down, as well as during the ascent. I have only once heard *Cisticola* calling when not on the wing; this was a bird which "sang" intermittently for about 20 minutes from a perch on the top of an old post standing about 5 feet above the surrounding grass.

#### Voice.

The "song" is very loud for the size of the bird. It consists of a short series of sharp, rather scratchy, calls of *tsit*..... with intervals of 1 to 2 seconds between them. Normally each chirp coincides with a dip in the bird's flight. Frequently it gives short bursts of 6 to 8 calls separated by longer periods of silence lasting 5 to 10 seconds. The alarm call is a much softer, steadier *tsit, tsit, tsit*..... with scarcely any interval between the notes.

The bird generally gives its warning when flying straight over, or nearly over, the nest at a height of about 10 to 25 feet. Adults, particularly the male, often emit a regular, low twittering note when approaching the nest with food, *tërsit-tërsit-tërsit-tërsit*.....

#### Breeding Season.

On Singapore Island the normal breeding season would seem to run from March to August, with the majority of the nests active between June and August. My earliest date is a nest with three eggs found on 5 March, 1945, and the latest a clutch of three eggs which hatched on 15 August. A few birds certainly breed outside these limits. Courtship flight was observed as early as the end of December and from then intermittently to the end of July. Spittle (MS note) records nests

with eggs found in March, April, May and July, and young birds in March and October; he also reports a courting pair seen towards the end of December. Lynes (1930: 93), probably on information supplied by H. C. Robinson, gives February to August as the breeding dates for Singapore, but with exceptions. The period covered is roughly that of the summer rains. The weather in Singapore is irregular, and was so even before the Japanese occupation, but as a general rule there are short dry spells about January-February and July-August, with intermittent rain, heaviest from October to December, in the intervals between them.

The timing of the periods of maximum rain varies in different parts of the Malay Peninsula. Madoc (1947: 89) gives the breeding season for this bird as February to June, without specifying the localities. Edgar (1933: 151) says that in the Dindings, southern Perak, nests were found from February to May; February is normally a very dry month in this area, and the wettest periods are round April and October. Herbert (1923: 100), under the heading *Cisticola cisticola cursitans*, says that round Bangkok, where the seasons are more marked, it starts building as soon as the rains commence; he gives the normal period for nesting as from early May, if the rains are good, to the end of August, with, of course, exceptions. It would in fact, seem that in general this bird breeds in the wetter, or at least in fairly wet, months, where the seasons are adequately defined. Further south, where the seasons are less clear-cut, it begins earlier than in the north and finishes about the same time.

#### Nest.

Very little rice is grown on Singapore Island, and here *Cisticola* nests almost entirely in open grassland, mostly among lalang, *Imperata cylindrica* Beauv. On the mainland it also breeds in the grass along the edges of the padi-fields, and according to Herbert (1923: 100) this is its favourite situation in the neighbourhood of Bangkok. In lalang areas the majority of the nests that are located are within about ten feet of the edge of the field. Undoubtedly it is much easier to find nests in this region, but it would seem that to some extent at least the birds themselves show a preference for it.

The nests are normally built in moderately low grass. They are generally about 15-30" from the ground, but they may be as low as only 5" or 6" above it. The determining factor is largely the height of the grass which always over tops the nest by 6-12". The nest is a neat, compact purse, with a maximum diameter of 2 $\frac{1}{4}$ -2 $\frac{3}{4}$ " and a height of 3 $\frac{1}{2}$ -4"; the upper portion is appreciably narrower than the lower, and the orifice may only be 1-1 $\frac{1}{4}$ " wide. Normally the rim is at least a little higher



at the back of the cup, and frequently it is built up a further 1-1½" in this region. The nest is supported by the incorporation of about 25 to 45 grass-stems or leaves in the outer layer of its wall. The narrowing of the upper portion bends these over slightly, and some of the heads tend to clump together; but in general the nest causes remarkably little disturbance of the surrounding vegetation and is most inconspicuous.

