Zappey's Flycatcher *Cyanoptila cumatilis*, a forgotten Chinese breeding endemic

PAUL J. LEADER & GEOFF J. CAREY

The Blue-and-white Flycatcher *Cyanoptila cyanomelana* is a summer visitor to north-east Asia. A review of museum material demonstrates that the present treatment of two subspecies (nominate and *cumatilis*) is untenable as (a) *intermedia*, although not currently recognised, is considered valid, and (b) the name *cumatilis* is currently incorrectly ascribed, being restricted in reality to central China (outside of the published range of Blue-and-white Flycatcher). Populations of all three taxa were studied on the breeding grounds in Russia, China and Japan and their songs recorded. Using criteria (Tobias *et al.* 2010) that grade morphological and vocal differences between allopatric taxa, *cumatilis* readily achieves the threshold for species status. The English name Zappey's Flycatcher is proposed in honour of the collector of the type specimen. Two subspecies of Blue-and-white Flycatcher are recognised, nominate and *intermedia*.

INTRODUCTION

The Blue-and-white Flycatcher *Cyanoptila cyanomelana* is a summer visitor to the forests of north-east Asia. Two subspecies are currently recognised, nominate *cyanomelana* Temminck, 1829, which breeds in the southern Kuril Islands, Japan and South Korea, and *cumatilis* Thayer & Bangs, 1909, which breeds in north-east China south to Hebei, south-east Russia and North Korea (Clement 2006). Although originally described as a full species based on the 'very different' plumage of males (Thayer & Bangs 1909), *cumatilis* has long been treated as a subspecies of *cyanomelana* (e.g. Vaurie 1954, 1958). A further subspecies, *intermedia* Weigold, 1922, is not currently recognised and has long been treated as a synonym of *cumatilis* (e.g. Hartert & Steinbacher 1934, Vaurie 1954, 1958). In this paper the validity of *intermedia* and the relationship between the three taxa are reviewed based upon an examination of museum specimens and fieldwork conducted during the breeding season in China, Japan and Russia.

METHODS

Museum specimens were examined at the Natural History Museum, Tring, United Kingdom (BMNH), the Yamashina Institute for Ornithology, Tokyo, Japan (YIO), the Institute for Zoology, Chinese Academy of Sciences, Beijing, People's Republic of China (IOZ), and the Museum of Zoology of the Far-Eastern National University, Vladivostok (MZFENU). The following biometrics were taken: wing (maximum chord), tail length (to base of tail measured under the undertail-coverts) and bill width at distal edge of nostrils. Measurements taken accord with standard procedures (Redfern & Clark 2001) and a sample of 20 males each from central China, south-east Russia and Japan was measured. Plumage differences of males and females from different populations were examined in detail, with consideration given to any differences attributable to age (first-summer birds being readily aged owing to retained juvenile greater coverts). Although no type specimens were examined, specimens from the type localities of both *intermedia* (Vladivostok) and *cyanomelana* ('Japan') were examined and photographs of the type of *cumatilis* (type locality: Mafuling 马夫岭 in Fangxian County, north-west Hubei), which is housed at the Museum of Comparative Zoology, Massachusetts (MCZ), were obtained.

During fieldwork conducted on the breeding grounds, sound recordings of males in song were obtained from Russia (Amurskaya Oblast and Primorskiy Kray), Japan (Honshu and Hokkaido) and China (Beijing) (Figure 1). Additional recordings were obtained from China (Beijing, Hebei and Shaanxi) from other sources.

Recordings were made using a Telinga Pro 5 with either a Sound Devices 722 or an HHB Portadisc MDP 500, and a Sony PCM-M10 with a Sennheiser ME66. Spectrograms were produced and analysis of various parameters carried out using Raven Pro 1.3 (Cornell Laboratory of Ornithology 2003–08). Contrast was adjusted for each recording to ensure all elements (defined as any continuous line on a sonagram) were retained, while minimising reverberation. Measurements were made using a spectrogram window size of 512.

A total of 889 song strophes was analysed, comprising 209 from eight male *cumatilis*, 461 from 15 male *intermedia* and 219 from nine male *cyanomelana* (see Table 2). Analysis of parameters of each strophe was based on those proposed by Tobias *et al*. (2010), and comprised:

- begin and end times (from which duration was calculated);
- lowest and highest frequency (from which frequency range was calculated);
- centre frequency (the frequency dividing a strophe into two intervals of equal energy);
- peak frequency (the frequency at which peak power occurs);
- pace (calculated by dividing strophe length by number of elements).

In addition, in order to bring out a consistent feature that was apparent on listening to the song of each, namely differences in the degree of variation in frequency and structure of elements within each strophe, a further parameter was analysed:

- the highest number of times that any individual element was repeated.

A repeat was determined aurally, rather than via the sonagram, on which minor differences between elements can be seen that are not detected by the human ear. Where appropriate, phrases were identified; these are defined as a discrete group of more than one element within a strophe. For each individual, we calculated the mean of each parameter; we then used the mean and standard deviation of all individuals per taxon to calculate Cohen's *d* values.

