

Notes on the vocalizations of Spotted Bush-warbler (*Bradypterus thoracicus*)

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In the following we briefly analyze and compare voice of the three races of Spotted Bush-warbler (*Bradypterus thoracicus*). We also try to quantify the extent of any vocal differences using the criteria proposed by Tobias *et al.* (2010), as a support for taxonomic review. We have made use of sound recordings available on-line from Xeno Canto (XC) and Macaulay Library (ML).

Voice has already been extensively studied in Alström *et al.* (2008), and measurements of basic sound parameters are provided:

Table 6. Characteristics of songs

	<i>thoracicus/przevalskii</i>	<i>kashmirensis</i>	<i>davidi/suschkini</i>
'Strophe' length (ms)	558–749 (626 ± 32; 60)	908–1444 (1170 ± 116; 53)	359–497 (423 ± 33; 70)*
Pause length (ms)	94–325 (170 ± 49; 60)	342–1833 (687 ± 332; 49)	413–1212 (645 ± 178; 70)
Buzz length (ms)†	76–118 (101 ± 9.3; 50)	105–220 (157 ± 40; 58)	359–497 (423 ± 33; 70)*
Frequency span buzz (Hz)†	1470–2511 2005 ± 248; 50	1344–2823 (2136 ± 331; 58)	1933–2782 (2395 ± 195; 70)
Mean frequency buzz (Hz)†	5412–5956 (5648 ± 135; 50)	5847–6698 (6287 ± 274; 58)	5208–6179 (5673 ± 269; 70)
Number of buzzes/strophe'	1	2	1*
Number of short elements/'strophe'	2 'introductory elements' + 3 + 3 + 3	1–5 'introductory elements' + 4 + 3	0

Values in parentheses: (mean ± SD; N).

*In our terminology, the buzzes of *davidi/suschkini* are synonymous with 'strophes', but these notes are presumably not homologous with the 'strophes' of *thoracicus/przevalskii* and *kashmirensis*, but instead with the buzzes in the strophes of these taxa.

†Both buzzes in each strophe in *kashmirensis*; length of first buzz 105–143 ms (mean 118 ± 0.009), second buzz 164–220 ms (mean 195 ± 0.01).

Based on these data we can calculate effect sizes (ES) for *thoracicus/przevalskii* vs. *kashmirensis*:

strophe length	ES 6.39
pause length	ES 2.18
buzz length	ES 1.93
freq. span	ES 0.45
mean freq.	ES 2.96

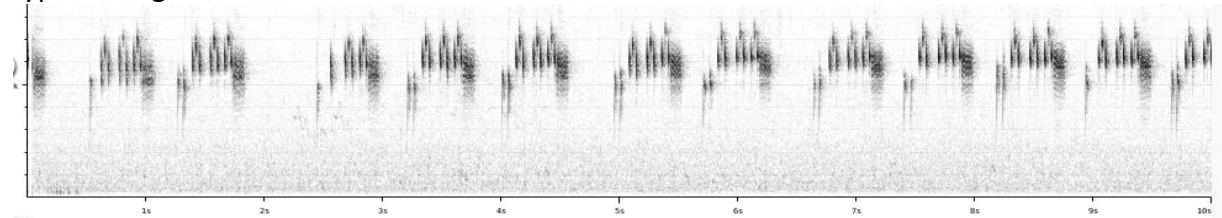
(Application of the term 'strophe' could be questioned, as it possibly leads to comparing not homologous parts of the song (1 phrase vs. 2 grouped phrases). In any case, a score can only be given for either strophe length or pause duration.)

Strict application of Tobias criteria based on the measurements in the paper would lead to score 3 for strophe length and score 2 for mean freq., resulting in a total score of 5.

