

The past and future of Gurney's Pitta *Pitta gurneyi*

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Gurney's Pitta *Pitta gurneyi*, whose plumages are described here with particular reference to the little-known juveniles and to those of Banded Pitta *P. guajana*, is known only from southernmost Burma (last record 1914) and from peninsular Thailand between 11°50'N and 7°30'N (last record – prior to 1986 – 1952). The species was considered relatively common at least until around 1920, but in the past 50 years has been seen in the wild only twice, although a few captive specimens have been known since the 1960s, the last such dying in 1985 (a sonagram of the one type of call produced by this individual is provided). The species appears to breed from late May through to November. Records suggest that it disappears from southern Burma in response to the monsoon rains (July to September), and so may not breed there. Its distribution in the peninsula coincides with the distribution there of its (almost sole) habitat, semi-evergreen rainforest, and only the most northerly records (possibly both migrants) and those from the mountain Khao Phanom Bencha in 1936 could refer to different (drier) habitats, these being the only cases where the species has been recorded away from lowland. Competition with Banded Pitta at most sites may have confined Gurney's to lowland forest, its disappearance (and possible extinction) being directly attributable to the almost entire deforestation of lowland peninsular Thailand. Khao Phanom Bencha and a few other sites are identified as conceivably still holding the species.

Gurney's (or the Black-breasted) Pitta *Pitta gurneyi* is endemic to the forests of peninsular (i.e. southernmost) Burma and Thailand, from south of 12°N to around 7°N. It is not known to extend into Malaysia, but this is just possible (see Natural constraints). Such a restricted range is unusual in a (non-montane) species in mainland South-East Asia, a fact remarked upon by Chasen (1939:203) and Wells (in Medway and Wells 1976:2). It is evidently this very limited distribution, combined with a lack of records in recent decades, that led to the species being considered by King (1978–1979) as threatened (IUCN status category 'Indeterminate'), although there is no mention of it in Jintanugool *et al.* (1985) or Blower (1985a). As King's treatment of the bird is somewhat cursory, a complete review of our knowledge of it seems appropriate; and indeed, the provision of every available detail relevant to the species's conservation is now essential in the face of evidence that, if it survives at all, it stands at the very edge of extinction.

In the following account, unless otherwise clearly stated, all coordinates and modern place-name spellings are derived from *The Times atlas of the world* (1980) or Office of Geography (1966a,b), the latter taking precedence over the former where discrepancies over coordinates occur. AMNH stands for American Museum of Natural History, ANSP for the Academy of Natural Sciences, Philadelphia, BMNH for British Museum (Natural History), BNHS for Bombay Natural History Society, CUMZB for Chulalongkorn University Museum of Zoology, Bangkok, IUCN for International Union for Conservation of Nature and Natural Resources, MAPS for Migratory Animal Pathological Survey, MCML for Merseyside County Museums, Liverpool, MNHN for Muséum National d'Histoire Naturelle, Paris, NRM for Naturhistoriska Riksmuseet, Stockholm, NUSZRC for National University of

Singapore Zoological Reference Collections, RMNH for Rijksmuseum van Natuurlijke Historie, Leiden, ROM for Royal Ontario Museum, Toronto, RTSD for Royal Thai Survey Department, SMF for Natur-Museum Senckenberg, Frankfurt, TISTR for Thailand Institute of Scientific and Technological Research, UMMZ for University of Michigan Museum of Zoology, UMZC for University Museum of Zoology, Cambridge (U.K.), USNM for National Museum of Natural History, Washington, ZMK for Zoological Museum, Copenhagen.

DESCRIPTION

The male Gurney's Pitta is unmistakable, having an intense iridescent blue hindcrown and nape, contrasting with a black forecrown, lores, sides of head and ear-coverts (see cover photograph). The head pattern contrasts sharply with a whitish throat and a bright yellow band across the upper breast extending onto the sides of the neck. The lower breast, belly and vent are black, with the feathers of the breast glossy, but those of the belly and vent matt. The flanks are yellow with short, bold, black bars. The upperwing coverts, tertials, mantle and rump are all rufescent brown; the primaries and secondaries are darker blackish-brown. The uppertail-coverts and tail are turquoise-blue.

The female is relatively subdued in coloration, having the entire crown and nape a rich ochre. The lores, sides of head and ear-coverts are black while the underparts are narrowly barred black on dull white, although this white is suffused with yellow across the breast. The upperparts and tail are as in the male.

Knowledge of plumages of juveniles is poor, owing to a paucity of skins: there are two males (Gyldenstolpe 1916, Meyer de Schauensee 1946) and two females (Meyer de Schauensee 1946 and in CUMZB). Of these, only the last is undescribed. From the descriptions of this (below) and the others, it would seem that there are no discernible differences between males and females. The Gyldenstolpe male appears to have been in post-juvenile moult, since it shows some black and yellow on the undersides; Meyer de Schauensee's (younger) male shows no such feathering.

In the CUMZB specimen, collected by C. J. Aagaard (see Distribution in Thailand), the upperparts, wings and tail are coloured as in the adult, save that there may be buffy tips to feathers of the coverts and tertials. The feathers of the crown are blackish-brown, with buffy shaft streaks, and there is also a long, buffy supercilium, the individual feathers of which are narrowly edged and tipped blackish, giving a scaly appearance. The lores, sides of head and ear-coverts are blackish-brown; the throat is buffy white, with some brown scaling. There is a dark brown, horseshoe-shaped patch across the upper breast which extends onto the sides of the lower breast. This is finely streaked with rufescent buff. The flanks and sides of belly are whitish, boldly barred blackish, while the centre of the lower breast and belly are buffy and are finely barred dark brown. The legs appear to be dull fleshy, while the bill is black.

The adults are impossible to confuse with any other pitta occurring in the region, given a good view. Both sexes of the Banded Pitta possess a broad white stripe which shows on the folded wing and which is formed by the broad white tips to the

median coverts and inner greater coverts. The female Banded Pitta (of the races that occur in the peninsular region) differs additionally from female Gurney's in having flame-orange sides to the hindcrown and nape, and a broad, buffy supercilium.

Adults of both sexes and juveniles of Banded Pitta differ from Gurney's Pitta in the following respects. (1) The tail and uppertail-coverts of Banded Pitta are a rich azure-blue (as compared with paler, turquoise-blue in Gurney's Pitta). (2) While both Gurney's and Banded Pittas possess white bases to the outermost five or six primaries, this band of white is approximately one centimetre wide in Gurney's and roughly half that width in the Banded Pitta. The assertion by King *et al.* (1975) that Gurney's Pitta has no white in the wing is technically incorrect, but is probably appropriate for the purposes of field identification, since the white bases to the primaries are so slight that they would probably be invisible even when the bird was seen in flight from above. (3) Banded Pittas have broad white edges to the outer webs of secondaries 5, 4 and 3, which are lacking in Gurney's Pitta, so that even if juvenile Banded Pittas lack the white coverts that form the white stripe on the folded wing (one specimen in BMNH appears to, others do not) they should still be easily separable from juvenile Gurney's.

DISTRIBUTION IN BURMA

Gurney's Pitta was first discovered in Burma in 1875 (Hume 1875:296). Locality records for the country are, apparently, derived from two collectors (W. Davison, Hume's collector, and W. L. Abbott for USNM) in three years (1875, 1877 and 1904) at six localities, all in southern parts of the most southerly division of Burma, Tenasserim. Davison, the collector of the type material, seems to have obtained by far the highest number of specimens (38 in BMNH alone) and certainly learnt more about it in the wild than anyone: without his remarkable record (in Hume and Davison 1878:244-245) we would know virtually nothing of the species. In his account he lists the localities at which he found the bird as Laynah, Malewoon and Bankasoon; Palaw-ton-ton is also noted without comment as a locality. As the glossary in Hume and Davison (1878:522-524) makes clear, 'Laynah' is modern-day Lenya (11°28'N 99°00'E), while 'Malewoon' is Maliwun (10°14'N 98°37'E) and 'Bankasoon' Bankachon (10°09'N 98°36'E). Palaw-ton-ton was, according to the glossary, 'a Malay village on the coast about 30 miles [50 km] north of Victoria Point', but the village in question (Kampong Pulo Tonton) is actually on an island (Pulo Tonton) c. 8 km north-west of Victoria Point, at 10°01'N 98°31'E (and is so mapped, e.g., on Army Map Service 1966).

Abbott obtained only two specimens, at Sungei Balik on 26 February and Telok Besar on 1 March (Riley 1938:261, also B. W. Miller pers. comm. 1986). 'Sungei Balik' is evidently Sungei Baleihgyi (10°29'N 98°32'E), while 'Telok Besar', untraceable as such, could perhaps be Talobusa (10°23'N 98°33'E); in any case it is evident from the dates that 'Telok Besar' is close to Sungei Baleihgyi, as Riley (1938:15) indicates that Abbott was collecting at the latter on 25-26 February and the former from 27 February to 6 March 1904.