In order to review species limits between *cumatilis, intermedia* and *cyanomelana* we applied the quantitative scoring system proposed by Tobias *et al.* (2010) to assess the degree of phenotypic difference between allopatric taxa. These criteria were summarised by Collar (2011a,b) thus: an exceptional difference (a radically different coloration or pattern) scores 4, a major character (a pronounced and striking difference in the colour or pattern of a body part, or in measurement or vocalisation) 3, a medium character (clear difference reflected, e.g., by a distinct hue rather than a different colour) 2, and a minor character (a weak difference, e.g. a change in shade) 1. Tobias *et al.* (2010) set a threshold of 7 to allow

Plate 1. Dorsal view of specimens of male *cumatilis*, IOZ, Beijing (Paul J. Leader).

Plate 4. Dorsal view of specimens of male *intermedia* (Paul J. Leader / © The Natural History Museum, Tring).

Plate 2. Ventral view of specimens of male *cumatilis*, IOZ, Beijing (Paul J. Leader).

Plate 5. Ventral view of specimens of male *intermedia* (Paul J. Leader / © The Natural History Museum, Tring).

Plate 3. Lateral view of specimens of male *cumatilis* IOZ, Beijing (Paul J. Leader).

Plate 6. Lateral view of specimens of male *intermedia* (Paul J. Leader / © The Natural History Museum, Tring).

Plate 7. Dorsal view of specimens of male *cyanomelana* (Paul J. Leader / © The Natural History Museum, Tring).

Plate 8. Ventral view of specimens of male *cyanomelana* (Paul J. Leader / © The Natural History Museum, Tring).

Plate 9. Lateral view of specimens of male *cyanomelana* (Paul J. Leader / © The Natural History Museum, Tring).

for species status, stating that only three plumage characters, two vocal characters, two biometric characters and one behavioural or ecological character may be counted. Vocal and biometric characters were assessed for effect size using Cohen's *d* using the online calculator at http://www.uccs.edu/~faculty/lbecker/, where 0.2–2 is minor, 2–5 medium, 5–10 major and >10 exceptional.

RESULTS

Morphological differences between populations

Examination of museum specimens revealed that there are consistent plumage differences between populations from central China, Japan and south-east Russia. Males from central China are highly distinct and show pronounced differences compared to specimens from Japan and south-east Russia. Males from Japan and south-east Russia, whilst more similar to each other than males from central China, are also consistently different.

Males from populations that breed in central China are distinct from specimens of other populations in being blue or blue-green across the breast, throat and ear-coverts, and in having black or blackish restricted to the lores (Plates 1–3). Many specimens from central China show extensive fine blackish vertical streaking across the breast and throat, and most exhibit a well-defined black or blackish line between the lower border of the breast and the rest of the underparts, which are white (Plate 2). The upperparts are typically blue-green, often with extensive fine black streaking across the mantle, scapulars, rump and uppertail-coverts (Plate 1). The similarity in the colour of (a) the breast, throat and ear-coverts and (b) the upperparts results in little, if any, contrast between these two areas. The throat, breast, ear-coverts and lores of males from Japan are typically pure glossy black (although a small number of specimens have narrow bluish tips to the breast and throat feathers) and the upperparts are a bright, rich blue; streaking on the upperparts is rare and, if present, restricted to the scapulars (Plates 7–9). Males from Russia are matt-blackish on the throat, breast and ear-coverts (only very rarely pure black), and usually show a bluish wash or distinct blue tones to the throat and breast (Plates 5–6). The upperparts are blue, although never as richly blue as Japanese birds, being intermediate in colour between Japanese specimens and those from central China; streaking on the upperparts is extremely rare and, when present, is restricted to the central part of the mantle (Plate 4). Males from both Japan and south-east Russia show marked contrast between the throat/breast/ear-coverts and the upperparts. Subtle differences in the plumages of females were also noted; however, as it was not possible to compare specimens of females directly from all three regions, this issue requires research and is not taken further here.

Whilst a white centre to the tail (rather than the sides) is considered a feature of '*cumatilis*' by Clement (2006) and Brazil (2009), none of the specimens examined showed anything other than white bases to the sides of the tail.

Only the specimens from central China matched the type of *cumatilis*, and whilst specimens from south-east Russia (including Vladivostok, the type locality of *intermedia*) were closer overall to those from Japan (i.e. *cyanomelana*), they differed consistently, as described above, and thus the name *intermedia* needs to be reinstated for populations in north-east mainland Asia. This treatment is followed hereafter and the name *cumatilis* is used only for the central Chinese population.

With longer wing and tail measurements *cumatilis* averages larger than both *intermedia* and *cyanomelana*, while on average *cyanomelana* is longer-winged than *intermedia*, but both have similar tail lengths (Table 1). Bill width values are very similar (average width of 5.81 mm for *intermedia*, 5.80 mm for *cyanomelana* and 5.83 mm for *cumatilis*).

