

An unusual new bulbul (Passeriformes: Pycnonotidae) from the limestone karst of Lao PDR

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Based on distinctive morphological (plumage and skin) and vocal characters we describe a new species of bulbul from the limestone karst of central Lao PDR and place it in the genus *Pycnonotus*. The species is so far known from one locality in Savannakhet province and two probable earlier records from the Bolikhamxai–Khammouan provinces border area. Initial observations suggest it may represent an extreme example of habitat specificity within the Pycnonotidae and have a distribution limited to the central Indochina limestone belt of central Lao PDR and, perhaps, western central Vietnam. Further work is required to understand more clearly the distribution, ecology and behaviour of this species. However, its apparent preference for sparsely vegetated, deciduous habitats on rugged and uncultivable karst terrain may partly explain why this conspicuous species escaped detection for so long. Based on inferred distribution and apparent habitat preferences, a large proportion of the global population may occur within the Phou Hinpoun (Khammouan Limestone) and perhaps Hin Namno National Protected Areas. The relative impenetrability of the large, cohesive areas of karst present therein should further protect against the majority of processes that currently threaten Indochinese karst birds and their habitats. Populations on isolated outcrops are expected to be more at risk.

INTRODUCTION

In recent decades field researchers entering the biologically rich forests of Indochina have been rewarded with many new discoveries. Relative to most neighbouring countries the birds of Lao PDR remained little surveyed until, after a 40-year near-hiatus, surveyors resumed documentation of the nation's avifauna in the 1990s (e.g. Thewlis *et al.* 1998, Duckworth *et al.* 1999, Duckworth and Tizard 2003). Since then much has been done to advance knowledge of the distribution and conservation status of the country's birds. However, many gaps remain, and ongoing surveys continue to produce important information and records of species not previously recorded for Lao PDR (Duckworth 2006).

Limestone karsts remain among the least studied ecosystems in South-East Asia, despite their supporting among the highest rates of habitat specialist and endemic taxa (Rundel 1999, Vermeulen and Whitten 1999, Clements *et al.* 2006). Based on field observations and museum diagnosis of two specimens, we describe a new species of bulbul, which we place within the genus *Pycnonotus*, from the limestone karst of central Lao PDR.

THE NEW BULBUL

On 17 May 1995, RJT observed a small group of distinctive bulbuls on limestone karst c. 150–200 m vertically above the Hinboun plain (itself at c. 165 m asl) at the northern end of the Khammouan limestone massif (18°04'N 104°31'E) (Fig. 1). As the group passed through, the birds alighted momentarily offering brief views of '5+ greyish brown bulbuls (?) with bare heads, somewhat buffy/olive undertail coverts, possibly two dark bars on rump. Twitterly calls'. This observation was omitted from the survey report (Duckworth *et al.* 1998) owing to its brevity and gross-level incompatibility with any known form. RJT subsequently weathered a fair amount of good-natured ribbing on relating the sighting to sceptical colleagues.

Nearby, in early 1999 T. D. Evans (*in litt.* 2009) observed atypical bulbuls on a small karst outcrop close to the village of Ban Naphong (Bolikhamxai province; 18°08'N 104°23'E) (Fig. 1) on three occasions: singles

on 6 January and 4 February, and two on 11 February. The first was taken to relate to Light-vented Bulbul *P. sinensis* and was inserted at proof stage as such to Duckworth *et al.* (1999), but better views on 4 February showed an unidentifiable bird: 'pale grey-white face; chestnut smear above and around eye, a little below it; hindcrown seemed pale, divided indistinctly from pale face by a salient of olive from the mantle, possibly with black face margin near eye; dark dull olive mantle; bright olive flight feathers; drab olive belly, greyer and paler than mantle'. These observations were left unreported.

More than 13 years after the 1995 sighting, 'bald' bulbuls were encountered again c. 185 km to the south-east. In November–December 2008 JWD and IAW surveyed birds in the lowland plains and Annamite foothills between the Phou Xang He and Hin Namno National Protected Areas (NPAs, formerly National Biodiversity Conservation Areas) in Muang Vilabouli, Savannakhet province, Lao PDR (Fig. 1). The region is well populated and the habitat comprises a complex mosaic of agricultural land, secondary forest and remnant patches of degraded natural forest. Limestone outcrops occur throughout the area as isolated karsts of various size and shape, and support among the few habitats within the survey area that are likely to have been little changed by human activity.

On 3 December 2008, JWD and IAW were surveying birds on Pha Lom (16°58'15"N 105°48'45"E), an east-west oriented limestone outcrop located c. 1.5 km south-south-east of the village of Ban Nonsomphou and 15.7 km west of the district capital town Vilabouli. Pha Lom stands approximately 800 m long by 250 m wide and rises to c. 215 m above the basal plain at 200 m asl. At approximately 13h00, IAW observed a distinctive though unfamiliar bulbul at c. 270 m asl, some 70 m vertically above the outcrop base, in sparse, deciduous, stunted, woody vegetation on steep and soil-less terrain. The bird had alighted directly overhead in a small, leafless tree, where it remained for two to three minutes, feeding casually on small fruits and cocking its head to gain a clear view of the observer at c. 5 m range. The bird then moved upslope and was followed by IAW for approximately 15 minutes when it called briefly and was joined by another, similar bird. The duo flew off soon after. At 14h00 on the same day IAW and JWD observed a pair foraging, calling