The construction of the nest varies slightly in the extent and quality of the workmanship, but in over forty examples the general plan was identical. The outer portion consists of pieces of lalang blade loosely plaited together, and fastened to the supporting stems and leaves by cobwebs wound over them. Lalang down itself may also be used for this purpose. In a few cases the dead leaf blades are actually pierced, and the cobweb threaded through them. The inner portion of the nest wall usually contains a number of fine, small, much branched rootlets, or the spiny stalks or seed-case skeletons of the sensitive plant, *Mimosa pudica* Linn.<sup>1</sup> The inside of the nest is generally lined with lalang down, but in a few cases this is omitted. The lower portion of the cup, and particularly its base, is more stoutly built than the remainder of the nest, and gives it its form and shape. When building the birds work from the outside. They begin by fastening some of the supporting stems and leaf-blades to each other with cobwebs, and then plait the strands of picked grass blades into a cup between them. The rim and the upward projection on one side are the last parts to be completed, and they may not be finished properly.

Both birds take part in the construction of the nest, but the cock does rather less work than the hen. Building occupies five to seven days. The hen may begin laying immediately, but there is often an interval of two to three days during which occasional strands of cobwebs are added to the outside of the nest. Two nests were put together, rather sketchily, in about five days, and the eggs laid the following day; the haste suggests that the birds were replacing earlier ones which had been destroyed. Three which took about seven days to build were not used until the third day after they had apparently been completed.

Ten abandoned nests were dissected. Four representative examples contained the following materials. Nest (a), supported by the inclusion of 33 lalang blades and stalks in the outer layer of the wall; fragments of dead grass blades, 267, mostly 30 to 60 mm. long, 2 as long as 200 to 205 mm. and 1 of 160 mm.; leaf stalks of *M. pudica*, 155; seed case skeletons of

<sup>1</sup> Both the stems and seed-cases of *M. pudica* possess a number of short, curved spines, which hook easily on any object and render them very valuable as a binding medium.

#### THE STREAKED FANTAIL WARBLER

*M. pudica*, 20; lalang down, approximately half a liqueur glass, together with the ends of 4 flower-heads each about 40 mm. long. Nest (b), supported by 35 lalang blades and stalks; fragments of dead blades, 341, of which over 50 were 90 to 120 mm. long; rootlets, 24, all about 25 to 35 mm. long; lalang down about 1½ liqueur glasses. Nest (c), supported by 26 blades and stalks; pieces of dead lalang blades, 307, mostly 30 to 60 mm. long, with 30 over 100 mm. long; leaf-stalks of *M. pudica*, 126; lalang down, about 1 liqueur glass. Nest (d), supported by 43 lalang blades and stems; pieces of dead blades, 255, mostly 20 to 60 mm. long, but about 30 over 70 mm. long; seed case skeletons of *M. pudica*, 117; lalang down, about 1 liqueur glass.

#### Eggs.

Thirty-one clutches were examined; twenty-four contained three eggs and the remainder two. Herbert (1923: 102) says that four is the normal full complement in the Bangkok area. Edgar (1933: 151) gives only one or two for nests in southern Perak. Madoc (1947: 89), localities not specified, says two eggs, but the Raffles Museum collection contains a clutch of three which he took in eastern Pahang in April 1938. Spittle (MS note) says two to three eggs for nests on the Changi Promontory, Singapore Island. Clutches from the Malay Peninsula are therefore certainly smaller than those recorded by Herbert for Siam proper, though it is probable that some of the very low figures represent incomplete sets.

The eggs are egg-shaped, with the surface smooth and slightly glossy. The ground colour is usually a very pale watery blue, but it may be white; over it is a fine, irregular spotting of pale burnt umber or burnt sienna brown, often thicker at the broader end. One egg examined was light blue, and nearly immaculate; a second had the spots confined to a fairly dense band round the broadest portion. Dimensions (20 eggs); average, 15.7 × 11.6 mm.; max. 17 × 12; min. 15 × 11.5, 15.5 × 11.