Table 1. Average wing and tail lengths (mm) and Standard Deviation (SD) of male *cumatilis*, *intermedia* and *cyanomelana* (n = 20 for each taxon).

	cumatilis		*intermedia*		*cyanomelana*	
	Mean	SD	Mean	SD	Mean	SD
Wing	95.4	2.10	92.8	1.96	94.3	2.14
Tail	66.9	2.10	64.6	2.65	64.0	1.75

Vocalisations

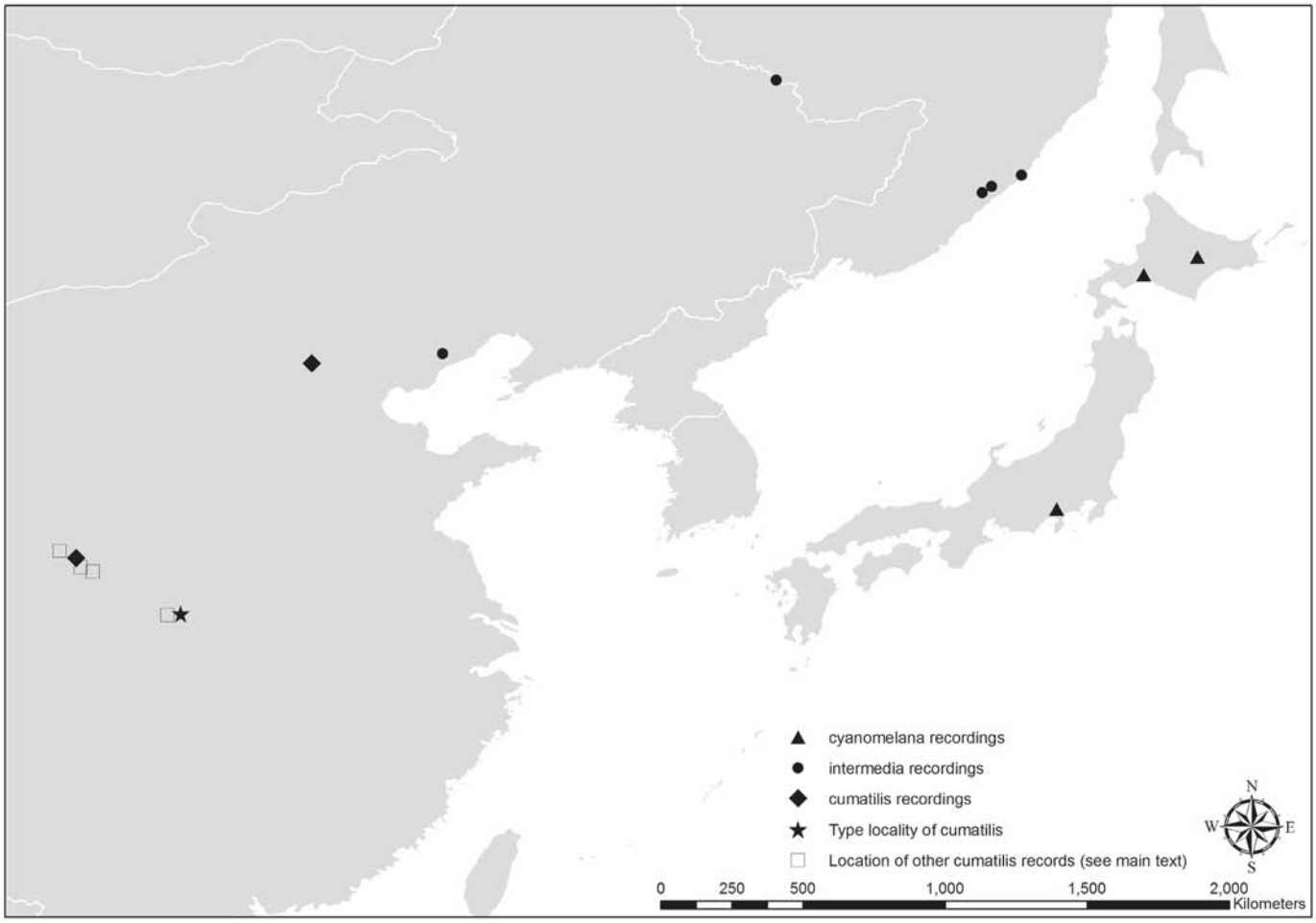
The songs of all three taxa are loud and usually uttered from the most prominent trees in the territory, especially those at the top of wooded slopes. Territories appear to be relatively large, and the volume of the song and choice of prominent perch when singing reflect this. For all taxa, the song comprises a regular series of discrete strophes (separated by distinct pauses normally longer than the strophe), each of which contains a differing number of elements, one or more of which was repeated to a varying degree, often in the terminal section of each strophe in the case of *cumatilis* and *cyanomelana*. Representative song strophes for each taxon are illustrated in Figures 2–4, while samples of recordings, including the actual strophe illustrated in the figures, have, where possible, been placed on the online database at XenoCanto (www.xenocanto.org/asia) with catalogue numbers provided after each strophe in Figures 2–4.

