

Notes on the vocalizations of Yellow-crested Manakin (*Heterocercus flavivertex*), Orange-crested Manakin (*Heterocercus aurantiivertex*) and Flame-crested Manakin (*Heterocercus linteatus*)

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In the following we briefly analyze and compare voice of Yellow-crested Manakin (*Heterocercus flavivertex*), Orange-crested Manakin (*Heterocercus aurantiivertex*) and Flame-crested Manakin (*Heterocercus linteatus*). 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).

The 'song' or advertisement call of these 3 taxa is highly distinctive (Fig. 1):

Heterocercus flavivertex: a thin rising whistle followed by an explosive short note and a falling thin whistle 'hueeee..SPEE-tseeeuw'

Measurements: (n=4)

# of notes	3 (occasionally only 2)
total length	2.08-3.19s
min. freq.	2070-3700Hz
max. freq.	6500-7200Hz
longest note	0.87-1.5s
shortest note	0.06-0.11s

Heterocercus aurantiivertex: a long trill of about 2s, usually rising/falling twice, preceded by one or two (barely audible) high-pitched short notes.

Measurements: (n=6)

# of notes	21-34
total length	1.73-2.48s
min. freq.	2700-3200Hz
max. freq.	7300-9000Hz
longest note	0.06-0.09s
shortest note	0.04-0.05s

Heterocercus linteatus: a thin rising whistle, followed by three explosive notes 'hee..PEEUW..PEEUW..PEEUW' (some recordings without the initial rising whistle, but it is not clear whether these are incomplete recordings of the song or genuine shorter versions of the song)

Measurements: (n=4)

# of notes	4 (3?)
total length	3.6-5.33s
min. freq.	1550-1770Hz
max. freq.	4500-6300Hz
longest note	0.9-1.3s
shortest note	0.1-1.06s

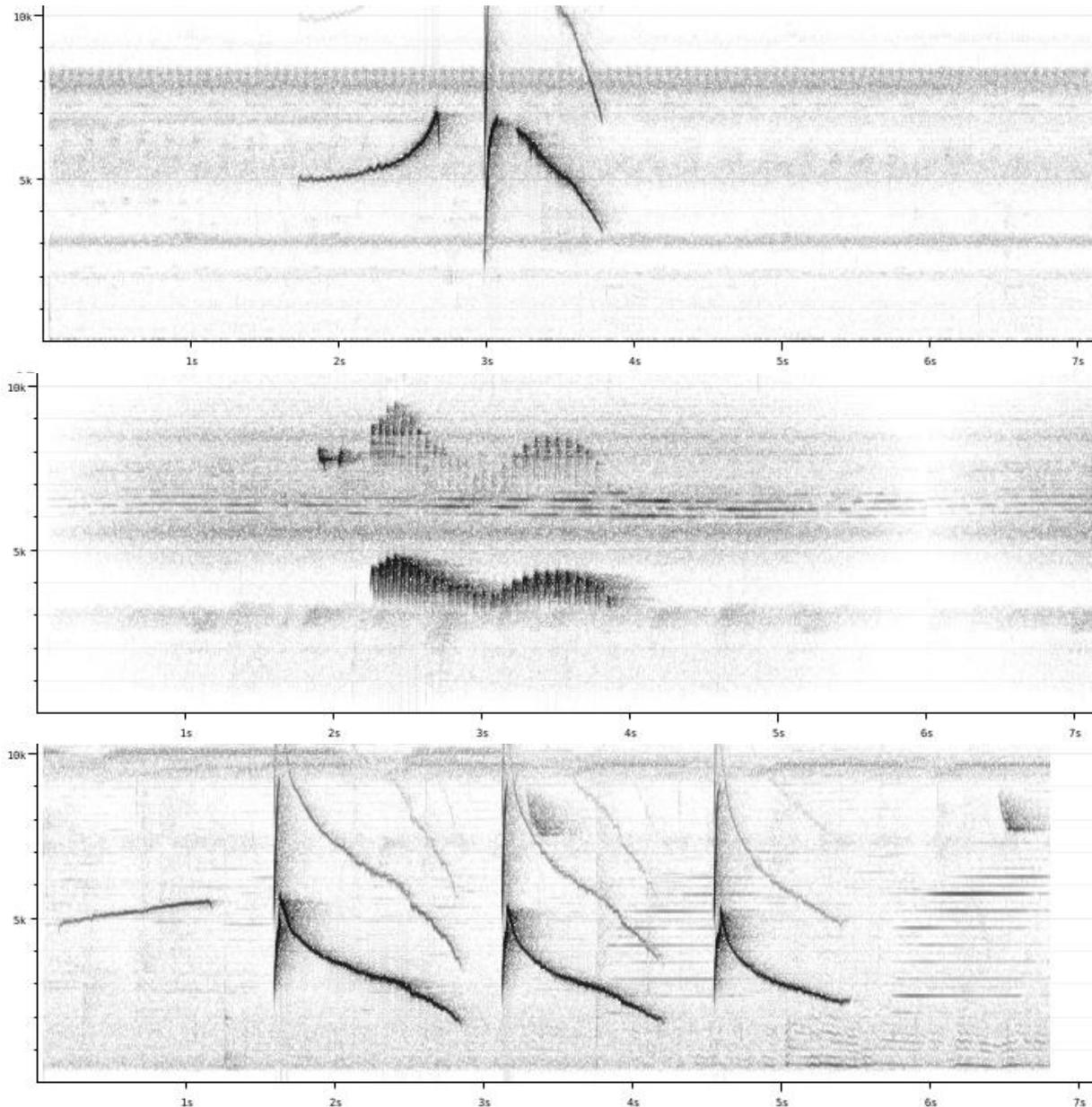


Figure 1: typical song of *flavivertex* (top), *aurantiivertex* (middle) and *linteatus* (bottom)

Main quantified differences are:

Song of *H. aurantiivertex* differs from the 2 other taxa mainly by the large number of notes (score 4), and the lack of any long notes (score 4). When applying Tobias criteria, this leads to a total vocal score of 8.

Song of *H. flavivertex* differs from *H. linteatus* by a lower number of notes (score 1), a shorter song (score 2) and higher frequencies (score 2-3), resulting in a total vocal score of 4-5.

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References

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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