#### Incubation.

Both birds incubate. The eggs are often left unattended during the middle hours of the day, especially towards the end of the incubation period. Laying was recorded fairly closely in the case of five clutches each of three eggs. In one the first egg was laid between 7 a.m. and 10.30 a.m.,<sup>1</sup> the second during the afternoon and the third between 7 a.m. and 10.30 a.m. the following morning; incubation began the same afternoon. In three cases the clutch was completed in one day between 7

1. "Tokyo Time." In relation to it the sun rose between 6.45 a.m. and 7.15 a.m., and set at approximately the same time in the evening. The nests were inspected at 7 and 10.30 a.m. and 3 and 6 p.m.

a.m. and 6 p.m.; incubation probably did not begin until the following afternoon. In the fifth clutch two eggs were laid between 7 a.m. and 10.30 a.m., and the third added in the same period the following day. In all cases the eggs hatched during the course of a single day, the first between 7 a.m. and 10.30 a.m. and the last between 3 p.m. and 6 p.m. On the other hand in a further nest which was found on 11 June with two eggs and a newly hatched chick the two eggs did not hatch until the following afternoon, at least twenty-four hours after the first one. In the five nests recorded in detail the period between the time when the last egg was laid and the time when the last chick hatched ranged from ten days eight hours  $\pm$  three hours to eleven days  $\pm$  three hours.

#### Fledging.

A newly hatched chick is completely naked, with the eye-slits barely visible. The general colour is a pinkish orange, with the feet flesh-coloured, the bill a pale, watery horn brown and the skin at the angle of the gape pale sulphur yellow. The inside of the mouth is bright yellow, and the tongue bright yellow with a broad black band, slit anteriorly in the midline, across it. The only feather tracts visible under the skin are those of the remiges. By the beginning of the third day the skin is paler, the bill slightly yellower and all the feather tracts are clearly visible.

The first sheathes to break the skin are those of the remiges, which come through towards the end of the third day. Initially these grow at a uniform rate, but by the fifth day the outermost primaries have begun to lag behind the others. The sheathes on the back, scapular region, head and neck pierce the skin about this time. By the time that the chick is six days old all the sheathes are through the skin. The eyes open during the seventh day. By the eighth day nearly all the feathers have emerged 1 to 3 mm. beyond the ends of their sheathes except for those on the fore part of the head and the chin. From this point the feathers develop rapidly, and by the time that the chick is about ten days old it is passibly though sketchily covered. The birds normally leave the nest when they are about eleven days old, but a close inspection during the preceding twenty-four hours may precipitate their departure, while others apparently remain until they are nearly twelve days old.

One of the parents invariably remains in the nest with the chicks throughout the night during the early stages of development, and frequently one does so up to the point at which the family abandons it. Usually it is the female bird, but on two occasions the cock was found to be in the nest at sunrise.

THE STREAKED FANTAIL WARBLER

One set of three chicks was measured to within fifteen hours of their leaving the nest; the figures, all in mm., for the eldest and youngest are given below. All measurements were taken about 7 p.m.

Age	Total length	Wing flat	Tail	Culmen	Gape
1-4 hours ..	32	< 4.5	..	< 3.5	< 5
9-12 hours ..	35	4.5	..	3.5	5
c. 2 days ..	38	5.5	..	> 3.5	6
c. 2½ days ..	41	7	..	4	6.5
c. 4 days ..	45	9	..	4.5	7.5
c. 4½ days ..	47	12	..	5	8
c. 6 days ..	55	20	..	6	8.5
c. 6½ days ..	58	23	..	6.5	9.5
c. 8 days ..	64	28	4	8	9
c. 8½ days ..	67	30	4.5	9	11
c. 10 days ..	72	38	6.5	< 9	11
c. 10½ days ..	73	39	7	> 9	12

Feeding.

Both parents feed the chicks. The food consists largely of caterpillars, but they also provide small grasshoppers, crickets, and occasionally other insects and spiders. At least the greater part of the material is obtained from the lalang slopes by searching in and around the bases of tussocks. Sometimes the adults work within 20 or 30 feet of the nest, but they usually go about 50 to 200 yards away.

The chicks are fed more frequently as they grow older, but there is considerable individual and day-to-day variation in the rate at which the food is brought to them. Chicks three to five days old were fed about once in twenty minutes on two consecutive dull afternoons (♂ 4 visits, ♀ 3, in 2 hours 20 minutes; ♂ 2 visits, ♀ 4, in 2 hours), while a second pair, with nestlings of roughly the same age, fed once in about sixteen minutes on two consecutive clear afternoons (♂ 3 visits, ♀ 4, in 2 hours; ♂ 4 visits, ♀ 4 in 2 hours 10 minutes). A group of three fledglings which had just left their nest were seen being fed every four to five minutes during the course of two bright but cloudy afternoons.