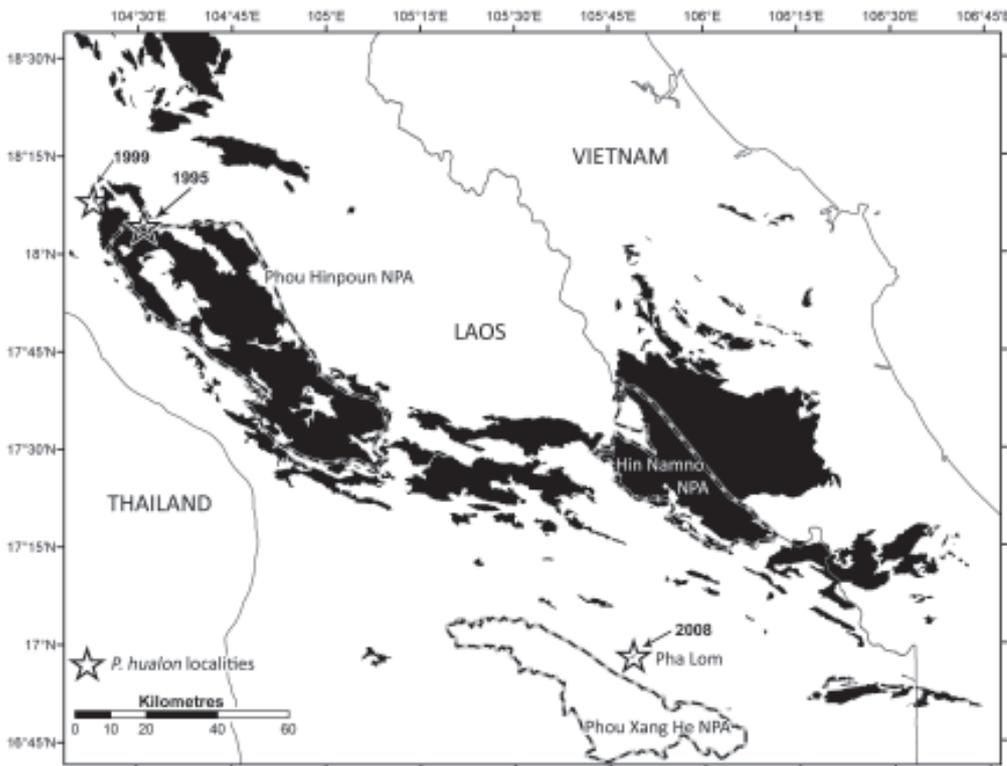


Figure 1. Map of central Lao PDR and Vietnam showing the distribution of limestone (central Indochina limestone belt), national protected areas and the location of known (Pha Lom) and presumed (Bolikhamxai–Khammouan border area) Bare-faced Bulbul *Pycnonotus hualon* localities. Bare-faced Bulbuls at Pha Lom occurred on isolated limestone outcrops.

and moving about in the same area for about half an hour.

Initial observations indicated a bulbul of grey-brown body colouring with olive-toned upperparts, erectile nuchal collar, distinctly paler, fawn-grey underparts, off-white throat and olive-green remiges in folded wings. Taken alone, this combination of rather sombre features is distinct from that shown by other bulbuls common in central Laos. Vocalisations were also clearly distinct from other common bulbuls in the region. However, the most striking and diagnostic feature of this unusual bird was its *prima facie* ‘bald’ appearance, with contrasting orange-pink and pale blue facial skin, a trait that immediately separates it from all other members of the family.

On 4 December between 06h45 and 17h30 several observations (totalling about an hour) were made by JWD and IAW of single birds and duos in the same location, with JWD making two sound recordings. These encounters may have involved repeated observations of only two individuals. On 5 December one of two closely associated birds was mist-netted in the same location using call playback and collected by IAW (Plates 1 and 3). On 6 December two birds were captured by Ubon, a resident of Ban Nonsomphou, using a slingshot and call playback under the supervision of IAW. The first of these was captured near where the first bird was mist-netted the previous day (c.20 m away) and was photographed and blood-sampled prior to its escape. The second was captured c.100 m further west on the karst and was collected by IAW (Plate 3). It was one of four birds (two duos) responding to call playback at the site. On this latter day, IAW observed a minimum of four birds, including the two captured, and perhaps as many as seven. Including the bird mist-netted on 5 December, at least five individuals were recorded on the south-eastern slopes of Pha Lom. Given the apparent strength of bond within duos, this figure is likely to total at least six, as it seems

unlikely the bird ‘widowed’ on 5 December paired again so quickly. So far as could be determined without capture, all birds observed on Pha Lom were essentially identical and occurred in the same general habitat-type.

Comparisons in February 2009 by IAW with material in the Museum of Victoria, Melbourne, Australia, and by JWD and IAW, with input from P. D. Round, with specimens at the Thailand Institute of Scientific and Technological Research (TISTR) in Bangkok, confirmed that the bird represents a new species, which we name:

***Pycnonotus hualon*, sp. nov.**
Bare-faced Bulbul

Holotype

Deposited in The Natural History Museum, Tring, UK (BMNH reg. no. 2009.1.1). Collected by IAW on Pha Lom (16°58′13″N 105°48′48″E), south of Ban Nonsomphou (a village not marked on the standard 1985–1987 series of Lao government 1:100,000 topographic maps), Vilabouli district, Savannakhet province, Lao PDR (Fig. 1) at c.295 m asl on 5 December 2008 (Plates 1 and 3). Prepared by G. H. Pfitzner at the Australian National Wildlife Collection (ANWC) as specimen no. 34958, Commonwealth Scientific and Industrial Research Organization (CSIRO), Canberra. Female, apparently prior to first breeding; oviduct elongate but not convoluted, follicles undeveloped. Skull ossified.

Diagnosis

Pycnonotus hualon is distinguished from all other bulbuls by the following individually diagnostic characters: the near-absence of contour feathering on the face and side of the head; the presence of extensive pale blue periorbital and loreal skin and orange-pink skin on the rear sides of the head and below the eye to the malar area; the predominance of loose, hair-like filoplumes (mostly un-

barbed) along the mid-crown; and the reduction of the anterior ear-coverts to a series of unbarbed bristles that cover the ear opening. It is further distinguished from other members of its genus by the combination of olive undertail-coverts, fawn-grey breast and belly, and off-white throat.

Description of the holotype

In the description below, subjective colour assessments of plumage are, where possible, followed by a formal colour classification taken from Smithe (1975). A formal description of facial skin coloration is not given owing to changes in appearance of these bare parts following specimen preparation.

Head and face

Crown from forehead to nape loosely endowed with a series of light-grey, mostly unbarbed hair-like filoplumes. Plumage densest on forehead and fore-crown, from insertion of bill to above rear of the eye, where some feathers are loosely barbed (barbules absent) and have dark shafts. Crown feathers emerging from between eye and nape are unbarbed.

Skin covering most of face and side of head, including lores, base of lower mandible and ear, predominantly bare (Plate 1a). Facial skin of lore, upper eyelid and supraorbital patch pale blue. Lower eyelid also blue, though this is only visible when the eye is closed. Skin of submoustachial and gape, below eye and back to nuchal collar across ear, tinged orange. Skin above ear and behind eye flesh-toned pink. All birds showed consistent colouring of the facial skin during field observations and handling.

Posterior ear-coverts form a tuft of white, upswept feathers (Plate 1a). Anterior ear-coverts reduced to a series of dark, unbarbed bristles that sweep back over ear opening. Five black rictal bristles, the posterior three being the strongest. Stiff facial bristles also present at anterior edge of lore (nasal bristles) and on lower mandible fore of gape. Soft facial bristles, visible only in the hand, present on other parts of the face, including below the eye.

Upperparts

There is a nuchal collar of slightly elongated and erectile feathers (Plate 1a), a posture-dependent character often visible from some distance in the field in most or all birds. Feathers of nuchal mid-line tinged olive (Plate 3a), those on sides pale grey to off-white. The boundary between these tonal areas is vague and shifts with viewing angle. Bases of nuchal feathers grey (84 Medium Neutral Gray), giving collar a mottled appearance when erect. Some rear central hair-like feathers mingle into the nuchal collar.

