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A breeding record of the Giant Pitta *Pitta caerulea* from Thailand

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An occupied nest of Giant Pitta *Pitta caerulea* was studied during July–August 1988 at the Khao Pra Bang Khram Non-Hunting Area, southern Thailand. The locations of four other disused nests, thought to be this species, are also described. This appears to be the first documented nesting of the species. Earthworms and land snails *Cyclophorus* were the predominant food items brought to the nestlings. Although the Giant Pitta appears primarily restricted to lowland forests, which have been almost completely destroyed in southern Thailand, the occurrence of birds in secondary growth, together with some former records of birds on hill slopes, suggests that the species may persist elsewhere in protected areas in southern and perhaps even south-western Thailand.

The Giant Pitta *Pitta caerulea* is a Sunda subregion endemic which is known from Tavoy in Burma (Smythies 1953), south through Peninsular Thailand and Peninsular Malaysia to Sumatra and Borneo. Two races are described, *P. c. caerulea* throughout the mainland and in Sumatra, and *P. c. hosei* in Borneo (Chasen 1935).

This enigmatic species is relatively seldom encountered in the field and remains one of the least known members of its genus. It was said by Davison to be unlike other pittas in that, when disturbed, it would fly off low but rapidly, and not alighting within 200 or 300 yards (Hume and Davison 1877). Even its call was unknown until 1985, when in March N. J. Redman (*in litt.*) called out a male in Taman Negara, Peninsular Malaysia, by imitating a whistle he heard, and in July J. W. Wall and G. C. Yong taped a long series of whistles at Sepilok, Sabah, East Malaysia (J. W. Wall *in litt.*). Almost nothing is known of its ecology. The collection of a half-grown nestling in Perlis, Malaysia, in early November (Medway and Wells 1976) and the collection of young attributed to this species in March 1834 at an unrecorded altitude on Mt Singgalang, Padang Highlands, Sumatra (Muller and Schlegel 1840) are the only documented frgments of breeding evidence. A nest discovered on Fraser's Hill, Malaysia, and provisionally attributed to this species (Medway and Wells 1976) was later determined to be that of a previously undescribed subspecies of Rusty-naped Pitta *Pitta oatesi* (King 1978).

Surveys of Gurney's Pitta *Pitta gurneyi* and other lowland forest birds carried out in and around the Khao Pra Bang Khram Non-Hunting Area (also known as Khao Noi Chuchi), Krabi and Trang provinces, southern Thailand, have also revealed the presence of Giant Pitta there. We give details of these sightings and provide the first documented description of the nesting of the species.

The first indications of the presence of Giant Pitta at Khao Noi Chuchi

came in June 1986, in P.D.R. and U.T.'s earliest conversations with villagers, who referred to the species as 'nok sum muu'. 'Nok' is Thai for bird, while 'sum' is a shelter and 'muu' means a pig. Wild pigs *Sus scrofa* apparently build a domed mound of vegetation, a 'sum muu', in which the female lies up while suckling young, and this is likened by villagers to the large and relatively conspicuous domed nest of Giant Pitta. The identity of 'nok sum muu' was confirmed by showing villagers, including the former bird-trapper Mr Beung Sukmechai ('Lung Beung'), the pitta page in Lekagul and Cronin (1974). Between June and December 1986 Lung Beung showed P.D.R. and U.T. the remains of three nests which he said were those of Giant Pitta, the details of which are reported in Table 1.

In April 1987, P.D.R. and C. R. Robson heard the characteristic series of long whistles from two Giant Pittas, possibly a pair, and in May C.R.R. succeeded in obtaining views of a calling male at another location approximately 2 km distant.

During 1988, at least two further male Giant Pittas were seen and heard intermittently by R. Lansdown, J. McLoughlin and others during the period from 9 April to mid-June. On 17 June, two juvenile birds were seen and heard calling and on 24 June an empty nest, thought to be that of Giant Pitta, was found in an area where no calls had been heard previously (McLoughlin 1988; Table 1).