The parent birds generally reach the nest by an indirect route. In one case the male always approached from a height of about fifty feet and descended in a series of swinging arcs, passing backwards and forwards over it, until he was only a few feet above the lalang. Then he dropped straight down to a flowering head close to the nest, or alighted in a clump a short distance away before making a final short dash to it.



The female of this pair usually flew once over the nest, calling softly, and then turned back and flew straight towards it. In alighting the birds nearly always settle near the top of aalang stem close to the nest, and then slide down it until they are almost level with the entrance.

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#### No. 7. Nesting notes on the Yellowbreasted Sunbird, *Leptocoma jugularis microleuca* (Oberh.).

The Yellowbreasted Sunbird<sup>1</sup> occurs widely, but in varying numbers, in coastal districts on both sides of the mainland of the Malay Peninsula, and on the majority of the off-lying islands. It is particularly plentiful on Singapore Island within a few miles of the coast, and is frequently seen in gardens in this region. It is the best-known, and probably the commonest, sunbird on the island. The greater part of the original data recorded here was obtained in the Sime Road Internment Camp in 1944-5; the remainder has been gathered subsequently in the Tanglin district of Singapore town.

#### General Habits.

This bird is found in a wide range of habitats in coastal areas, but it is seen most frequently in open scrub, orchards and gardens. It is a noisy and conspicuous feeder. It subsists mostly on nectar, but it also takes spiders and any of the smaller insects. It usually feeds fairly near the ground, but at times it works over tall trees and is very partial to the material available to it in the crown of a flowering coconut palm. It generally feeds perching and in the case of blossoms like the Canna and Hibiscus pierces the side of the corolla to obtain the nectar instead of approaching from the front. It can hover in the manner of the American humming-birds, but it does it more clumsily and for a much shorter time.

#### Voice.

The Yellowbreasted Sunbird possesses two distinct calls. The working or feeding note is a loud, strident, querulous *chee-ip..... chee-ip.....*, with a distinct pause between the notes.

<sup>1</sup>. Malayan Checklist No. 541a.

## THE YELLOWBREASTED SUNBIRD

It is appreciably more vocal in clear, sunny weather, in contrast to the Orangebellied Flowerpecker which has a slightly similar call, but is rather subdued in bright weather and much noisier on dull days. The flight call, *trik..... trik.....*, is very like that of the Flowerpecker, but slightly quieter and less metallic. When taking off the Sunbird often gives a preliminary call of *chee-ipee*, repeated, rather sharply, two or three times.

### Breeding Season.

On Singapore Island the normal breeding season runs at least from January to September, with periods of augmented activity from January to March and June to September. Possibly a few birds breed in every month of the year. Edgar (1933: 159) reports nests from the Dindings, lower Perak, from January to May. According to Chasen (1939: 387) Ryves found nests in Negri Sembilan in January and April, and Madoc found eggs in west Selangor from January to May. These suggest that in the Malay States it breeds only in the first half of the year, but it must be remembered that this bird is not as common in these areas as it is on Singapore Island. Possibly it nests through at least the greater part of the year there also, with a single peak period in the first 4-5 months. Herbert (1923: 221), writing of *Cyrtostomus j. flammoxillaris* (= the northern race, *Leptocoma jugularis flammoxillaris* (Blyth)), says that round Bangkok nests are plentiful by early February and continue as freely up to the end of August; a fair number may be found in January and September, and occasional ones in the other months. This is much the same as the situation in Singapore, except that here *L. j. microleuca* slackens off in April and May.

