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VOCAL IMITATION AND COURTSHIP DISPLAYS IN CHESTNUT-VENTED TIT-BABBLERS *SYLVIA SUBCAERULEA*

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In birds, vocal imitation, or mimicry, i.e. the copying of the songs or calls of other species, or mechanical sounds, is a very widespread and well-documented, but relatively poorly understood phenomenon. Vernon (1973) reported the incorporation of alien or extraspecific sounds in 63 species of southern African passerines, from 28 genera in 14 families; based on updated taxonomy (following Hockey *et al*. 2005), these totals are 66 species, representing 34 genera in 17 families. Groups such as robin-chats, larks, chats and some warblers are celebrated for their ability to copy other species, while less familiar imitators include sunbirds, canaries, white-eyes, nicators, shrikes and bush-shrikes.

An important distinction must be made between the terms *imitation* and *mimicry*, which relates to the function of incorporating foreign sounds into a bird's repertoire. Multiple hypotheses have been proposed to explain vocal *imitation* (see for example Kelley *et al.* 2008), and a full discussion of this fascinating but imperfectly resolved question is beyond the scope of this note. However, in most cases vocal imitation probably serves to embellish, enrich or diversify song in order to increase repertoire size for territorial and sexual competition. Imitations are typically incorporated in short snippets or recomposed into novel phrases. The result does not hold any direct adaptive advantage for the *imitator* to be recognised by or resemble the *imitated*. As an example, Chorister Robin-Chats *Cossypha dichroa* do not only imitate other birds, but also dogs, humans, frogs, locomotives and car alarms (Oatley 2005). In other words, virtually any sounds they hear in the environment around them.

Conversely, vocal *mimicry* does hold an advantage to the *imitator* in being recognised by or resembling the *imitated* species. Consider for example, fork-tailed drongos *Dicrurus adsimilis*, mimicking the alarm calls of foraging suricates *Suricata suricatta* as soon as the latter discover prey; this causes the animals to bolt to their hideouts and allows the drongos to steal the suricates' food (O'Riain 2001). Another important function of mimicry is intraspecific recognition e.g. within flocks of highly social birds, or between males and females of the parasitic Viduidae family.

This paper reports on an *ad hoc* study of vocal imitation by the Chestnut-vented Tit-Babbler *Sylvia subcaerulea* (previously *Parisoma subcaeruleum*). Observations were carried out on 19 September 2013, while conducting fieldwork in sparse mixed woodland and scrub on the slopes of Biddulphsberg (S28°16.975' E27°46.201' 1670 m a.s.l.), 15 km east of Senekal, Free State, South Africa. My attention was initially drawn to what sounded like a Red-throated Wryneck *Jynx ruficollis* calling from within a bush. Upon closer inspection I realised that the sound originated from a Tit-babbler, which was singing loudly while foraging in the middle and upper vegetation strata.

For the next hour (between *ca*. 07:45 and 08:45) the Tit-babbler continued singing vigorously and virtually continuously. The song was composed primarily of imitations of other bird species (Table 1), interspersed with characteristic innate Tit-babbler calls.

