

On modulation in Eastern and Western chant

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ABSTRACT. *In his Epistola de harmonica institutione (c.900 CE), Regino of Prüm names fourteen antiphons that he calls nothae – that is, ‘degenerate and illegitimate – that begin in one mode, are yet another in the middle, and end in a third’. These antiphons represent two different types of modulation: one diatonic, the other resulting from systemic transposition brought about by chromatic alteration. A rationale for both types of modulation is offered by the Musica and Scolica enchiriadis, respectively, both dating to the second half of the ninth century, with the Scolica providing a theory of vitia, or ‘corruptions’, to accommodate chants modulating by means of chromatic alteration. Modulation likewise played an important role in Eastern chant. Gerda Wolfram has shown that both diatonic and chromatic modulation can be documented in the earliest manuscripts of Byzantine chant, namely those dating to the tenth century. Indeed, the Hagiopolites, the oldest preserved Byzantine treatise on music (twelfth century CE), discusses chromatic modulation via what are called phthorai (‘corruptions’), like the vitia in the West, and the papadikaí, or singers’ manuals, explicate the theory of diatonic modulation called ‘parallagē’. This article illustrates both phthorai and parallagē with an exercise from the treatise on church music by Akakios Chalkeopulos (c.1500 CE), and concludes that not just the nomenclature and intonation formulas of the Byzantine modes, but also the technique of modulating within a single chant were features shared by both Eastern and Western chant already in the earliest stages of their respective written traditions.*

One of my theory professors once asked our class, ‘How do you make a modulation?’ His intentionally simplistic answer was: ‘Just introduce the accidentals that will be in the signature of the new key.’ The way that takes place, of course, is not simple. It depends on a multitude of factors, such as composer, place, era and so on. In western Europe in the mid-eighteenth century, for example, the most likely method of modulating would have been to move to the nearest-related key, either moving up or down the circle of fifths or to the relative major, often by way of one or more common chords or secondary dominants. But how would one modulate if one had no major or minor keys and no functional harmony, as was the case with the monophonic music of the ninth and tenth centuries in both eastern and western Europe? Providing at least one answer to that question will be the goal of this article.

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Example 1. *Et respicientes*, a *notha*, according to Regino, which begins in the third mode and ends in the eighth (*Antiphonale monasticum*, 460, with alleluia modified according to earliest sources listed in the Cantus database). Cf. Andreas Pfisterer, 'Zum Problem des Tonartwechsels im gregorianischen Choral', in *Das modale System im Spannungsfeld zwischen Theorie und kompositorischer Praxis*, ed. Jochen Brieger, *Hamburger Jahrbuch für Musikwissenschaft* 29 (Frankfurt am Main, 2013), 17–39, at 19.



Example 2. *Si in digito Dei*, a typical melody of the third mode, ending on E (*Antiphonale monasticum*, 363–4).

Let us begin with one of the most perceptive writers on chant in the ninth and tenth centuries in the West, Regino of Prüm (d. 915 CE).¹ In his *Epistola de harmonica institutione*, written c.900 CE, Regino states: 'There are certain antiphons that we call *nothae* – that is, degenerate and illegitimate – that begin in one mode, are yet another in the middle, and end in a third'.² He then names fourteen of these modulating chants, two of which appear in Examples 1 and 3. According to Regino, the first of these, *Et respicientes*, moves from the third to the eighth mode; the second, *Sion renovaberis*, from the seventh to the fourth. These two antiphons illustrate two different methods of changing mode.

The ductus of *Et respicientes* in Example 1 makes what I would call a 'diatonic modulation'. It begins with a melodic formula typical of chants in the third mode, as one can see by comparing Examples 1 and 2, but its final cadence on G, approached from a minor third below, marks it as *tetrardus plagal*, the eighth mode. Turning to Example 3: the first three phrases of *Sion renovaberis* are clearly in *tetrardus autentus*, the seventh mode, but the phrase *qui venturus est* introduces B flats that convert it into a transposed *deuterus plagis*, the fourth mode. Untransposed, the chant would have an F sharp as well as an F natural above the final, E. In this case the modulation takes place via systemic transposition brought about by chromatic alteration.

