

4. The Birds

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INTRODUCTION

EARLIER expeditions to Tioman (principally those already listed by Bullock and Medway, this *Bulletin*, p. 9) have effectively sampled the resident avifauna. Although no formal list of the birds of Tioman has been published, scattered accounts exist, and details of distribution and taxonomy have been summarised in Chasen (1935) and/or Gibson-Hill (1949). The two are not always consistent.

In this paper are listed all land and shore birds so far recorded from the island. Species recorded on our recent trip which had not hitherto been unambiguously attributed to Tioman or the Tioman archipelago (i.e., discounting vague embracing phrases such as "most offshore islands", "most suitable islands") are marked with an asterisk. The order and numbering follow Gibson-Hill (1949), but systematic names have been revised and English colloquial names are taken from McClure's Standard list for S.E. Asia (1963).

Of the 37 species of presumably resident birds, eight have in the past been distinguished subspecifically from mainland Malayan forms. Only one of these subspecies is endemic to the island (*Stachyris nigriceps tionis*); the remainder also occur elsewhere, on more distant islands to eastward in the South China Sea (Table 1).

TABLE 1

Birds of Tioman: distribution of subspecies that have been distinguished from mainland Malayan forms

| Trinomial | Distribution |
|--|--|
| <i>Treron vernans adina</i> (Oberh.)* | Tioman; Anamba Is.; Natuna Is. |
| <i>Pycnonotus plumosus chiroplethis</i> Oberh. | Tioman; Anamba Is. |
| <i>Pycnonotus brunneus zapoli</i> Oberh.* | Tinggi (? and Tioman); Anamba Is. |
| <i>Stachyris nigriceps tionis</i> Rob. & Kloss. | Tioman. |
| <i>Orthotomus atrogularis major</i> Chas. & Kloss. | Tioman; Anamba Is. |
| <i>Gracula religiosa prasiocara</i> Oberh.* | Tioman; Anamba Is.; Tambelan Is. |
| <i>Aplonis panayensis heterochlorus</i> Oberh.* | Tioman & Aor; Rhio Archipelago; Anamba & Tambelan Is.; Natuna Is.; North Bornean Is. including Mantanani & Karimata. |
| <i>Dicrurus paradiseus microlophus</i> Oberh. | Tioman; Anamba Is.; N. Natuna Is. |

*Not admitted by Gibson-Hill (1949).

We did not, in March-April 1962, attempt to collect series of skins, and available material does not permit any reassessment of the validity of these races. A few birds were collected, usually in order to verify identification; these were examined for ectoparasites and skinned. The skins are now in the collection of the Zoology Department, University of Malaya. But most of the observations given below are based on sight records, or on birds that were mist-netted and released after inspection and collection of ectoparasites.

ANNOTATED LIST

THE BIRDS OF TIOMAN

10. *Fregata andrewsi* Mathews. Christmas Island Frigate-bird.

11. *Fregata ariel* (Gray). Least Frigate-bird.

We confirmed previous observations (Gibson-Hill, 1950) that both frigate-birds habitually roost (but do not breed) on Pulau Rengis, off the west coast of Tioman (fig. 1). This tiny islet, consisting of no more than a steep pile of very large granite boulders, supports a close cover of stunted trees none of which exceed 20 feet in height. Characteristically, the frigate-birds gather over the island at sunset but do not come in to roost until nightfall, when they appear to settle on the ends of the bigger branches. They leave again at first light. 37 birds were counted off at dawn on 5th April, but many more were judged to be present on the evening of 7th April when a male and female of each species were collected.

Previous observers have found frigate-birds on Tioman between May and July. It remains to be ascertained whether they are in fact present throughout the year.

15. *Butorides striatus* (Linn.). Little Green Heron.

Several observations in the narrow strip of mangrove behind the rest-house at Tekek; also a solitary bird on the rocky foreshore south of Kg. Lalang, 28th March.

22. *Egretta sacra* (Gmelin). Reef Egret.

We found four individuals, all in the commoner grey phase, consistently present on the beach near Tekek; and one, also grey, was to be seen every day at Mokut during our stay there. Off Kg. Genting is a sea rock regularly used as a roost, much stained with droppings.

48. *Haliastur indus* (Boddaert). Brahminy Kite.

Present at Tekek, but not venturing far inland. Not recorded at Mokut.

60. *Haliaeetus leucogaster* (Gmelin). White-bellied Sea Eagle.

Common and conspicuous, restricted to the beach and close offshore. At least three individuals were consistently present in Tekek bay; one of them an immature apparently still dependent on its parents.