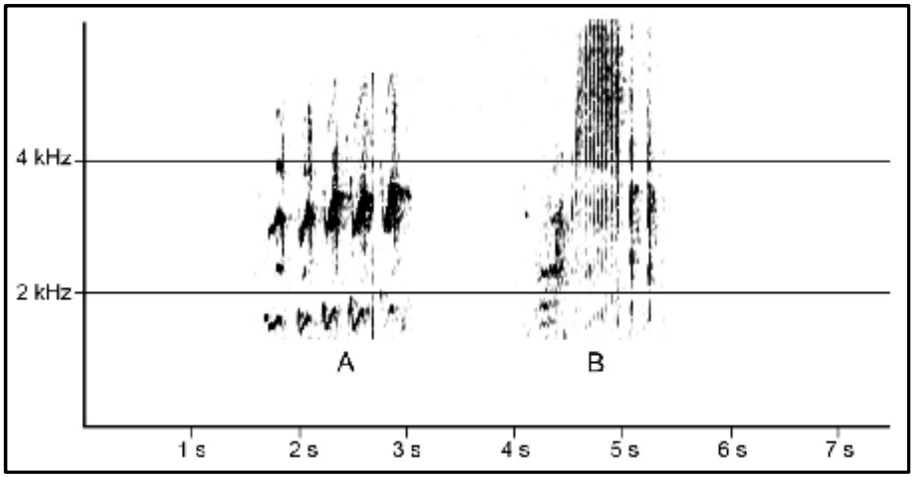

Fig 1 - Imitation of the piercing 'kweek-kweek-kweek…' calls of Red-throated Wryneck (**A**), followed by familiar rolling tit-babbler 'cherrrr-rik-tik' calls (**B**). The male gave this phrase four times, at 2-4 s intervals. Two iterations included five wryneck 'kweeks', and the other two iterations only two 'kweeks'

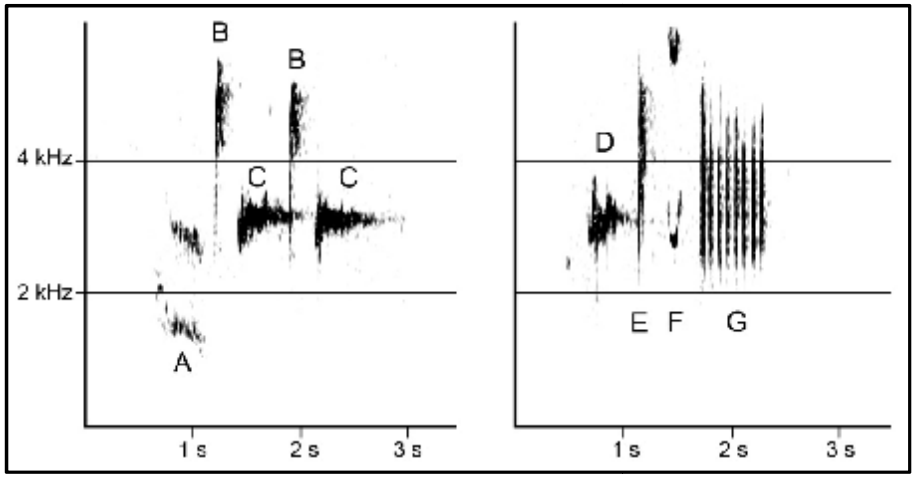

Fig 2 - Creative mixing of imitations to create novel song phrases. In the first sonogram, element **A** is imitation of a Black-backed Puffback (see also Fig 1); **B** and **C** are imitations of a Bokmakierie. In the second, element **D** is also an imitation of a Bokmakierie (matches C), while **E**, **F** and **G** are three calls of Cape White-eyes

While some imitations were given singly and repeated for long periods, most were given in rapid succession and in short snippets, and mixed to compose unique phrases. Such phrases (or slight variations) were repeated a few times before switching to a new series of phrases incorporating imitations of another species. Series of identical or similar phrases were typically composed of mimicry of 1-3 other species (see Table 2). To get an idea of repetition, I tried to identify a specific characteristic element and count how many times this was repeated. An unmistakable, clear, mellow whistle (an imitation of the terminal part of the song of the Rufous-naped Lark *Mirafra africana*) turned out to be an excellent indicator. This whistle was incorporated into 19 phrases, each *ca.* 1.5-2.5 s in length, given in a two minute period, i.e. one phrase every 6.3 s. The partial Rufous-naped Lark song seemed to form the central and fixed component of each slightly improvised subsequent phrase. After two minutes, the Tit-babbler ceased singing for *ca.* 5 min while moving around in and among the tree canopies. When it resumed singing, it again incorporated the Rufous-naped Lark whistle, but more erratically, instead apparently switching to mimicry of the African Rock Pipit *Anthus crenatus* as a central theme for each phrase.

A full list of the species imitated is presented in Table 1 (see also Table 3 and 4). But what can we learn from such a list of imitations?