¹ On Regino's biography and musical activity, see Susan Rankin, 'Searching for Order Amidst Carolingian Chaos: The Musical Work of Regino of Prüm', in *Knowledge and Culture in Times of Threat: The Fall of the Carolingian Empire (ca. 900)*, ed. Warren Pezé, *Monographien zur Geschichte des Mittelalters*, ed. Harald Müller and Steffen Patzold, 69 (Stuttgart, 2020), 77–102, esp. 80–102; and Heinrich Hüsch, 'Regino von Prüm, Historiker, Kirchenrechtler und Musiktheoretiker', in *Festschrift Karl Gustav Fellner: zum sechzigsten Geburtstag am 7. Juli 1962* (Regensburg, 1962), 205–23.

² 'Sunt namque quaedam antiphonae, quas nothas, id est degeneres et non legitimas, appellamus, quae ab uno tono incipiunt, alterius sunt in medio, et in tertio finiuntur', in Regino of Prüm, 'Epistola de harmonica institutione', in *Clavis Gerberti I*, ed. Michael Bernhard (Munich, 1989), 37–73, at 40; also in Martin Gerbert, ed., *Scriptores ecclesiastici de musica sacra potissimum* (St Blasien, 1784, repr. Hildesheim, 1963), I: 230–47, at 231, A–B). For the sake of comparison between East and West, I shall translate the term *tonus* as 'mode' throughout this article, except when it designates the interval of a whole tone.



Example 3. *Sion renovaberis* as notated, transposed to *a* (*Antiphonale monasticum*, 201).

A rationale for both types of modulation in the West is offered by the *Musica* and *Scolica enchiriadis*, dating to the third quarter of the ninth century, whose tone-system appears in [Example 4](#).³

After setting out this scale, which consists of disjunct tetrachords structured tone–semitone–tone, the author provides an explication of diatonic modulation ([Example 5](#)).

When you have sung the first disposition, you can recognise that the *vis* of the first sound ♩ creates the character of the first mode, which is called *protus autentus*. When you have sung the second, you will perceive the *deuterus* mode to be governed by the *deuterus* sound ♩^\flat . Likewise considering the third, you will see that the *potestas* of the *tritus* mode depends on the *tritus* sound ♩ . When you have modulated the fourth, you will know that the genus of the *tetrardus* mode proceeds from the *tetrardus* sound ♩^\sharp .

Recognising that some chants modulate via chromatic alteration, the author of the *Scolica enchiriadis*, cast in dialogue form, offers a theory of *vitia* or ‘corruptions’ to explain them. As shown in [Example 6](#), the Master has his student sing a pentachord up and down within the *enchiriadis* tone-system.

Next, in [Example 7](#), the Master repeats the process, but changes the intervals in descent, placing a *deuterus* beneath the *tetrardus*, converting the latter into a *tritus*, thus yielding the equivalent of our F sharp.

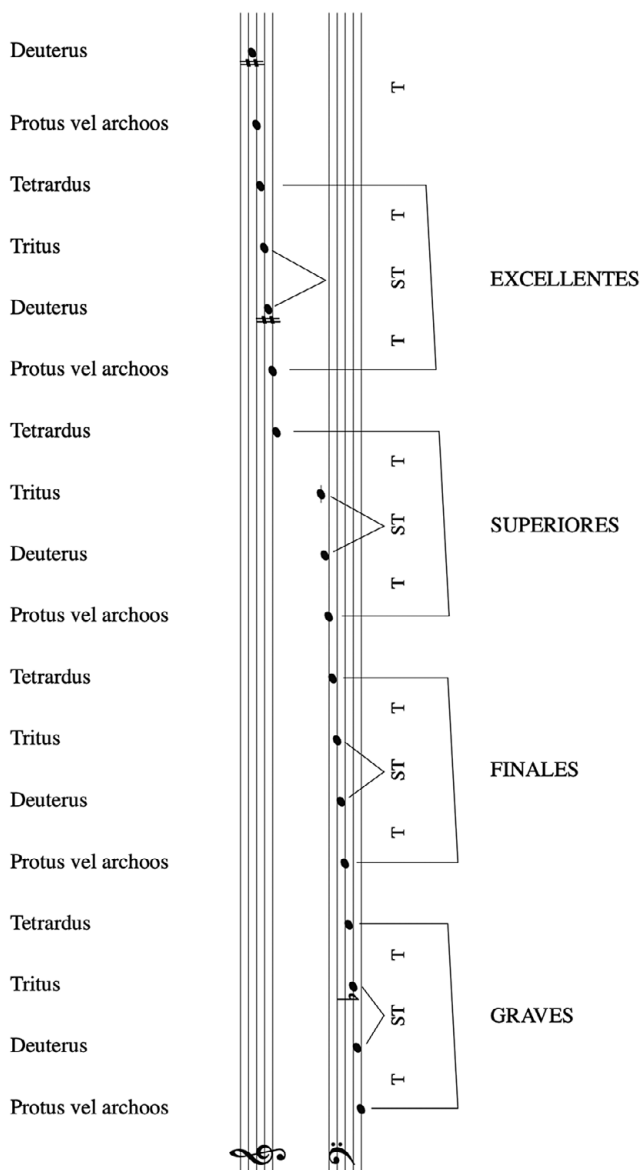
By making use of these *vitia*, even chants modulating chromatically, as does *Sion renovaberis*, could be accommodated in their proper modal position, as one can see in [Example 8](#).