On 22 July 1988, Lung Beung found an occupied nest, containing two eggs, at yet another location and reported this in a letter to U.T. This made a total of seven discrete locations around Khao Noi Chuchi from which Giant Pittas, their nests or abandoned nests, had been reported over the three years, of which at least four were occupied by birds in 1988.

Lung Beung showed the occupied nest to J.E., C.R.R., Mr Kamol and Mrs Patcharee Komolphalin on 29 July. The nest was a large domed structure, not quite globular, being slightly higher than wide (external horizontal diameter 210 mm; vertical height 320 mm). The roof was slightly flattened. The entrance measured 140 mm wide and 120 mm high. The nest entrance was flattened into a ledge 180 mm deep. The nest was constructed from dry leaves from a selection of unidentified broadleaved plants, and was fixed in the fork of a rattan, either *Calamus* sp. or *Daemonorops* sp. The entrance was 0.85 m above the ground (see Plate 1).

The nest was located in a forest fragment which extended for about 1.5 km along a low ridge and varied from about 200 m to 500 m in width. This finger of forest was still more or less connected by secondary growth to approximately 5 km^2 of forest on a nearby hill which rose to 479 m elevation but was otherwise isolated from the more extensive lowland forest patches at the site. The nest-site was within 5 m of the base of a 30 degree slope and only 10 m from the forest edge, at roughly 150 m above sea level. The nest entrance faced up the slope. There was no permanent stream in the immediate vicinity, although there was a moist gully running parallel with the forest edge and lying between it and the nest. Beyond the forest edge the land had been cleared for cultivation, mostly within the last five years, and a

new house was in the early stages of construction only 50 m away.

OBSERVATIONS AT THE NEST

As the observers approached on 29 July, the male bird was inadvertently flushed from the nest. Close inspection of the contents revealed two large

Table 1. Details of old or unoccupied nests at Khao Noi Chuchi, believed to be those of Giant Pitta.

Date seen	Location	Nest tree	Height above ground (m).	Description
1 Aug 1986	Patch of secondary growth (2 ha)	*Calamus* (?) *longisetus*	3	Collapsed; from previous year
5 Dec 1986	Tall secondary forest	*Licuala* sp.	2	Collapsed; from previous year
5 Dec 1986	Tall secondary forest	*Calamus* or *Daemonorops*	1	Collapsed; from previous year
24 June 1988	Secondary forest	*Calamus* or *Daemonorops*	1	Recently used; 30 cm diameter Entrance hole 15 × 10 cm Base of sticks; constructed of bamboo and palm leaves and lined with rootlets (McLoughlin 1988)

Plate 1. Occupied nest of Giant Pitta, Khao Noi Chuchi, 9 August 1988. U. Treesucon.

(30 × 35mm) eggs, coloured off-white and with a band of fine brown speckling towards the broad end of each. The speckles became slightly larger, but were fewer in number and therefore less dense towards the apex. After a rapid inspection, the observers left the site.

When C.R.R. and J.E. returned to the nest on the morning of 30 July, there was no bird present. After measuring the nest the observers retreated 20m and hid in the vegetation on the slope overlooking the nest-site. Although some calling was heard in the vicinity of the nest, neither bird returned within 30 minutes, so the observation was discontinued. Lung Beung and J.E. returned at 17h10 to find the female apparently incubating. At 17h25 she stood up and, after standing on the ledge of the nest, slipped unseen to the ground.

Lung Beung and J.E. observed the nest again on 2 August, from 08h30 until 09h20, when it began to shower with rain. The female appeared to be incubating, but left the nest at 08h42. J.E. returned alone at 16h15 and, as there was no bird present, inspected the nest, which now contained two nestlings. He retreated up the slope to his former viewing position and built a small screen from branches and saplings, ready to conduct observations the following day.