The typical song of *cumatilis* is rather simple and repetitive and of a relatively lower pitch overall, and the frequency range compared to the other taxa is notably narrower, largely due to a lower mean high frequency (Table 3 and Figures 2–4). In addition, the centre and peak frequencies are both approximately 10% or more lower. Not only is the pitch lower, however, but the delivery is slightly more measured and slower. Generally speaking, in *cumatilis* each strophe consists of a measured repetition of similar elements, with or without an introductory series of 1–5 notes, creating a song of little variety or, usually, melody. The exception to this was a male recorded in Shaanxi province, whose minor variation in pitch of certain elements in each strophe imparted a distinctive rhythm compared to *cumatilis* males at Beijing. The lack of diversity in elements is indicated by the mean highest number of repeated elements being distinctly higher than the equivalent figures for the other two taxa.

Compared to *cumatilis* the typical song of *intermedia* sounds less measured and contains more variation in pitch within both individual elements and each strophe as a whole, and in structure of elements. Phrases (a discrete group of more than one element within a strophe) are more clearly defined, as a result of the elements in each strophe being less regularly spaced than those of *cumatilis*, and the frequency range is relatively wide (Figure 3). The rapid repetition of short elements nearly producing a trill is almost absent from the songs of *cumatilis* and *cyanomelana*.

For 84% of *intermedia* strophes, the first element is higher in pitch than the second and, usually, most of the remainder of the strophe. A bias toward a higher-pitched first element is also shown by both *cumatilis* and *cyanomelana*, but it is not so marked (57% and 36% respectively). The song of *cyanomelana* contains more repetition of elements at the same pitch than is the case with *intermedia*, but not to the same extent as *cumatilis*. Within-strophe variation in pitch is greater than in *cumatilis*, although not as marked as in *intermedia*.

Figure 1. Locations of *cumatilis*, *intermedia* and *cyanomelana* recordings used in this study and locations of all known breeding season records of *cumatilis*.



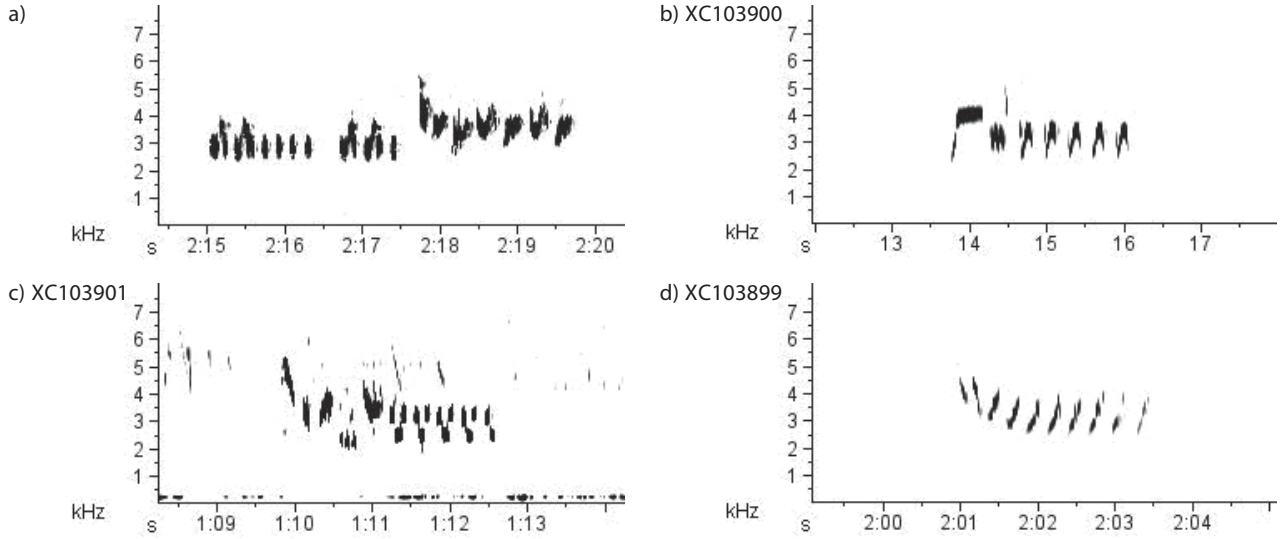


Figure 2. Representative song strophes of *cumatilis*: (a) Shaanxi, China, (b), (c) and (d) Beijing, China. Note the relatively simple structure, lacking sharp or significant frequency variations within element and strophe, and the generally lower pitch compared to *intermedia* and *cyanomelana*. Recording (a) made by P. Alström, others by G. J. Carey. Reference numbers refer to XenoCanto catalogue number.