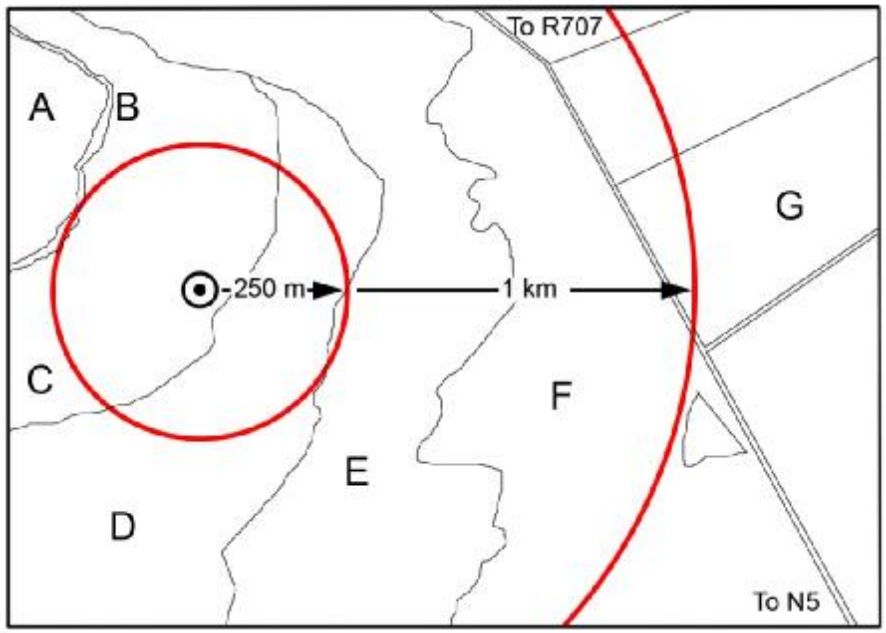

Fig 3 – A - Open summit grassland at >1800 m; **B** - Cliffs; **C** - Steep, scrubby slopes; **D -** Flat, bushy grassland at 1600 m; **E -** Woodland; **F -** Farmland with copses of alien trees; **G -** Natural grassland at 1500 m

In the words of Vernon (1973) there is little use in attempting to compile a full list of species imitated, for such a list will merely reflect "the sounds the imitative species hears around it, and the ability of the observers to identify those sounds". Nevertheless, it is tempting to make some cautious deductions.

The repertoire of this individual male included at least 29 species. However, it is likely that some obscure, shorter imitations were overlooked, and in all likelihood, its repertoire probably includes imitations of 35-45 species. Skead (1995) recorded one Tit-babbler

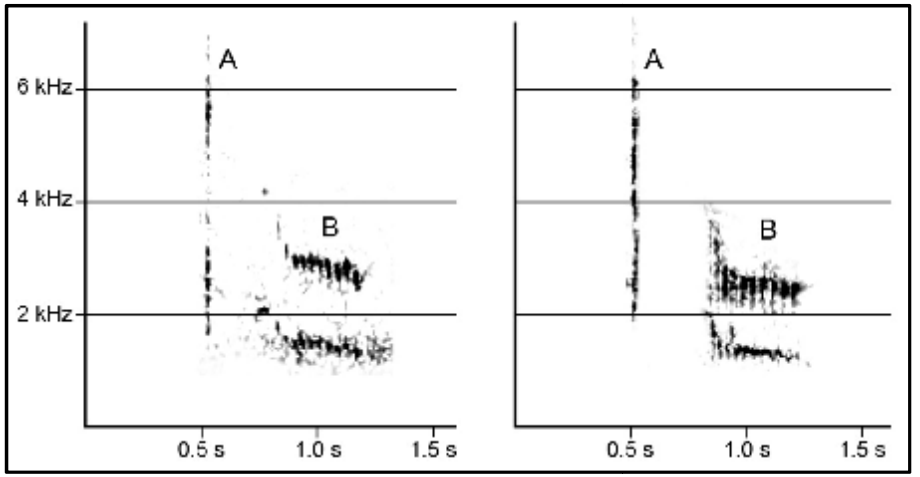

Fig 4 - Suspected imitation of Black-backed Puffback. The first sonogram is of the Tit-Babbler recorded at Biddulphsberg, while the second is of a Black-backed Puffback from Enseleni, KwaZulu-Natal (Charles Hesse; www.xeno-canto.org). The two calls are similar in frequency, length, composition and quality. Both feature an initial click/bill snap (**A**), followed by a slightly descending snarl (**B**).