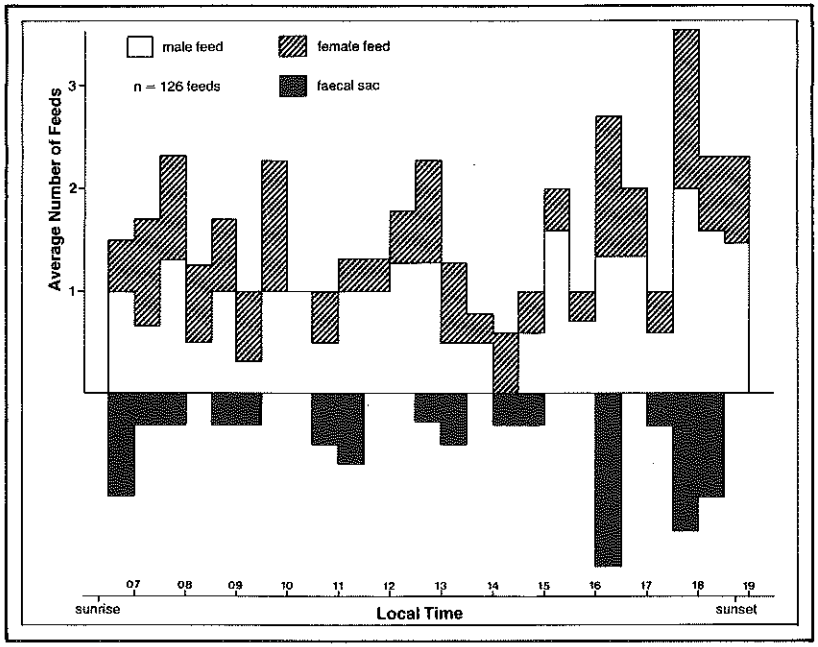
On 3 August, J.E. watched the nest from 06h50 until it began to rain at 09h10. During this period the male visited the nest with food on five occasions and the female twice. On 4 August, the nest was watched from 06h45 until 09h55. The female was still present on the nest at this time, and remained brooding the young until 08h00. From 08h00 to 09h55, the male made five visits and the female eight visits. At 09h18, the male removed a faecal sac. On 5 August, the nest was watched from 16h15 until 18h00, during which period the male made seven visits and the female three.

Observations were subsequently conducted by P. Hurrell on 7 August (06h44 to 10h05 and 12h00 to 13h15); by U.T., who also photographed the birds, on 8 August (06h00 to 19h00: see cover) and 9 August (06h00 to 14h00: see Plate 2); and by P.D.R. on 12 August (12h53 to 19h00), 13 August (06h53 to 18h50) and 14 August (07h43 to 08h51). U.T. watched the nest from a blind, constructed on 7 August at a distance of 9m from the nest. P.D.R. watched from the photographic blind on 12 August, but on the two succeeding days watched from a distance of 25–30m. All observers used binoculars of 8 to 10× magnification but, in addition, both U.T. and P.D.R. used a tripod-mounted telescope of 20× magnification.

Subsequent observations of feeding frequency are shown in the Figure. A further 136 parental visits were observed, making 167 visits in a total observation period of 52 hours 16 minutes (average one visit per 18min 47s). On one occasion, the male made two successive visits only 30s apart. The longest interval between two visits was two hours, though this coincided with first use of the photographic hide and was presumably due to the initial disturbance caused. If instances of obvious disturbance are discounted, the longest interval between feeds was one hour one minute. There was a roughly equal division of labour between the sexes, the male contributing

Plate 2. Female Giant Pitta at nest, 9 August 1988. U. Treesucon.

Figure. Feeding frequency by half-hour periods.



93 visits (55.7%) and the female 73 (43.7%), with one visit undetermined.