In a two-day circumnavigation of Tioman, Dunn observed 13 different White-bellied Sea Eagles, and this figure probably represents the total adult population. Daytime roosts were plotted (fig. 3) and show an even distribution around the island, giving an average density of one bird per 2.9 miles of coastline.

*71. *Spilornis cheela* Latham. Serpent Eagle.

Recorded inland only, never over the beach. From the sea a single bird was seen circling over forest at the foot of Nenek Si-Mokut (15th April); near Camp II its distinctive call was heard several times; and inland of Tekek, a single bird was watched for some time (23rd April) being mobbed by a pair of racket-tailed drongos.

*74. *Falco peregrinus* Tunstall. Peregrine Falcon.

During our week at Mokut (8-14th April) one or two peregrines were seen every hot day, circling in the thermals off the cliff faces of the Nenek Si-Mokut outcrop. No other records. On hot days these thermals attracted a number of raptors, some of which could not be identified.

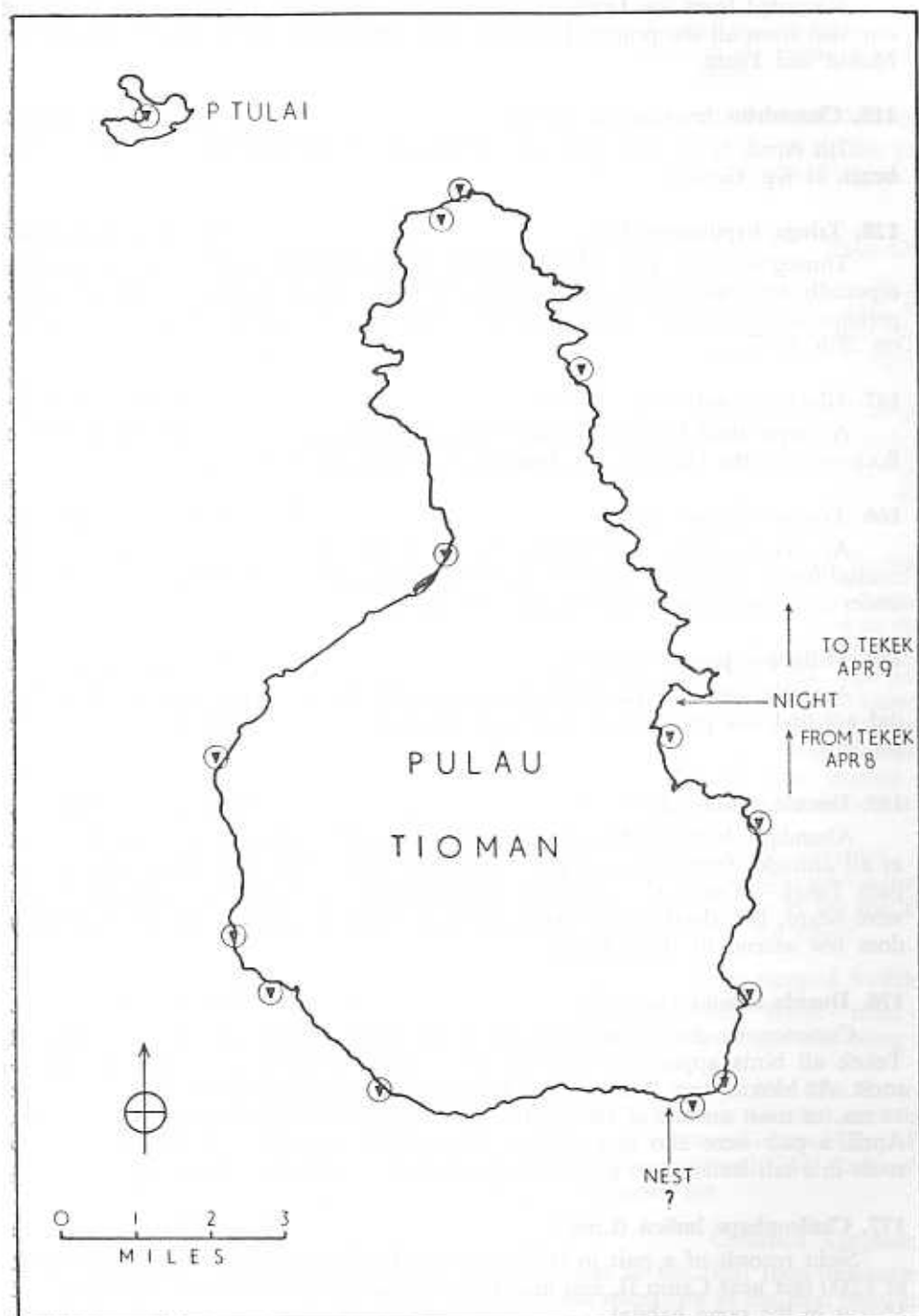


Figure 3. Sketch map of Pulau Tioman, showing distribution of White-bellied Sea Eagle population.