Oates (1883: 419) mentions that his collectors also obtained specimens at

Maliwun, but this was evidently in deliberate duplication of Davison's work. One of these specimens is in AMNH, another in RMNH; the whereabouts of any others is unknown to us. The specimen in BNHS listed without date from Bankachon (Abdulali 1975:480) was collected by G. C. Shortridge in January 1914 (S. Unnithau *in litt.* 1985), again presumably in duplication of Davison.

DISTRIBUTION IN THAILAND

The earliest record – apparently made in either 1875 or 1877 – of Gurney's Pitta in Thailand was by Davison at 'Kenong, within the estuary of the Pakchan, but on the Siamese or southern side' (Hume and Davison 1878:244), i.e. just across the river (and border) from Bankachon. However, no locality bearing this name can be traced; the only settlement on the south side of the Pakchan estuary whose name has any resemblance is Ranong (9°58'N 98°35'E), which used commonly to be spelt 'Renong' (see, e.g., the map accompanying Robinson and Kloss 1921), so it seems that 'Kenong' was the result of a typographer's misreading of a manuscript R as K.

This record was quickly followed by Hume's (1879:156) announcement, without comment, that the species had been found on 'Tonka', i.e. Phuket Island (Ko Phuket) off the west coast of peninsular Thailand. This evidently refers to a male bird in BMNH from 'Tapraw' (untraced), taken on 11 April 1879 by J. Darling (one of Hume's collectors: see Robinson 1927: xxxiii), since a specimen of a male listed as from 'Tapraw, Island of Tonkah' is mentioned by Sclater (1888:449), although the issue is confused by this being attributed to Davison and ascribed to the type material.

There is a skin of an adult female Gurney's Pitta in MNHN, received in 1893 but otherwise undated; it was collected by G. M. Bel at or in 'Siam Prov. Banataphan' (C. Voisin *in litt.* 1985). This would appear most likely to have come from Ban Saphan district in Prachuap Khiri Khan province, at 11°13'N 99°31'E (read from RTSD 1973).

All the remaining records from Thailand stem from the twentieth century in the years 1909–1919, 1929, 1936, 1952 and 1986. E. C. Dickinson (*in litt.* 1985) has pointed out that early collectors in the northern peninsula were chiefly dependent on the railway system for their transport and that railway station villages were commonly used as bases for collecting forays. This fact is certainly borne out by Gurney's Pitta records and indeed helps confirm the identity of some sites.

Robinson and Kloss (1911:49) found the species in 'several localities' in Trang province. They do not specify these sites, but there are skins in BMNH, AMNH, NRM, NUSZRC and UMZC dating from 1909–1910 and stemming from Trang which are evidently theirs and whose labels bear more precise site data: 'Chong', 4, 5 (two specimens) and 12 December 1909, 'Lam-ra', 6, 8, 11, 18, 19, 20, 21 and 31 January and 24 February 1910, 'Ko-Khau', 13, 19 and 21 January 1910, and 'Krongmon', 16 February 1910. All these localities are mentioned (with these spellings) several times throughout Robinson and Kloss (1910, 1911), but only one of them, Chong, is traceable with immediate certainty. As Robinson and Kloss (1910:669-670) make clear, Chong is Khao Kachong, whose coordinates as read

from Army Map Service (1965) are 7°31'N 99°48'E, this being Khao Chong in or near the Nature Centre at the northern end of the Khao Banthad Wildlife Sanctuary (described, e.g., by Lekagul *et al.* 1985:36). The altitude at which one of the Chong specimens was taken on 5 December is noted on the label as 250 ft (75 m).

The other sites were evidently not visited by Robinson and Kloss personally, as they say (1910:670-671) that 'after our departure from Chong our collectors visited several localities in the N. E. portion of the State [Trang] towards Lakon [i.e. Nakhon Si Thammarat], but for various reasons were unable to ascend any of the hills'. There is a Ban (=village) Lamphu La, whose old name was Ban Lam Ra, at 7°41'N 99°34'E, this being only 10 km north of Trang town. E. C. Dickinson (*in litt.* 1985), who maintains a Thai locality card index bequeathed him by H. G. Deignan, confirms the position and identity of this locality, which he also has as 'Lam Phura' and 'Sathani [station] Lam Phila'. 'Ko-Khau' (untraceable as such or as, e.g., Kho Khao) must have been very close; Robinson and Kloss (1911:15) describe it as 'at some considerable distance inland'. Dickinson suggests that 'Ko-Khau' is a typographer's misreading of 'Ko-Khan' (it appears indeed as the latter on specimen labels) and that this is therefore (Ban) Khok Khan, or now (Ban) Khuan Khan, at 7°34'N 99°38'E. 'Krongmon' (specimen in AMNH, where the label reads 'Krongmun') seems unlikely to have been far distant either. It does not feature in any gazetteer, but there is a Khlong Muan railway station at 7°53'N 99°38'E, which is only another 10 km or so to the north of Ban Lamphu La (Dickinson's index agrees with this identification and position). 'Krongmon' is also important for providing a record of the highly threatened Giant Ibis *Thaumatibis (Pseudibis) gigantea* (Robinson and Kloss 1911:17).

Robinson (1915:97) found Gurney's Pitta 'in the neighbourhood of Ban Kok Klap' (in former Bandon – now Surat Thani – province), where he collected during the week 29 June to 6 July 1913. He describes this locality as four miles (c. 7 km) west of the main Bangkok–Singapore railway, and on the banks of the river Lampun (Khlong Lamphun). By relating this information to several maps it is possible to determine the coordinates of the site as 8°53'N 99°17'E. During this collecting trip he also visited the mountain c. 25 km to the east of Ban Kok Klap, named 'Kao Nawng' (Khao Nong), where he failed to find the species (reporting it as 'not extending far up the slopes, as it was not met with at either of our camps').

Gyldenstolpe (1916:85) collected an immature male Gurney's Pitta on 8 December 1914 inland of Koh Lak (now renamed – or replaced by – Prachuap Khiri Khan, as noted by Deignan 1963:99). This is the most northerly record for the species. The locality is given as 'Koh Lak Paa' ('paa' merely signifies 'forest'), the encounter being made 'during one of my excursions among the mountain chain separating Tenasserim and Siam'. It is clear from Gyldenstolpe's (1916:10) account of his itinerary that he was in the low dividing range several (perhaps up to 20) kilometres to the north of the mountain Khao Luang, and the approximate coordinates for the record may therefore be read from the latitude of Prachuap Khiri Khan just before it intersects the Burmese border, hence 11°50'N 99°40'E. The statement in King (1978–1979) that this record was from Koh Lak itself, 'an island on the west [*sic*] coast of the Isthmus of Kra in Thailand', is obviously erroneous.

In October 1915 a nest (the first and until 1986 only to be recorded) was found at

'Klong Wang Hip, Tung Song' (Herbert 1924:298). Tung Song (Thung Song) is a town in Nakhon Si Thammarat (the record is thus generalised in Medway and Wells 1976:255); Klong Wang Hip ('Klong Wahip' on BMNH specimen labels) is described by Herbert in Baker (1919a:178-180) as a stream at the foot of the hills about eight miles (13 km) north-east of Thung Song. He also mentions the mountain Khao Wang Hip and implies it was very close to the stream in question; the coordinates for the mountain read from Army Map Service (1965) are 8°19'N 99°42'E. E. C. Dickinson's card index places Klong Wang Hip at 8°10'N 99°40'E. One small anomaly in this record is Herbert's statement that 'the female was shot by my Dyak collector as it flew from the nest . . . on the 9th October' when the skin of this bird in BMNH is dated 1 October. A male from the same locality – presumably the mate (these are the only two specimens from this site) – is dated 9 October. Perhaps therefore it was the male that was shot as it flew from the nest, the search for the latter having intensified after dissection of the female had showed it to contain a shelled egg ready for laying.

In January 1916 the same collector (C. Chunggat for E. G. Herbert, on BMNH labels) obtained (at least) six further specimens of Gurney's Pitta: on 5th, at 'Maprit', he took four, three males and a female; on 17th and 20th, at 'Klong Bang Lai', he took a female and a male respectively (Baker 1919b:417-418; specimens all in BMNH). Herbert again provided details of these two localities in Baker (1919a:178-180), Maprit being 'a station on the southern railway, west of Patiyou' and Klong Bang Lai 'a camp on the banks of a stream of that name, about 10 miles [17 km] north-west of Maprit and close to the hills'. The two sites are marked on the map that accompanies Robinson and Kloss (1921) and on the map in Robinson (1927: xii). Royal Survey Department (1930) marks Maprit as 'Ma Prid station', from which the coordinates are 10°55'N 99°20'E: this puts it a little to the north-east of its position on the map in Robinson and Kloss (1921) and it is also thus north, and not west, of Pathiu (this error is because Pathiu was misplaced on many nineteenth century maps north-east of its true position). Through this link it becomes possible to identify 'Maprit' with what Office of Geography (1966b) calls Sathani Map Ammarit, at 10°52'N 99°21'E (its coordinates for Pathiu being 10°42'N 99°19'E). E. C. Dickinson's card index places Klong Bang Lai at 10°45'N 99°10'E, and indicates that this is the same as Ban Salui (also marked on Royal Survey Department 1930).