that imitated 18 species, and another that copied nine species. Of particular interest is an apparent imitation of Black-backed Puffback *Dryoscopus cubla* (Fig 4), a species not known to occur near Biddulphsberg. According to SABAP2 data, the closest populations of puffbacks are 120 km to the east along the KwaZulu-Natal border, or 150 km to the north along the middle Vaal River (http://sabap2.adu.org.za). In addition, De Swardt (2013) reported a puffback along the Vet River near Wesselsbron, Free State, 150 km north-west from Biddulphsberg. Of course, tit-babblers and puffbacks commonly occur in sympatry over vast areas of the bushveld north of S26°. However, both the tit-babbler and puffback are considered

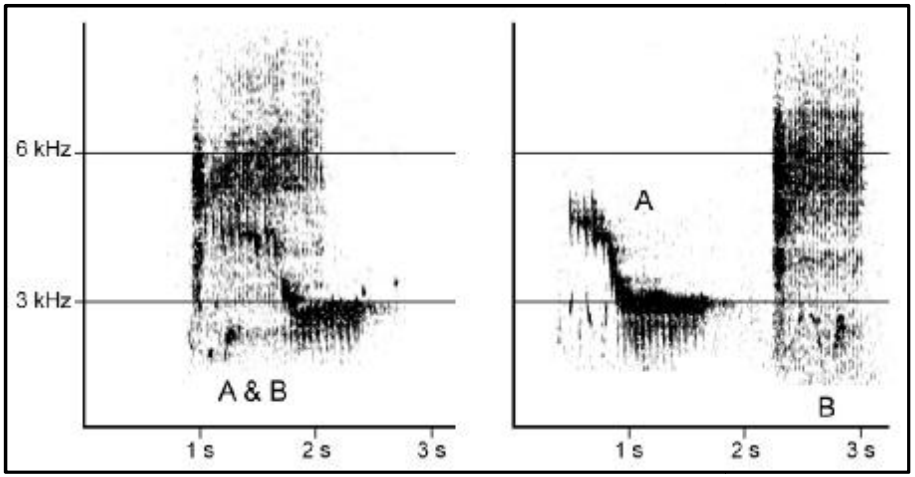

Fig 5 - Duet between the sexes. In the first sonogram the male and presumed female's respective calls are synchronised, while in the second sonogram the musical, rolling, descending trill of the male (**A**) precedes the harsh churring call of the female (**B**).

resident and sedentary (Hockey *et al.* 2005), with the greatest ringing recovery distance being <10 km from the ringing site (SAFRING data). If both species are sedentary and do not co-occur at Biddulphsberg, where would the Tit-Babbler then have memorised a puffback call? Or is the sound learned secondarily from another imitator? Or is it possible that some tit-babblers (or puffbacks) do actually undertake large-scale movements, whether during post-fledging dispersal, seasonally or nomadically? Admittedly, it might be dangerous to base such assumptions solely on a 0.8 s imitation.

The list of imitated species does however suggest movements over shorter distances. The male in question was singing and apparently initiating breeding on the sparsely wooded lower slopes of Biddulphsberg, where it could potentially come into auditory contact with most of the species it imitated. Referring to Fig 3, within 250 m of its territory, the Biddulphsberg Tit-babbler might also have heard species associated with scrubby slopes (e.g. Wailing Cisticola *Cisticola lais*), cliffs (e.g. Alpine Swift *Tachymarptis melba*) or bushy grassland (e.g. Bokmakierie *Telophorus zeylonus*). Within 1 km of its current territory, but ostensibly out of earshot, it might have had opportunities to learn the sounds of species associated with denser woodland (e.g. Ashy Tit *Parus cineracens*, Blue Waxbill *Uraeginthus angolensis*) or farmland with copses of alien trees (e.g. Red-throated Wryneck, White-browed Sparrow-Weaver *Plocepasser mahali*). It would have had to move at least 1 km to come into contact with species inhabiting open grasslands, such as Spike-heeled Lark *Chersomanes albofasciata*, Ant-eating Chat *Myrmecocichla formicivora* and African Pipit *Anthus cinnamomeus*.

