

Mimicry by Great Tit *Parus major* of Western Bonelli's Warbler *Phylloscopus bonelli*

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The Great Tit commonly mimics other species' calls. Here, we report the putative case of a Great Tit mimicking the call of a Western Bonelli's Warbler in winter. Despite the fact that the bird was not seen, we reached this conclusion after analyzing the sonogram and comparing it to true Bonelli's Warbler calls and to another confirmed recording of a Great Tit mimicking Bonelli's Warbler calls. Therefore, Bonelli's Warbler records based on calls outside of its usual dates and distribution should be regarded with caution. A review of 4,681 sound recordings of Great Tits from the xeno-canto database revealed 109 mimicry cases of at least 20 other species, the commonest being Common Chiffchaff, Marsh Tit and Common Chaffinch. People participating in bird monitoring schemes should be aware of the great variability in the repertoire of Great Tit calls (and other related mimicking species) to prevent potential misidentification.

Key words: Great Tit, *Parus major*, Western Bonelli's Warbler, *Phylloscopus bonelli*, mimicry, sonogram, voice, xeno-canto.

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Received: 26.10.19; Accepted: 22.11.19 / Edited by O. Gordo

Sound mimicry is a relatively frequent behaviour in birds (Hindmarsh 1986, Kelley *et al.* 2008). There are many evolutionary hypotheses regarding the possible function of mimicry including the deception of other birds, avoiding heterospecific competition, individual identification, or mate attraction. However, most of these theories currently have little backing or have been definitively rejected. It is likely that this behaviour is related simply to mistakes during song-learning processes (Hindmarsh 1984, 1986; Kelley *et al.* 2008).

On 26 December 2018, RA was carrying out a SOCC (Catalan Common Bird Monitoring scheme) survey at site 23, Masos, La Palma d'Ebre, Tarragona, Spain (41°14'56"N 0°38'06"E). This site is a dry Mediterranean landscape dominated by sclerophyllous vegetation consisting of a mosaic of farmland (olive

and almond trees), fallow land and abandoned fields, as well as small stands of Aleppo pines. After finishing the survey, he noted several calls of a Western Bonelli's Warbler *Phylloscopus bonelli* (WBW hereafter). This species is a common breeder in the area but as a trans-Saharan migratory species is only present during spring and summer. The first local birds arrive in late March and leave the area from early August to mid-September (Ferrer *et al.* 1986). Due to the exceptionality of this potential winter record of the WBW in the area (Morganti & Pulido 2012), RA approached the spot where the bird was calling but unfortunately was not able to observe it. However, these WBW calls were included as part of the typical repertoire of a Great Tit *Parus major* originating from the same place. For this reason, RA assumed that it was a Great Tit mimicking WBW calls. Nevertheless, as this behaviour was

exceptional, he recorded the calls using the video mode of a Nikon Coolpix P900 camera.

The 26-second recording (Raul Aymí, XC504540; available at www.xeno-canto.org/504540) was analysed later using the audio editor Audacity. An examination of the recording revealed that there was no clear structural placement of the supposed WBW calls in relation to the Great Tit calls present in the recording. Moreover, the WBW calls clearly overlapped the Great Tit calls. Although syringe anatomy allows birds to produce two sounds simultaneously, our analysis of the sonogram suggests two different individuals calling at the same time.

In order to test the hypothesis that the WBW calls were being made by a wintering WBW, we compared our sonogram with an actual WBW call recorded on 24 April 2019 near Tarragona (41°05'52"N 1°09'35"E; Xavier Riera, XC504518; available at www.xeno-canto.org/504518). The frequency range in our recording was similar to the WBW call (2.1–4.0 kHz vs 2.4–4.4 kHz, respectively) but had a lower highest pitch (Figure 1). Moreover, the note length in our record was patently longer than in the true WBW recording (0.35 vs 0.20 seconds, respectively; Figure 1). Therefore, although imperceptible to the human ear, the sonogram of the recorded WBW did not match a typical WBW call and, consequently, the hypothesis of a wintering WBW was ruled out.