113. *Charadrius peroni* Schlegel.

Malay Sand Plover.

Recorded from the Tioman archipelago (Gibson-Hill, 1949) but absent during our visit from all the principal beaches, viz., those near Tekek, at Genting, Nipah Mokut and Juara.

115. *Charadrius leschenaulti* Lesson.

Large Sand Plover.

7th April, K. J. Kuncheria collected a female from a flock of 15-20 on the beach at Kg. Genting.

128. *Tringa hypoleucos* Linn.

Common Sandpiper.

Throughout our stay winter visitors were common, singly, on all beaches, especially near stream mouths; none were seen inland. A flock of eleven birds, perhaps on passage, were seen at the edge of the sea on the point south of Tk. Nipah on 25th April.

147. *Glareola pratincola* (Linn.).

Collared Pratincole.

A single tired bird on Tekek beach, 28th March; a male collected from a flock of 6 on the beach at Kg. Genting, 7th April (K. J. Kuncheria).

166. *Treron vernans* (Linn.).

Pink-necked Green Pigeon.

At Tekek, Juara and Mokut, flocks of this pigeon were common in the coastal fringe, in coconut plantations, belukar and scrub. A dead nestling was found under a coconut palm at Mokut on 10th April.

168. *Ptilinopus jambu* (Gmelin).

Jambu Fruit Pigeon.

A single specimen has been recorded from Tioman (Gibson-Hill, 1949). We did not find this pigeon, and since the species is locally migratory it may not be resident.

169. *Ducula aenea* (Linn.).

Green Imperial Pigeon.

Abundant, in noisy flocks of a dozen or so, in the canopy zone of tall forest at all altitudes from sea level (Tk. Nipah) to about 2,000 feet (especially on the path Tekek—Camp II—Juara; also at Mokut). At Camp V (3,000 feet) calls were heard, but always from lower down the hillside, and the species apparently does not ascend to this altitude.

170. *Ducula bicolor* (Scopoli).

Pied Imperial Pigeon.

Common by day in small flocks in the lower reaches of the forest, but at Tekek all birds apparently returned to P. Tulai in the evening (see below) to roost. At Mokut, too, flocks of this pigeon were seen at sunset heading south out to sea, to roost on one of the smaller satellite islands (Pulau Jahat); but on 11th April, a pair were also seen still on Tioman flying uphill at dusk and going to roost in a tall leafless tree top in the forest at about 500 feet, above Kg. Mokut.

177. *Chalcophaps indica* (Linn.).

Emerald Ground Dove.

Sight records of a pair in belukar above Tekek, a solitary bird in tall forest at 1,000 feet near Camp II, and in overgrown plantation at Mokut. Also netted at Mokut in the same habitat.

***190. *Cacomantis merulinus* (Scopoli).** Plaintive Cuckoo.

No formal record; but a long descending call resembling one of the two calls of this cuckoo was several times heard at Tekek at dusk. On two brightly moonlit nights, 23/24 and 24/25th April, a single bird called from dusk until dawn from the mangrove behind the rest-house. The more characteristic 4-note rising call was not heard.

203. *Phaenicophaeus curvirostris* (Shaw). Chestnut-breasted Malcoha.

A large green-billed malcoha was seen by B. L. Lim (8th April) on the path to Camp II. It was probably this species, which is recorded from Tioman by Gibson-Hill (1949 : 98).

***213. *Otus bakkamoena* Pennant.** Collared Scops Owl.

At Mokut apparently common in the overgrown coconut plantations on the lower slopes; we obtained one sight record (perched on a branch by night) and three net captures. By Camp II in tall forest a solitary bird was disturbed from roost in the hanging dead fronds of a wild *Arenga* palm at 0645 hrs., 27th April.

***229. *Caprimulgus macrurus* Horsfield.** Long-tailed Nightjar.

We failed to hear nightjars at dusk or dawn on any occasion, and although we were regularly out by night only once did any of us see nightjars. On 12th April three were encountered after dark in coconut plantations at Tekek. One, sub-adult, apparently of this species, was collected.

231. *Collocalia maxima* Hume. Black-nest Swiftlet.

Breeds in large numbers (cf. Gibson-Hill, 1948, under *C. lowi*) exclusively in landlocked caves, at all heights from a few hundred feet above sea-level to near the summit of G. Kajang. We found eggs (♂ 1) in 32 out of 215 nests, the remainder being empty, at Gua Sinah at about 2,000 ft., Ulu Lalang, on 5th April. The nests are regularly harvested by certain islanders, notably by Che Ismail of Kg. Lalang, who estimated that there were at least forty colonies in his beat; talks with collectors operating in other areas suggest that there are at least twice as many occupied caves in the island as a whole. Ismail's caves yield an average total harvest of 2 *pikul* of nests. At a mean figure of 4,000 nests/*pikul*, this figure indicates a breeding population of at least 8,000 adults in his sector alone.