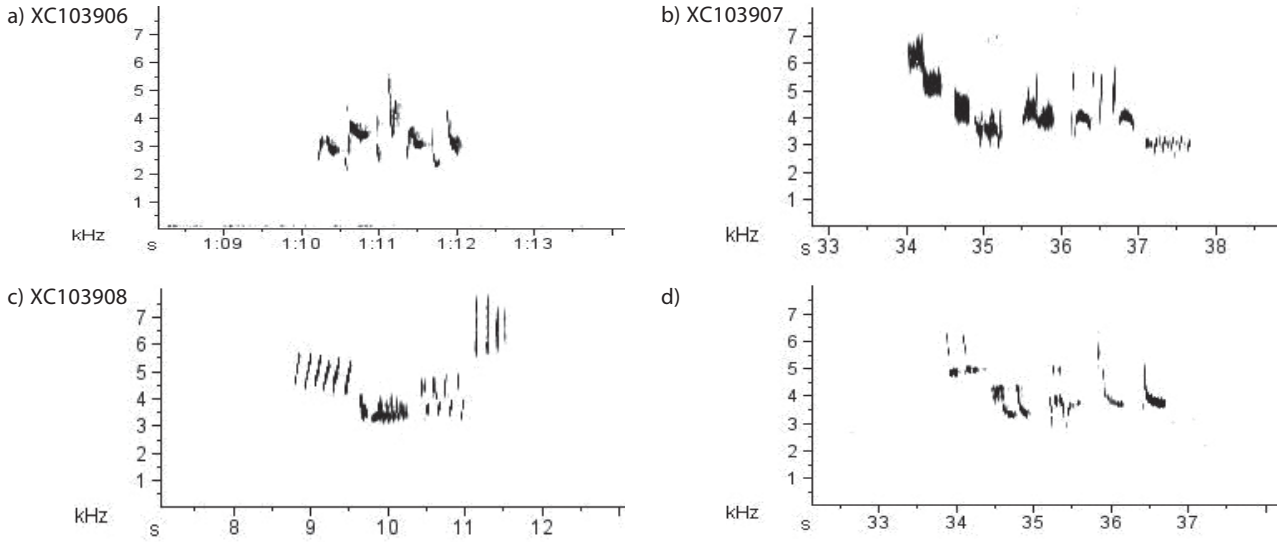


Figure 3. Representative song strophes of *intermedia*: (a), (b), (c) Primorskiy Kray, Russia, (d) Hebei, China. Note the greater variation of both pitch within each strophe and structure of individual elements. The series of very short elements in (c) is more typical of this taxon. Recording (d) made by P. Alström, others by G. J. Carey. Reference numbers refer to XenoCanto catalogue number.

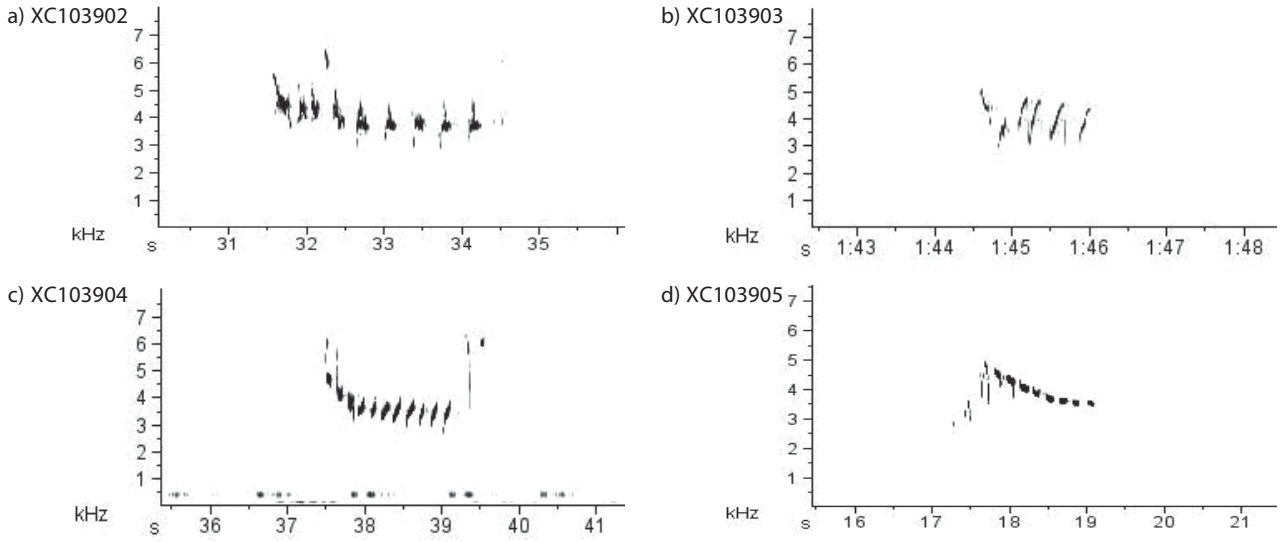


Figure 4. Representative song strophes of *cyanomelana*: (a) Honshu, Japan, (b), (c), (d) Hokkaido, Japan. The repetition of elements is more similar to *cumatilis*, while the change in pitch is more similar to *intermedia*. Compared to *cumatilis*, pitch is generally higher and frequency range greater. Recordings (a) and (b) made by G. J. Carey, recordings (c) and (d) by P. J. Leader. Reference numbers refer to XenoCanto catalogue number.

Table 2. Locations of recordings, number of males and number of strophes analysed.