There are very few other candidate species as potential mimics of the WBW calls in our recording. Common Redstarts *Phoenicurus phoenicurus* are known to mimic calls of WBW in recordings from France and Sweden (Comolet-Tirman 1995, 2018). However, the occurrence of this species in our study area in winter seems even less plausible

than that of a WBW and thus this species was rejected as the supposed mimic.

We are aware of records of Great Tits mimicking WBW calls. One was a bird seen and heard for ca. two minutes at the Gavarres reservoir, Barcelona, Spain (41°59'N 2°04'E) on 10 December 2016 (Marc Illa, Martí Franch and Josep Maria Puig, pers. com.). Unfortunately, it was not recorded. The other instance was a bird seen and recorded in Almofala, Figueira de Castelo Rodrigo, Portugal, on 5 January 2019 (João Tomás, XC448902; available at www.xeno-canto.org/448902). A comparison of the sonogram of this Portuguese bird with our own recording revealed a close resemblance (Figure 1). Both the length of the note (0.31 seconds) and the frequency range (1.9–4.0 kHz) of the Portuguese bird closely matched our recording, suggesting that our recorded WBW call was indeed most probably produced by a Great Tit.

Although we were unable to observe the bird (or birds) in our sound recording, all evidence points to the Great Tit as the mimic of the WBW call. The Great Tit has an extraordinary variety of calls, which sometimes imitate other species (Cramp & Perrins 1993, Haftorn *et al.* 1996, Gorissen 2005, Constantine & The Sound Approach 2006, Gorissen *et al.* 2006). A review of the 4,681 recordings available at www.xeno-canto.org (accessed 9 October 2019) for this species found 109 cases of heterospecific mimicry (2% of cases) of 20 species, the most usual being the Common Chiffchaff, Marsh Tit and Common Chaffinch (Table 1). This result reveals that, in terms of the number of birds imitated, the Great Tit approaches genuinely imitative species like starlings (Hindmarsh 1984, 1986) but is far from specialists like the Marsh

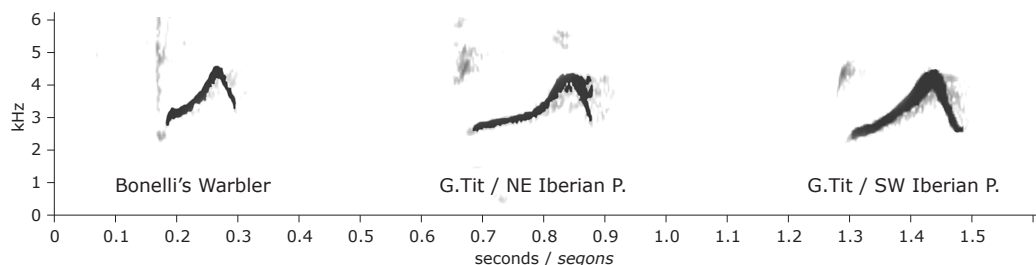


Figure 1. Sonograms comparing the call of a Western Bonelli's Warbler with putative mimicry by a Great Tit in our recording (centre) and in the recording by João Tomás in Portugal (right).
Sonogrames comparant el reclam de un mosquiter pàl·lid amb la possible imitació de la mallerenga carbonera en la nostra gravació i incloent-hi la gravació de João Tomás a Portugal (dreta).

Table 1. Number of cases of mimicry by Great Tits found in the 4,681 recordings available for this species at xeno-canto.

Nombre de casos d'imitacions trobades en les 4.681 gravacions de mallerenga carbonera disponibles a xeno-canto.