Another interesting imitation was the unmistakable cadence of a Willow Warbler *Phylloscopus trochilus*. The Tit-Babbler imitated this migrant some 2-6 weeks before the first arrivals of Willow Warblers in the area (Herremans, 1997). This suggests that the Tit-Babbler would have remembered the Willow Warbler song from at least the preceding April before the warbler departed for the Palearctic (i.e. 5 months). Apart from the warbler and the puffback, all of the other species imitated were encountered during our fieldwork at the site.

Intermittently the singing male was approached by a second bird, presumed to be a female. This second bird appeared marginally smaller. While perched 0.5 m apart on exposed twigs, the pair would then perform a simple duet (Fig 5). The male gave a musical, rolling, 1.4-2.0 s trill, descending abruptly from 4.5 kHz to 3.0 kHz (rendered as *prrii-rrroo*). The presumed female gave a sharp, harsh churring note of 0.8-1.5 s, spanning frequency 2.0-8.0 kHz (rendered as *churrrrr*; somewhat reminiscent of a sunbird alarm call).

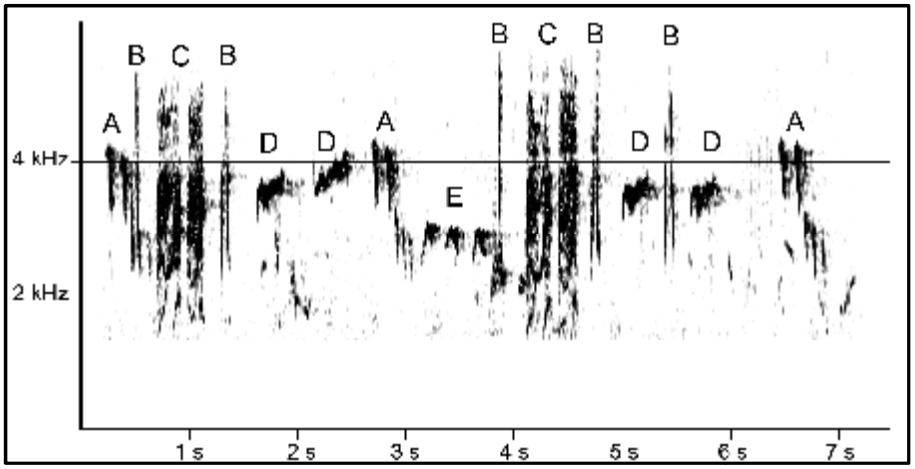

Fig 6 - Fast, continuous, less clearly phrased song when excited. In this 7 s sample, typical tit-babbler calls, **A** ("pi'pi-prr") and **E** ("we-we-we"), are interspersed with imitations of three other species: African Pipit (**B**), Common Fiscal (**C**) and Ant-eating Chat (**D**).

Sometimes the two birds began their respective calls in perfect synchronisation, while at other times the female would call immediately after the male. The male repeated his musical trill every 6-7 s whether the female responded or not. While engaged in duetting, the presumed female was once witnessed to perform wing and tail stretches, but whether this was coincidental or formed part of a display is unknown.

When approached by the female, the imitative song of the male became noticeably faster and more intense, with shorter and more varied snatches of imitation (Fig 6). High speed aerial chases would often ensue in such situations. During these presumed courtship displays, the birds flew rapidly, with audible wing beats, around the outsides of bushes or trees, 1-3 m above the ground. Chases usually ended with the birds diving into cover. Chases lasted a few seconds to a minute or more.

Egg-laying occurs mainly in September to November (August to April) in summer-rainfall areas (Tarboton 2011). Despite no rain having fallen by the time of our visit, the intense singing and energetic behaviour of the tit-babblers strongly suggested that breeding was underway. Indeed, virtually all adult passerines collected during our trip had enlarged gonads. Skead (1995) described apparent courtship behaviour in this species, also in September, which likewise involved aerial displays and loud, persistent song including mimicry. It appears that vocal imitation may play an important role in territory establishment, pair-bond formation or sexual selection in the Chestnut-vented Tit-Babbler.