Clearly, both the theory and practice of modulation were already present in the West in the ninth century, and as Gerda Wolfram has shown, both types of modulation can be documented in the East in the earliest manuscripts of Byzantine chant, namely those dating to the tenth century.⁴ Indeed, the *Hagiopolites*, the oldest preserved Byzantine treatise on music, discusses modulation by what are called *phthorai* (‘corruptions’), like the *vitia* in the West.⁵ It says of them that ‘they were called *phthorai*

³ The dating is that given by Hans Schmid, ed., *Musica et Scolica enchiriadis una cum aliquibus tractatibus adiuncti*, Veröffentlichungen der Musikhistorischen Kommission 3 (Munich, 1981), X.

⁴ Gerda Wolfram, ‘Die *Phthorai* der Paläobyzantinischen Notationen’, in *Palaeobyzantine Notations: A Reconsideration of the Source Material*, ed. Jørgen Raasted and Christian Troelsgård (Hernen, 1995), 119–30.

⁵ Paris, Bibliothèque nationale de France (hereafter BnF), gr. 360, the principal source for the *Hagiopolites*, is dated to the thirteenth or early fourteenth century. The theory it contains, however, must date to the twelfth century, since it describes the Chartres notation, which went out of use in the late twelfth century. The treatise is edited and translated in Jørgen Raasted, ‘The *Hagiopolites*: A Byzantine Treatise on Musical Theory,’ *Cahiers de l’Institut du moyen-âge Grec et Latin*, 45 (1983), 1–99.



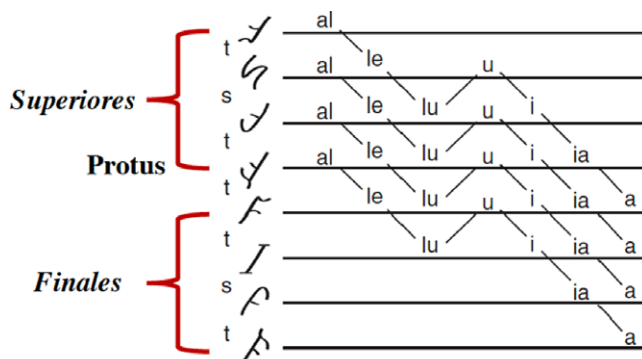
Example 4. Tone-system of the *Musica and Scolica enchiriadis* (from Charles M. Atkinson, *The Critical Nexus: Tone-System, Mode and Notation in the Early Middle Ages* (New York: Oxford University Press, 2009), 122). Used with permission.

because they begin from their own modes, but their cadences and endings are on pitches (φθογγάς) from other *modes*'.⁶ A chart of these *phthorai*, drawn from the manuscript BAV, Barberini gr. 300 appears in [Example 9](#).⁷

⁶ 'Φθοραὶ δὲ ὀνομάσθησαν, ὅτι ἐκ τῶν ἰδίων ἤχων ἀνάρχονται, τελειοῦνται δὲ εἰς ἐτέρων ἤχων φθογγάς αἱ θέσεις αὐτῶν καὶ τὰ ἀποτελέσματα', in *ibid.*, 42.