Feathers of mantle, back, scapulars and rump drab olive (30 Olive), uppertail-coverts brighter olive (48 Olive Green) (Plates 1b and 3a). All dorsal body contour feathers below nape have grey bases (84 Medium Neutral Gray), so that the strength and tone of olive fringing on any given feather tract is influenced by light and viewing angle.

Tail slightly rounded, with outermost pair of 12 rectrices 7 mm shorter than the central pair. Dorsal side of the rectrices olive (48 Olive Green) and concolorous with uppertail-coverts.

No moult evident in the rectrices. Fault bars of rectrices appear to be aligned, suggesting a bird in its first year and consistent with anatomical evidence that this individual had not entered its first breeding season.

Wings

Lesser and median coverts brownish-grey (119 Sepia) with olive tips (29 Brownish Olive). Greater coverts and alula feathers grey (119 Sepia) with olive fringing on outer webs (29 Brownish Olive). Remiges grey (119 Sepia) with outer webs predominantly olive (29 Brownish Olive) and brighter olive (48 Olive Green) in the emarginate primaries (P2–P8). Underside of remiges dull silver-grey (84 Medium Neutral Gray). Underwing-coverts fawn-grey and concolorous with breast.

There are ten primaries, with P10 (outermost) approximately half the length of P9. Wing point: P6 approximately equal to P7. No moult evident in the remiges.

Underparts

Feathers of the throat and sides of neck off-white with grey bases (84 Medium Neutral Gray). Chin feathers all white. Region of chin between mandibles sparsely feathered with some elongated filoplumes present (Plate 1a). Feathers on sides of neck merge with nuchal feathers to form a pale neck-collar that borders the orange-pink facial skin. As with the nuchal region, the perceived tone of the throat feathers depends on the bird's posture and the relative proportion of feather tips and bases that are visible.

Breast, belly and flanks olive-tinted fawn-grey (79 Glaucous) (Plate 3b). Undertail-coverts olive (48 Olive-Green) with grey bases (84 Medium Neutral Gray). Underside of tail dark olive-tinged grey (29 Brownish Olive).

Legs well feathered to just below the tibiotarsal-tarsometatarsal joint and concolorous with belly.

Bare parts

Bill (exterior) all black. Culmen decurved past the fossa, not strongly carinated, and with a notch on each tomium just before the very slightly hooked tip. Tomia slightly convex from base of bill to just in front of the nares, the change in contour creating a point of tomial flexure. Gonys almost straight (very slightly convex).

The rear of the tarsus, toes and claws are black, and the anterior edge of the tarsus dark with fleshy tones. The soles of the feet are pale bone-coloured.

Iris very dark brown (live specimen), appearing black in the field. Inside of mouth salmon-pink and distinctly brighter than facial skin. No brood-patch or cloacal protuberance observed.

Measurements of type

Total length (fully stretched) 190 mm; head 36.8 mm; culmen (from skull) 15.7 mm; tarsus 19.6 mm; wing (max. chord) 91.5 mm; tail (measured dorsally to base of shaft of longest feather) 96 mm; body mass 32.7 g.

Paratype

A second specimen of *P. hualon* was collected by IAW from Pha Lom at c.325 m asl on 6 December 2008 (Plate 3). It was prepared by G. H. Pfitzner at ANWC, Canberra, where it is held as specimen no. 34982. This is of a male, with non-turgid (inactive) testes measuring (left to right) 2 × 1 mm and 1 × 1 mm.

The male paratype is larger and heavier than the female holotype. It is slightly darker over the entire venter and dorsum, with the most notable differences being in coloration of feathers of the throat and crown. Compared to the holotype, the throat feathers of the paratype have



Plate 1. Head and face (a) and upperparts (b) of the holotype female Bare-faced Bulbul. (I. Woxvold)



Plate 2. Lateral view of a bird that escaped during handling; sex unknown. (I. Woxvold)



Plate 3. Dorsal (a) and ventral (b) view of the holotype (bottom; one wing removed in preparation) and paratype Bare-faced Bulbuls collected on Pha Lom, Savannakhet province, Lao PDR on 5 and 6 December 2008. (K. Aplin)

darker grey bases and darker tips, and feathering on the crown is thicker and darker. While in both specimens the throat is lighter than the breast and belly, the throat feathers on the paratype are almost concolorous with the olive-fawn breast and belly of the holotype. Colour of the tail feathers does not differ between specimens for either surface. There was no apparent difference in the colour of facial skin between the live paratype and holotype. The paratype has all-black tarsi (no flesh tones on the anterior portion). Measurements: total length (fully stretched) 201 mm; head 37.5 mm; culmen (from skull) 16.6 mm; tarsus 20.7 mm; wing (max. chord) 94 mm; tail 98 mm; body mass 41.3 g.

Etymology

'*Hualon*' is a Lao word meaning 'bald-head[ed]' (*hua* = head). It is a standard term used in reference to people with bald or shaven heads, which we use here as a noun in apposition to the genus name. We select this name as it is an immediate response, on being shown photographs of the species, to what is otherwise (to non-ornithologists) a relatively drab and anonymous bird. Coincidentally (see habitat description below), a massif lacking dense, tall vegetation on its upper parts is often known in Lao as a '*phou hualon*'.

TAXONOMIC CONSIDERATIONS

Delacour (1943) considered the bulbuls to be among the most distinctive and clearly defined passerine groups. While this statement still enjoys broad support, recent research

has excluded a number of taxa formerly considered bulbuls, and yet others are expected to cross this familial boundary in the future (Fishpool and Tobias 2005). Most notably, the 'greenbulbs' of Madagascar, formerly placed alongside the African greenbulbs in *Phyllastrephus*, are now known to share their strong morphological and behavioural similarities with bulbuls through convergence rather than shared ancestry, and were removed to *Xanthomixis* and *Bernieria* of Sylviidae by Cibois *et al.* (2001).

The overall appearance and behaviour of *P. hualon*, including shape and size, plumage, posture, vocalisations, flight and feeding habits, led to its immediate and independent recognition as a pycnonotid by all observers in the field and all viewers of the prepared skins. It further possesses a combination of morphological characters that, taken together, place it firmly within the Pycnonotidae, including a thin sheet of bone over the posterior portion of the nostril (operculate nostrils), long, soft plumage, nuchal filoplumes and thin skin (noted during preparation, G. H. Pfitzner *in litt.* 2009; live birds readily shed feathers when handled, pers. obs.).