Swiftlets were conspicuous only in the early morning and the evening. At these times of day, noisy and excited flocks would gather, over beaches and around the summits of G. Kajang and neighbouring peaks. During the heat of the day the birds apparently dispersed, and were not seen in numbers over the island.

233. *Collocalia fuciphaga* (Thunberg). Grey-rumped Swiftlet.

Colonies of this swiftlet, which builds the much esteemed "White" nests of commerce, are restricted on Tioman to sea caves only, the principal site being at Tk. Dungun, north of Juara.

Recent work (Medway, in preparation) has shown that *vestita* (the Brown-rumped Swiftlet) is a subspecies of *fuciphaga* (not = *francica* Gmelin) occurring only in Sumatra and Borneo. Records of "*vestita*" from Tioman (Gibson-Hill, 1949) can be attributed to very dark-rumped *C. fuciphaga germani*; and (234) *Collocalia vestita* should be deleted from the Tioman (and Malayan) list.

***250. *Alcedo atthis* (Linn.).** Common Kingfisher.

Regularly seen at Tekek in the mangrove and in the tidal (but freshwater) reaches of the S. Ayer Besar; at Mokut among the mangrove in the bay. Nowhere encountered inland.

- 258. *Halcyon coromanda*** (Latham). Ruddy Kingfisher.
Recorded from Tioman (Gibson-Hill, 1949: 120) but not seen by us.
- 261. *Halcyon chloris*** (Boddaert). White-collared Kingfisher.
Common and definitely not "relatively scarce" (Gibson-Hill, 1949 : 121) in the narrow strip behind the beach all round the island; observed at stream-sides; in mangrove and among coconut palms.
- *268. *Eurystomus orientalis*** (Linn.). Broad-billed Roller.
A party of 6-7 flying along Mokut beach, 9th April. Single birds also seen at Mokut in open cultivated land on 10th and 12th April.
(No woodpeckers were observed, although Wells, Dunn and Medway all independently heard an indefinite tapping near Camp II.)
- 332. *Hirundo rustica*** Linn. Barn Swallow.
- 333. *Hirundo tahitica*** Gmelin. Pacific Swallow.
Swallows were abundant on the beach at Tekek on our arrival. They were still there, in considerably reduced numbers when we left (27th April). Large flocks of an unidentified swallow were roosting on P. Rengis.
- 350. *Dicrurus paradiseus*** (Linn.). Greater Racquet-tailed Drongo.
Probably the most widely distributed bird on the island, this drongo was common and conspicuous in all habitats from mangrove, open planted areas, ladang and orchards, through belukar and secondary forest, to tall forest at all altitudes up to and including the ridge at 3,050 ft. at Camp V. Characteristically it was noisy, showy and unafraid.
- 359. *Corvus* sp.**
We were told by Che Ismail that crows occasionally visit Tioman. Their appearance is sufficiently rare to be considered a bad omen, foretelling a death.
- 377. *Malacopteron magnirostre*** (Moore). Brown-headed Tree Babbler.
Common in tall forest up to 3,000 ft., although not seen on the ridge itself at Camp V, nor on the summit of G. Kajang. Typically encountered in small parties of 3 to 4, foraging in the undergrowth at shrub level.
- 385. *Napothera brevicaudata*** (Blyth). Streaked Wren Babbler.
This montane bird is recorded from Tioman, but we failed to see it.
- 390. *Stachyris nigriceps*** Blyth. Grey-throated Tree Babbler.
On 20th April a nest of this species, with two downy young, was found in a bushy rattan plant, 3 ft. from ground level, at c. 1,200 ft., Ulu Lalang. The nest was a deep cup, half-domed, 14 cm. high by 8 cm. diameter. The outer casing consisted of dry, dead leaflets of rattan; the inner lining, of fibres of palm spathes, etc. along with very soft fibres apparently derived from decomposed monocotyledonous leaves.
Both the nest and its siting accord well with descriptions in Chasen (1939: 301).
- 407. *Alcippe poiocephala*** (Jerdon). Common Nun Babbler.
A simple descending seven-note call, widely heard in forest from Camp II to the slopes below Camp V, was tentatively identified as this species (D. R. Wells).

