

The taxonomic status of *Pycnonotus bimaculatus snouckaerti*

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Introduction

The Orange-spotted Bulbul *Pycnonotus bimaculatus* is endemic to the islands of Sumatra and Java in Indonesia, occurring in three subspecies: *snouckaerti* in northern Sumatra, *bimaculatus* in central and southern Sumatra and West and Central Java, and *tenggerensis* in East Java and Bali (Fishpool & Tobias 2005, Dickinson & Christidis 2014). The form *snouckaerti* was originally described as a full species (Siebers 1928), but was later assigned as a subspecies of *P. bimaculatus* (Rand & Deignan 1960), an arrangement that has remained unchallenged down to the present.

This taxonomic acquiescence presumably derives from sheer unfamiliarity with *snouckaerti*, which occupies a small area of northern Sumatra rarely if ever visited by ornithologists and which is known, so far as we are aware, from 19 specimens: five adult males, one juvenile male, one female and one unsexed bird held in Naturalis Biodiversity Center, formerly RMNH, Leiden, Netherlands, and eight males and three females held in the Museum of Zoology (MZB), Bogor, Indonesia. Mees (1996) referred to the form as 'strongly differentiated', but van Marle & Voous (1988) did not comment on its distinctiveness while Fishpool & Tobias (2005) discriminated it from nominate *bimaculatus* simply on the basis of its 'lower breast and belly grey-brown (paler on mid-belly), bill relatively small', with no accompanying illustration (despite the policy of the *Handbook of the birds of the world* to depict all well-marked subspecies: J. del Hoyo verbally 2010).

However, while researching Indonesian bird taxa in Naturalis JAE was struck by the distinctiveness of *snouckaerti*, and subsequently determined (via B. van Balen and A. Nurza *in litt.* 2013) that the form was currently known from only two localities in northern Sumatra, 145 km apart. A sound recording of it by B. van Balen revealed potential vocal differences from the other two taxa, providing further stimulus for a search in the wild. In September 2014, after several failed attempts, JAE discovered *snouckaerti* at two separate localities in Aceh, a pair and four birds respectively, and managed to obtain a range of photographs and sound recordings which confirmed that a revision of its taxonomic rank was necessary.

Methods

We examined, measured and photographed the series of *P. b. snouckaerti* in Naturalis and MZB and compared them with specimens of *P. bimaculatus* from elsewhere in Sumatra and Java. To determine size differences we compared a total of 13 male *snouckaerti* with male Sumatran specimens of *P. bimaculatus* in three museums, which also happened to total 13 (seven in Naturalis, two in MZB and four in the Natural History Museum, Tring [NHMUK]). We also compared photographs of living representatives of *snouckaerti* and *bimaculatus* and recordings of their voices.

In order to assess the appropriate taxonomic rank of *snouckaerti* (subspecies or species) we scored its degree of phenotypic differentiation against *bimaculatus* and *tenggerensis* using a system outlined in Tobias *et al.* (2010) in which a major character (pronounced difference in body part colour or pattern, measurement or vocalisation) scores 3, medium character (clear difference, e.g. a distinct hue rather than different colour) 2, and minor character (weak difference, e.g. a change in shade) 1; a threshold of 7 is set to allow species status, species status cannot be triggered by minor characters alone, and only three plumage characters, two vocal characters, two biometric characters (assessed for effect size using Cohen's *d* where 0.2–2 is minor, 2–5 medium and 5–10 major) and one behavioural or ecological character (allowed 1) may be counted (hence 'ns' below indicates 'not scored', but the potential score is added in square brackets).

Results

The form *snouckaerti* differs from *P. bimaculatus* (with *tenggerensis*) in several strong plumage and mensural characters. We enumerate them here as follows, and add the Tobias criteria scores at the end of each. Plates 1–6 show these characters in various combinations.

