

## Notes on the vocalizations of Mountain Elaenia (*Elaenia frantzii*)

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In the following we briefly analyze and compare voice of the different races of Mountain Elaenia (*Elaenia frantzii*). 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).

Members of the genus *Elaenia* have a dawn song and several day-time 'calls'. Dawn song is usually the most complex vocalization, often quite rhythmic, and very constant over the entire range of the species (a true subspecies!). Unlike some other Tyrant-flycatchers (e.g. *Zimmerius* genus), every species has a very characteristic dawn-song, which thus is an excellent indicator for taxonomic decisions. It is only in recent years that gradually with increasing knowledge more dawn songs of Tyrant flycatchers have been gathered. Obviously, the issue is that birds sing in near-darkness, and identification of the 'singing silhouette' is problematic, while singing may be limited to a short period in the year.

Dawn song of Central American birds is quite different from South-American birds:

Central American group (only dawn song of *frantzii* available, n=6)

Dawn song is a repeated phrase "cheeh-rr-eéh...chee-rr-eéh...chee-rr-eéh..." (Fig. 1). This simple phrase consists of an overslurred whistle followed by a rising burry part and a higher-pitched second overslurred note, all three notes interconnected without clear pause. As last note is higher-pitched, it sounds to the ear as if emphasis is on the last note.

1st note

min freq	2800-3200Hz
max freq	4100-5000Hz
freq range	1300-1800Hz
length	0.09-0.11s

2nd note

min freq	3700-4800Hz
max freq	5400-6200Hz
freq range	1300-1700Hz
length	0.09-0.11

total length	0.24-0.26s
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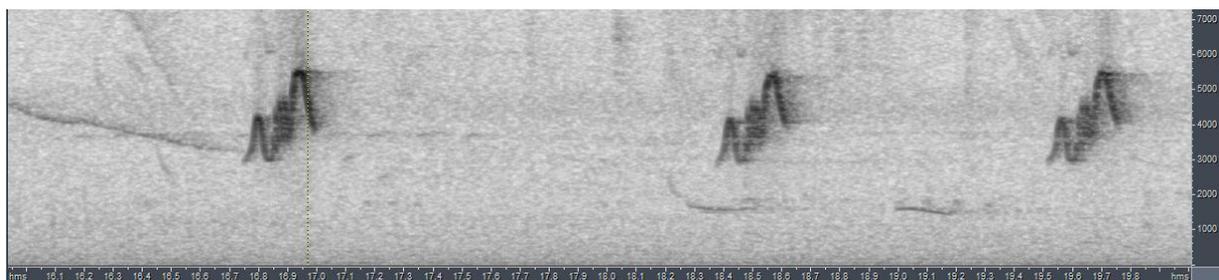


Figure 1: typical dawn song of race *frantzi*

South American group (*pudica* and *browni*, n=11)

Dawn song is a combination of two phrase types. Phrase A "whéerr-heeh" consists of an overslurred note (sharp upside-down V-shape, with a burry descending leg) followed by a well-separated underslurred V-shaped note, both notes covering about the same frequency range (on a sonogram very different from previous group, Fig. 2). Also, sounds to the ear as if first note is emphasized, unlike previous group. Phrase B is identical to phrase A but with the addition of a gurgling ending rattle "whéerr-heeh-brrrr". Phrases are typically uttered intermittently AABAABAAAB.. etc., occasionally only AAAA... or BBBB... (unlike in Central American birds, which seems to have only one single phrase A)

1st note

min freq 2200-2700Hz  
max freq 5300-6200Hz  
freq range 3000-4000Hz  
length 0.16-0.22s

2nd note

min freq 2450-3000Hz  
max freq 5600-6300Hz  
freq range 2700-3800Hz  
length 0.075-0.11s

total length 0.26-0.30s

ending gurgling part

min freq 400-700Hz  
max freq 5000-6000Hz  
length 0.14-0.16s  
# of notes 4-5

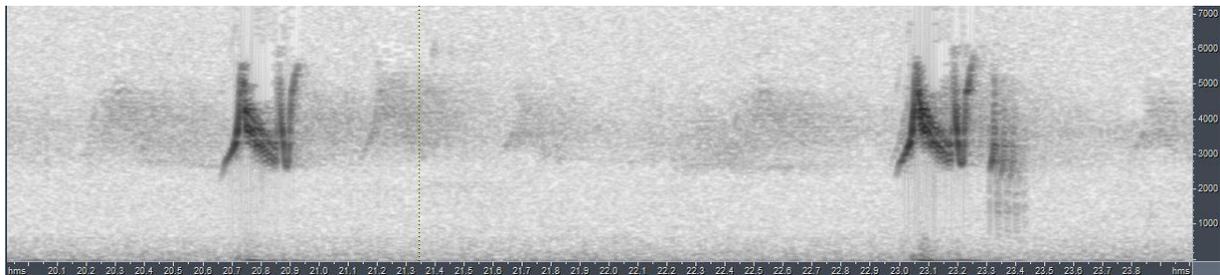


Figure 2: typical dawn song of South-American birds, illustrating a phrase A and a phrase B

Dawn song recordings of both groups are about identical within each group, and very different between both groups, and thus, assignment to one of the 2 groups on a sonogram is straightforward.

This can be quantified by e.g. pointing out that Central American group has a first note which is shorter (score 3) with a much smaller frequency range (score 3-4), a second note which is higher-pitched (score 3) with a similar smaller frequency range (score 3-4) and a total length which is slightly smaller. Central American group has only one phrase, while South-American group has 2 distinct phrases (score 3), the second phrase ending in a gurgling rattle with min. frequencies far lower than any frequency in Central American group (score 3-4).

Call notes seem to differ much less. One call type seems to be more drawn-out with flatter frequency slope in South-American groups, although there may be some overlap. A more in depth analysis would be needed to establish any diagnostic differences.

Based on the very different dawn song (much more so than what appears to the human ear, due to the fast rendition of the phrase), by applying Tobias criteria, a total vocal score of about 6 can be given.

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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.

### Recommended citation

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