- 413. *Aegithina viridissima*** (Bonaparte). Green Iora.
Recorded from Tioman by Chasen (1935). Not seen by us.
- *423. *Pycnonotus atriceps*** (Temminck). Black-headed Bulbul.
A sight record by Dunn, in scrub at the edge of mangrove at Kg. Tekek.
- 433. *Pycnonotus plumosus*** Blyth. Large Olive Bulbul.
Stated to occur on Tioman by Gibson-Hill (1949), but Chasen (1935 : 201) records it only from nearby P. Tinggi. We did not see this bulbul and its inclusion in the island list remains tentative.
- 434. *Pycnonotus brunneus*** Blyth. Red-eyed Brown Bulbul.
Common in the southern part of the island, particularly in open country, orchards and plantations, but also observed in forest on the hill-sides up to 2,000 ft. in Ulu Lalang.
A nest, from which one fully fledged young was disturbed, was found at Mokut on 12th April, in the crown of a small (12 ft. high) isolated tree in the middle of harvested ladang. The nest was cup-shaped, measuring 11.5 cm. in diameter and 8 cm. deep externally, the inside of the cup being 9 cm. in diameter and 3.5 cm. deep. The materials used were as follows: outer casing, broad leaves, leaf stalks and midribs, interspersed with flecks of kapok; middle layer, principally broad strips of dry banana leaf with a certain amount of shredded graminaceous material including a threshed ear of rice; cup lining, dark fibres of *Arenga*.
- 441. *Hypsipetes criniger*** (Blyth). Hairy-backed Bulbul.
Found only in the undergrowth of tall forest, both around Camp II, and on the ascent to Camp V at 1,500 ft.
- 450. *Copsychus saularis*** (Linn.). Magpie Robin.
Recorded at Tekek, Nipah and Mokut, where it is common in open country around the villages, and among coconuts.
- 451. *Copsychus malabaricus*** (Scopoli). Common Shama.
Common in forest at all heights, from tall belukar behind Tekek up to the penultimate ridge of G. Kajang.
- 482. *Orthotomus atrogularis*** Temminck. Black-necked Tailorbird.
Abundant in bushes and scrub, including *Lantana* thickets, and secondary jungle around Kgs. Tekek, Mokut and Lalang. On G. Kajang it was also heard in the bamboo zone, and was the only bird apparently resident in the scrub on the summit, where an adult and a juvenile were seen immediately after dawn. At Mokut a family of three fledglings with one adult were seen on 10th April.
- *?505. *Muscicapa ?mugimaki*** Temminck. Black-and-orange Flycatcher.
A sexually dimorphic flycatcher was present in small numbers on the high ground around Camp V and on the summit of G. Kajang, 16th April. Field notes describe the male as all dark above, with an impression of slaty blue, and a distinct wingbar; breast orange and abdomen white. The female was olive-brown above, with breast orange and abdomen dark. As so often with flycatchers, these notes leave the identification in considerable doubt, and I include the record only for the sake of completeness.

518. *Motacilla flava* Linn. Yellow Wagtail.

Two birds seen on the beach on 8th April. A flock of eight in breeding plumage feeding in harvested ladang at Tekek, 24th April. A female was collected from the latter group, and is attributable to *M. f. simillima*.

526. *Aplonis panayensis* (Scopoli). Philippine Glossy Starling.

Large garrulous flocks were recorded at Tekek, along the beach and especially into coconut plantations, and at Mokut. Large flocks also roosted on P. Rengis.

533. *Gracula religiosa* Linn. Hill Myna.

In the region of Tekek and Juara equally abundant in the coastal strip among coconuts and in tall forest all the way to Camp II. At Mokut slightly less conspicuous, but still very common in the cultivated subcoastal fringe. On high ground it was present up to 2,500 ft., below Camp V, but relatively scarce at this altitude.

535. *Anthreptes malacensis* (Scopoli). Brown-throated Sunbird.

At Tekek and Mokut common in coconuts and fringing belukar.

539. *Nectarinia sperata* (Linn.). Van Hasselt's Sunbird.

At Tekek in mangrove behind the rest-house, in tall secondary forest, in belukar on the forest edge, and an uncertain sight record in the subcanopy level of tall forest near Camp II. At Mokut in orchards and plantations; and at T. Nipah in mangrove. Males were aggressive and singing strongly; one male collected had enlarged testes.

541. *Nectarinia jugularis* (Linn.). Yellow-breasted Sunbird.

Observed at Tekek and Juara in or near patches of mangrove. It was not seen at Nipah, in the more restricted area of mangrove there, nor elsewhere where there was no mangrove.

***552. *Dicaeum cruentatum* (Linn.).** Scarlet-backed Flowerpecker.

Sight records of three birds (both sexes) in mangrove and coconut at Tekek (Dunn.).