Although feeding was roughly even throughout the day, there appeared to be a slight tendency for the frequency of feeds to increase during the afternoon. However, there is some bias from initial unwitting disturbance involved in photographing the birds and their subsequent habituation. On the only full day on which the photographic blind was used, 8 August, only six feeds were recorded from 06h00 to 13h00, compared with 22 feeds from 13h00 to 19h00 and 23 feeds during 06h00 to 13h00 on the following day. If feeding rates are compared, feeding frequency was one visit per 26 min 30 s (averaged for all the period when the photographic hide was used) compared with one visit per 12 min 23 s for the period when observations were made at a distance.

The average time spent on the nest during feeding visits was 36.7 s (n = 69 visits) and ranged from 7 s to 2 min 37 s. There was no apparent difference between the sexes in the average duration of the visits, although the longest feeding visit by the female was 86 s whereas the male made two visits of 2 minutes duration or longer. One of these visits coincided with the male presenting a large (c. 2 cm long) insect larva (probably a beetle) to the young and, on this occasion, he was still feeding the young when joined by the female. Otherwise, both members of the pair were not seen on the nest together during the day except on 7 August, 5–6 days following the hatch, when the female entered the nest at 07h16, and brooded the young for 1 hour 28 minutes. During this period, the male made three feeding visits and, on one of these occasions, the female took food from the male and assisted him in feeding the young. Feeding continued uninterrupted even in moderately heavy rain.

Both sexes contributed to nest sanitation, the male carrying away 11 faecal sacs during the observation period and the female 18.

Overnight brooding of the young by the female appeared to be a consistent trait. On each of the three occasions when observations were continued until nightfall (8, 12 and 13 August) the female was seen to enter the nest to brood, at 18h46, 18h44 and 18h39 respectively. On two of these occasions, both male and female birds were seen on the nest together for a few seconds, the male leaving shortly before the female entered the nest. It was unclear whether the female fed the young before entering the nest to brood. On the morning of 4 August, the female remained on the nest until 08h00, but on both 8 and 9 August she had apparently already left by 06h00.

The behaviour at the nest differed in a number of ways from that of Gurney's Pitta, which has also received recent study (Round and Treesucon 1986, Gretton 1987). First, both parents spent rather longer perching on the nest while bringing food to the young. Gretton (1987) found average length of feeding visits of Gurney's Pitta as 26.55 s in the male and 22.55 s in the female, while those of Giant Pitta were almost half as long again. This may be linked with the apparently greater wariness of Giant Pitta, as the birds spent long periods looking around while perched on the nest rim, usually

after having fed the young. There may well be considerable individual variation in both species, however, as the first male Gurney's Pitta ever watched at the nest by P.D.R. and U.T. usually spent no more than 5–10 s on the nest during each feeding visit.

Another striking behavioural difference was that the female Giant Pitta brooded the young overnight, even when they were within two days of leaving the nest. The adaptiveness of this behaviour is not fully evident, since nestlings of the larger species, having a smaller ratio of surface area to body volume, should be less prone to overnight heat loss than those of their smaller congener and therefore less likely to require brooding to help maintain body temperature. Perhaps a better explanation is that a larger, more conspicuous nest might be more likely to attract the unwelcome attentions of a nocturnal predator, and therefore requires the attendance of an adult. However, snakes are possibly the most significant predator of nestling birds and presumably detect their prey by smell rather than by vision. Also, it is unclear whether the presence of the adult bird would be sufficient to deter a predator of this sort.

FEEDING

Of a total of 131 food items brought in, 66 (50%) were not seen well enough to be identified. Of the visible food items (Table 2), the larger annelid worms and snails predominated, each accounting for slightly more than one third. On several occasions, the birds could be heard smashing snails on an 'anvil', a behaviour reported to be fairly common among pittas (Bruce 1985), and on one occasion U.T. watched the male bird, with a snail in its bill, smashing it

Table 2. Food items brought in to nestlings.