There is a skin of a male Gurney's Pitta in ZMK, collected by R. Havmøller on 23 May 1916 at 'Hannaat, Bandon, Siam' (S. Brogger-Jensen *in litt.* 1985). Hannaat cannot be traced with certainty. There is, however, a Ban Han Not at 8°55'N 99°10'E, in the lowlands of the Tapli valley, Surat Thani province, due west of Robinson's Ban Kok Klap.

On 12 December 1917 Robinson and Kloss (1919:103) obtained a male at Klong Tung Sai (Klongtun Sai on BMNH label) on Junk Seylon (=Phuket Island). The coordinates (read from RTSD 1973) are 8°02'N 98°23'E (the locality is thus marked in Robinson and Kloss 1919:89).

In March 1919 Robinson and Kloss (1924:222) found the species at 'Tasan' (Thasan), in Chumphon ('Chumporn', 'Chumpawn' on BMNH labels) province. Ban Tha San is at 10°29'N 98°55'E, mapped as (e.g.) Ban Htasan at precisely these

coordinates on the junction of the river 'Khlaung Htaung Kha' and another unnamed stream in Bagge (1897). Robinson and Kloss (1921:10-11) describe Thasan as 'pleasantly situated among low hills covered with evergreen forest at the confluence of two clear-water streams' and mark it on the map that accompanies their paper; Robinson (1927: xii) also maps it. Seven birds (four males, three females) were collected there in the eight days 15-22 March; three of these (one male, two females) are in BMNH, the other four being in NUSZRC.

On 25 July 1929, C. J. Aagaard collected a specimen of a juvenile female Gurney's Pitta at or in 'Bandon', i.e. in Surat Thani province. The specimen, erroneously labelled '*Eucichla cyajane irena*' (meaning Banded Pitta *Pitta guajana*) is now deposited in CUMZB. The precise collecting locality is not clear. Bandon is the former name both for the city and for the province of Surat Thani, the former being at 9°08'N 99°19'E, the latter stretching along the whole lowland area bordering Bandon Bay (Robinson 1915; see map in Robinson and Kloss 1921).

In August 1936 collectors for Meyer de Schauensee (1946) found the species on the mountain Khao Bhanam (Phanom) Bencha (1,360 m), at 8°17'N 98°56'E, north of the town of Krabi. Four birds (two females, an immature female and a male nestling) were reported collected in the three weeks 5-27 August, at 600-1,060 m, but the nestling (in USNM) is in fact dated 19 September (B. W. Miller *in litt.* 1986).

On 24 December 1952, H. G. Deignan collected an adult female Gurney's Pitta at Ban Khlua Klang, Prachuap Khiri Khan province; the gonads were not enlarged (specimen in USNM: B. W. Miller *in litt.* 1986). While this site is not marked on any modern map, Deignan (*in litt.* 1956 to R. E. Elbel) stated that 'Ban Khlua Klang is a very new settlement currently being carved out of the forest for the cultivation of castor beans; it is in tambon Huai Yang, and in amphoe Prachuap Khiri Khan'. This enables the site to be placed with confidence in the present-day Huai Yang sub-district, in the plains or foothills to the east of the mountain Khao Luang, at around 11°38'N 99°36'E (as also given in E. C. Dickinson's card index).

From 1952 to 1986, no ornithologist reported encountering Gurney's Pitta in the wild, despite considerable fieldwork within its known range, and the few records were all of birds in trade (see below). However, in June 1986 P.D.R. and U. Treesucon found a pair with a nest (which failed) at an unprotected site in the Khlong Thom district of Krabi province. This rediscovery of the species took place long after the text of this paper was complete (and only a few days before it went to press); all further details plus a general prognosis will be found in Round and Treesucon (*Forktail* 2, in press).

NUMBERS

Within its rather restricted area of distribution, Gurney's Pitta has been judged to be relatively numerous. This at least was the finding of Robinson and Kloss, who reported it 'the commonest of the genus [*Eucichla*, of which however they recorded only one other species (Banded Pitta) while obtaining four of *Pitta*] in Trang', where they 'secured over thirty specimens from several localities' (Robinson and

Kloss 1911:49), and found it 'very common indeed' around Ban Kok Klap (where, in contrast to the situation in Trang, the Banded Pitta was 'even commoner') (Robinson 1915:97) and 'equally common' at Thasan (Robinson and Kloss 1924:222); however, on Phuket Island they considered it 'apparently not nearly so common . . . as on the mainland of Trang' (Robinson and Kloss 1919:103).

These findings evidently led subsequent reviewers of the species to describe it as occurring 'rather commonly' (Riley 1938:261), being 'apparently fairly plentiful' (Gibson-Hill 1949:256), and 'fairly common locally' (Glenister 1951:246 and subsequent reprints down to 1983). Chasen (1939:203) made the mistake of returning the species to *Pitta* whilst citing without proviso the remark above about it being the commonest of the genus at Trang, so that he exaggerated its abundance there. On the other hand, in southernmost Burma, to which Davison considered the species probably a non-breeding migrant, he was at pains to stress that it was 'by no means a common bird' and that 'it was only by persistently hunting them, and never missing an opportunity of securing a bird where possible, that I and my people succeeded in getting the number we did' (Hume and Davison 1878:244). (With regard to these comments it is worth noting that four of the six Burmese localities for Gurney's Pitta have produced only a single specimen each.)

What is curious about Robinson and Kloss's findings is that other workers have failed to find it in Trang: Riley (1938:13) reports that Abbott was at Chong for a month from around 19 January to 21 February 1897, and was in Trang generally from February 1896 to April 1897 and again from December 1898 to early March 1899, obtaining over 1,300 specimens of birds, yet not one *Pitta gurneyi*; and Meyer de Schauensee's (1946) collectors worked at Chong in October 1936, with similar negative results. E. C. Dickinson (*in litt.* 1985) comments that such anomalies may be attributable to the hunting methods of the native collectors involved, those using snares probably being much more successful than those depending on firearms.

In recent years the species has been judged uncommon (Lekagul and Cronin 1974:143), and this is presumably a source for the unattributed statement in King (1978–1979), repeated by Bain and Humphrey (1982:330), that it 'is now scarce over much of its range in Thailand'. This assertion may well be true, but it gives a false impression of being derived from positive contact with the bird in the field. In fact, such information as exists on the modern status of the species emanates solely from observations of specimens in trade. At the Bangkok Sunday Market from November 1966 to December 1968 there were only six Gurney's as against 37 Banded Pittas (also listed as 'uncommon' by Lekagul and Cronin 1974:142) among a total of 214 pittas offered for sale (McClure and Chaiyaphun 1971:68).

One of these birds was purchased by B. Lekagul in September 1968 and its skin is now in his private collection (there is also a market-purchased female in TISTR, with no data). The skin of a female in UMMZ is derived from a captive bird received in the flesh in September 1972 (B.W. Miller *in litt.* 1986), and might evidently have been one of the birds reported by McClure and Chaiyaphun (1971). At least one pair of *gurneyi* was in captivity in Britain up to around 1975, when the male escaped (Vince 1980:105), this stock perhaps also deriving from birds on sale in 1966–1968 (C. Vince *in litt.* 1985 has no clear record of the origin or number of these birds, 'but from memory I would say I had an adult male and probably three

immatures, one of which I always considered a female'). However, during casual observations at the Sunday Market from 1978 to the present, there was only one further undoubted record of a Gurney's Pitta, a male bird which was kept alive in an aviary until 2 June 1985; reports of at least three further individuals were received during this period, whereas in contrast the number of Banded Pittas entering the (now illegal) trade in Bangkok has remained constant, at roughly 20 individuals per year (P. na Patalung verbally 1985).

BIOLOGY

Our knowledge of the biology of the species is slight and easily summarised. It is strictly confined to evergreen forests, never venturing into the open or into gardens: favoured localities are narrow, densely wooded but undergrowth-free valleys lying between hills (Hume and Davison 1878:244). The Koh Lak (Prachuap Khiri Khan) specimen was flushed in 'a very dense and almost impenetrable piece of jungle' (Gyldenstolpe 1916:85). Birds keep to the ground (they have a habit of jerking up their tails and slightly drooping their wings as they hop along) and feed on snails, worms, slugs and insects; they are shy and retiring, rarely flying when disturbed but hopping rapidly away at the slightest indication of danger to the cover of an obstacle or some tangled vegetation where they remain hidden until the trouble has passed (Hume and Davison 1878). Usually birds are found singly, 'occasionally a couple together' (Hume and Davison 1878). The one nest found held a clutch of four eggs but the female contained a shelled egg (Herbert 1924), so the full clutch may be as much as five (Chasen 1939). Herbert reported that this nest 'was made of dry bamboo-leaves, domed, with an entrance on one side, and placed on the ground at the foot of a bamboo-clump' (Baker 1934:259; also 1926:458).