### Nest.

Under fully natural conditions the nest is generally suspended from the end of a hanging branch of a tree, or from a bush or creeper, at heights of 2 to 25 feet above the ground. Occasionally the birds make use of the end of a coconut palm leaf. On the whole the lower sites are favoured more than the higher ones, and probably about two-thirds of the nests are built at heights of less than 10 feet.<sup>1</sup> In contact with man and his works this bird has found a substitute for tree and shrub branches, and on Singapore Island a number of nests are suspended from electric cables or telephone wires, often close to their entry into a building, and from barbed or galvanised wire fences. Barbed wire barricades running through areas of lalang and

<sup>1</sup> Spittle (MS notes) says that only 1 out of a series of 12 nests found on Changi Promontory in 1943 was more than 8 feet from the ground. My records for 56 nests show 33 nests below 10 feet, but a number of the higher nests were near to buildings.

coarse grass seem to be particularly attractive to it. Certain of the higher sites chosen are very exposed, and the nests occupying them must be continually swinging through 45-60 degrees on all but the calmest days. I have even seen wind gusts lifting an inhabited nest hanging from a telegraph wire until its long axis was nearly horizontal.

The nests are built on a common basic plan, though they show some appreciable variation in finish. 31 examples were examined in detail. They are fairly compact pear-shaped, structures, 4-5" high and with a maximum diameter of 2-2½". The entrance, which is situated near the top, is generally oval, about 1½" high and ¾-1¼" wide. It is protected by a projecting eave which may jut out for as much as 1¼-1½". The top of the nest, above the level of the eave, is continued upwards to form a holdfast which embraces the branch or wire from which the nest is suspended. Below the nest there is an untidy hanging tail, varying in length from a few inches to nearly a foot. This obviously increases the surface area of the whole structure and in exposed situations the wind's hold on it. At the same time it undoubtedly serves to damp down the sway of the nest when the bird is alighting. Observations suggest that the tail is not designedly shorter in exposed situations, and that variations in length depend rather on the energy of the builder and the extent to which fragments subsequently fall away from it. Some of the longest tails that I have seen were on nests suspended from telegraph wires and the ends of Albizzia branches.

The nest is built of vegetable fibres, short strips of dead grass blades, in the neighbourhood of native houses fragments of atap, bound together with spiders' webs. The pieces are not plaited to any measurable extent. It is generally neatly and fairly thickly lined with very fine vegetable fibres and lalang or other plant down. It is not unusual to find small feathers cast by the domestic fowl included in the lining in the neighbourhood of kampongs, and several nests which I examined that had been built near to Tulip Trees, *Spathodea campanulata* Beauv., had 25-35 of the papery winged seeds pressed down in the floor. Spittle (MS notes) records the presence of intermediary layers of petals of the Shoe Flower, *Hibiscus rosasinensis* Linn., in the downy layer, and Edgar (1933: 159) the use of bulbul feathers.

The outside of the nest and the tail are variously and untidily decorated with fragments of any vegetable and other material available in the neighbourhood. These give it a very ragged, unplanned appearance which may easily result in its being taken for a bunch of refuse that has been caught up on the wire or branch-end. Bits of atap, small pieces of bark,

#### THE YELLOWBREASTED SUNBIRD

small dead leaves and the frass from wood-boring larvæ or caterpillar faeces are the most general elements in the decoration, but lengths of string, blobs of cotton wool, moss, discarded combings of human hair and the cast feathers of other birds are occasionally used.

The nest is built by the hen. The cock is normally present in the vicinity for at least the greater part of the time, vocal but unco-operative and limiting his help to visits of inspection. The work takes about eight days, but after the structure is apparently completed occasional bits of decoration may be added for a further 2-3 days before the first egg is laid. The hen begins by building up an untidy solid mass of material wound round and hanging from the supporting structure. It apparently owes its cohesion largely to the inclusion of strands of spider's silk. The bird obtains these by hovering in front of a web and then flying backwards with a beak-full of the material. An appreciable amount is required and the hen searches widely for it, even to the extent of entering the verandas of houses. No doubt, prompted by sudden hunger, she occasionally takes the spider instead, but few domestic species rest in the centre of their webs. There is little doubt that the idea that the bird sometimes seeks food in inhabited buildings is based on the search for building silk.