However, assignment of species to genera within the Pycnonotidae has been problematic. Classifications based on morphological characters have proven largely unstable (e.g. Sharpe 1882, Deignan 1942, Delacour 1943, Dickinson and Gregory 2002), and while genetic studies are helping to uncover the true relationships among species within and between some genera (e.g. Pasquet *et al.* 2001, Warren *et al.* 2005, Moyle and Marks 2006, Johansson *et al.* 2007) such information is still piecemeal. A stable taxonomic hypothesis for the Pycnonotidae will require

Plate 4. Bare-faced Bulbul habitat on Pha Lom. (I. Woxvold)



extensive additional sampling and analysis and is predicted to result in significant changes to present generic arrangements within this large family widespread across the tropics, subtropics and adjacent temperate areas of Africa and southern Asia (Fishpool and Tobias 2005).

We assigned *P. hualon* generically based on a combination of morphological and behavioural characters. All the characters examined, including bill morphology, facial bristle patterning (rictal and nasal bristles), tarsus, vocalisation and general plumage pattern below the neck, were consistent with the species's placement within *Pycnonotus*. Moreover, the morphological and vocal traits manifest in *P. hualon* were inconsistent with those exhibited by the other 26 genera included within the family under the most recent global revision (Fishpool and Tobias 2005). For example, based on comparisons with museum specimens and illustrations and descriptions provided in Delacour (1943) and Dickinson and Gregory (2002), the bill morphology of *P. hualon*, including shape, carination, and position and shape of the nasal fossa, aperture and operculum, appears distinct from that of all other Asian and Indian Ocean (including Malagasy) genera (*Spizixos*, *Alophioxus*, *Acritillas*, *Hemixos*, *Hypsipetes*, *Microscelis*, *Cerasophila*, *Iole*, *Ixos*, *Thapsinillas*, *Setornis*, *Tricholestes*, *Bernieria*, *Xanthomixis*) and the majority of African genera (*Andropadus*, *Calyptrorhynchus*, *Baeopogon*, *Phyllastrephus*, *Bleda*, *Criniger*, *Neolestes*, *Nicator*). Basic vocal, morphological and plumage characters are also distinct from the remaining African genera (*Ixonotus*, *Chlorocichla*, *Thescelocichla*, *Pyrrhurus*).

Although *P. hualon* possesses strikingly distinct head and facial patterning, this character is insufficient to place the species outside *Pycnonotus*. A bare and conspicuously coloured head and face, comparable in divergence from putative congeners to that of the Bare-faced Bulbul, is also observed uniquely in the Bare-headed Laughingthrush *Garrulax calvus* (Timaliidae) of the mountains of northern Borneo (Collar and Robson 2007). Not only is this species retained within the genus *Garrulax* but most taxonomists have also, until recently, treated it as a race of the Black Laughingthrush *G. lugubris*. Moreover, Chasen (1935) detected 'incipient baldness' in nominate *G. (l.) lugubris* of the Malay Peninsula. We therefore believe the distinctive facial features of *P. hualon* to be a uniquely derived character insufficient to require generic isolation from *Pycnonotus* as currently recognised.

Distinctive patterning of the head and face is seen in many bulbuls, and within the family as a whole is thought to play an important role in terms of display (Fishpool and Tobias 2005). In addition to conspicuous plumage patterns, a number of species have coloured and/or unfeathered skin around the eyes. For example, the Red-tailed Bristlebill *Bleda syndactylus* has a supraorbital pattern similar to that of *P. hualon*, with a crescent of bare blue skin present above, fore and aft of the eye. Other examples include the Blue-wattled Bulbul *P. nieuwenhuisii*, the Black-fronted (African Red-eyed) Bulbul *P. nigricans*, and the Red-tailed Greenbul *Criniger calurus*. *Pycnonotus hualon* appears to possess an extreme extension of this tendency which, based on the preliminary molecular phylogeny of the Pycnonotidae constructed by Moyle and Marks (2006), has developed independently in multiple bulbul lineages.

With 42 currently recognised species, *Pycnonotus* is by far the largest genus in the family and in its present form

is considered to be polyphyletic (Fishpool and Tobias 2005, Moyle and Marks 2006). It contains numerous distinctive subgroups, many of which were previously treated as separate genera. A full revision of the genus, including results from genetic studies, is likely to lead to the resumption of many historical genera and a narrower interpretation of *Pycnonotus* centred on (but not restricted to) Africa (Dickinson and Dekker 2002, Fishpool and Tobias 2005). In light of this, we recognise that placing Bare-faced Bulbul within *Pycnonotus* is largely a matter of convenience, and that its generic position quite probably will be reassigned in the future pending further research clarifying the true limits of *Pycnonotus*. It is far beyond the scope of this new species description to carry out the extensive analysis required in order to determine the phylogenetic relationships of *P. hualon*, and thus to determine its true generic placement.

Within *Pycnonotus* as currently defined, an initial assessment of bill morphology, plumage pattern and vocalisations suggests that *P. hualon* most closely resembles bulbuls of the White-browed/Yellow-vented *P. luteolus*/*P. goiavier* superspecies group (groups named here are as defined by Fishpool and Tobias 2005), the *Otocompsa* group (Red-whiskered Bulbul *P. jocosus*, Brown-breasted Bulbul *P. xanthorrhous*, Light-vented Bulbul, Styan's Bulbul *P. taiwanus*), the rather variable Flavescent Bulbul *P. flavescens* and some members of the *Brachypus* group, such as the Olive-winged Bulbul *P. plumosus*.

Taken alone, available genetic data would be insufficient to compare with and definitively assign the Bare-faced Bulbul to any currently recognised genus or *Pycnonotus* subgroup. In the most extensive analysis published to date, Moyle and Marks (2006) showed that *Pycnonotus* is paraphyletic, with three of the 13 species sampled from this genus (Black-headed Bulbul *P. atriceps*, Puff-backed Bulbul *P. eutilotus* and Black-and-white Bulbul *P. melanoleucos*) apparently distantly related to a clade consisting of the remaining *Pycnonotus* and Collared Finchbill *Spizixos semitorques*. These two *Pycnonotus* clades were separated by a suite of currently recognised Asian genera, including *Tricholestes*, *Setornis*, *Alophioxus*, *Iole*, *Microscelis*, *Hypsipetes*, *Hemixos*, *Ixos* and *Spizixos*. Among these latter genera, at least *Ixos* appeared also to be paraphyletic. Given this unstable taxonomic situation, confident statements on the true contents of *Pycnonotus* and allies are further restrained by the paucity of genera for which the type species was sampled (including both *Pycnonotus* and its apparent closest relative *Spizixos*) and the large number of proposed intra-*Pycnonotus* groups (see Fishpool and Tobias 2005) not sampled at all, a number of which may be of interest in assigning a generic position to *P. hualon*. In particular, Moyle and Marks (2006) included no representatives of the *Otocompsa* group, the *P. cafer* complex or the Yellow-throated Bulbul *P. xantholaemus*, an unusual Indian bird with no obvious close relatives within the genus and habitat use somewhat similar to that of *P. hualon*. Any one of the unsampled *Pycnonotus* groups may prove to be most closely related to *P. hualon* and to be as distantly related to the apparent core group as are *P. atriceps*, *P. eutilotus* and *P. melanoleucos*, or potentially to be even more divergent. Identification of the true sister group of *P. hualon*, and confident proposal as to whether it belongs within a pre-existing group or constitutes its own monospecific (sub)genus, must therefore await a fuller analysis of *Pycnonotus* and its allies.