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Acknowledgements

I wholeheartedly thank Dawie de Swardt of the National Museum in Bloemfontein for providing me with a sound recording of this talented Tit-Babbler, for his company at Biddulphsberg, and for commenting on the manuscript of this article. Klaas Manamela of the Sound Library at Ditsong National Museum of Natural History made additional sound recordings available to me.

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Table 1 - All species imitated by Chestnut-vented Tit-Babbler at Biddulphsberg, Free State, 19 September 2013. Occurrence or frequency of inclusion is indicated. Certain species seemed to be favoured, e.g. Bokmakierie, Pied Starling, Red-throated Wryneck, whereas others were only imitated on one or two occasions.

English Name	Scientific Name	Incidence
Bokmakierie	*Telophorus zeylonus*	high
Bulbul, African Red-eyed	*Pycnonotus nigricans*	low
Chat, Ant-eating	*Myrmecocichla formicivora*	high
Cisticola, Wailing	*Cisticola lais*	low
Cuckoo, Diderick	*Chrysococcyx caprius*	medium
Fiscal, Common	*Lanius collaris*	medium
Lark, Rufous-naped	*Mirafra africana*	high
Lark, Spike-heeled	*Chersomanes albofasciata*	low
Mousebird, Red-faced	*Urocolius indicus*	medium
Neddicky	*Cisticola fulvicapilla*	medium
Pipit, African	*Anthus cinnamomeus*	high
Pipit, African Rock	*Anthus crenatus*	medium
Puffback, Black-backed	*Dryoscopus cubla*	high
Robin, Kalahari Scrub-	*Cercotrichas paena*	low
Robin, Karoo Scrub-	*Cercotrichas coryphaeus*	high
Seedeater, Streaky-headed	*Crithagra gularis*	medium
Sparrow, Cape	*Passer melanurus*	medium
Sparrow, Southern Grey-headed	*Passer diffusus*	medium
Starling, Pied	*Spreo bicolor*	high
Sunbird, White-bellied	*Cinnyris talatala*	low
Swift, Alpine	*Tachymarptis melba*	low
Tchagra, Brown-crowned	*Tchagra australis*	low
Tit, Ashy	*Parus cinerascens*	low
Warbler, Willow	*Phylloscopus trochilus*	high
Waxbill, Blue	*Uraeginthus angolensis*	medium
Weaver, Southern Masked	*Ploceus velatus*	medium
Weaver, White-browed Sparrow-	*Plocepasser mahali*	medium
White-eye, Cape	*Zosterops virens*	high
Wryneck, Red-throated	*Jynx ruficollis*	high

Table 2 - Examples of composition of imitative phrases

Series	Species imitated
Phrase A	Pied Starling, Cape Sparrow
Phrase B	African Red-eyed Bulbul, Neddicky, White-bellied Sunbird
Phrase C	Blue Waxbill, African Red-eyed Bulbul, Kalahari Scrub-Robin
Phrase D	Pied Starling
Phrase E	Brown-crowned Tchagra
Phrase F	Bokmakierie, Pied Starling, Cape White-eye
Phrase G	Wailing Cisticola, Alpine Swift, Karoo Scrub-Robin
Phrase H	Southern Masked Weaver, Ashy Tit

Table 3 - Analysis of three minutes of song. The tit-babbler's own calls (by either sex) are printed in bold, with the abbreviation **CVTB**, and the codes **C**:typical "cherrr-rik-tik" call; **M**:musical, rolling trill of male; **F**:harsh churr of female; **D**:duet between sexes. The two calls given in brackets could not be identified. Other abbreviations are: **ANT**=Ant-eating Chat; **AP**=African Pipit; **BBPB**=Black-backed Puffback; **BOK**=Bokmakierie; **CWE**=Cape White-eye; **FIS**=Common Fiscal; **KSR**=Karoo Scrub Robin; **SGHS**=Southern Grey-headed Sparrow; and **WRY**=Red-throated Wryneck.