By the time that she has been working for about two days the hen has accumulated a fairly large mass of material, with the beginning of a hanging tail below it. At this stage she starts perching on the main mass and thrusting her head into the upper portion. There she turns it from side to side until she has formed a cavity large enough to include the fore part of her body. Then she thrusts downwards and usually succeeds in hollowing out the interior of the nest by the end of the third day. This work puts a considerable strain on the upper portion round the entrance, and the wall generally becomes extremely thin. To compensate for this additional material may be plaited in it. Alternatively, if the structure is definitely unsatisfactory, she may abandon the nest and begin another elsewhere. It is not unusual to find nests left at this stage. In one case under observation the bird attempted to use an abandoned effort as a source of material for a second attempt, but apparently had some difficulty in getting the fragments free of the spiders' webbing with which they had been entangled.

The lining is added as soon as the shape of the chamber is established. The bird presses it into position along the sides by entering the nest at intervals and half-expanding her wings, so that she pushes outwards with the dorsal surface of the distal portion. As the inside of the nest nears completion the hen begins to work on the eave. She pulls material down from the entrance to form the core of it, and then if necessary adds



further fine vegetable fibres to shape it more fully. Work on the external decoration begins about the sixth day, and with it the addition of further material below the nest to extend the tail. When operating on the outside of the nest the hen grasps the wall with her feet and supports her weight on her tail. At intervals she straightens her thighs to their full extent and leans back to look well at her work.

The female often utters a short chirrup on returning to the nest in the early stages of its construction. Sometimes this is answered by the cock from his perch nearby. As the work progresses her calls become more frequent, until ultimately she almost invariably heralds her return in this manner. The cock also becomes increasingly stimulated by the nest as its form matures. From about the fifth day he hovers twittering round it at intervals and even displays to it, raising his tufts of orange-yellow pectoral feathers so that they stand out like the pectoral fins of a fish.

The increasing interest of the cock in the nest, culminating in display to it, might suggest that its construction is an essential part of courtship, but this cannot be so. In spite of statements to the contrary (Chasen, 1939: 387) nests may be used more than once, and on these occasions the hen merely adds a few further bits of decoration to the outside and renews or augments the downy lining. Occasionally birds finish a nest which had previously been abandoned. In one case a nest was left when almost completed; five months later two birds finished it and reared a brood there. No ringing has been attempted in Malaya, and it is not certain that repeated occupation of the same nest (one is known to have been used, with repairs, for four years) is always due to the same birds. It is possible that certain sites have strong attractions to the Sunbird which are not apparent to the human eye. Some support is lent to this by the fact that sites are sometimes re-occupied after an interval of over a year.

#### Eggs.

Twenty-nine clutches were examined; 1 contained 3 eggs and 2 comprised only a single egg; the remainder (26) had 2 eggs. Spittle (MS notes), Madoc (1947: 110) and Chasen (1939: 387) all say 2 eggs. This figure is also given by Herbert (1923: 221) for the northern race in the neighbourhood of Bangkok.

The eggs are egg-shaped with a fine matt surface. The ground colour varies from off-white to a very pale green; over it is a fine speckling of light olive-grey, which may almost completely obscure it; above this are a few larger spots or blotches of mummy-brown or russet brown and short squiggles of black or dark umber brown. In some cases these markings

## THE YELLOWBREASTED SUNBIRD

are distributed fairly evenly over the whole surface, but in others they are largely restricted to the broader end. Dimensions (20 eggs); average,  $15.8 \times 11$  m.; max.  $17 \times 11.5$ ; min.  $14.5 \times 10.5$ . Herbert (1923: 221) gives  $15.5 \times 11.0$  m. as the average size of eggs of the northern bird taken round Bangkok.

### Incubation.

Only the hen incubates, though the cock spends the greater part of the day at least in the vicinity of the nest. The eggs are often left unattended during the middle hours of the day, especially towards the end of the incubation period. Laying was recorded fairly closely in the case of four normal clutches. In each case the first egg was laid in the afternoon and the second during the course of the following day. The interval between the appearance of eggs varied from 15 hours  $\pm 3$  hours to 21 hours  $\pm 3$  hours. In three clutches the first egg hatched in the afternoon and the second egg 12-15 hours  $\pm 3$  hours later. In the fourth nest the first egg hatched about noon and the second egg 45 hours  $\pm 3$  hours later. In the first three instances the period between the time when the last egg was laid and the time when the last chick hatched ranged from 10 days 18 hours  $\pm 3$  hours to 11 days 3  $\pm$  hours. In the fourth nest it was 12 days  $\pm 3$  hours. This last chick was a small sickly creature and disappeared from the nest when it was about 4 days old.