1. Its plush orange supraloral tuft is considerably larger and higher than in *bimaculatus*, almost meeting over the forehead (2).
2. It lacks the narrow yellowish-orange upper and (sometimes) lower 'eyelids' of *bimaculatus* (ns[2]).
3. Its iris is red, *vs* brown in *bimaculatus* (ns[2]), visible in Plate 5 and confirmed by labels on three male specimens in Naturalis.
4. The markings on the head, throat and breast are different: the chin and upper throat are grey-brown but neatly stippled pale grey, while the lower throat and breast are grey-brown with pale grey fringes that produce a subtle scaled effect, whereas in *bimaculatus* the chin to mid-belly is unmarked dark brown, with pale grey scaling only vaguely beginning on the lower breast as it dissolves unevenly into the whitish belly (ns[2]).
5. The pale-scaled grey-brown of the breast extends down to the lower belly, along the flanks and onto the axillaries, leaving only (if at all) a small whitish intertarsal belly-patch, whereas in *bimaculatus* the grey-brown of the breast stops in a jagged edge, leaving the entire belly as well as the axillaries whitish (3).
6. Its ear-coverts are grey-tipped slaty-brown, continuous with the colour pattern of the rest of the head and neck, whereas *bimaculatus* has plain yellowish ear-coverts (3).
7. The undertail-coverts are not pure bright yellow, as in *bimaculatus*, but duller yellow with broad slaty-brown bases, creating a bold mottled effect (ns[2]).
8. The rectrices are edged slightly more strongly with yellow-olive than in *bimaculatus* (ns[1]).
9. The bill is only slightly longer but the wings and tail are considerably so (Table 1), the difference between the tails producing an effect size of 3.2 (score 2).
10. Its song is similar in structure and pattern to that of *bimaculatus*, being a very staccato, sharp, loud strophe building to a twice-repeated triplet, lasting c.3 seconds, *chrrp chrrp pipipip-Wítoto-Wítoto-tó*, but it has a dry reedy or metallic quality, the first notes rolling or fricative; whereas *bimaculatus* (with *tenggerensis*) produces more open, vowel-like notes, richer and more thrush-like, the first more bubbling than rolling, the climax notes less like triplets: *wup up udup upupup-Wítoto-Wítodidu-dó*. This distinction is considered constant (JAE), but without acoustic analysis, probably only useful when a larger sample of both taxa is assembled, we refrain from allowing it more than a score of 1. A further difference may lie in the call, which is a harsh *chek*, while *bimaculatus* makes a sharp *chik*; but we offer no score here until further recordings are made and analysed.

The habitat and behaviour of *snouckaerti* appear similar to those of *bimaculatus*, the birds showing a preference for small, scrubby clearings dominated by fern and high grass inside submontane forest above 1,000 m, where they were found feeding, occasionally perching up in the larger trees along the forested edge to sing (JAE pers. obs.).

Table 1. Morphometric means (in mm) and standard deviations of male specimens in Naturalis, MZB and NHMUK of *Pycnonotus bimaculatus* (from Sumatra) and *P. snouckaerti*; ¹ n=11; ² n=12.

Taxon	n	bill	wing	tail
<i>Pycnonotus bimaculatus</i>	13	17.6 ± 0.9 ¹	89.4 ± 3.8	90.4 ± 3.3
<i>Pycnonotus snouckaerti</i>	13	18.2 ± 0.8 ²	96.7 ± 2.2 ²	99.7 ± 3.0



Plates 1–2. Lateral and ventral views of five male *P. snouckaerti* in Naturalis (left to right RMNH 38155 [type], 125775, 10259, 10260, 10261).



Plates 3–4. Lateral and ventral views of two male *P. snouckaerti* (lower two) and two male *P. bimaculatus* from Sumatra in Naturalis (bottom to top RMNH 38155 [type], 10259; 125777, 125779).