⁷ From Christian Troelsgård, *Byzantine Neumes*, Monumenta musicae Byzantinae (hereafter MMB), Subsidia IX (Copenhagen, 2011), 71.

Primam dispositionem cum cecineris, poteris dinoscere, quia vis primi soni *f* primi toni virtutem creet, qui protus autentus dicitur. Secundam cum cecineris, senties tonum deuterum a sono *f* deuterio gubernari. Tertiam assumens videbis similiter in sono *f* trito triti toni consistere potestatem. Quartam cum fueris modulatus, intelliges toni tetrardi genus a sono tetrardo *f* procedere.



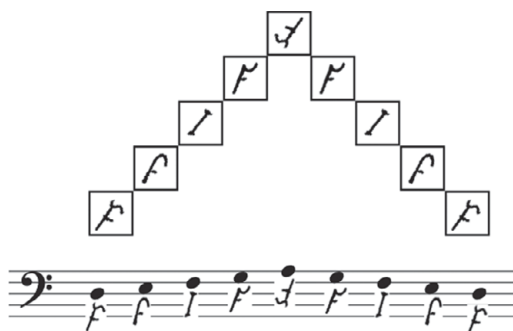
Example 5. *Musica enchiridis*, cap. VIII: Quomodo ex IIII^{or} sonorum vi omnes toni producantur (How the 4 modes are produced from the force (*vis*) of the 4 sounds). Hans Schmid, ed., *Musica et Scolica enchiridis una cum aliquibus tractatibus adiuncti*, Veröffentlichungen der Musikhistorischen Kommission 3 (Munich, 1981), 15–16 (diagram reprinted from Schmid with permission of the Bayerische Akademie der Wissenschaften).

M: Dic etiam pentacordum a *f* proto.

(**M:** Sing a pentachord from the *protus*

D. Dixi.

D. I have sung it.):



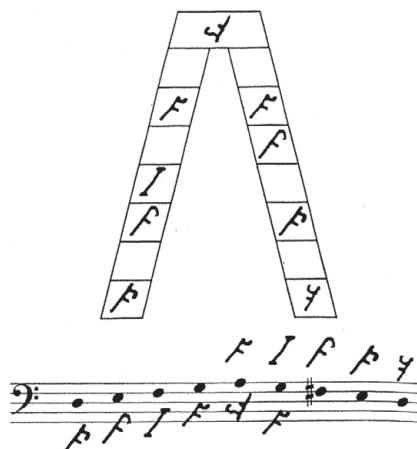
Example 6. *Scolica enchiridis*: 'Normal' pentachord (ed. Schmid, 68; diagram reprinted from Schmid with permission of the Bayerische Akademie der Wissenschaften).

Following the *Hagiopolites*, at the place in a chant indicated by the *phthorá*, one uses the pitch indicated there as a pivot, at which point one substitutes the starting tone of another mode with its own characteristic intervals. With the reappearance of the *phthorá*, the original mode returns.⁸

⁸ I am here borrowing a sentence from the description of the *phthorá* in the treatise 'On the Theory of the Art of Chanting and on Certain Erroneous Views That Some Hold About It' by Manuel Chrysaphes, ed. Dmitri Conomos, in *The Treatise of Manuel Chrysaphes, the Lampadarios: On the Theory of the Art of Chanting and on Certain Erroneous Views That Some Hold About it*, ed. Carsten Høeg, MMB, Corpus scriptorum de re musica II (Vienna, 1985), 48.

M: Dicam et ego hoc idem, dehinc paululum ab hoc ordine declinans in sequenti latere f deuterum sonum f tetrardo quasi / trito subiungam ita:

(M: I shall sing the same, but, deviating a bit from this order on the second side, I shall join the *deuterus* sound beneath the *tetrardus* as if [the latter] were a *tritus*, thus):



Example 7. An example of a *vitium*: *Scolica enchiriadis*: 'Normal' pentachord altered by placing the *deuterus* sound immediately beneath the *tetrardus* in descending (ed. Schmid, 68; diagram reprinted from Schmid with permission of the Bayerische Akademie der Wissenschaften).

Example 8. *Sion renovaberis* as notated, transposed to a, from *Antiphonale monasticum* (upper) and at its proper pitch level, E, rationalised by *vitium* (lower).