### Fledging.

A newly hatched chick is completely naked. The general colour is a raw, reddish pink, with a head bluish, as though bruised. The bill is a pale horn brown, darker on the dorsal aspect and with the angle of the gape a very light sulphur yellow. The throat, tongue and inside of the mouth are a dull orange yellow. The only feather tracts visible under the skin are those of the remiges. The remainder do not start to appear until the third day. By this time the primaries and secondaries, in their sheathes, are beginning to pierce through the skin covering them.

The colouring of the soft parts and fleshy areas becomes stronger and darker as the chick grows older. By the end of the fifth day the gape is a full orange yellow, and the body purple grey, except for the throat and belly which are orange red. At this stage the ends of the sheathes are through the skin along the midline of the neck, on the flanks and on the dorsal surface of the wings. They are a dark lead grey except for those on the under parts and the lower border of the upper flank line, which are orange grey. The eyes begin to open at this stage.

By the end of the seventh day the skin is a dark purplish grey. The feathering is advancing rapidly and the sheathes in

the scapular region and along the centre of the back are 4-5 mm. long. The rectrices, which appear rather late, are still only about 2 mm. long. By the end of the seventh day the primaries, secondaries, greater wing coverts, scapulars and the majority of the feathers on the back and flanks have emerged from their sheathes. Those on the head, chin and shanks, the rectrices and a few of the lesser coverts are still enclosed. By the end of the eleventh day all the feathers have extended beyond their sheathes except those on the forehead and round the aural orifices. Both upper and lower tail coverts are present. The feathers continue to develop during the remainder of the chick's stay in the nest, but those on the forehead still remain in their sheathes.

The hen generally spends the night in the nest with the chicks until the family finally abandons it. She usually takes up her position about half an hour before sundown, and remains there until an hour after sunrise. In the early stages she may also enter the nest after feeding the chicks and sit brooding them for a few minutes. The young birds normally leave when they are 15-16 days old. The cock, who assists in feeding them, though he does less work than the hen, becomes increasingly solicitous at this stage and can often be seen with, or near, fledglings that have just left the nest.

One set of two chicks was measured at intervals of two days; the figures, in mm., for the elder are given below. All measurements were taken about 7 p.m.

Age	Total length	Wing flat	Longest remige	Tail	Culmen	Gape
c. 1 day .. ..	30	7	..	..	4	6
c. 3 days .. ..	45	9	..	..	6	6.5
c. 5 days .. ..	51	13	4	..	7	8
c. 7 days .. ..	60	21	10	2	8.5	10
c. 9 days .. ..	68	27	17	4	10	11
c. 11 days .. ..	72	32	22	6	11.5	13.5
c. 13 days .. ..	77	38	28	10	13	15
c. 15 days .. ..	80	40	29	12	13.5	15.5

#### Feeding.

Both parents feed the chicks. The food is carried in the adult's crop and regurgitated on its return to the nest. The cock is slower and more cautious than the hen. He generally alights on a branch or wire a few feet away first, and remains there for one or two minutes cleaning his bill against his perch and preening. The hen usually approaches more directly and

## NEST OF THE LONGBILLED SPIDERHUNTER

quickly. On several occasions she was seen to slip in and feed the chicks while the cock was still getting ready to descend to the nest.

Random observations on the frequency of feeding visits were made on several nests. In the case of one with two chicks a regular watch was kept from 3-4 p.m. on alternate days throughout the nestling period. The following visits were recorded.

Approximate age Elder Chick in days	1	3	5	7	9	11	13	15
Visits by ♂	2	1	3	2	2	2	3	3
Visits by ♀	3	4	3	4	3	5	5	4
Total	5	5	6	6	5	7	8	7

This gives a total of 18 visits by the cock bird against 31 by the hen. This proportion is supported by the observations on the other nests. The female apparently feeds the chicks nearly twice as often as the male does. The frequency of feeding also increases slightly as the chicks grow older. In the field it seems that the parents work rather more quickly on warm sunny days than in dull weather, but the actual difference in the limited number of figures at present available is not significant.