Davison apparently discerned three calls from the species: one ('its ordinary note') distinctly pitta-like yet 'notably' different; a 'peculiar note - a sort of kir-r-r' when suddenly alarmed; and - heard on one occasion only - a 'peculiar short double note', given with a flapping of wings and jerking of tail by a male perched high in a tree (Hume and Davison 1878). During the morning and evening birds call (presumably giving the first of the calls above) 'and may then be heard answering one another in all directions' (Hume and Davison 1878).

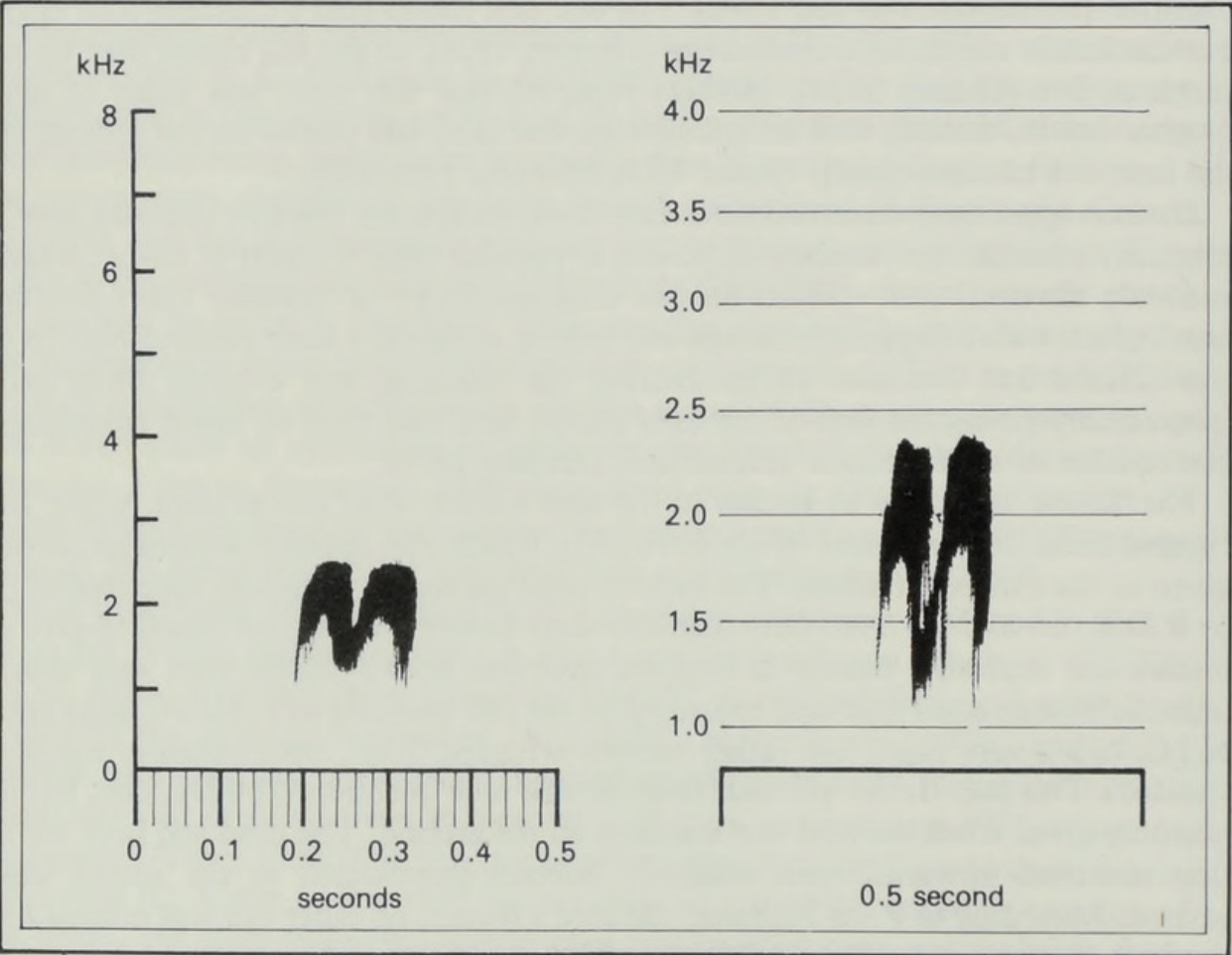
The 'kir-r-r' note may be similar to the well known 'brief but strident, whirr' of Banded Pitta (Medway and Wells 1976:255), which also appears sometimes to be given in the context of alarm. The captive male *gurneyi* in Bangkok, tape-recorded by P.D.R. on 31 May 1985 (less than two days before it died), was heard to give a mellow but explosive 'taroop' at frequent intervals; both syllables were very short with the first stressed (the tape recording of the call sounded to J. Hall-Craggs and N.J.C. like a very rapid but rather mellow whistled 'lilip', both syllables equally stressed). This may be the 'peculiar short double note' mentioned by Davison, but it was only given when the bird was standing on the ground. The head and neck were first stretched upwards, then suddenly bobbed downwards as the sound was uttered. According to P. na Patalung, the bird's owner, no other call was uttered by the bird in over six years of captivity, calling was restricted to a six-week period

during May and June each year (mostly taking place in the early morning and evening), and the bird was not with certainty heard to call from a perch (although it usually roosted in the low trees and shrubs with which the aviary was provided).

Sonagrams of this call, prepared by J. Hall-Craggs, are given in Figure 1. Making allowances for the amount of reflection on the recording, she comments (*in litt.* 1985) that this is ‘a distinctly disyllabic sound of brief duration, 0.12 to 0.125 s, each syllable c. 0.06 s, the two connected at the lower frequencies (just >1.0 to 1.5 kHz) but increasingly divided up to c. 0.02 s at the highest frequency, c. 2.4 kHz. In view of the very short time interval between the syllables, the separation is surprisingly clear and easy to hear. The call begins and ends abruptly, giving a slight consonantal sound, but has an overall tonal quality of rather mellow, hollow timbre. It is likely that this sound is locatable and used to maintain contact or to gain attention’. Thirty calls were recorded consecutively over a period of three minutes forty-two seconds, thus an average of one call every 7.4 s, although some calls were only 2–3 s apart.

Davison reported that ‘specimens dissected in April, May and June showed no signs of breeding’. This finding is fairly consistent with the few records of breeding that we have, although of course Davison’s birds were all from Tenasserim, where somewhat different conditions apply (see Natural constraints) and where breeding was never recorded. Breeding records comprise the Aagaard juvenile from 25 July, the nestling collected in September, when an immature bird was also obtained

Figure 1. Sonagrams of the call (two versions) of Gurney’s Pitta in captivity (see Biology).



(Meyer de Schauensee 1946), and the nest found in early October (Herbert 1924); the bird taken by Gyldenstolpe (1916) in December was also immature. The induction to be made is that breeding might commence in late May or early June and continue into November. It seems clear therefore that, like other pittas so far studied in Thailand (Robinson 1915, Herbert 1924, Round and Treesucon 1983), *gurneyi* is primarily a wet season breeder.

Davison speculated that the Burmese birds went to breed 'probably to Siam or into the higher portions of the hills dividing Siam from Tenasserim' and on the face of it Gyldenstolpe's specimen seems a good testimony to the latter proposition. It is noteworthy that the immature and nestling in August/September were from a mountain locality – not, incidentally, 'at least 2000 ft' as reported in Medway and Wells (1976:255), but as noted above (at least, according to Meyer de Schauensee's collectors) between 2,000 and 3,500 ft – and indeed the locality of the October nest appears, on the evidence presented above, to have been in the vicinity of a mountain and therefore quite possibly in hilly country. The testimony of Robinson (1915), that birds in July were common in lowlands but absent from an adjacent mountain, takes no account of the fact that his first hill camp was at 360 m, and that no collecting appears to have been conducted *en route* upwards. It is much to be regretted that Robinson and Kloss never investigated (or at least never published) the gonadal condition of the many birds they collected.

MOVEMENTS

The problem of the species's (former) numerical status is compounded by the problem of its movements. Davison's experience in southern Tenasserim was that a few birds began to appear around 10 February but that the species remained scarce until mid-April, becoming more numerous until the end of May, and then largely disappearing with the onset of the regular monsoon, though with some birds staying on into July (Hume and Davison 1878:244). Robinson and Kloss (1924:222-223) were respectful of this view, but could not confirm it, reporting that they had always found it equally common, in Trang (in the south of its range) in December and January, near Chumphon (north-centre) in March, and in Surat Thani (centre) in June and July. Chasen (1939:204) took these findings as providing 'no evidence to show that the bird is migratory in Peninsular Siam'; Gibson-Hill (1949:256) rephrased this as 'the evidence would suggest that in the peninsula it is sedentary', and Bain and Humphrey (1982:330) in turn declared that 'the Thai population is believed to be sedentary'. The point about Robinson and Kloss's evidence is, however, that it neither confirms nor negates Davison's judgement; and the point about Davison's judgement is that it was based on more fieldwork in Tenasserim and greater knowledge of the species than anyone else has ever achieved.