Within bulbuls are several documented cases of hybridisation and of dissimilar phenotypic intraspecific morphs. Hybridisation has been recorded in Asia between Light-vented and Styan's Bulbuls (Severinghaus 1990, BirdLife International 2001), between Himalayan Bulbul *P. leucogenys* and White-eared Bulbul *P. leucotis* (Rasmussen and Anderton 2005), between Red-vented Bulbul *P. cafer* and Sooty-headed Bulbul *P. aurigaster* (Deignan 1949, Zheng 1983), and in Africa within the Cape Bulbul *P. capensis* complex. In the latter group, hybrids of Common Bulbul *P. barbatus* with two other species are widely variable in size and colour of the eye wattles, which may differ from those of either parent (Markus 1967, Liversidge 1985, Lloyd *et al.* 1997). Similarly, Williams (2002) suggested that the rare and poorly known Blue-wattled Bulbul of Borneo and Sumatra may be a hybrid of the Black-headed Bulbul and the Grey-bellied Bulbul *P. cyaniventris*, a pairing that, if real, would produce fleshy blue eye-rings shown in neither supposed parent species. Distinctive colour morphs or subspecies occur in, among others, the Black-headed Bulbul, Common Bulbul and Sooty-headed Bulbul.

Pycnonotus hualon cannot reasonably be considered to be either a recent hybrid between already known species or a distinctive morph/subspecies of an already known species. All individuals observed at Pha Lom ($n \geq 5$) displayed a high degree of consistency across a suite of characters that are strikingly different from those observed in any other bulbul, including bare and conspicuously coloured facial skin and distinctive underparts and vocalisations. Even extreme morphs, such as the grey form of the Black-headed Bulbul, differ in colour tone and saturation rather than plumage pattern and baldness. In the case of hybridisation, selecting any two bulbul parent species would still require the spontaneous and consistent development of both orange and blue pigmentation on different parts of the face, a phenomenon that to our knowledge has not been observed in any other bird.

Habitat specificity also bears on Williams's (2002) discussion of whether the Blue-wattled Bulbul is a hybrid or valid taxon. As an alternative to the hybrid hypothesis, he considered the possibility that it may be a genuinely rare species restricted largely to a specific habitat thus far poorly surveyed in Borneo and Sumatra, but cautioned that strong habitat specificity was rare within bulbuls. The apparent restriction in habitat use displayed by the Bare-faced Bulbul (see below, Habitat) provides a suitable precedent.

VOCALISATIONS

Pycnonotus hualon was regularly heard to give a distinctive call that served as a useful indicator of the species's presence. The most common vocalisations consisted of a short (<1 sec) series of whistled, dry bubbling notes. Although normally uttered as a single, non-repeated call, at 15h50 on 4 December 2008 a series of nine such calls was recorded (prior to 'flight call', see below) given over a period of 20 seconds by a single bird of unknown sex. The basal phrase consists of a short (<0.3 secs) series of 3–5 notes that rise distinctly and end abruptly in a higher, separate note (Fig. 2a). The basal phrase may be given alone or followed by a longer series of accelerating notes of steady or descending pitch (Fig. 2b).

A more excited-sounding bubbling trill, initially rising in pitch, was sometimes given immediately prior to and/or as birds flew off. This was sometimes followed by short, rising trills given in flight (Fig. 2c). Flight calls distinct from other elements of the species's vocabulary have also been noted in Red-vented Bulbuls *P. cafer* (Kumar 2004).

The structure of *P. hualon*'s bubbling trills, including the rate at which individual notes are delivered, recalls vocalisations given by Cream-vented Bulbuls *P. simplex* and (Asian) Red-eyed Bulbuls *P. brunneus*, although the notes of *P. hualon* sound somewhat brighter, higher-pitched and more whistled. In pitch, structure and tone, *P. hualon*'s bubbling trills more closely resemble those of Crested Finchbill *Spizixos canifrons* included in Scharringa (2005), although the notes of the latter species are delivered at a higher rate.

A series of calls of similar phrasing, although delivered in a much harsher, churring tone, was recorded at 10h40 on 4 December. Ten calls were delivered over c.42 seconds by a single bird, each call consisting of two introductory notes rising in pitch and followed by a series of 4–7 notes of similar pitch (Fig. 2d). This call could be rendered as *ch-ch chi chi-chi-chi-chi*.

Observations suggest that the calls described here may serve as social contact signals (*sensu* Kumar and Bhatt 2000) used to maintain cohesiveness between duo members. The first bird encountered appeared to be alone

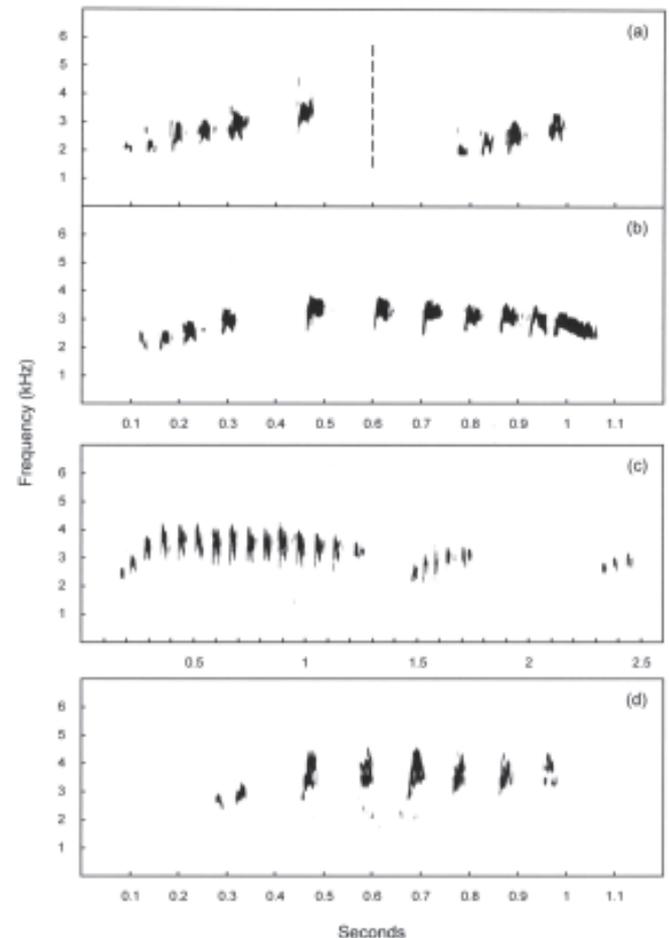


Figure 2. Vocalisations of Bare-faced Bulbul recorded at Pha Lom in December 2008. Sonograms show commonly heard bubbling trills (a, b), flight calls (c), and a harsher, churring call (d).