Taxon	Location	No. of males	No. of strophes
cumatilis	Shaanxi, China	1	19
cumatilis	Beijing, China	7	190
intermedia	Hebei, China	3	101
intermedia	Amurskaya Oblast, Russia	1	34
intermedia	Primorskiy Kray, Russia	11	326
cyanomelana	Honshu, Japan	1	26
cyanomelana	Hokkaido, Japan	8	193
Total		**32**	**889**

Table 3. Mean and standard deviation (SD) values of parameters (see text) selected for analysis of *cumatilis*, *intermedia* and *cyanomelana*.

	cumatilis		*intermedia*		*cyanomelana*	
	mean	SD	mean	SD	mean	SD
Low Freq (Hz)	2,283	265	2,347	292	2,554	330
High Freq (Hz)	4,892	624	6,220	937	6,508	1,108
Freq Range (Hz)	2,609	638	3,873	901	3,953	1,053
Centre Freq (Hz)	3,425	348	3,915	430	3,931	303
Peak Freq (Hz)	3,614	488	4,041	567	4,009	451
Length (s)	2.68	1.05	2.37	0.71	2.18	0.59
No. of elements	8.73	3.68	8.55	3.30	7.98	2.45
Pace (elements/s)	3.26	0.46	3.67	1.12	3.73	0.92
Highest count repeated elements	5.63	2.39	2.59	2.11	2.80	1.75

Taxonomic and geographical delimitations

Based on these findings, *cumatilis* is restricted to central China, breeding north to Beijing, west to Shaanxi, and south to north-west Hubei. Thayer & Bangs (1909) described *cumatilis* on the basis of seven specimens (five males and two females) collected by W. R. Zappey in Hubei (Hupeh), China, between 11 and 25 May 1907. Altitudes are available for four of these specimens (MCZ online database: http://www.mcz.harvard.edu/collections/searchcollections.html, accessed January 2012) and are approximately 1,500–1,700 m ('5000–5500ft'). Given the dates, latitude, altitude and number of individuals involved—including both sexes—it seems reasonable to assume that these were breeding birds. As such, *cumatilis* has a breeding range almost entirely south and west of that published in much of the modern literature for Blue-and-white Flycatcher, and the type locality is c. 1,000 km south of the range published in Clement (2006), although Dementiev & Gladkov (1954) map the breeding distribution of Blue-and-white Flycatcher south to the Yangtze River, and Cheng (1987) questions whether the species breeds as far south as Hebei. Confusingly, Zheng (2011) lists both *cumatilis* and *cyanomelana* as breeding in north-east China (Liaoning, Jilin and Heilongjiang). We have no evidence that *cumatilis* and *intermedia* intergrade in the Beijing/Hebei area where they breed within at least 300 km of each other.

Therefore, the range currently attributed to *cumatilis* in much of the modern literature is extensively occupied by *intermedia*. The correct breeding distribution of the three taxa is considered to be as follows:

cumatilis: a Chinese breeding endemic occurring in central China, north to Beijing, west to Shaanxi (P. Alström *in litt.* 2011) and south to north-west Hubei; presently known from only a small number of locations (Figure 1);

cyanomelana: southern Kuril Islands (specimens examined) and Japan (Kyushu, Tsushima, Shikoku, Honshu and Hokkaido) (Brazil 1991);

intermedia: north-east China (Heilongjiang south to eastern Hebei) (Cheng 1987), south-east Russia (Amurskaya Oblast and Primorskiy Kray) (Dementiev & Gladkov 1954) and the Korean peninsula.

Both *intermedia* and *cyanomelana* are stated to occur in the Korean peninsula (Clement 2006), with *intermedia* in the north and *cyanomelana* in the south, with the two reportedly intergrading (Mayr & Cottrell 1986); however, this seems unusual for what are otherwise mainland-breeding (*intermedia*) and island-breeding (*cyanomelana*) taxa. The morphology of birds breeding in South Korea (N. Moores *in litt.* 2012) clearly fits *intermedia* and they are treated here as such; however, further research is required to clarify the situation.

Species limits

Characters of male *cumatilis*, *intermedia* and *cyanomelana* selected for comparison based on Tobias *et al.* (2010) were assessed (Table 4). In the absence of clearly independent biometric characters only wing length was assessed and Cohen's *d* values for *cumatilis* compared to both *intermedia* and *cyanomelana* were within the range of 0.2–2 and hence qualified as a minor difference. In terms of vocalisations, spectral differences for *cumatilis* compared to *intermedia* and *cyanomelana* were higher than temporal differences (Cohen's *d* values for all parameters in Table 3 are provided in Table 5). No behavioural or ecological differences were observed on the breeding grounds. Overall, *cumatilis* easily achieves the threshold for species status (a score of 7) set by Tobias *et al.* (2010), scoring 10 when compared against *intermedia* and 11 against *cyanomelana* (Table 4). Differences between *intermedia* and *cyanomelana* (score 3) fell short of the threshold but are viewed here as supporting the treatment of *intermedia* as a valid subspecies.

Table 4. Characters of male *cumatilis*, *intermedia* and *cyanomelana* selected for comparison based on Tobias *et al*. (2010), with score (see text) in brackets.