***562. *Zosterops ? palpebrosa* (Temminck).** Oriental White-eye.

A single bird, fitting this species in general character, and with a distinct eye-ring, seen in the mangrove of Tekek, 6th April, and at least two birds seen in belukar edge near Kg. Tekek, 8th April (Dunn). These sight records constitute the first published observation of white-eyes not only on Tioman but also anywhere on (or off) the east coast of Malaya.

***569. *Lonchura striata* (Linn.).** Sharp-tailed Munia.

At Tekek and Mokut small flocks of 3-8 were regularly feeding in rice stubble on the hillside. At Tekek two were collected; their stomachs contained rice and grass seeds.

THE BIRDS OF TULAI

(3-5th April, 22-23rd April)

- 10/11. *Fregata* sp. Frigate-Birds.
Frigate-birds were seen over the island by day only.
15. *Butorides striatus* (Linn.). Little Green Heron.
22. *Egretta sacra* (Gmelin). Reef Egret.
4-5 present on the island, in the grey phase; cf. the Tekek flock.
48. *Haliastur indus* (Boddaert). Brahminy Kite.
During 3-5th April, there was considerable movement of raptors in passage over P. Tulai, and on occasions up to five species were seen simultaneously riding the thermals over the island. Of the Brahminy Kite, there were 3-4 individuals present on 3rd April, including at least one juvenile, but the population fluctuated irregularly and there is no certainty that all (or any) were resident on the island.
- 50/51. *Accipiter* sp. Goshawk.
Mid-morning 4th April, one large goshawk, distinctly streaked below (? *A. trivirgatus*, the Crested Goshawk) was riding one thermal over the island with a juvenile Brahminy Kite, while a Peregrine Falcon, a Sparrow Hawk, and two White-bellied Sea Eagles rode another. A little later five more goshawks passed over the island heading west, and in the late afternoon a flock of eleven was seen moving over. A flock of nine was observed in the early morning of 5th April.
52. *Accipiter virgatus* (Temminck). Sparrow Hawk.
A single Sparrow Hawk was recorded on 3, 4 and 5th April.
60. *Haliaeetus leucogaster* (Gmelin). White-bellied Sea Eagle.
At least two White-bellied Sea Eagles were present on the island; they were very active, calling frequently and flying into the trees. One bird was flushed from the ground on the western ridge of the island.
74. *Falco peregrinus* Tunstall. Peregrine Falcon.
On 4th April, see above.
128. *Tringa hypoleucos* Linn. Common Sandpiper.
Two birds present in the mangrove, 3rd and 4th April.
166. *Treron vernans* (Linn.). Pink-necked Green Pigeon.
A large flock roosting in the mangrove and feeding on the island was present on both visits. One male collected by B. Ensoll, 23rd April.
170. *Ducula bicolor* (Scopoli). Pied Imperial Pigeon.
Abundant, in large numbers in many parts of the island. A proportion left Tulai by day, flying to Tioman; but many remained on the island, feeding in noisy flocks in the tree tops along the ridge.
177. *Chalcophaps indica* (Linn.). Emerald Ground Dove.
One bird seen in the forest on the edge ridge.

?178. *Caloenas nicobarica* (Linn.). Nicobar Pigeon.

At 0620 hours, 5th April, in poor light, a large pigeon, appearing all black, was flushed from roost in the trees behind the camp.

197. *Eudynamys scolopacea* (Linn.). Koel.

On both visits Koels were abundant, in small flocks, creeping rather than flying about in the tree tops, calling noisily. A male and a female were collected on 3rd April. The former was in heavy moult, changing into nuptial plumage; the latter was not moulting.

231. *Collocalia maxima* Hume. Black-nest Swiftlet.

At least a thousand swiftlets congregated over the island each early morning of our visit (3-5th April), dispersing by day. Only *C. maxima* is resident on the island. Three breeding colonies are known, all in land-locked caves. We visited one site above Pasir Panjang, and found 278 nests in a clustered group attached to the sloping underside (c. 55° from vertical) of a large boulder; 24 nests were empty, 170 contained eggs (♂ 1) and 84 contained naked, newly-hatched nestlings (5th April).

239. *Apus pacificus* (Latham). Migratory Swift.

In small numbers over the island in the early mornings, flocking with *Collocalia*.

250. *Alcedo atthis* (Linn.). Common Kingfisher.

Observed both in the mangrove, and on the rocky shore on the north side of the island.

261. *Halcyon chloris* (Boddaert). White-collared Kingfisher.

Seen on the shore of camp bay.

526. *Aplonis panayensis* (Scopoli). Philippine Glossy Starling.

A flock feeding in high trees on the ridge on 4th April.

541. *Nectarinia jugularis* (Linn.). Yellow-breasted Sunbird.