	Number of items	Percentage of those seen
Earthworms	22	33.9
Small worms	2	3.1
Snails	22	33.9
Large insect larvae (probably Coleoptera)	2	3.1
Cricket (Orthoptera)	1	1.5
Insects	1	1.5
Large winged insect (possibly mantid)	1	1.5
Earthworm or insect larva	2	3.1
Frog	1	1.5
Large unidentified	11	16.9
Total seen	65	
Unseen	66	

against a rock four or five times (Plate 3). The bird then turned, looked at the observation blind and flew for about 15 m, landing out of view. After observations ceased, two almost complete broken shells and various small shell fragments were collected. The snails were subsequently identified as belonging to the genus *Cyclophorus*. They were large (50–60 mm diameter), robust and thick-shelled snails, somewhat vertically compressed about the axis of the spiral. Snails were relatively easily identified as prey when the birds brought them in, since their flesh appeared blackish and, on some occasions, the horny operculum could clearly be seen. Both of the shells collected had been broken in the posterior part of the body whorl (Plate 4). In all probability, however, the flesh was extracted from the shell aperture since the snails' opercula were too large to permit passage of the body through the break in the posterior whorls of the shell. In Thailand *Cyclophorus* is more or less exclusively associated with forests and is often found in proximity to rocky areas (Dr S. Upatham verbally).

The majority of the unseen food items may also have been snails and worms, since the usual viewing conditions (from 25–30 m) were not very favourable and, in addition, the bird's body, when it landed on the nest, obscured a clear view of the prey. When observations were made from the photographic blind, at 9 m range, unobserved items only accounted for 13 of 53 feeds (24.5%) and snails and worms together accounted for 90% of all food items identified. Robinson and Kloss (1924) also recorded a male Giant Pitta eating a small snake while Davison reported large black ants from his specimens shot in Burma (Hume and Davison 1877).

As might be expected with two species so markedly different in size, the diet of Giant Pitta differed strongly from that of Gurney's. In the latter, worms accounted for over 70% of all food items and snails or slugs less than 2%, compared with 34% each for worms and snails in Giant Pitta (Table 2). Gurney's was, however, also noted taking frogs on four occasions (Gretton 1987).

FLEDGING PERIOD

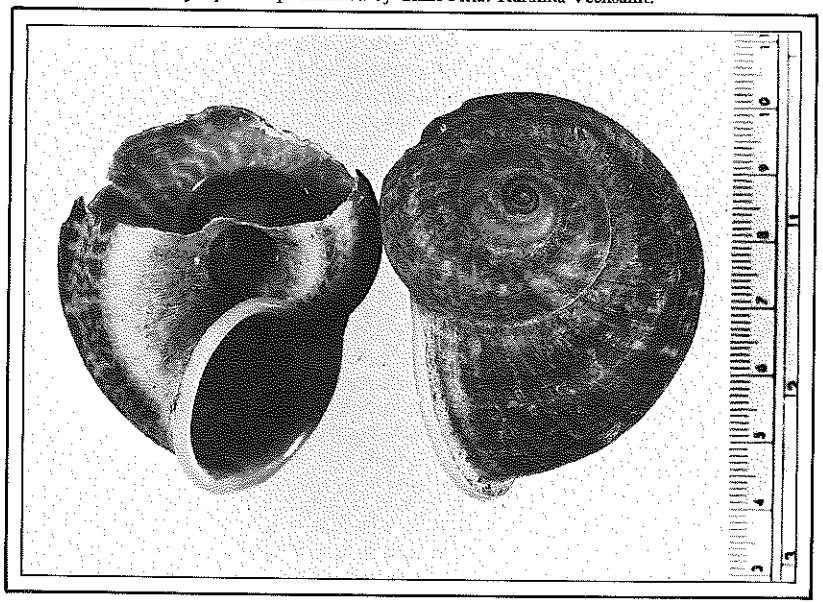
The young were first seen on the afternoon of 2 August, and were thought to have hatched on either 30 or 31 July. The young were well grown by 12 August, when they already showed the adult-type face pattern of pale cheeks, throat and eyebrow contrasting with a dark eye-line extending behind the eye. The upperparts appeared uniformly dark brown and the bills pale orange-flesh. Lung Beung later reported that the young left the nest on 15 August, when they would have been a maximum of 16 days old.