Character	*cumatilis vs intermedia*	*cumatilis vs cyanomelana*	*intermedia vs cyanomelana*
Plumage			
Underparts	Differences in breast, throat and lores combine to render it highly distinctive **(3)**, extensive black streaking **(2)**	Differences in breast, throat and lores combine to render it highly distinctive **(3)**, extensive black streaking **(2)**	Differences in breast, throat and lores due to a difference in shade **(1)**
Upperparts	Entire upperparts a different shade **(1)**	Entire upperparts a distinctly different hue **(2)**	Entire upperparts a different shade **(1)**
Vocal			
High frequency (Cohen's *d*)	3.52 **(2)**	3.69 **(2)**	0.22 **(1)**
Pace (Cohen's *d*)	1.81 **(1)**	1.63 **(1)**	0.06 **(0)**
Biometric			
Wing length (Cohen's *d*)	0.26 **(1)**	0.48 **(1)**	0.19 **(0)**
Total score	**10**	**11**	**3**

Table 5. Cohen's *d* values of vocal parameters of *cumatilis*, *intermedia* and *cyanomelana* selected for analysis.

Parameter	*cumatilis vs intermedia*	*cumatilis vs cyanomelana*	*intermedia vs cyanomelana*
Low frequency	1.89	3.05	0.88
High frequency	3.52	3.69	0.22
Frequency range	2.92	3.04	0.04
Centre frequency	3.10	4.55	0.25
Peak frequency	2.59	3.45	0.14
Length	0.17	0.35	0.30
Number of elements	0.19	0.03	0.25
Pace	1.81	1.63	0.00

Based on these results the following taxonomic treatment is proposed:

Zappey's Flycatcher *Cyanoptila cumatilis* Thayer and Bangs, 1909

Blue-and-white Flycatcher *Cyanoptila cyanomelana* Temminck, 1829

subspecies *intermedia* Weigold, 1922.

DISCUSSION

The English name for *cumatilis* honours Walter R. Zappey, the collector of the type specimen. The current status of Zappey's Flycatcher requires further research. It is currently known as a breeding bird from only a small number of locations in central China (see Table 6); however, this includes the type locality, from which it would appear to be unrecorded since 1907. On present knowledge it breeds between 1,000 and 1,700 m in temperate mixed coniferous and deciduous forest from Shaanxi to the mountains of Beijing. This distribution corresponds with the Shanxi Mountains Endemic Bird Area (EBA), and although as yet there are no records from Shanxi, it seems most likely that it occurs there. Two other species breed only in the Shanxi Mountains EBA, Brown Eared-pheasant *Crossoptilon mantchuricum* and Grey-sided Thrush *Turdus fea* (BirdLife International 2012a), both breeding at similar altitudes to Zappey's Flycatcher although the former occurs up to 2,600 m. Both are currently listed as Vulnerable owing to habitat loss to agriculture and urban development and habitat degradation caused by logging and livestock-grazing (BirdLife International 2012b), and it seems likely that Zappey's Flycatcher would similarly qualify as globally threatened.

It is poorly represented in the collections examined (except IOZ) and only two specimens, both migrants, are in BMNH (an adult male from Malaysia dated December 1919 and a first-winter male from Hainan in May 1899, i.e. before *cumatilis* was formally described). There is a recent field record (photographed) of an adult male from Hong Kong in October 2008 (Holmes 2010). However, owing to past taxonomic confusion with *intermedia,* published records of *cumatilis* cannot be taken at face value: recent examples of published records of *cumatilis* which clearly refer to *intermedia* include Shigeta (2003) and Peterson (2006).

Lei *et al.* (2007), Sangster *et al.* (2010) and Zuccon & Ericson (2010) all concluded that Verditer Flycatcher *Muscicapa thalassina* is closely related to *Cyanoptila cyanomelana* and that both should be placed in either *Niltava* or a sister genus to *Niltava*. However, none of these studies stated the subspecies or the geographical origin of the *Cyanoptila* samples and, in view of this, we suggest that more comprehensive genetic work is required, including analysis of material from *cumatilis*, *intermedia* and *cyanomelana* (especially given that some plumage characters are shared between *cumatilis* and *M. thalassina* and which may imply a closer relationship than with *intermedia* or *cyanomelana*), so that the exact relationship between the three *Cyanoptila* taxa, and between each of these and *M. thalassina*, can be determined before any such changes are adopted.

ACKNOWLEDGEMENTS

We would like to thank the following for their invaluable assistance in the field: Alexi Antonov, Mark Brazil, Sergei Surmach, Yoshimitsu Shigeta and David Stanton. Liu Yang helped in locating Mafuling, the type locality of *cumatilis*. The following kindly provided additional recordings: Per Alström, Mark Brazil, Xia Canwei, Will Duckworth, Paul Holt, Bo Petersson and Mathias Ritschard. Access to museum collections was kindly facilitated by Oleg A. Burkovsky (MZFENU, Vladivostok), Yoshimitsu Shigeta (YIO), Fu Min-Lei (IOZ) and Mark Adams (BMNH). Per Alström and Phil Round provided very helpful feedback which improved the clarity of the paper, Yee Lai prepared Figure 1 and Catriona Leven assisted with statistical analysis. Referees Joe Tobias and Nigel Collar provided valuable comments. Finally, Jeremiah Trimble (MCZ) provided photographs of the type of *cumatilis*.

REFERENCES

BirdLife International (2012a) Endemic Bird Area factsheet: Shanxi mountains. Downloaded from http://www.birdlife.org on 12/06/2012.