Discounting the starlings, which were probably migrant, the Yellow-breasted Sunbird was the only passerine resident on Tulai. It was present only in the camp bay, where there was mangrove, and elsewhere on the island it was absent. Males were active, and a freshly made pendant nest, without eggs, was found on the edge of the mangrove on 4th April.

DISCUSSION

RESIDENTS

There are two ways in which the resident birds of Tioman could have populated the island. They could either represent a relict fauna, selected survivors from the late Pleistocene land mass that formerly connected all the major islands of the Sunda shelf; or they could constitute an oceanic fauna, a group of species that on different occasions and by different means have crossed the sea barrier between Malaya and Tioman. Support for the argument that the avifauna is relict is provided by the fact that, in the past, several taxonomists have considered that some

25 per cent of the island's known resident birds are subspecifically distinguishable from mainland forms, and that the affinities of these subspecies lie with populations further east on the Sunda shelf. However, the weight of evidence is otherwise.

In many ways more significant than the list of birds found on Tioman is the list of birds which are always conspicuous when present, by virtue of their size, habits or calls, and which, by their absence from the records, can certainly be excluded from the Tioman fauna. These certain absentees include a large number of birds that would be common in similar habitats on the Malayan mainland. At the family level, pheasants and partridges, parrots, hornbills, bee-eaters, and barbets are missing entirely. Despite the indeterminate taps heard in the region of Camp II, it is also unlikely that wood-peckers, most of which are noisy and conspicuous, are represented. It is improbable, too, that pittas, if present, could have been overlooked.

There are in addition a number of birds characteristically associated with particular habitats, which on the mainland are common and conspicuous in those habitats, but which on Tioman are lacking. One obvious group comprises the inland streamside birds, fork-tails, the bulbul *Pycnonotus zeylanicus*, forest kingfishers, the Black-and-crimson Broadbill *Cymbirhynchus macrorhynchos*. Also conspicuously missing are the spiderhunters, particularly *Arachnothera longirostris*, invariably associated with bananas on the mainland. Yet another group comprises open country and meadow birds, including the Yellow-vented Bulbul, the White-fronted Kingfisher, the resident pipit *Anthus novaseelandiae*, rice pests such as the weaver, the munias *Lonchura maja*, *L. punctulata* and *L. malacca*, and the Tree-sparrow. These birds, however, although accepted as native Malayan species, are geologically recent introductions to Malaya and are either, like the sparrow, directly symbiotic with man, or dependent on human activity, in felling and clearing the natural forest vegetation for the provision of a suitable habitat. *Lonchura striata* on the other hand is naturally a species of forest clearings and is probably a member of Malaya's anciently native avifauna. The isolation of Tioman has so far prevented any of the "new" land birds (except *Copsychus saularis* ?) from colonising the open habitat.

Other undoubtedly "old" species surprisingly absent from Tioman are tree swifts *Hemiprocne* spp., and the spinetail swift *Chaetura leucopygialis*, which are all common in lowland and submontane forest on the mainland. On Tioman there is a large resident population of the closely related swiftlets *Collocalia*, which might have ousted other swifts by competition. However in several inland sites in S.E. Asia (notably in Sarawak and Sabah) very much larger resident swiftlet populations coexist with the same species of *Hemiprocne* and *Chaetura*, providing evidence that swifts and swiftlets are not competitive to the extent of being exclusive.

In the list of absent species are included many of the larger forest birds (e.g. hornbills and pheasants). It is conceivable that after isolation by the rising sea, Tioman might have been too small to support a viable population of birds of this size. Until more is known of their ecology, this possibility must be kept in mind. However, it is known that Pulau Pangkor, Perak, supports a large population of Argus Pheasants. This island is, ecologically at least, probably sufficiently isolated

from the mainland to prevent recruitment of the population of a sedentary, relatively poor flyer such as the Argus. Since Pangkor is only a quarter the size of Tioman, it provides evidence that, other things being equal, Tioman is well above the viable size for a large forest gallinule.

Excepting *Napothera brevicaudata*, the birds of Tioman are predominantly common lowland forest species. Our observations indicate that despite reduced competition, no species has extended ecologically beyond the gross bounds of its normal habitat on the mainland. As a result many niches remain unfilled, and the visitor's first impression on Tioman is of the paucity of birds. This is particularly true on high ground above 2,500 ft., which is also the normal altitudinal limit to the range of most of these birds on the mainland. On Tioman too they do not extend beyond this limit, although the submontane species that on the mainland are competitive above this altitude are all lacking. Ornithologically, the peaks of P. Tioman are depressingly barren. The lack of montane forms is strong evidence that the bird population is not a relict fauna.