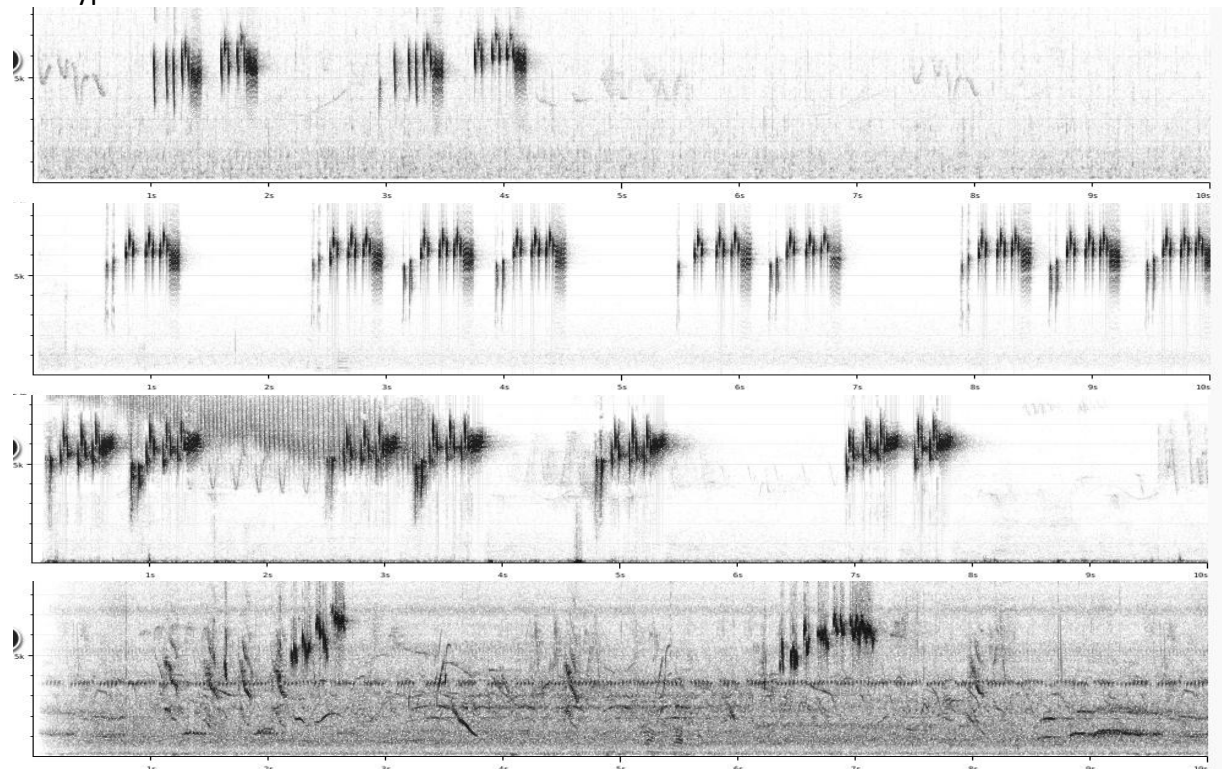
Qualitatively, vocal difference lies mainly in the fact that *thoracicus/przevalski* has a repeated strophe which contains a single buzz, while *kashmirensis* has a repeated strophe which contains twice a buzz (Alström *et al.* 2008).

Some examples of song of *thoracicus/przevalski*:

Typical song:

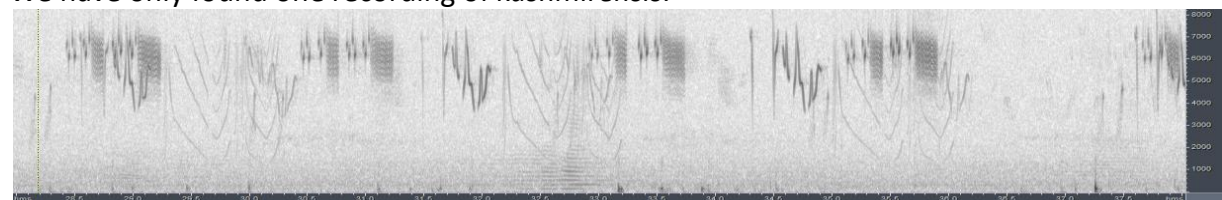


less typical variations:



From these examples it would seem that the situation is somewhat less clear-cut, with strophes not necessarily being identical.

We have only found one recording of *kashmirensis*:



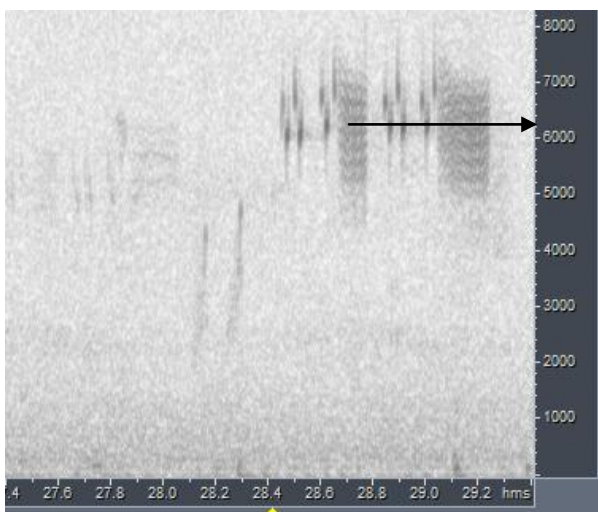
This recording indeed nicely shows the 'doubled strophes' (with the first and second not identical, the second one having a longer buzz etc., which is different from the occasional 'double strophes' in *thoracicus/przevalski*)

It would seem that the aforementioned study suffered somewhat from small sample size of sound recordings, as reflected in Table 1 of the paper. Nevertheless, it is clear that the songs of both groups are different.