Davison's skins in BMNH and AMNH – plus two in SMF (D. S. Peters *in litt.* 1985), one in MCML (Fisher 1980:282), one in ROM (N.J.C.), one dated by month of three in MNHN (C. Voisin *in litt.* 1985) and one in RMNH (F. G. Rozendaal *in litt.* 1986) – appear to confirm the pattern he suggests. In 1875 he obtained three birds in February, six in March, three in April and one in May (one of those in April

was from Palaw-ton-ton, the one in May from Lenya: the latter indicates that he was not in southernmost Burma in that month). In 1877 he obtained five in April, 19 in May and five in June. Taken together this yields three in February, six in March, eight in April, 20 in May, and five in June. It turns out, however, that two of his BMNH specimens were taken in December 1875, while the AMNH specimen collected by Oates in 'South Tenasserim' is dated 23 January 1877 (as indicated by Baker 1926:458) and the BNHS specimen is also from January (see above). So proven records for Burma extend from December through to June, with July also claimed. In Thailand the records listed above cover January and February (Trang), March (Chumphon), April (Phuket), May and July (Surat Thani), August and September (Krabi), October (Nakhon Si Thammarat) and December (Prachuap Khiri Khan, Phuket, Trang), i.e. no records apparently exist for June prior to 1986 or November.

If the picture appears confused, this need not be blamed wholly on paucity of data. It seems very likely that the species's seasonal responses may be complex and dependent on several factors; such migrations as occur may, for example, be age-related or confined to populations in only part of the whole range. From the point of view of conservation, however, some understanding of the species's displacements, seasonal or otherwise, is obviously essential if it is to be afforded adequate protection throughout its annual (and life) cycle.

NATURAL CONSTRAINTS

The factors naturally restricting the species's range to what it is (or was) appear to be related to climate, vegetation and, in part, competition, although how is by no means clear. Drawing on Smitinand *et al.* (1967), Wells (in Medway and Wells 1976:2-3) notes and maps two important ecological boundaries across the isthmus of the Malayan peninsula, the first being the northern limit of 'rainforest' at about 10°40'N (on the Thai side of the Tenasserim chain), beyond which it is replaced by 'dry evergreen forest', the second being the transition from 'Thai-Burmese' to 'Malaysian' floristic formations, this occurring as a north-north-east divide roughly between 6° and 7°N (and thus just including the northernmost part of Perlis state in Malaysia). Whitmore (1984:201-203) proposes slightly different boundaries and vegetation categories, the Kra Isthmus being characterised as holding 'semi-evergreen rain forest' changing north of around 12°30'N (i.e. just north of Prachuap Khiri Khan) to 'moist deciduous forest', while in the south he re-draws the ecotone line (between semi-evergreen and evergreen rainforest) east-north-east through Perlis and Pattani (see Figure 3). Wells's comment is that 'Gurney's Pitta, the one species confined between the two zones of differentiation, may have evolved in this small area; alternatively its former range may have been reduced by extinction'. Either way, the conclusion must be that the region under review has features which enable (or would enable, man permitting) the bird to survive there.

RTSD (1972) charts the distribution of tropical monsoon climate as occurring throughout peninsular Thailand from just north of 12°N south to the Malaysian border, with the exception of the eastern half of the region from around 8°N, this

being classified as 'tropical rainforest climate'. This conforms well with Whitmore's ecological boundary to the north (and gives a slightly better accommodation than Wells's to the Prachuap Khiri Khan record at around $11^{\circ}50'N$), and similarly, to the south, what Wells and Whitmore treat in terms of floristic composition can also be seen as a real climatic boundary (although the lines are not exactly coincidental, the features are obviously correlated). It is also worth noting that the 80% humidity contour almost exactly embraces the Pitta's range, running across the isthmus just south of Prachuap Khiri Khan and just south of Trang (RTSD 1972).

Records of Gurney's Pitta are thus all from semi-evergreen rainforest, with the possible exceptions of Prachuap Khiri Khan, which is at the boundary with moist deciduous (dry evergreen) forest, Khao Phanom Bencha, which has some 'hill evergreen forest' (Round in press), and of Thung Song, which may be or may have been in or on the edge of the evergreen rainforest area. Certainly it is striking that, of 65 specimens of bird (inexplicably, Gurney's Pitta is not counted among them) listed from Ban Khlua Klang (Prachuap Khiri Khan) in H. G. Deignan's papers (which are now in the possession of E. C. Dickinson), there are no exclusively Sundaic lowland forest species: most are common birds of open country or deciduous forest, indicating that the area supported a continental Indochinese fauna. The Gurney's Pitta at that and the other Prachuap site may thus have been migrant individuals in atypical habitat, *en route* to or from the moister forests to the west in Burma, or at least having dispersed from breeding areas to the south.

The climatic difference between semi-evergreen and evergreen rainforest, as indicated by RTSD (1972), which plots the rainfall patterns at Ranong, Surat Thani, Phuket and Songkhla, is that the former not merely experiences a 'dry' season, but also endures periods of much greater wetness: the area of such forest thus coincides with the distribution of 'tropical monsoon climate' within peninsular Thailand. Ranong receives under 100 mm per month, December–March, but 200–600 mm per month, April–June, and over 800 mm per month, July–September. Further south, at Phuket, the dry season is similar but otherwise rainfall is fairly regularly distributed at c. 250–350 mm per month. At Surat Thani the pattern is broadly similar, though with lower rainfall and December still 'wet'. Down at Songkhla, however, in the 'tropical rain forest climate', the rainfall is fairly constant from February to September at approximately 100 mm per month, rising to 300, 550, 450 and 175 mm for the months from October to January (so overall much drier). It is possible, therefore, that Gurney's Pitta is adapted to a seasonal environment and requires high levels of rainfall in which to breed, but that the phenomenally high rainfall at Ranong and just across the border in southern Burma forces it elsewhere for the duration of the monsoon. (Davison reported parallel fluctuations in the populations of many southern Tenasserim birds.)

There may be some quite specific adaptation in the ecology of the species which is responsible for its restriction of range. Such a feature could only be identified from a close study of the bird in the wild. Meanwhile, the other major consideration concerns competition from other species of pitta. Throughout the Sunda subregion sympatric species of pitta tend to show segregation on size, habitat or altitude. The Blue Pitta *Pitta cyanea* and Garnet Pitta *P. granatina* have distributions that border the northern and southern frontiers respectively of Gurney's Pitta (Lekagul and

Cronin 1974, King *et al.* 1975). Although there is a vocal record of *cyanea* from Surat Thani province, Thailand (P.D.R. and D.R.W.), and a sight record of *granatina* from Trang (Holmes 1973:51), *cyanea* is larger and *granatina* smaller than *gurneyi*, and neither should compete with it. Moreover, both the similar-sized Blue-winged Pitta *P. moluccensis* and the smaller Hooded Pitta *P. sordida*, though partly sympatric with *gurneyi* in the breeding season, are largely segregated on habitat, preferring forest-edge, secondary growth and bamboo (Round in press).

The closest potential competitor would be the Banded Pitta *P. guajana*, which is almost identical to *gurneyi* in size and which also inhabits forest interior. The relationship of *guajana* and *gurneyi* is unusual, however, in that both have been found together at many sites: in Trang (Robinson and Kloss 1911), Surat Thani (Robinson 1915), Chumphon (Robinson and Kloss 1921) and on Khao Phanom Bencha (Meyer de Schauensee 1946). Although Robinson's (1915) findings imply that both Banded and Gurney's Pittas were abundant in the lowlands, they show that *gurneyi* was absent at around 360 m on a nearby mountain, where *guajana* was common up to at least 600 m. Robinson and Kloss (1911:49) described *guajana* in Trang as 'exceedingly common wherever met with, but very local' and (1924:223) wrote of its distribution in peninsular Thailand as 'most strictly associated with limestone hills such as are found throughout the Malay Peninsula on both sides of the main range . . . The association is correlated with the presence of certain species of shells on the limestone, which constitute the principal article of food of these birds'. Most subsequent workers have thought this claim mistaken, however, since the species appears to be equally common in lowland forests which are remote from limestone outcrops. Chasen (1939:202) stressed that the species was 'a bird of the low-country forests' but that 'it avoids the swamps'.

The possibility exists, therefore, that while *gurneyi* and *guajana* can both occupy lowland forest, with some degree of segregation or dominance based on subtle variations in forest-floor conditions, reduced resources commonly lead to *gurneyi* being excluded from the hill slopes by *guajana*. In some cases even the lowland-foothill ecotone may be unsuitable for *gurneyi*: in recent searches by P.D.R. of valley-bottom forests among the foothills of the peninsular mountain spine (at Khlong Nakha Wildlife Sanctuary in Ranong province and at Khao Chong in Trang, 50–100 m, as well as in an isolated patch of c. 20 km² of logged forest in the level lowlands near the town of Krabi), only *guajana* could be found.