VOCALISATIONS

The only call recorded in the vicinity of the nest consisted of a slow and

Plate 3. Snails at Giant Pitta 'anvil', 9 August 1988. U. Treesucon.

Plate 4. Snail shells *Cyclophorus* sp. smashed by Giant Pitta. Kannika Vechsanit.



mournful whistle. Each note was identical, with a descending pitch and downward inflection. The birds were never seen while calling, so that the sex of the caller was not determined. Calls were heard during 08h00 to 11h00 with breaks of 15–20 minutes.

In 1988, Khao Noi Chuchi was continuously manned from 24 March to 7 August, yet Giant Pitta calls were heard only during two periods: in April (9–15 April and 20–26 April) and from mid- to late June onwards (McLoughlin 1988). In April, on at least four occasions when calling birds were seen, all were males. Calling was reported at all times of day, but was most frequent during 06h00–07h00 and 16h00–18h00. While the birds called mainly from the ground or from fallen logs, on occasion birds also called from low trees in response to imitation of their calls. The calls were described as 'a short discordant whistle, "phreew", repeated several times. The whistles were constant except for the odd one . . . delivered at a lower pitch thus adding to the calls' tuneless quality'. Bouts of calling usually lasted no longer than 2–3 minutes but, on occasion, birds were heard calling for a period of up to 50 minutes (McLoughlin 1988). The same (or very similar) call was also given by females and juveniles in June. Calls heard at this time possessed a more even quality, and lacked the occasional lower-pitched notes and, in three out of four occasions on which the birds were seen, were given by females or juveniles. On 17 June, two juvenile birds, thought to have recently fledged, were located calling from a gully and both birds responded to imitations of their calls. The implications are, therefore, that two call-types, extremely similar to the human ear, may serve different functions. Calls in April may be associated with territoriality and those in the post-fledging season with alarm or contact.

STATUS

The extremely secretive behaviour of this species has hitherto greatly impeded any assessment of its status. While most recent records of Giant Pitta throughout its range have come from forests below the hill-foot boundary, strongly suggesting that, in common with many other Sundaic birds (Wells 1985), these may be its optimal habitat, there are, nonetheless, several older records from the hill slopes. These include a bird netted at 800m elevation on Khao Luang, Nakhon Si Thammarat, Thailand (B. King, verbally and *in litt.*, also cited in Medway and Wells 1976) and two records at 800 feet (240–250m) in West Malaysia: a sighting in the Main Range, Selangor (Medway and Nisbet 1968), and a male specimen from Gunung Benom, Pahang (Medway *et al.* 1968). In addition, a specimen from Mt Murud, Sarawak, Borneo, was taken at c. 900m (Smythies 1960). Van Marle and Voous (1988) list the species as a resident in hill or lower montane forest in Sumatra, on the basis of specimens collected at unrecorded altitudes from Mt Singgalang, Padang Highlands and in Lampung district.

It is possible that, as lowland forests were more extensive in historical times, Giant Pitta was more abundant and therefore more likely to disperse onto the submontane slopes. Another possibility is that it may persist locally above the hill-foot boundary in areas of gentle slope or on plateaus or elsewhere where the forest plant community may perhaps more closely resemble that of the lowlands.