and was followed by IAW for 15 minutes over a short distance upslope, at which point it gave the bubbling 'anticline' (rising then falling) call depicted in figure 2b. On giving this call the bird was immediately joined by a second bird that had apparently been foraging higher on the karst. Moreover, after netting the female on 5 December, the accompanying bird remained nearby and called frequently at least until IAW's departure two hours later. The following morning a single bird was seen and heard calling in the same location on IAW's arrival at 10h15.

A looped playback of the bubbling call series (including Figs 2a–c) repeatedly attracted the close attention of both single birds and duos, with up to two duos simultaneously observed within metres of the source.

It is unclear whether males and/or females were vocalising during our fieldwork. The bird netted on 5 December was a female and may therefore have been accompanied by a male, particularly given the strength of the bond within the duo which appeared to last at least a day after capture. However, gonadal condition and the alignment of fault bars on the rectrices suggest the bird was still in its first year and may therefore have been accompanied by a sibling of either sex.

Further work is required to understand the complete vocal repertoire of this species at various times of day (e.g. roosting signals) and at other times of year. For example, males of at least some *Pycnonotus* species engage in territorial song, mainly during the breeding season (Lloyd *et al.* 1996).

BEHAVIOUR

As with most Asian bulbuls, *P. hualon* was neither skulking nor shy but rather conspicuous in its habits. Birds were seen foraging and moving about at all times of day. Most observations were of duos or single birds, the exceptions being a group of at least five birds observed by RJT at the northern end of the Khammouan limestone in May, and in December four birds on Pha Lom responding simultaneously to call playback. However, in the latter instance the group appeared to comprise two separate duos (see below). Singles tended to call more regularly, occasionally vocalising for some minutes before being joined by another bird or flying off.

In keeping with most members of the family, *P. hualon* is predominantly arboreal. However, birds also alight readily on the limestone substrate, such as on the edge of a precipice or on jagged crags in steep terrain. In contrast to truly terrestrial habits, these birds were only observed perching on rock, sometimes for some minutes, but not to walk or hop along the ground. Yellow-throated Bulbuls of southern India also perch on rocky slopes (BirdLife International 2001; see below, Habitat).

There was little evidence of *P. hualon* joining mixed-species flocks. On one occasion a single bird was seen in the same tree as a Black-crested Bulbul *P. melanicterus*, although it was not determined whether they entered or left the tree together.

Most flights were short and from tree to tree. On one occasion a pair undertook a lengthy and sustained flight off the face of the karst and along the slope for more than 100 m. The flight pattern is strong, direct and undulating, characteristic of other Asian *Pycnonotus* species.

There was no evidence of breeding at the time of the Pha Lom survey. No nests, fledglings or carrying of food or nest material were observed. There was no evidence of agonistic or territorial behaviour. On one occasion two duos were observed in close proximity after responding to call playback. Both duos repeatedly alighted in the same small tree but appeared to maintain pair cohesiveness and moved off separately. This fieldwork was conducted during the early dry season, a period of low breeding activity for most of the region's passerines, including bulbuls (McClure 1974) and most or all of the non-ground-nesting, non-river-channel passerines in lowland Laos (Duckworth 2007). Considering the apparent cohesiveness within *P. hualon* duos (see above, Vocalisations), these observations suggest that pair-bonds may be maintained throughout much or all of the year.

HABITAT

All of the relatively few observations of *P. hualon* were of birds on the middle and upper levels of karst and well above the basal plains. At all localities (Pha Lom and those in the Bolikhamxai–Khammouan border area) soil was almost absent, leaving sun-bleached limestone as the predominant substrate in this often steep terrain. Vegetation was dominated by small deciduous trees and shrubs (most below 4 m in height). On Pha Lom in December 2008, most woody plant species were either entirely leafless or held only sparse foliage (Plate 4) and a variety of species was in fruit, with birds observed to eat figs (*Ficus* sp., Moraceae) and berries from a woody shrub *Bridelia* cf. *B. tomentosa* (Euphorbiaceae/Phyllanthaceae). A subsequent fly-over in June 2009 showed the vegetation to be in full leaf. At the site beside the Hinboun plain, cycads, pandans and cactus-like species of Euphorbiaceae were also prominent.

Several factors suggest that *P. hualon* may be largely or entirely restricted to sparse deciduous forest occurring on limestone. First, despite fairly extensive fieldwork in the area, and especially given the species's distinctive, far-carrying and freely given call, no Bare-faced Bulbuls were seen or heard in the forest or agriculture on the plains surrounding Pha Lom, or in transitional habitat on the outcrop's lower slopes (which held a skirt of tall semi-evergreen forest). Second, the 1995 and 1999 sightings of similar birds, deemed likely to be *P. hualon*, were made in similar habitat on limestone karst. Third, if the species does inhabit better forested areas in limestone landscapes it is likely that it would have been found before now. Between 1994 and 2008 there has been substantial survey effort (by RJT and others) both within limestone landscapes and in closely adjacent areas such as the Nakai Plateau. These surveys focused largely on tall forest and other well-vegetated habitats of internal basins (known as *kouan* in Lao) and/or around the base of rocky prominences. Fourth, more than 20 residents of Ban Nonsomphou, the village nearest to Pha Lom (<1.5 km), did not recognise *P. hualon* from a series of photographs taken of a bird in the hand. Among those questioned were farmers who cultivate land at the base of Pha Lom and have hunted in the area since they were children. Hunting of frugivorous passerines is common throughout Lao PDR, with boys as young as five or six waiting with

slingshots at fruiting trees (Duckworth *et al.* 1999), and was observed widely during the 2008 survey of Muang Vilabouli. Metal war debris was readily observed on the higher slopes of Pha Lom and further indicated that this area is little visited by local residents; where such artefacts occur in Lao PDR, they are eagerly collected by villagers who regard them as valuable 'non-timber forest products' (e.g. Foppes and Ketphanh 2003). In sum, given the species's conspicuous habits and distinctive appearance and call, it seems reasonable to conclude that *P. hualon* escaped detection for so long due to its ecological restriction to this non-cultivable, little surveyed and generally inhospitable terrain.