In a few sites, however, *gurneyi* might be able to survive on higher ground (although whether it could do so in the absence of adjoining lowland forest must remain open to doubt: see Habitat destruction); on Khao Phanom Bencha, for example, the resource base must have been (and may still be) sufficiently wide to allow it to co-exist with *guajana*, but the destruction of all adjacent lowland forest may have caused *gurneyi* problems at this site. The other area of high ground from which *gurneyi* has been recorded is the hill region of Prachuap Khiri Khan. Since the most northerly records of Banded Pitta are from Thasan, Chumphon province (Robinson and Kloss 1921:223), and it is so far unknown from Tenasserim, it seems likely that *gurneyi* is less altitudinally restricted wherever *guajana* is absent. The narrow strip of forest remaining on the submontane slopes of the Thai–Burmese border in southern Prachuap province may yet prove crucial for *gurneyi*.

The Table provides measurements of *gurneyi*, *guajana*, *cyanea* and *granatina*. Curiously, while body size varies between species, bill and tarsus lengths barely do. Feeding ecology may not, therefore, be the principal isolating mechanism. However, differences in the weight of *gurneyi* and *guajana* conceivably indicate differing preferences for forest substrates.

HABITAT DESTRUCTION

The sense that some disaster must have befallen Gurney's Pitta is very strong when one considers that as many as 62 skins, none more recent than 1919, lie in BMNH drawers, and yet that the species has only twice been found by ornithologists in the

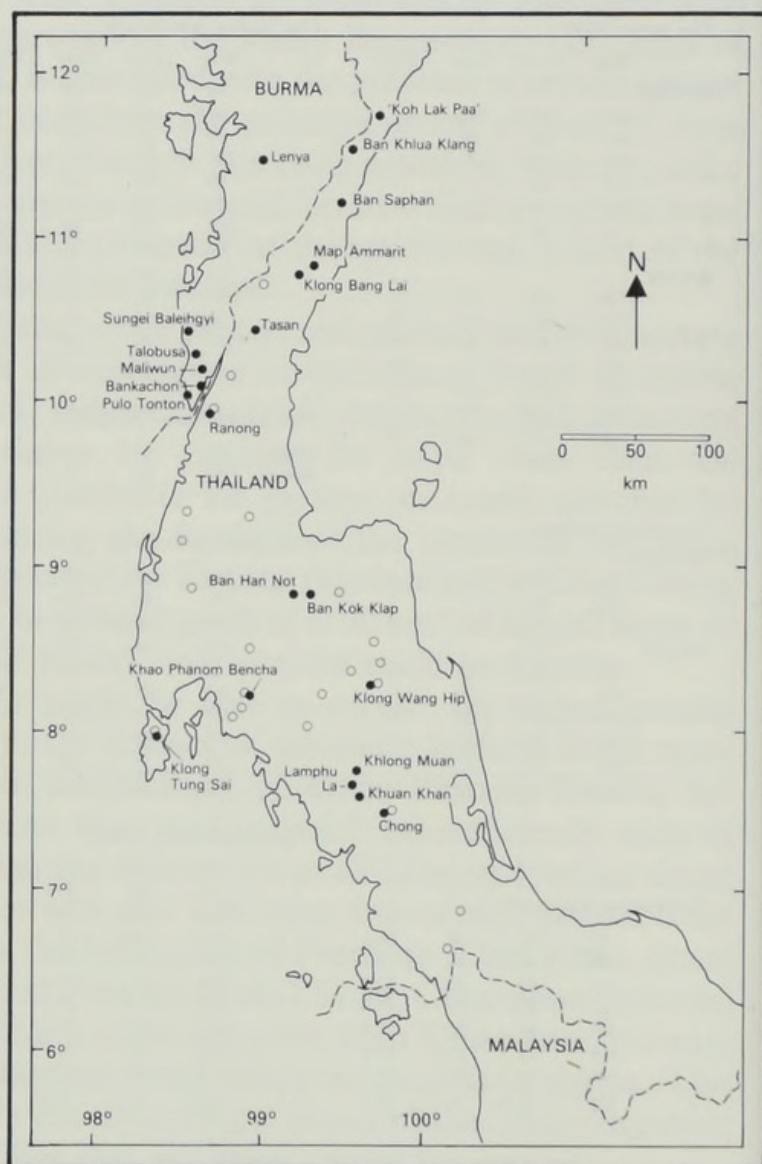
Table. The comparative morphology of four species of pitta from the Malay peninsula. Measurements are in millimetres; those of *P. guajana irena* and *P. granatina* are from live specimens netted at Pasoh, Negeri Sembilan, Malaysia (2°59'N 102°18'E); all others are from specimens in the flesh (i.e. before preparation as museum skins). Maximum and minimum lengths are italicized.

| <i>Pitta gurneyi</i> males | | | | <i>Pitta guajana irena</i> females | | | | <i>Pitta granatina</i> both sexes | | | | | |
|----------------------------------|--------|------|-------|---------------------------------------|-----------|-------|-------|-----------------------------------|--------|------|-------|-------|------|
| Wing | Tarsus | Gape | Wt(g) | Wing | Tarsus | Gape | Wt(g) | Wing | Tarsus | Gape | Wt(g) | | |
| NUSZRC | | | | 98 | 40 | 29 | 90.7 | 90 | 42 | 28 | 60.2 | | |
| 106 | 40 | 29.5 | — | 94.5 | 42 | 29 | 76.5 | 89 | 42 | 28 | 60.7 | | |
| 107 | 40 | 28 | — | 99 | 42 | 29 | 85.9 | 89 | 40 | 28 | 54.2 | | |
| 104 | 39 | 28 | — | 100 | 44 | 31 | 92.7 | 88 | — | 27 | 52.0 | | |
| 103 | 41 | — | — | 99 | 43 | 27 | 83.5 | 94 | 42 | 29 | 61.2 | | |
| 102 | 38 | — | — | 101 | 42 | 29 | 78.9 | 89 | 42 | 29 | 59.0 | | |
| — | 39 | — | — | 101 | 43 | 28 | 83.7 | 90 | — | 27 | 60.6 | | |
| | | | | 98 | 42 | 28 | 81.4 | 89 | 42 | 28 | 63.8 | | |
| BMNH | | | | 101 | 40 | 28 | 80.8 | 90 | 39 | 27 | 62.8 | | |
| (76) | 38 | 27 | 71 | 104 | 45 | 30 | 96.9 | 87 | 44 | 28 | 59.9 | | |
| 103 | 41 | 28 | 79 | 99.5 | 44 | 30 | 74.0 | 87 | 44 | 28 | 53.7 | | |
| 102 | 41 | 28 | 79 | 101 | 43 | 29 | 77.1 | 85 | 44 | 28 | 57.6 | | |
| 107 | — | — | 86 | \bar{x} | 99.7 | 42.5 | 28.9 | 83.5 | 90 | 45 | 29 | 57.6 | |
| 107 | 41 | 29 | 57 | <i>Pitta guajana ripleyi</i> (NUSZRC) | | | | 89 | 40 | 29 | 64.0 | | |
| 102 | 38 | 29 | — | male | 102 | 40 | — | — | 93 | 45 | 29 | 62.6 | |
| \bar{x} | 104.3 | 39.6 | 28.3 | 74.4 | female | 98 | 40 | — | — | 89.5 | 45 | (32)? | 55.9 |
| | | | | | | | | | 91 | 42 | 29 | 52.7 | |
| | | | | | | | | | 90 | 42 | 28 | 61.3 | |
| | | | | | | | | \bar{x} | 89.4 | 42.5 | 28.2 | 58.9 | |
| <i>Pitta gurneyi</i> females | | | | <i>Pitta cyanea cyanea</i> males | | | | | | | | | |
| NUSZRC | | | | 119 | 46 | 32 | 113 | | | | | | |
| 104 | 35 | — | — | 117 | 46 | 32 | 106 | | | | | | |
| 107 | 41 | — | — | 119 | 46 | 31 | — | | | | | | |
| BMNH | | | | 114 | 44 | 32 | 120 | | | | | | |
| 105 | 38 | 28 | 86 | 117 | — | 33 | 113 | | | | | | |
| 103 | — | 28 | — | 117 | 41 | — | 106 | | | | | | |
| 105 | 41 | 29 | 79 | 121 | 43 | 32 | 113 | | | | | | |
| 102 | 36 | 25 | — | 114 | 46 | 33 | 106 | | | | | | |
| 102 | 40 | 29 | — | 112 | — | 28 | 111 | | | | | | |
| \bar{x} | 104.0 | 38.5 | 27.8 | 82.5 | \bar{x} | 116.7 | 44.6 | 31.6 | 111.0 | | | | |
| <i>Pitta guajana irena</i> males | | | | <i>Pitta cyanea cyanea</i> females | | | | | | | | | |
| 95 | 41 | 26 | 86.6 | 117 | 46 | 30.5 | 120 | | | | | | |
| 98 | 39 | 29 | — | — | 43 | 30.5 | — | | | | | | |
| 104 | 45 | 31 | 84.3 | 112 | 43 | 30.5 | 113 | | | | | | |
| 101 | 46 | 29 | 75.5 | 120 | 44 | 33 | — | | | | | | |
| 105 | 46 | 30 | 86.6 | 117 | 41 | 30.5 | 113 | | | | | | |
| 104 | 41 | 27.5 | 88.6 | 109 | 41 | 28 | 113 | | | | | | |
| 105 | 43 | 31 | 89.9 | 109 | 43 | 30.5 | 120 | | | | | | |
| \bar{x} | 101.7 | 43.0 | 29.1 | 85.3 | 117 | 44 | 30.5 | 99 | | | | | |
| | | | | | 114 | 46 | 35 | — | | | | | |
| | | | | | 114 | 46 | 30.5 | 99 | | | | | |
| | | | | | \bar{x} | 114.3 | 43.7 | 31.0 | 111.0 | | | | |