Wells (1985) has stressed the critical importance of forests of the level lowlands for the conservation of the Sundaic forest bird community. In Peninsular Thailand, the reduction in lowland species with increased slope or altitude may be even more severe than elsewhere in the Sunda subregion since the montane areas are small and the mountain flanks extremely steep (Round 1988). Yet over 95% of all forest below 200m elevation in Peninsular Thailand had been cleared by the end of 1985, and in many areas the front of forest clearance has already ascended the hill slopes to 600m. Even if the Giant Pitta still persists above the hill-foot boundary in Thailand, its population there must be extremely small. Although 11 national parks and wildlife sanctuaries have so far been established on the mainland of Peninsular Thailand, three of which either encompass, or are situated close to, former localities from which Giant Pitta has been recorded, none encompasses any significant areas of level lowland forest, so that Khao Noi Chuchi may be the most important single site in Thailand for Giant Pitta (as it undoubtedly is for Gurney's Pitta and for many other Sundaic forest birds).

Elsewhere in its range, the Giant Pitta may still be fairly widespread. It is known from several sites, including some protected areas, such as Taman Negara National Park, Krau Game Reserve and the proposed Endau-Rompin National Park in West Malaysia (F. R. Lambert *in litt.*, D. R. Wells *in litt.*); also Sepilok, Sabah, and from Sungai Kubaan, Tutoh, Sarawak (Fogden 1976), which lies outside any park or sanctuary. Its occurrence in protected areas in Sumatra remains to be determined. Although not accorded threatened status by Collar and Andrew (1988) it is listed as "near-threatened", presumably because of the increasing pressure on lowland forests throughout its range from logging, estate agriculture and human settlement.

One of the interesting facets of studies at Khao Noi Chuchi is the extent to which both Giant and Gurney's Pittas, together with some other lowland forest birds, have been recorded in patches of secondary growth. One of the four nests described in Table 1 was in a small patch of secondary growth at least 2km from the nearest piece of primary forest. A small number of Gurney's Pittas have also been recorded in such sites (Round and Treesucon 1986, Gretton 1987). It may be that birds are forced to utilise such areas because of the almost complete lack of primary forest in the level lowlands of southern Thailand, or it could be that both Giant and Gurney's Pittas actually favour a certain stage of advanced successional regrowth. Gurney's Pitta has been known to raise young to fledging in a small (2ha), nearly isolated plot (Gretton 1987). The principal question may be whether the

young birds, once they have left the nest, can survive long enough in such habitat fragments to enable them to disperse elsewhere, or indeed whether sufficient habitat remains elsewhere for them to establish their own breeding territories. While the recent (May 1989) suspension of logging activities in Thailand may improve the conservation prospects for Thailand's upland watersheds, there is currently much impetus for the promotion of commercial forestry (chiefly involving eucalypt plantations) and cash crops (especially oil palm) in areas of so-called 'degraded forest' in the lowlands. This would actually promote the clearance of much existing scrub and secondary growth and prevent the re-establishment of any semi-natural secondary forest which could conceivably support some of the more ecologically tolerant lowland forest birds.

Although the northernmost record for Giant Pitta in Thailand is at Tasan, Chumphon Province (10°30′N; Robinson and Kloss 1924), it should perhaps also be searched for to the north of this, especially in view of the fact that it has been recorded to Tavoy in Burma (14°00′N). Although very little forest now remains in Thailand between about 10°30′ and 12°00′N, there are some large areas of evergreen forest on hill slopes further north still, between about 12°00′ and 14°00′N, including the Kaeng Krachan National Park (3,080 km^2) in Phetchaburi Province. Although it appears that the moist rainforest biome extends further north on the Burmese side of the Dawna Mountain range in Tenasserim than on the Thai side (Wells 1976), a surprising number of Sundaic forest birds, including Ferruginous Wood-Partridge *Caloperdix oculea*, Raffles's Malkoha *Phaenicophaeus chlorophaeus*, Chestnut-breasted Malkoha *P. curvirostris*, Red-throated Barbet *Megalaima mystacophanos* and Maroon-breasted Flycatcher *Philentoma velatum*, have recently and unexpectedly been found in Thailand even as far north as 14°58′N in patches of evergreen forest (records held on file at Conservation Data Center, Mahidol University). This part of Thailand certainly warrants further ornithological study.

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