In the lowlands the paucity of species is compensated to some extent by the abundance of individuals. Many species (notably the Pink-necked Green Pigeon, the Green Imperial Pigeon, the Hill Myna and the Greater Racquet-tailed Drongo) are much more frequently encountered than they would be in similar terrain on the mainland. In lowland forest and plantation on Tioman, the total avian biomass is probably equivalent to that of the same habitat in the mainland. In open lowland scrub, and in submontane forest, birds are definitely scarcer on Tioman. These relationships are indicated by comparative netting figures in Table 2.

TABLE 2
Comparative netting figures on Pulau Tioman and in Selangor.

| Habitat | Net-days | Catch (all species) | Birds per Net-days |
|---|----------|------------------------|-----------------------|
| PULAU TIOMAN | | | |
| (1) Hill forest, above 2,500 ft. ... | 16 | 0 | 0 |
| (2) Lowland forest, up to 1,100 ft. ... | 9 | 4 | 0.44 |
| (3) Overgrown plantation ... | 7 | 5 | 0.71 |
| SELANGOR* | | | |
| (1) Lowland forest (Subang) ... | 1,800 | 924 | 0.51 |
| (2) Overgrown plantation (Rantau Panjang) ... | 4,500 | 3,684 | 0.81 |

*Figures for Selangor kindly supplied by Dr. H. E. McClure, U.S.A.M.R.U.

Unlike mammals, the total biomass of birds apparently nowhere on Tioman exceeds the biomass of an equivalent stretch of mainland forest. The extreme abundance of mammals has been attributed partly to the lack of mammalian predators. The relatively low bird population indicates the minor role mammalian carnivores play in controlling the population balance among birds. In part the failure of birds to attain such large numbers as mammals may be attributed to the presence of avian raptors, but to a great extent it is probably due to the ecological conservatism of birds and their consequent inability to expand into and exploit unoccupied ecological niches.

MIGRANTS

In March, on the mainland, many migrant birds are still to be found in the forest, particularly in high ground. The dearth of migratory passerines on Tioman stresses the fact that, on the northward movement at least, this island is right off the normal migration route. The only migratory passerines recorded (excluding Philippine Glossy Starlings, of doubtful status) were swallows, evidently wintering on Tioman, a poorly identified flycatcher, and the Yellow Wagtail. The behaviour of the wagtails suggested that all those seen were on passage, and were not a wintering population. In March, in Selangor, winter visitor Yellow Wagtails are still abundant in inland forest along stream-sides. On Tioman single bird(s) were seen only on the shore (probably one straggler); those in the flock were clearly on passage.

The shore itself, white coral sand meeting clear blue sea, is impoverished in comparison with the muddy flats of the west coast of Malaya, and inhospitable to waders. It is known that the principle northward route of migratory waders follows the west coast, and the paucity of this group on Tioman beaches was expected.

Other non-passerines of probably migrant status include several raptors, perhaps the Jambu Fruit Pigeon and the Broad-billed Roller. Little else can be added at present, except that it would be particularly rewarding to be able to compare bird lists of, say, June and November with our March and April list, in order to assess the true role of Tioman in bird migration.

PULAU TULAI

The most striking difference between the avifaunas of Tioman and Tulai was the abundance on the latter of characteristic island birds (notably the Pied Imperial Pigeon and the Koel) that were scarce or absent from Tioman. Characteristically, if not invariably, throughout its range the Pied Imperial Pigeon roosts on offshore islands, although frequently visiting the neighbouring mainland by day to feed. From both Tekek and Mokut flocks of this pigeon left at dusk to return to smaller islands (Tulai or P. Jahat) to roost and, although a proportion remained on Tioman, this island was evidently too large to be generally acceptable a roost. Similarly the Koel, although known from the coastal belt of the mainland, prefers small islands. In this case again Tioman was evidently too large to attract the Koels, even though they were abundant on nearby Tulai. In this context it is interesting to note the role of little P. Rengis, as a roosting site for large flocks of presumably non-breeding visitors — frigate-birds, swallows and starlings.

The Yellow-breasted Sunbird on Tulai strikingly illustrates the ecological conservatism of birds. Although no other small passerine was present, and although the flowerpecker niche was available over the whole island, the entire population of this species was restricted to the small area of fringing mangrove in the north-western bay.

SUMMARY

Records of 53 species of birds (excluding oceanic birds other than the frigates) from P. Tioman are discussed; and 21 species are recorded from Tulai. Eleven of the records from Tioman are apparently new. The possible origin of the resident avifauna of Tioman is examined, and it is concluded that it is derived from recent invaders from the mainland. The occurrence of migratory species on both islands is also discussed; and the differences between Tulai, a small island, and Tioman, a big island, are noted.

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