wild in the past half-century. This seeming disappearance cannot simply be attributed to a lack of fieldwork within its range. Although no systematic ornithological surveys appear to have been conducted in southernmost Burma since Abbott's visit just after the turn of the century (the duration and intensity of Shortridge's work in 1914 are not known; the species is no more than listed by Salter 1983:7), no fewer than 22 terrestrial forest localities in the semi-evergreen rainforest zone of peninsular Thailand were visited in the years from 1962 to 1985 by ringing or collecting teams of MAPS (King 1966, McClure and Leelavit 1972) and TISTR (J. Nabhitabhata verbally 1985) or by independent birdwatchers and researchers who reported their findings to the Association for the Conservation of Wildlife. In spite of this, not one specimen or even sighting of Gurney's *Pitta* resulted, although five of the sites visited (Ranong, Khao Wang Hip, Klong Tung Sai, Khao Phanom Bencha and Khao Chong) were close to or coincided with former *gurneyi* localities (see Figure 2).

Such recent fieldwork has, however, taken place against a scenario of large-scale forest destruction, by both officially approved logging and illegal encroachment,

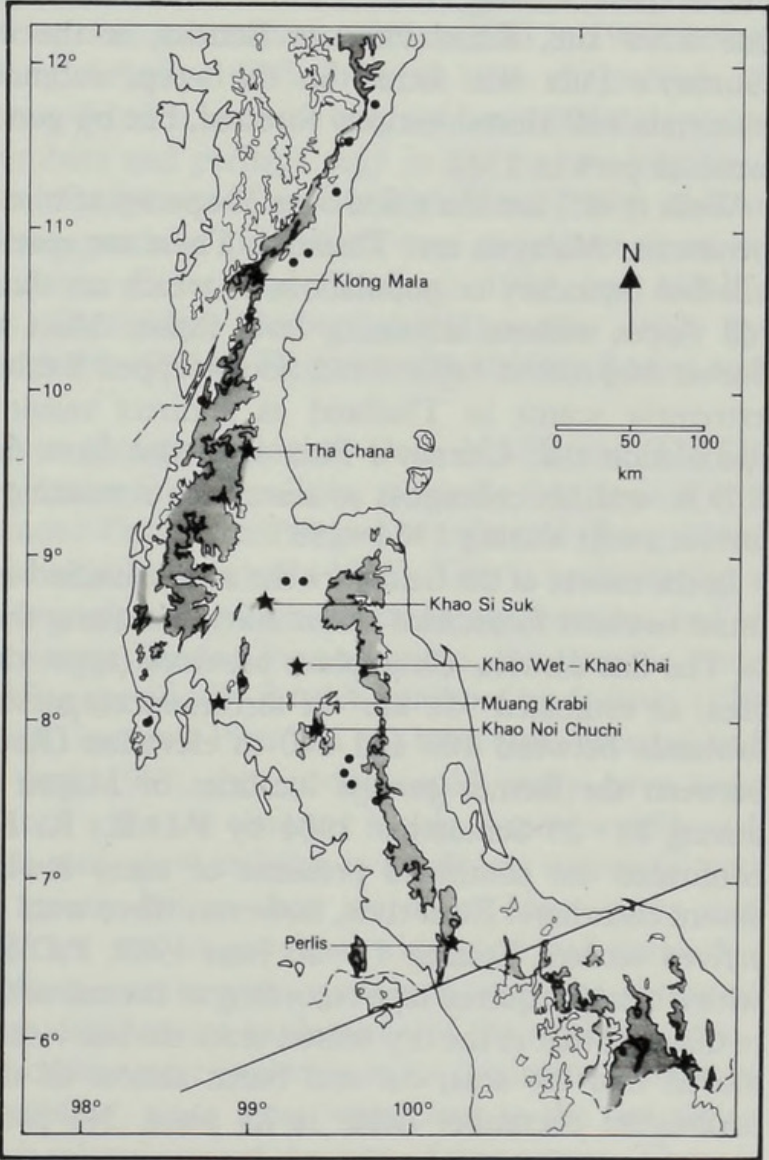
Figure 2. Records (and their absence) of Gurney's *Pitta*. Black circles and respective names represent sites for the species mentioned in the text. Open circles represent sites where fieldwork was conducted, 1962–1985: all such sites were forested at the time of visit, but none resulted in a record of Gurney's *Pitta*.



within the range of Gurney's Pitta. According to unpublished data in the Royal Thai Forest Department, the cover of terrestrial forest in peninsular Thailand had been reduced to 14,301 km², or approximately 20% of the land area of the region, by the end of 1982 (Round in press). Although this still comprises some extensive blocks, of which the largest, shared between the provinces of Ranong, Surat Thani and Phang-na (including some selectively logged areas), was measured at 4,426 km² (Round in press), all such areas coincide almost exactly with the uplands of the peninsular mountain spine (Figure 3). The forests of the level lowlands have almost entirely disappeared and have been replaced by croplands, fruit orchards, rubber and oil-palm plantations. The major expansion of Thailand's protected area network did not take place until the late 1970s and, as a result, the opportunity to include extensive forested lowlands never arose. Most of such areas had already been destroyed.

There are currently five national parks and five wildlife sanctuaries in peninsular Thailand (excluding coastal sites and offshore islands) but, although their combined area exceeds 5,000 km², it is doubtful whether any of them encompasses individual

Figure 3. The distribution of remaining forest cover in peninsular Thailand in relation to elevation (note: forest cover in Burma is omitted from this map). The contour line is placed at 200 m above mean sea level. The shaded area represents remaining forest (source: Royal Thai Forest Department 1983). Black circles indicate sites for Gurney's Pitta, as in Figure 2. The stars indicate sites referred to in the text which may still support lowland forest. The bold diagonal line marks the suggested boundary between semi-evergreen 'Thai type' rainforest and evergreen 'Malayan type' rainforest (after Whitmore 1984).



patches of level lowland forest greater than 5 km² (Round in press). Even where lowland areas have been included within protected areas, most have suffered subsequent encroachment by 'slash-and-burn' farmers and, in the worst affected areas, cultivation has ascended the hill slopes above 200 m.

The Thailand distribution of Gurney's Pitta mapped by Bain and Humphrey (1982:332) is puzzling in its lack of relation to proven records until one realises that all they have done is delineate remaining forest patches within the species's known latitudinal extremes (compare the map of deforested areas in Bain and Humphrey 1982:10; see Figure 3). If one considers the 16 precise localities where Gurney's Pitta was (or is assumed to have been) collected in Thailand (treating both sites in Phuket, one of which is untraced, as a single locality, and discounting Aagaard's 'Bandon') and compares them with the map of forest cover (Figure 3), it is evident that at least seven (Klong Bang Lai, Maprit, Ban Kok Klap, Hannaat, Krongmon, 'Ko-Khau' and Lam-ra) are in parts of the level lowlands which are now remote from remaining forest. At a further eight sites, (three in Prachuap, plus Thasan, Ranong, Klong Wang Hip, Phuket and Chong), although the lowlands are deforested, nearby hills still support forest above the 100 or 200 m contour and at one of these, Chong, there is still c. 2 km² of valley bottom forest remaining. The one other site, Khao Phanom Bencha, is the only undoubted locality where Gurney's Pitta was found on the steep, submontane slopes. Not only is the mountain still almost entirely forested, but by good fortune it was established as a national park in 1982.

Wells (1985) has identified over 30 species of bird which are lowland specialists in peninsular Malaysia and Thailand. These are species which either do not cross the hill-foot boundary or populations of which are thought to be unable to survive on hill slopes without adjoining level forest. Most such species (e.g. Red-crowned Barbet *Megalaima rafflesii* and Sooty-capped Babbler *Malacopteron affine*) are now extremely scarce in Thailand as a direct result of lowland deforestation, and speculation that Gurney's Pitta may also have fallen victim to this process led P.D.R. and his colleagues to search for remaining level lowland forests within its former range during 1984–1985.