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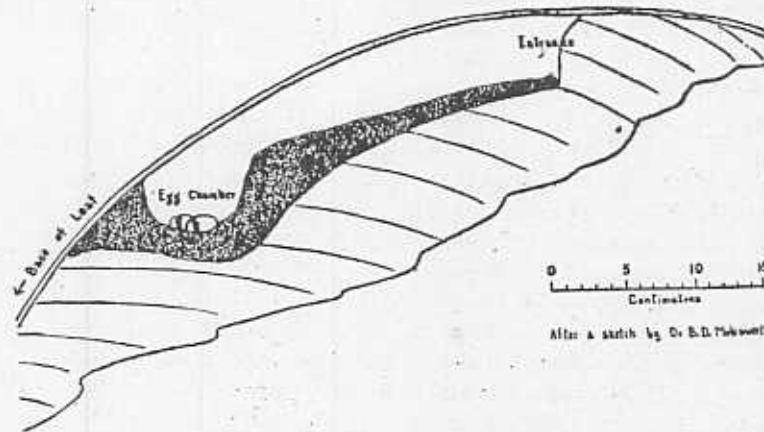
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### No. 8. The nest and eggs of the Longbilled Spiderhunter, *Arachnothera r. robusta* Müll. & Schleg.

There is at present only one published record of the nest and eggs of this bird. This is based on an example found in Sarawak in 1865 or 1866 by Doria, who took the hen to confirm the identification. The nest and eggs were described by Count Salvadori (1874: 185-6). An English translation of his account, with the measurements converted from millimetres to inches, is given by Shelley, (1876-80: 369).



Doria's nest, which was sewn to the under surface of a large leaf, in the usual spiderhunter manner, is described as 33 cm. long and 12 cm. wide. It was bottle-shaped, swollen out below to form the nesting chamber and flattened above. It was made of a thick layer of interwoven fibres, leaves, grass and bark.



The nest of the Longbilled Spider-hunter, *Arachnothera v. robusta* Müll. & Schleg., *in situ*: a diagrammatic sketch of the appearance following longitudinal section along the line of the midrib of the leaf.

The eggs, two in number, were white, finely streaked with black and with spots of the same colour towards the broad end; the dimensions are given as 21 mm. by 15 mm.

The Longbilled Spiderhunter (Malayan checklist no. 547) appears to be scarce in the Malay States, and at present is known formally only from a few scattered localities in Perak, western Pahang, Selangor and Negri Sembilan. On 13 April, 1949, Dr. B. D. Molesworth found a nest containing two fresh eggs in jungle country near the Leper Settlement at Sungei Buloh, Selangor. It was fastened to the underside of the broad leaf of an epiphyte, about 15 feet from the ground and overhanging a ravine. The leaf was over a foot wide at the point where the nest was attached to it.

The nest, which was subsequently sent to the Raffles Museum, is seemingly similar in form to Doria's example. It is roughly bottle-shaped, with the long neck flattened against the leaf. It is about 38 cm. long with a maximum width of 11.5 cm. The opening, which faces towards the tip of the leaf, is about 5 cm. wide and 3.8 cm. high. The entrance leads into a tunnel about 22.5 cm. long which terminates in a hemispherical egg chamber about 6.5 cm. in diameter. The nest is composed

#### NEST OF THE LONGBILLED SPIDERHUNTER

throughout of coarse vegetable fibres and thin strips of bark tightly but untidily matted together. A few pieces of cobweb are incorporated in it, but there is no sign of leaves or grass. It is fastened to the leaf along both sides by about 78 stitches of spider's silk which have apparently been passed through the vane from the underside and terminate on the upper surface in little blobs like knots. The stitches are spaced fairly widely, at about 6 mm. intervals along the sides of the tunnel, and more closely, at intervals of 2-3 mm. along the wall of the nest chamber.

The eggs are egg-shaped, with a fine matt surface. They are pure white in colour with a ring of black scrawls, looking as if made with a pen and Indian ink, round the broader end. One was broken in getting the nest down; the other measures  $22 \times 15.5$  mm.

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