Discussion

The enumeration of morphological differences in the list above almost exactly matches those itemised by Siebers (1928), who understandably regarded *snouckaerti* as a full species, even though he only had access to a single specimen; and our vocal evidence adds further support. On the basis of the scores allocated above to the different characters, a total of 11 clearly takes *snouckaerti* well beyond the level of distinctiveness represented by a score of 7 at which it is deemed appropriate, under the criteria of Tobias *et al.* (2010), to be treated as a full species. We suggest the English name ‘Aceh Bulbul’ for this reinstated Sumatran endemic species to highlight the importance of the province’s forests and avifauna; it is currently the only known species endemic to Aceh.

The current conservation status and future prospects of the Aceh Bulbul appear to be poor. On present knowledge its range is small, perhaps the smallest of all Sumatran endemics with the possible exception of the enigmatic, Critically Endangered Rück’s Blue Flycatcher *Cyornis ruckii* (BirdLife International 2001). Apart from

the aforementioned records, JAE has visited Aceh on three separate occasions in search of *snouckaerti* (and other range-restricted taxa) without success, even failing in one of the areas where he previously encountered the species. Trapping for the cagebird trade is a major driver of declines in songbird populations in Sumatra (Shepherd 2006, 2010, Wirth 2014, Harris *et al.* in press), and we strongly suspect that this pressure is at least partially responsible for the abnormally low densities at which the Aceh Bulbul evidently now occurs, given how vocal and conspicuous the birds proved to be once found, and given the absence or greatly reduced numbers of other species expected or encountered during JAE’s searches (most notably various laughingthrush species, Silver-eared Mesia *Leiothrix argenteauris* and Ruby-throated Bulbul *Pycnonotus dispar*). However, despite repeated visits to the Sumatran bird markets, most notably Medan, over a period of five years (monthly surveys carried out in 1997–2001), not a single *snouckaerti* was found among the more than one thousand Orange-spotted Bulbuls observed (Shepherd *et al.* 2004), reinforcing our suspicion that Aceh Bulbul is very range-



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Plate 5. *Pycnonotus snouckaerti*, northern Sumatra, September 2014. The uniformity of slate-grey plumage with frosty edges, large supraloral tuft and longer tail really make this taxon distinctive when observed in the field.



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Plate 6. *Pycnonotus bimaculatus*, Ijen Plateau, East Java, July 2005; note in this specimen the breast is unusually lightly marked.

restricted, and potentially genuinely rare. However, as surveys of the bird markets were not carried out on a daily basis, and as many of the birds captured in Aceh are sold locally, or sent to other bird markets throughout Sumatra and Java, on-going trade in this species cannot be ruled out.

Although IUCN Red List criteria require robust evidence on range size as one component of any assessment of threat to a species, we judge it inappropriate here to list the localities at which the Aceh Bulbul has been found. Large areas of forest above 1,000 m still remain unsurveyed in the region, and as yet it is not clear if the species is present in Gunung Leuser National Park (8,000 km², with a high proportion of its area above 1,500 m), so it is conceivable that the species is still present in remoter pockets of habitat where trapping is less intense. For the immediate future, discreet, wide-ranging investigations are urgently needed in the field and at markets in order to learn more about the range and status of and threats to the species and to determine the most effective conservation response. Given the distribution of birds captured in Aceh for trade within Indonesia, it is essential that surveyors watch for this species during surveys in other trade hubs in Sumatra, as well as in Java.

It should be noted that there is no quota for the harvest and trade of *Pycnonotus bimaculatus* in Indonesia, which means that capture, keeping or trading of this species is in violation of the Decree of the Ministry of Forestry No. 447/Kpts-11/2003 (revised from Decree of the Ministry of Forestry No. 62/Kpts-11 /1998). This requires any harvest or capture and distribution of wild plant and animal specimens to be conducted under licence and in accordance with set quotas (e.g. Shepherd & Nijman 2007, Shepherd 2010).