Further work is required to determine more precisely the habitat preferences of *P. hualon*. Karst landscapes within central Indochina cover a wide range of altitudes and climatic conditions and support a variety of vegetation formations. Suitable habitat may also occur on sparsely vegetated non-calcareous outcrops. In addition, seasonal patterns in movement and habitat use might be exhibited by *P. hualon*. For example, in the harshly seasonal environment of central Laos, which receives almost no rain from November to March, seasonal shifts in fruit availability might well occur and may lead birds to forage elsewhere. Alternatively, birds may remain within a stable home range and shift their dietary preferences between fruit and other foods (e.g. arthropods, nectar, small vertebrates) at different times of year, as has been observed in Puff-throated Bulbuls *Alophoixus pallidus* in north-eastern Thailand (Khamcha and Gale 2009).

Many Asian bulbuls exhibit some degree of habitat specificity in natural landscapes. For example, ancestrally in Indochina, field observations suggest that Sooty-headed Bulbuls may have been largely restricted to deciduous dipterocarp forest, while Streak-eared *Pycnonotus blanfordi*, Yellow-vented and perhaps Black-headed Bulbuls may have been riparian or wetland specialists. However, most Asian bulbuls adapt well to human-altered habitats. This is particularly true of frugivorous species, most of which feed on small fruits that commonly occur on plants in secondary regrowth habitats. Such adaptability is consistent with an apparent expansion in the habitat use and range of many bulbul species following human settlement, and has led some researchers to conclude that specialised habitat requirements are currently rare within the family (e.g. Fishpool and Tobias 2005).

Initial observations suggest that *P. hualon* has not expanded its ecological profile into degraded or fragmented habitats, and as such may represent an extreme example of habitat specificity within the Pycnonotidae, and the only known bulbul that is a limestone specialist. If so, these preferences are somewhat similar to those exhibited by the Yellow-throated Bulbul, a Vulnerable species of central southern India. Although not a limestone specialist, this 'rare and peculiar bird' (Delacour 1943: 23) inhabits stony and boulder-strewn hills with various forms of scrub and dry to moist deciduous woodlands, and often perches on bare rock (BirdLife International 2001).

DISTRIBUTION

Pycnonotus hualon is currently known definitely only from Pha Lom, a single limestone outcrop arising from the

lowland plains of Muang Vilabouli in Savannakhet province. The only known habitat is sparse, stunted, open deciduous forest on karst terrain in areas with a marked dry season. Rundel (1999) recognised these xeric woodlands as a distinctive habitat of the central Indochina limestone belt, a series of well-connected hills/mountains with karst topography that extend across central Lao PDR and east into Vietnam (Fig. 1).

RJT observed a group of birds considered most likely to be *P. hualon* in similar habitat at the northern edge of the Khammouan province limestone in 1995. This identification cannot be considered certain given the brevity of the views and a potential discrepancy in field description from the hypodigm, with birds at the northern site described as having 'possibly two dark bars on rump'; there were no dark rump-bars on the birds at Pha Lom (Plate 3a). However, this discrepancy is almost certainly due to the brief, somewhat distant views taken in harsh light on the karst. On markedly superior field views, IAW and JWD noted that many plumage characters varied in tone (fawn, khaki, olive, grey, buff, etc.) with changes in light and viewing angle. Moreover, a number of other *Pycnonotus* bulbuls, including Black-headed, Andaman *P. fuscoflavescens*, Grey-headed *P. priocephalus*, Yellow-wattled *P. urostictus* and Puff-backed Bulbuls, show barred rumps during display, when birds raise their feathers exposing contrasting colours of the tips and bases (Fishpool and Tobias 2005). Similarly, in *P. hualon* all dorsal body contour feathers below the nape have grey bases and olive tips.

There are also a number of discrepancies between the 1999 descriptions and the birds observed and collected on Pha Lom in 2008. In Evans's notes, the precise layout of dark and light on the rear head, the failure to note the characteristic baldness, the suspicion of dark lores and the appearance of chestnut above the eye are all at odds with the birds from Pha Lom. However, these differences may all be explained by changes in lighting and angle, as in the above example, or in some cases they may represent seasonal or population-level variation. IAW and JWD noted that in some views the plumage of the nape changed with light and the way the nuchal collar was held (flat or erect), that baldness was sometimes not possible to ascertain, especially in direct sunlight, and that the precise colour of the facial skin was often only discernible given excellent views. Moreover, and despite these differences, it is considered that Evans may have viewed Bare-faced Bulbuls since (1) it was difficult to ascribe the birds to any other bulbul species, and (2) his notes describe the following series of similarities with *P. hualon*: general plumage characters below the neck and consistency in broad-scale head patterning including face different from nape and distinct coloration of the supraorbital patch and lore.

Based on the conservative assumption that the birds of both regions are the same species, this strongly suggests that its range extends north from the type locality through the extensive karst systems of the Khammouan province limestones into southern Bolikhamxai (Fig. 1).

The type locality for *P. hualon* may be close to the southern limit of this species's range. The karst outcrops surveyed there are among the most southerly of such formations present in the vicinity (Fig. 1), and the November–December surveys yielded southernmost records of a variety of Indochinese limestone specialist

fauna, including the Sooty Babbler *Stachyris herberti* and the murid rodent genus *Saxatilomys* (K. Aplin *in litt.* 2009), both of which were recorded on Pha Lom. The next major outcroppings of limestone are hundreds of kilometres to the south in northern Cambodia and to the south-east in Quang Nam province in Vietnam. None of the several species endemic or near-endemic to the central Indochinese limestones has been recorded in these isolated areas (RJT pers. obs.).

Phou Xang He NPA lies less than 10 km south of Pha Lom (Fig. 1). The geomorphology of Phou Xang He is dominated by a variety of non-calcareous rock formations. The eponymous Sayphou Xanghe comprises an extensive sandstone escarpment, while the Phou Hinho massif is igneous (Thewlis *et al.* 1996). *Pycnonotus hualon* has not been recorded at Phou Xang He (Thewlis *et al.* 1996). However, more work may be required to prove a species is absent than to reveal its presence, and additional surveys should include a focus on the park's more rugged terrain.