Species	No. of recordings
White Wagtail (<i>Motacilla alba</i>)	2
Song Thrush (<i>Turdus philomelos</i>)	1
Common Blackbird (<i>Turdus merula</i>)	4
Willow Warbler (<i>Phylloscopus trochilus</i>)	3
Western Bonelli's Warbler (<i>Phylloscopus bonelli</i>)	1
Common Chiffchaff (<i>Phylloscopus collybita</i>)	19
<i>Regulus</i> sp.	1
Winter Wren (<i>Troglodytes troglodytes</i>)	1
Coal Tit (<i>Parus ater</i>)	3
European Blue Tit (<i>Cyanistes caeruleus</i>)	12
Crested Tit (<i>Lophophanes cristatus</i>)	2
Willow Tit (<i>Poecile montanus</i>)	1
Marsh Tit (<i>Poecile palustris</i>)	18
<i>Poecile</i> sp.	1
Long-tailed Tit (<i>Aegithalos caedatus</i>)	1
Eurasian Nuthatch (<i>Sitta europaea</i>)	9
Short-toed Treecreeper (<i>Certhia brachydactyla</i>)	7
House Sparrow (<i>Passer domesticus</i>)	1
Tree Sparrow (<i>Passer montanus</i>)	1
Common Chaffinch (<i>Fringilla coelebs</i>)	18
Eurasian Siskin (<i>Carduelis spinus</i>)	1
Unknown	2
TOTAL	109

Warbler, which has been recorded as mimicking 70 species (Dowsett-Lemaire 1979).

Despite the large number of records of mimicry available on the xeno-canto web site, all are anecdotal and opportunistic recordings that do not allow for a rigorous quantification of the true mimicry behaviour and ability of the Great Tit. In addition, not all Great Tit populations will have been sampled with the same intensity, so the list of mimicked species (Table 1) is probably heavily biased towards the commonest species in central and northern Europe. For instance, on the Balearic Islands, Great Tits also mimic the calls of the Sardinian Warbler *Sylvia melanocephala*, the so-called *t-tra t-tra t-tra* (G. Gargallo com. pers.), but no recording is available. Therefore, we are fairly sure that the figures probably underestimate the mimicking ability of the Great Tit.

The Great Tit is recorded regularly on surveys of common bird monitoring schemes because it is

one of the commonest European birds (BirdLife 2015). People taking part in those surveys should be aware of this often underestimated mimicry to prevent misidentifications. In fact, mimicry could be an issue for data recorded in these monitoring schemes, as other tit species, starlings and corvids also regularly imitate other birds. Finally, in the particular case of the WBW, exceptional records of calls outside its typical dates in Europe should be carefully scrutinized – as we did – as they could be simply misidentifications of Great Tits.

Acknowledgements

We are grateful for the recordings used in our research from the xeno-canto database made by many different people and for details of sightings by Marc Illa, Martí Franch and Josep Maria Puig in Catalonia. This note has benefitted from the comments and suggestions made by two anonymous reviewers and the editor.

Resum

Imitació del reclam del mosquiter pàl·lid *Phylloscopus bonelli* per la mallerenga carbonera *Parus major*

La mallerenga carbonera imita sovint els sons d'altres espècies. En aquesta nota descrivim el possible cas d'una mallerenga carbonera imitant el reclam d'un mosquiter pàl·lid a l'hivern. Malgrat que no vam observar l'ocell, hem arribat a aquesta conclusió gràcies a una anàlisi detallada del sonograma que vam enregistrar i la seva comparació amb gravacions de mosquiter pàl·lid i d'un altre cas confirmat de mallerenga carbonera imitant-lo. Es tractaria, doncs, del segon cas on s'ha pogut enregistrar aquest comportament. En qualsevol cas, les citacions de mosqueters pàl·lids basades només en el seu reclam fora de les dates i llocs habituals de l'espècie caldria enregistrar-los i sotmetre'ls a una anàlisi exhaustiva, ja que les diferències de freqüència i durada del reclam imitat vers el real van ser indistingibles per a l'oïda humana. Una revisió dels enregistraments de xeno-canto demostra que les mallerengues carboneres poden imitar almenys 20 espècies, essent les més comunes el mosquiter comú, la mallerenga d'aigua i el pinsà. Els ornitòlegs que col·laboren en els censos d'ocells haurien de ser conscients de l'elevada variabilitat en el repertori de la mallerenga carbonera per no identificar erròniament aquesta espècie durant els mostrejos de camp.