Acknowledgements

We thank Pepijn Kamminga and Steven van der Mije for granting us access to material at Naturalis, Dewi Prawiradilaga and Mohammed Irham for access to material in MZB, Robert Prys-Jones for access to material in NHMUK, Bas van Balen for providing site details, sound recordings and discussion, Agus Nurza for logistical help and information on his sighting, Chris Shepherd for market data from Medan and for recommendations regarding conservation status, Bert Harris for looking out for trade in the species and discussion, and two referees for helpful comments.

References

- BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book*. Cambridge, U.K.: BirdLife International.
- Dickinson, E. C. & Christidis, L., eds. (2014) *The Howard & Moore complete checklist of the birds of the world*, 2. Fourth edition. Eastbourne: Aves Press.
- Fishpool, L. D. C. & Tobias, J. A. (2005) Family Pycnonotidae (bulbuls). Pp.124–251 in J. del Hoyo, A. Elliott & D. A. Christie, eds. *Handbook of the birds of the world*, 10. Barcelona: Lynx Edicions.
- Harris, J. B. C., Green, J. M. H., Prawiradilaga, D. M., Giam, X., Giyanto, Hikmatullah, D., Putra, C. A. & Wilcove, D. S. (2015) Using market data and expert opinion to identify overexploited species in the wild bird trade. *Biol. Conserv.* 187: 51–60.
- van Marle, J. G. & Voous, K. H. (1988) *The birds of Sumatra: an annotated checklist*. Tring, U.K.: British Ornithologists' Union (Check-list 10).
- Mees, G. F. (1996) Geographical variation in birds of Java. *Publ. Nuttall Orn. Club* 26.
- Rand, A. L. & Deignan, H. G. (1960) Family Pycnonotidae. Pp.221–300 in E. Mayr & J. C. Greenway, eds. *Checklist of birds of the world*, 9. Cambridge, Mass.: Museum of Comparative Zoology.
- Shepherd, C. R., Sukumaran, J. & Wich, S. A. (2004) *Open season: an analysis of the pet trade in Medan, Sumatra 1997–2001*. Selangor, Malaysia: Traffic Southeast Asia.
- Shepherd, C. R. (2006) The bird trade in Medan, North Sumatra: an overview. *BirdingASIA* 5: 16–24.
- Shepherd, C. R. (2010) Observations on trade in laughingthrushes (*Garrulax* sp.) in North Sumatra, Indonesia. *Bird Conserv. Internatn.* 21: 86–91.

Siebers, H. C. (1928) Eine neue *Pycnonotus*-Art von Nord-Sumatra. *Treubia* 10: 395-397.

Tobias, J. A., Seddon, N., Spottiswoode, C. N., Pilgrim, J. P., Fishpool, L. D. C. & Collar, N. J. (2010) Quantitative criteria for species delimitation. *Ibis* 152: 724-746.

Wirth, R. (2014) Krieg am Vögel. *ZGAP Mitt.* 30(2): 3-6.

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Growth of Chinese Sparrowhawk *Accipiter soloensis* nestlings

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Introduction

Being able to estimate the age of individual nestlings is essential for various raptor studies, monitoring and conservation. Since the increase in body measurements of raptor nestlings follows a predictable pattern, it is often possible to estimate the age of nestlings by fitting measurements of a given parameter to a growth curve of known form (Starck & Ricklefs 1998, Hardey *et al.* 2006). Information on nestling growth and best-fitting models of growth has been collected for many raptor species and populations, and used for reliable ageing and sexing, as well as for ecological studies of raptors (e.g. Moss 1979, Bortolotti 1984, Bortolotti 1986, Negro *et al.* 1994, Viñuela & Ferrer 1997, Arroyo *et al.* 2000).