Surveys in November–December 2008 of the lower slopes of karst near Ban Houayhong, c.35 km east of Ban Nonsomphou (Pha Kat: 17°04'N 106°08'E; Pha Kholai: 17°02'N 106°10'E; Pha Oot: 17°03'N 106°08'E), and of non-calcareous hills in the general area, failed to locate the species. At the edge of suitable habitat on Pha Oot, hourly playback of the entire sequence of tape-recorded calls (including all those presented here as sonograms) through most of the daylight hours of 6 December failed to elicit a response. However, access to suitable habitat on the higher slopes of each of these outcrops was too limited to rule out this bulbul's presence in these localities. We believe the species is likely to occur on at least some of the many karst outcrops with suitable habitat that are present within the local area. For example, birds may be expected to occur on Pha Pen, an outcrop slightly larger than Pha Lom and situated less than 1 km to its south, and overflight showed a sparse 'archipelago' of small and mid-sized outcrops north from Pha Lom to the main Khammouan massifs.

Elsewhere in the region, extensive limestone karst formations occur in northern Lao PDR, northern Vietnam and north-western Thailand. However, in the absence of further information on distribution and habitat preferences, we tentatively suggest that, like the Sooty Babbler (Collar and Robson 2007), *P. hualon* may be endemic to limestone areas in central Lao PDR and perhaps the adjacent region of central Vietnam. Moreover, initial observations suggest that the habitat use of *P. hualon* may be more restricted than that of the Sooty Babbler, which is often found in more mesic habitats including evergreen and semi-evergreen forest (Eames *et al.* 1995, Thewlis *et al.* 1998, Timmins *et al.* 1999), as well as in open deciduous, stunted, xeric vegetation on limestone (e.g. Pha Lom 2008, pers. obs.). Mean annual rainfall increases significantly west to east across central Lao PDR from the Mekong to the Annamites (Rundel 1999, Inthavong *et al.* 2008). Vegetation on limestone changes markedly across these rainfall and altitudinal gradients from dry deciduous to wet evergreen forest communities (P. Bonnet *in litt.* 2009). If *P. hualon* is indeed restricted to the more xeric woodlands on the western karsts of the central Indochina limestone belt, then it may prove to be Lao PDR's only endemic bird species yet discovered.

CONSERVATION

Extensive areas of limestone karst with presumably suitable habitat are legally protected in central Laos within the 1,620 km² Phou Hinpoun (formerly Khammouan Limestone) and the 865 km² Hin Namno NPAs (Rundel 1999, Walston and Vinton 1999, Robichaud *et al.* 2001). These NPAs encompass the Central Khammouan Limestone and Hin Namno Important Bird Areas (Ounekham and Inthapatha 2003). The vast limestone formations protected therein comprise a more or less cohesive series of rugged and, to date, practically impenetrable karst, and wholesale loss of habitat from these areas is considered implausible even in the mid-term (Ounekham and Inthapatha 2003). If Bare-faced Bulbul occurs in either of these NPAs, then a large proportion of the global population is expected to be buffered against all site-based processes that currently threaten karst birds and their habitats.

Threats to biodiversity on South-East Asian karst include limestone quarrying, conversion of habitat in surrounding areas, hunting, and habitat degradation through processes such as livestock grazing and firewood collection (Ounekham and Inthapatha 2003, Clements *et al.* 2006). Bare-faced Bulbul is too small to be hunted selectively and therefore unlikely to be driven to local extinction within the large karst landscapes it seems likely to inhabit. By contrast, populations on isolated outcrops such as Pha Lom may be susceptible to the effects of human activity such as quarrying, adjacent metaliferous mining and a variety of village-centred processes.

Pha Lom and similar outcrops in the local area rise above a human-dominated landscape, with the habitat reflecting a long and complex history of anthropogenic disturbances including shifting cultivation, intensive harvesting of natural resources and modern warfare. Local populations of *Pycnonotus hualon* have probably remained largely immune to these influences by occupying stunted, xeric habitat on non-cultivable and rugged karst. Nevertheless, as agricultural practices continue to intensify, many karst-dwelling species may be threatened by the development of arable land around the base of limestone outcrops. These processes may be less threatening for *P. hualon* than for other limestone specialists such as the Sooty Babbler, as the former may be restricted to drier vegetation on higher slopes (see above). However, while habitat clearance for agriculture may not directly threaten populations upslope, the ultimate threat posed by loss of basal forest cannot be accurately predicted without further investigation into the ecological and life history requirements of *P. hualon*, including patterns of habitat use throughout the year. Moreover, rising human populations in the vicinity of limestone outcrops may exacerbate threats posed by other processes such as fire, hunting, collection of resources such as firewood and, perhaps, the effects of goat-grazing on karst vegetation, as is clearly the case around many smaller limestone outcrops in Vietnam (RJT pers. obs.).

The general absence of information regarding the population size, trend and distribution of *P. hualon* indicates that the species should be categorised as Data Deficient based on the most recent definitions of the IUCN Red List (IUCN 2001). Should further searches corroborate a hypothesised distribution restricted largely or wholly to the central Indochina limestone belt, *P. hualon*

should further meet the criterion set by BirdLife International (Stattersfield *et al.* 1998) for nomination as a restricted-range species (total global breeding range less than 50,000 km²).

FINAL REMARKS

This paper describes for the first time in over 100 years a new Asian species of bulbul: Grey-eyed Bulbul *Iole propinqua* (Oustalet, 1903) being heretofore the most recently described. That *P. hualon* has escaped detection for so long is somewhat surprising given the bird's distinctive appearance and call, conspicuous habits and occurrence in a well-populated region of lowland Laos. Its recent discovery can be at least partly explained by the species's apparent association with sparsely vegetated, deciduous habitats on rugged karst terrain.

Despite high rates of speciation and endemism in karst habitats, flora and fauna communities on limestone are relatively poorly known throughout South-East Asia (Clements *et al.* 2006), a situation that holds particularly in Lao PDR (Rundel 1999). Indeed, several other unresolved bird taxa are already known from the central Indochinese limestone, including the 'Limestone Leaf Warbler' *Phylloscopus* sp. (Duckworth *et al.* 1998) and a potentially distinctive (or at least ecologically aberrant lowland) form of Green-backed Tit *Parus monticolus* (Timmins and Khounboline 1996). This scenario holds true for other taxa. Among mammals, for example, a number of morphologically distinctive leaf monkeys *Trachypithecus* have been described from similar habitat in recent decades (Groves 2001); the taxonomy of this group is still to be resolved (T. Nadler *in litt.* 2008). Recently described small mammals include the phylogenetically distinct Kha-nyou *Laonastes aenigmamus* (Jenkins *et al.* 2004), the sole known living representative of a family of rodents believed extinct for some 11 million years (Diatomyidae) (Dawson *et al.* 2006). Taken together, these recent discoveries highlight the need for additional surveys in Lao PDR's limestone karsts and, as exemplified by the recent discovery of Nonggang Babbler *Stachyris nonggangensis* in karst at the China-Vietnam border (Zhou and Jiang 2008), in similar habitats throughout the region.

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