BirdLife International (2012b) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 13/06/2012.

Brazil, M. A. (1991) *The birds of Japan*. London: Christopher Helm.

Brazil, M. A. (2009) *Birds of East Asia.* London: Christopher Helm.

Cheng, Tso-Hsin (1987) *A synopsis of the avifauna of China*. Beijing: Science Press.

Clement, P. (2006) Blue-and-white Flycatcher species account. P.147 in J. del Hoyo, A. Elliott & D. A. Christie, eds. (2006) *Handbook of the birds of the world*, 11. Barcelona: Lynx Edicions.

Table 6. Known breeding-season locations of *Cyanoptila cumatilis*.

Location	Coordinates	Comment
Xiaolongmen, Beijing, China	40°00′N 115°28′E	Specimens examined (IOZ) and studied in the field
Houzhenzi, Shaanxi, China	33°51′N 107°51′E	P. Alström *in litt.* 2011; photos examined, recordings analysed for this study
Pingli,Shaanxi, China	32°18′N 109°18′E	Photos of specimens examined
Taibai,Shaanxi, China	34°05′N 107°19′E	Photos of specimens examined
Ningshan, Shaanxi, China	33°26′N 108°22′E	Photos of specimens examined
Foping, Shaanxi, China	33°34′N 107°59′E	P. Alström *in litt.* 2011; photos examined
Fangxian, Hubei, China	32°03′N 110°44′E	MCZ online database: http://www.mcz.harvard.edu/collections/searchcollections.html accessed January 2012. Not examined (nor photos seen) by the authors
Mafu Ling, Hubei, China	32°03′N 110°44′E	Type locality. Photos of type specimen (an adult male) examined

Collar, N. J. (2011a) Species limits in some Philippine birds including the Greater Flameback *Chrysocolaptes lucidus. Forktail* 27: 29–38.

Collar, N. J. (2011b) Taxonomic notes on some Asian babblers (Timaliidae). *Forktail* 27: 100–102.

Dementiev, G. P. & Gladkov, N. A., eds. (1954) *Birds of the Soviet Union*. Vol. 5. Moskva: Sovetskaya Nauka.

Hartert, E. & Steinbacher, F. (1934) *Die Vögel der paläarktischen Fauna*. *Ergänzungsband*. Berlin: R. Friedländer und Sohn.

Holmes, J. (2011) Blue-and-white Flycatcher *Cyanoptila cyanomelana cumatilis* on Po Toi. The first record of this taxon in Hong Kong. *Hong Kong Bird Report* 2007–2008: 302–303. (In English and Chinese.)

Lei, X., Lian, Z.-M., Lei, F.-M., Yin, Z.-H. & Zhao, H.-F. (2007) Phylogeny of some Muscicapinae species based on cyt b mitrochondrial gene sequences. *Acta Zool. Sinica* 53: 95–105.

Mayr, E. & Cottrell, G. W. (1986) *Check-list of birds of the world*, 11. Cambridge, Mass.: Museum of Comparative Zoology.

Peterson, A. T. (2006) Taxonomy *is* important in conservation: a preliminary reassessment of Philippine species-level bird taxonomy. *Bird Conserv. Internatn.* 16: 155–173.

Redfern, C. P. F. & Clark, J. A. (2001) *Ringer's manual*. Thetford, U.K.: British Trust for Ornithology.

Sangster, G., Alström, P., Forsmark, E. & Olsson, U. (2010) Multi-locus phylogenetic analysis of Old World chats and flycatchers reveals extensive paraphyly at family, subfamily and genus level (Aves: Muscicapidae). *Molec. Phylogen. Evol.* 57: 380–392.

Tobias, J. A., Seddon, N., Spottiswoode, C. N., Pilgrim, J. D., Fishpool, L. D. C. & Collar, N. J. (2010) Criteria for species delimitation based on phenotype. *Ibis* 152: 724–746.

Thayer, J. E. & Bangs, O. (1909) Descriptions of new birds from central China. *Bull. Mus. Comp. Zool.* 52: 141.

Shigeta, Y. (2003) The first authentic record of Chinese Blue-and-white Flycatcher *Cyanoptila cyanomelana cumatilis* for Japan. *J. Yamashina Inst. Orn*. 34: 309–313. (In Japanese with English abstract.)

Vaurie, C. (1954) Systematic notes on Palearctic birds. No. 12 Muscicapinae, Hirundinidae and Sturnidae. *Amer. Mus. Novit*. 1694.

Vaurie, C. (1958) *The birds of the Palearctic fauna. Passeriformes.* London: H. F. & G. Witherby.

Zheng, G., ed. (2011) *A checklist on the classification and distribution of the birds of China*. Beijing: Science Press. (In Chinese.)

Zuccon, D. & Ericson, P. G. P. (2010) A multi-gene phylogeny disentangles the chat-flycatcher complex (Aves: Muscicapidae). *Zoologica Scripta* 39: 213–224.

***Paul J. LEADER** and **Geoff J. CAREY**, AEC Ltd., 127 Commercial Centre, Palm Springs, New Territories, Hong Kong, Email pjl@aechk.hk*