The Chinese Sparrowhawk *Accipiter soloensis* occurs in a wide geographic range throughout East and South Asia as a long-distance migrant (Ferguson-Lees & Christie 2001). However, little information on the growth of nestlings has been recorded because of its relatively confined breeding range in Korea and China (Ferguson-Lees & Christie 2001, Choi *et al.* 2013). Only two previous studies reported simple and general changes in nestling growth (Kwon & Won 1975, Park *et al.* 1975), but they did not provide any growth model for ageing nestlings. Hence, a growth model for this species is desirable to facilitate further studies that require estimation of nestling age. The objective of this study was to give an account of the growth of young Chinese Sparrowhawks by describing their general appearance, measuring nestlings of known age, and selecting the best-fitting growth model for the accipiter.

Methods

We searched for nests of Chinese Sparrowhawks in June and July from 2005 to 2008 at Gwangju (37.450°N 127.283°E), Gyeonggi province, Republic of Korea, and identified the breeding status of nests we found. We visited the nests daily or used video surveillance systems comprising camcorders (Panasonic NV-MX5000), infrared CCTV cameras (IEVision, IVT-26IRS; Samsung, SIR-4150) and DVD/DVR recorders (Samsung SV-DVR350; Gyungil Electronic Co., DR-554N) to identify hatching dates.

We measured six parameters (body mass, wing, tail, bill, head and tarsus length) of 16 nestlings from five nests. General measurement procedures, as described in Baker (1993) and Hardey *et al.* (2006), were used. Body mass was weighed to the nearest 0.1 g using a portable electronic scale when nestlings weighed <100 g (HS-120, Ohaus Corp., NJ, USA) and to the nearest 0.5 g using a spring scale when the weight exceeded 100 g (Medio-40310, Pesola AG, Baar, Switzerland). Wing length and tail length were measured to the nearest 0.1 mm using a thin metal ruler. We tried to measure maximum wing length, although it was not always possible especially when the nestlings were young and the feather sheaths remained. Tarsus length, head length and bill length (measured from bill-tip to the distal part of the cere) were recorded to the nearest 0.01 mm using a digital vernier caliper (Digimatic 500-181, Mitutoyo Corp., Kawasaki, Japan).

All measurements were taken in the late afternoon between 16h00 and 18h00 to avoid any potential bias caused by measurements

at different times of day e.g. body mass changes resulting from short-term fluctuations in food supply (Hardey *et al.* 2006). To avoid premature fledging, most measurements on nestlings (53/58 measurements; 91%) were taken during the 15 days after hatching. Since sexual dimorphism is small, even in adults of this species (Kemp & Crowe 1994, Choi *et al.* 2013), we did not identify the sex of nestlings.

As growth in nestling body parts was best explained by logistic growth curves, the logistic curve was estimated following Starck & Ricklefs (1998):

$$W=A/[1+\exp(-K(t-t_i))]$$

where W = the growth variable, A = asymptote, K = the growth rate constant, t = age of nestling, and t_i = the inflection point of the growth curve.

We measured wing (maximum wing length) and tail of 14 birds (seven males and seven females) in first summer plumage (1S), captured at stopover sites on spring migration in May 2007 and 2008, to provide asymptotic values for growth models. Because the sparrowhawks do not moult their flight and tail feathers in their first year, these measurements may represent the mean size of approximately 60-day-old birds, when they first start their migration south. We ignored the potential effects of abrasion on feather length and possible size changes of structural parts during their first winter.

SAS 8.1 software (SAS Inst. Inc., Cary, NC, USA) was used for statistical analyses, and the constants for the logistic growth curve were calculated from a non-linear procedure (PROC NLIN) in SAS.

Results

The growth curves and the model predictors of the parts measured are presented in Figures 1 & 2 and Table 1. The inflection point of the body mass curve, indicating the time of highest growth rate,

Figure 1. Growth in (a) body mass, (b) bill length, (c) tarsus length, and (d) head length of 16 Chinese Sparrowhawk nestlings from five nests. Solid lines indicate the logistic growth curves, and dashed lines represent upper and lower 95% confidence levels.