Time	Species imitated
00:02	BBPB, [1], BBPB
00:10	KSR, [1]
00:12	**CVTB_C**
00:14	KSR
00:15	BBPB, [1]
00:21	BBPB, BOK
00:26	BOK, SGHS
00:30	BOK, SGHS
00:34	BOK, CWE
00:37	**CVTB_C**
00:45	BOK, CWE, [2]
00:48	BOK, **CVTB_C**, CWE
00:54	WRY, **CVTB_M**
01:01	WRY
01:04	**CVTB_C**
01:08	**CVTB_C**
01:14	WRY, **CVTB_M**
01:19	**CVTB_F**
01:36	**CVTM_M**
01:42	**CVTB_D**
01:49	**CVTB_F**
01:50	**CVTM_M**
01:55	**CVTM_M**
01:57	**CVTB_F**
02:00	**CVTM_M**
02:03	**CVTB_F**
02:11	**CVTM_M**
02:18	**CVTM_M**
02:23	AP, FIS, AP, **CVTB_M**, FIS, AP
02:29	**CVTB_M**, AP, FIS, AP, FIS
02:33	**CVTB_M**
02:37	**CVTB_M**, AP, FIS, AP, ANT, AP, ANT, **CVTB_M**
02:42	**CVTB_M**, AP, FIS, AP, ANT, **CVTB_M**, AP, FIS, AP, ANT, AP, ANT, **CVTB_M**
02:50	**CVTM_M**
02:52	**CVTB_C**
02:56	AP, FIS, AP, ANT

Table 4 - Additional species imitated by the Chestnut-vented Tit-Babbler. References as follows: **Skead (1995):** from ten separate observations between 1951 and 1972 in the King William's Town area of the Eastern Cape. **Maclean (1993):** location and date unspecified. **DNMNH:**Ditsong National Museum of Natural History Sound Library; from Vaalkop Dam Nature Reserve, North-West Province. Finally, note that imitations may also include mechanical sounds, e.g. a bird in a suburban garden in Bulawayo, Zimbabwe, reportedly imitated the squeaking of a wheel-barrow (Vernon 1973).

English Name	Scientific Name	Reference
Batis, Cape	*Batis capensis*	Maclean (1993)
Batis, Chinspot	*Batis molitor*	Skead (1995)
Batis, Pririt	*Batis pririt*	Maclean (1993)
Bunting, Cape	*Emberiza capensis*	Maclean (1993)
Bunting, Golden-breasted	*Emberiza flaviventris*	Skead (1995)
Canary, Brimstone	*Crithagra sulphuratus*	Skead (1995)
Canary, Cape	*Serinus canicollis*	Skead (1995)
Canary, White-throated	*Crithagra albogularis*	Maclean (1993)
Cisticola, Rattling	*Cisticola chiniana*	DNMNH
Crombec, Long-billed	*Sylvietta rufescens*	Maclean (1993)
Drongo, Fork-tailed	*Dicrurus adsimilis*	Skead (1995)
Flycatcher, Fiscal	*Sigelus silens*	Skead (1995)
Greenbul, Sombre	*Andropadus importunus*	Skead (1995)
Honeyguide, Greater	*Indicator indicator*	Maclean (1993)
Penduline-tit, Cape	*Anthoscopus minutus*	Skead (1995)
Prinia, Karoo	*Prinia maculosa*	Maclean (1993)
Robin, White-browed Scrub	*Cercotrichas leucophrys*	Skead (1995)
Robin-Chat, Cape	*Cossypha caffra*	Skead (1995)
Sunbird, Greater Double-collared	*Cinnyris afer*	Skead (1995)
Swallow, Greater Striped	*Hirundo cucullata*	Skead (1995)
Swallow, White-throated	*Hirundo albigularis*	Skead (1995)
Tit, (Southern) Grey	*Parus afer*	Maclean (1993)
Weaver, Cape	*Ploceus capensis*	Skead (1995)
Weaver, Spectacled	*Ploceus ocularis*	Skead (1995)
Wood-Hoopoe, Green	*Phoeniculus purpureus*	Skead (1995)