In the course of the fieldwork the area identified as being most likely to support an intact lowland forest bird community was along the Klong Mala and its tributaries in Tha Sae district, Chumphon province (approximately 10°43'N 99°00'E). This area, an estimated 910 km² of forest, encompassed as much as 150 km² of level lowlands between 100 and 200 m elevation (Round in press), and lies roughly between the former *gurneyi* localities of Maprit and Thasan. A reconnaissance during 21–25 September 1984 by P.D.R., K. Komolphalin and U. Treesucon confirmed the continued presence of many lowland forest birds now scarce or absent elsewhere. Even then, however, there were many clearings created by newly arrived settlers. During 11–20 June 1985, P.D.R. and U.T. returned, equipped with a newly acquired tape-recording of the call of Gurney's Pitta (see Biology), only to discover that in the dry season since the last visit hundreds of landless settlers had moved into the area, cut and burnt almost all the standing lowland forest, and established cucumber fields in its place. No patches of trees larger than a few hectares remained and, although the survey concentrated on the Klong Lahia, near

the eastern boundary of the area, the settlers reported that the lowlands elsewhere along the Klong Mala river system had already also been cleared. Even though the area is shortly to be declared a wildlife sanctuary, it is unlikely that there will be any forest remaining other than on the hill slopes by the time this happens (for other details and comment, see Round and Treesucon 1986).

Recently it has become clear that deforestation is not much less a problem in the lowlands of southern Tenasserim: there, where Burma's 'most highly developed moist evergreen forest and associated fauna' are found, the stands are 'under increasing pressure from local people (resin tapping, mangrove charcoal, timber exploitation) and the highly organised Thai timber thieves' (Blower 1985b:85).

PROGNOSIS

During 1982–1985, at least one captive male Gurney's Pitta lived in a private aviary in Bangkok and, since this bird was bought from a trader no earlier than 1978, this provided concrete evidence of the species's survival in the wild until at least that time. In addition, there were reports of three further individuals held captive in Thailand in the early 1980s, at least one, concerning a female held in 1982, being considered genuine (P. na Patalung verbally 1985). Prior to 1986, the records of birds in captivity in the previous two decades were the only evidence that the species survived, albeit in very small numbers and perhaps only in one or two localities. However, if we are to refer to the 'disappearance' of Gurney's Pitta, it is as well to reflect how records of it have been patchily distributed over time ever since its discovery: 1875–1879 by Davison, Oates and Darling; 1904 by Abbott; 1909–1919 by Robinson, Kloss, Shortridge, Herbert and Havmøller; 1929 by Aagaard; 1936 by Meyer de Schauensee; 1952 by Deignan; and 1986 by Round and Treesucon.

It should also be noted that even though biologists from MAPS and TISTR visited such a large number of peninsular forest localities, relatively few pittas of any species (and no more than ten Banded Pittas) were ringed or collected (King 1966, McClure and Leelavit 1972, J. Nabhitabhata verbally 1985). This is undoubtedly a reflection of the difficulty both in seeing pittas, which can be highly secretive, and of catching them in mist-nets. Rather more Banded Pitta sightings, for example, have been made by birdwatchers searching specifically for this family of birds from 1979 onwards. However, since the call of Gurney's Pitta had not been tape-recorded and was not known with certainty until 1985, the species could easily have been overlooked. Pittas are most often seen when the observer is able to move swiftly and silently along a well-marked forest trail; slow stalking is much less successful and enables the birds to disappear quietly before they are seen. Most parks and sanctuaries in peninsular Thailand are not yet provided with good trail networks; moreover, the steep, rugged mountainous terrain combined with the threat of encountering armed insurgents has discouraged exploration of the remoter areas.

Although most former *gurneyi* localities were evidently in the lowlands, this might simply reflect their relative accessibility, since most were close to the few major settlements and railway lines which existed around the turn of the century. There is

also the evidence of Meyer de Schauensee's records that, at least on occasion, the species could be found at considerable elevation and, indeed, much of what is known about the habitat requirements of Gurney's *Pitta* is pure conjecture. Nevertheless, the destruction of the Klong Mala forests in 1984–1985 was a serious blow to hopes of rediscovering the species, only partially compensated for by the events of June 1986.

There is thus still an urgent need to mount a comprehensive search for Gurney's *Pitta*, and this might also be used to identify those areas in peninsular Thailand which continue to support the richest lowland forest bird communities. Such survey work could also yield further detailed information concerning the impact of the 'diversity attenuation phenomenon' (Wells 1985:216) on the lowland bird community in Thailand. Such a search should first concentrate on those former *gurneyi* localities where forest still remains on the submontane slopes: the hills west of Prachuap; Thasan (Chumphon province); the headwaters of the Klong Lamphun (Surat Thani province); Khao Wang Hip (Nakhon Si Thammarat province); Khao Phanom Bencha (Krabi province); the headwaters of the Klong Tung Sai (Phuket Island); and Khao Chong (Trang province). Of these, the Prachuap hills and Khao Phanom Bencha appear to provide the best hope.

Particular attention should also be given to those areas which may still support some level lowland forest. In addition to the Klong Mala area, mentioned under Habitat destruction, the Tha Chana district of Surat Thani province (approximately 9°34'N 98°57'E) on the gently sloping, eastern flank of the peninsular mountain spine is identified in Round (in press) as possibly still supporting 116 km² of forest below 100 m.

Areas of 20–50 km² of forest, mostly centred on or around lower hills which are remote from the main mountain massifs, may still exist at four further sites (coordinates read from RTSD 1973): Khao Si Suk, Phanom district, Surat Thani province (8°42'N 98°55'E); Khao Wet–Khao Khai, Phrasaeng district, Surat Thani province (8°23'N 99°11'E); Muang district, Krabi Province (8°11'N 98°49'E); and Khao Noi Chuchi, Thung Song district, Nakhon Si Thammarat province (7°54'N 99°18'E) (Figure 3). However, all of these areas are certain to be much disturbed.

With regard to the possible occurrence of Gurney's *Pitta* in Perlis state, Malaysia, despite the opinion that it 'almost certainly' does not or did not live there (Robinson and Kloss 1924:223), potential habitat was extensive until five years ago but now only two separated fragments, both logged, remain. One is a 100–200 ha valley bottom in the Bukit Bintang Forest Reserve (total area 2,638 ha) and the other a maximum 1,000 ha of lowlands within the Mata Air Forest Reserve. The latter totals 4,884 ha but its lowland remnant is in two parts, separated by a forested hill ridge. One of these parts is threatened by a new town, the other by plantation agriculture. Both forest reserves are on the north-west side of Perlis, up against the line of limestone hills that forms the Thailand frontier. Mata Air is contiguous with Thaleban National Park in Thailand, and World Wildlife Fund Malaysia has urged the fusion of the two into an international conservation area. Plans are in hand to search these two areas in 1986. Meanwhile, of course, approaches need also to be made to the Burmese authorities in order to determine the feasibility of survey work

in south Tenasserim.

Gurney's Pitta is, as Hume (1875) called it, a 'really lovely species'. The search to discover a viable population, the survey to plot its distribution accurately, the work to determine its year-round and life-cycle needs, and the effort to get it adequately conserved, must involve major initiatives. The future of one of the finest and most distinctive birds in South-East Asia is the prize.

Museum specimens: an inventory and appeal

Museum specimens have played an important part in the preparation of this paper, and it is our wish to trace every one in the hope that some new information may come to light. To date we can account for 103: AMNH has seven, ANSP four, BMNH 62, BNHS one, CUMZB one, MNHN four, NRM three, NUSZRC eight, RMNH two, ROM one, SMF two, TISTR one, UMMZ one, UMZC one, USNM three, ZMK one, and B. Lekagul's private collection one. We would greatly appreciate being sent details of any other specimens.

J. Hall-Craggs selflessly devoted a day and a half of her valuable time making 21 sonagrams in search of the most appropriate illustration for reproduction here. E. C. Dickinson provided confirmation of the identity of many Thai localities, copied us the letter from Deignan to Elbel, and commented helpfully on the typescript. B. W. Miller, having already checked all pitta specimens in the U.S.A., provided a complete print-out of his data on Gurney's, answered several major queries with alacrity, and drew our attention to the undocumented record dating from 1952. We thank them heartily for their very generous assistance. We are also most grateful to the staff of the Sub-department of Ornithology, BMNH, for access to the collections in their care, to M. LeCroy (AMNH), S. Unnithau (BNHS), C. Voisin (MNHN), C. Edelstam (NRM), F. G. Rozendaal (RMNH), D. S. Peters (SMF) and S. Brogger-Jensen (ZMK) for the provision of data from labels on specimens in their respective museums, to T. Wongratana for permission to examine the bird collection in CUMZB, to the staff of the Forest Mapping and Remote Sensing Subdivision of the Royal Forest Department, Bangkok, for permission to examine maps of forest cover, and to the staff of the Map Room, University Library, Cambridge, for their patience in providing many of the maps consulted in this study. We are also grateful to J. Nabhitabhata for information on localities visited by field teams from TISTR, to R. E. Elbel for help with Deignan's collecting localities, and to P. na Patalung for information on Gurney's Pitta in trade and for permission to tape-record and photograph the individual in his care. T. P. Inskipp kindly drew our attention to Vince (1980). Members of staff at the ICBP International Secretariat kindly read and commented on this paper in draft. J. F. Bellamy and R. Pfaff very ably prepared much of the typescript. N.J.C.'s part in this paper is a contribution from the ICBP/IUCN Red Data Book programme.

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