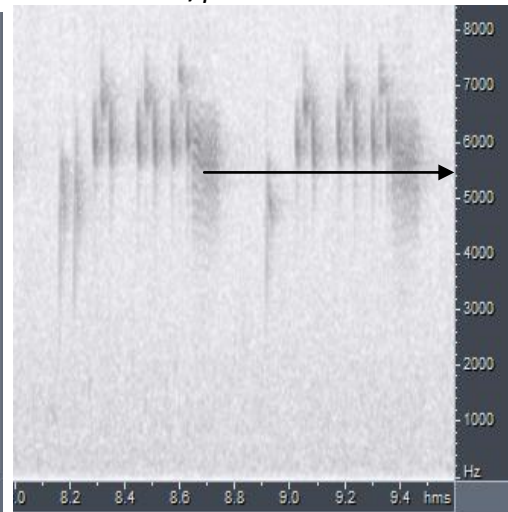
An alternative, more pragmatic way of scoring (3 for single vs. double buzz in smallest repeated unit, 1-2 for lower frequency of the buzz etc.), would lead to a similar total score of 4-5.

This can be illustrated by the following detail of typical song phrases for both groups (arrows indicating average buzz frequency):

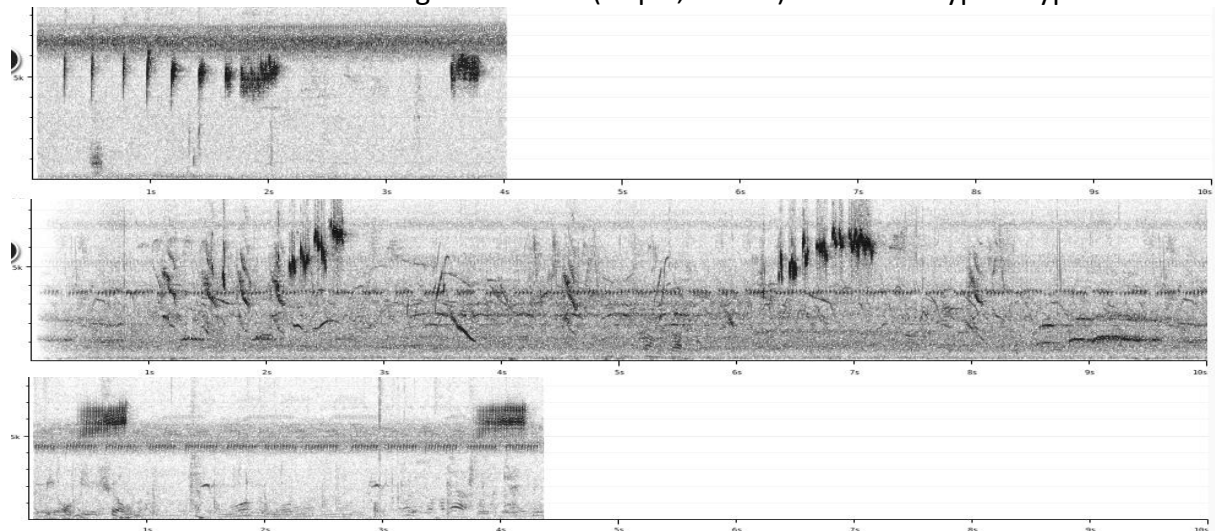
kashmirensis



thoracicus/przevalski



One final word of caution: all *L.t. thoracicus* recordings are from China. For some reason, none of the *thoracicus* recordings from India (Nepal, Assam) are of the 'typical type':



Something seems to be overlooked here. Either, these are vocalizations of an overwintering different Bush Warbler, there is a cryptic taxon here different from Chinese *thoracicus*, or simply these are not yet the May-June spring songs... This is clearly food for further study.

This note was finalized on 15th February 2016, using sound recordings available on-line at that moment. We would like to thank in particular the sound recordists who placed their recordings for this species on XC: Nick Athanas, Oscar Campbell, Tomas Carlberg, David Farrow, Frank Lambert, Mike Nelson, Craig Robson, Ding Li Yong and Sahas Barve Aditya Malgaonkar.

References

Alström, P., Rasmussen, P.C., Olsson, U. & Sundberg, P. (2008). Species delimitation based on multiple criteria: the Spotted Bush Warbler *Bradypterus thoracicus* complex (Aves: Megaluridae). *Zool. J. Linn. Soc.* **154**: 291–307.

Tobias, J.A., Seddon, N., Spottiswoode, C.N., Pilgrim, J.D., Fishpool, L.D.C. & Collar, N.J. (2010). Quantitative criteria for species delimitation. *Ibis* 152(4): 724–746.

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