Resumen

Imitación del reclamo del mosquitero papialbo *Phylloscopus bonelli* por el carbonero común *Parus major*

El carbonero común imita a menudo los sonidos de otras especies. En esta nota describimos el posible caso de un carbonero imitando el reclamo de un mosquitero papialbo en invierno. A pesar de que no observamos el ave, hemos llegado a esta conclusión gracias a un análisis detallado del sonograma grabado y su comparación con grabaciones de mosquitero pálido y de otro caso confirmado de carbonero imitándolo. Se trataría, por tanto, del segundo caso donde se ha podido registrar este comportamiento. En cualquier caso, las citas de mosquiteros pálidos basadas sólo en su reclamo fuera de las fechas y lugares habituales de la especie deberían registrarse y someterse a un análisis exhaustivo, ya que las diferencias de frecuencia y duración del reclamo imitado con el real fueron indistinguibles para el oído humano. Una revisión de las grabaciones de xeno-canto demuestra que los carboneros comunes pueden imitar al menos 20 es-

pecies, siendo las más comunes el mosquitero común, el carbonero palustre y el pinzón. Los ornitólogos que colaboran en los censos de aves deberían ser conscientes de la elevada variabilidad en el repertorio del carbonero para no identificar erróneamente esta especie durante los muestreos de campo.

References

- Baylis, J.R.** 1982. Avian vocal mimicry: its function and evolution. In Kroodsma, D.E. & Miller, E.H. (eds.): *Acoustic Communication in Birds*. Pp. 51–80. New York: Academic Press.
- BirdLife International.** 2015. *European Red List of birds*. Office for official publications of the European Communities, Luxembourg. / <http://datazone.birdlife.org/info/euroredlist>
- Comolet-Tirman, J.** 1995. Does the Redstart (*Phoenicurus phoenicurus*) mimic bird species heard during migration? *Bioacoustics* 6: 73–79.
- Comolet-Tirman, J.** 2018. Mimicry of Western Bonelli's Warbler by the Common Redstart in Northern Europe. *Xenocanto*, November 2018, available at: <https://www.xeno-canto.org/article/232>
- Constantine, M. & The Sound Approach.** 2006. *The Sound Approach to Birding: A Guide to Understanding Bird Sound*. Dorset: The Sound Approach.
- Cramp, S.** 1992. *The Birds of the Western Palearctic*. Vol. VI. Oxford: Oxford University Press.
- Cramp, S. & Perrins, C.M.** 1993. *The Birds of the Western Palearctic*. Vol. VII. Oxford: Oxford University Press.
- Dowsett-Lemaire, F.** 1979. Imitative range of song of marsh warbler, with special reference to imitations of the African birds. *Ibis* 121: 453–467.
- Ferrer, X., Martínez-Vilalta, A. & Muntaner, J.** 1986. *Ocells*. In: *Història Natural dels Països Catalans*. Vol. 12. Barcelona: Enciclopèdia Catalana.
- Gorissen, L.** 2005. *The vocal communication strategies of blue and great tits, studied from an intra- and interspecific perspective*. PhD Thesis. Antwerp University (Belgium).
- Gorissen, L., Gorissen, M. & Eens, M.** 2006. Heterospecific song matching in two closely related songbirds (*Parus major* and *P. caeruleus*): great tits match blue tits but not vice versa. *Behav. Ecol. Sociobiol.* 60: 260–269.
- Haftorn, S., Hailman, J. P. & Hailman, E. D.** 1996. Heterospecific imitation by Great Tits *Parus major*. *Fauna Norvegica, Serie C – Cinclus* 19: 39–47.
- Hindmarsh, A.M.** 1984. Vocal mimicry in starlings. *Behaviour* 90: 302–324.
- Hindmarsh, A.M.** 1986. The functional significance of vocal mimicry in song. *Behaviour* 99: 87–100.
- Kelley, L.A., Coe, R.L., Madden, J.R. & Healy, S.D.** 2008. Vocal mimicry in songbirds. *Animal Behav.* 76: 521–528.
- Morganti, M. & Pulido, F.** 2012. Invernada de aves transaharianas en España. In *SEO/BidLife: Atlas de las aves en invierno en España 2007-2010*. Pp. 59–64. Madrid: Ministerio de Agricultura, Alimentación y Medio Ambiente-SEO/BirdLife.