A particularly instructive example of the use of the *phthorá* to effect a chromatic modulation, and one that also happens to demonstrate diatonic modulation, or what was called *parallagē* in the East, is an exercise appearing in the treatise on church music by Akakios Chalkeopoulos written c.1500.⁹ It exhibits a *phthorá* of the *protos* mode at the midpoint of its first line in the manuscript National Library of Greece 917. A reproduction of the notation of this piece, together with its transcription, appears in Example 10.

⁹ Gerda Wolfram, ed., *Akakios Chalkeopoulos*, MMB, *Corpus scriptorum de re musica* VI (Turnhout, 2020).

The piece actually behaves as Akakios describes it, as one can see in Jørgen Raasted's transcription in [Example 10](#). It begins with a section in *tetartos plagios*, outlining the principal interval, G to d, at the very outset. Since the *phthorá* applied here is that of the first mode, the pitch *f* over which it is placed must be reinterpreted as *a*, the starting pitch of the *protos* mode. This in turn calls for two tones, a semitone and a tone beneath the *f*, effectively transposing the next section into *protos authentēs*, as indicated by the signature that Raasted has provided.¹¹ After finishing the *protos* section with an ascent to its transposed starting pitch, bracketed as C in the example, the piece closes in the *tetartos plagios*, transposed up a half step to A flat – the section labelled D in the example.

Turning to the original version, without the *phthorá* and hence without the key signature towards the end of the first line of the transcription, the immediate repetition of figure A a step lower as motive B starts to move away from *tetartos* and towards a *protos plagios* transposed from D up to *a*, with the pentachord *a* up to *e* corresponding to the pentachord D to *a* in the untransposed mode. This is confirmed by the final cadential descent, labelled D in the example, which moves from *e* down to the transposed final, *a*.

As mentioned earlier, this kind of diatonic modulation would be called *parallagē* in the East, and is described in the singers' manuals known as *papadikai*.¹² A particularly clear one is that in the Codex Chrysander from the seventeenth century ([Example 11](#)).

There we read:

If you descend one sound from the *protos*, you will find the *tetartos plagios*, and if you descend one sound from the *tetartos plagios* you will find the *tritōs plagios*; [if you descend] one sound from that you will find the *deuteros plagios*, and from the *deuteros plagios* one sound the *protos plagios*. If you ascend from the *deuteros* one sound you will find the *tritōs*, and from that one sound you will find the *tetartos*, and from the *tetartos* one sound you will find the *protos* again.

If this seems familiar, there is a reason: we saw the same theory in [Example 5](#) above from the *Musica enchiriadis*.

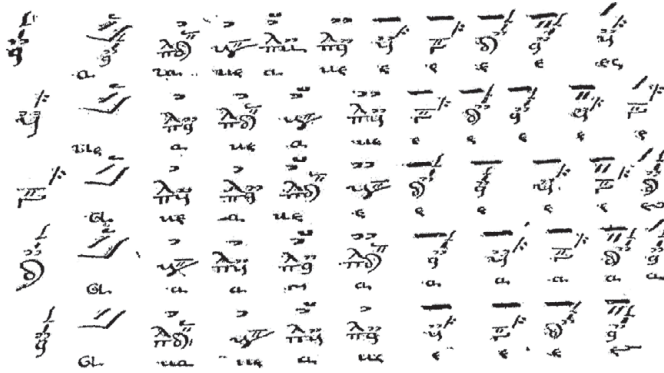
¹¹ My use of the term *authentēs* (Gr. αὐθεντής) in the phrase *protos authentēs* is based on the appearance of that term in the manuscript Sinai, Greek 212, whose date may be as early as the seventh century. This was first pointed out by Heinrich Husmann, 'Eine alte orientalische christliche Liturgie: altsyrisch-melkitisch', *Orientalia Christiana Periodica*, 42 (1976), 174, and has recently been reprised by Stig Simeon R. Frøyshov in 'The Early Development of the Liturgical Eight-Mode System in Jerusalem', *St. Vladimir's Theological Quarterly*, 51 (2007), 139–78, at 146–7. Husmann had actually posited that the abbreviation 'auth' in the signature *ēch a' auth* (HX[ΟΣ] Α' ΑΥΘ[ΕΝΤΗΣ / -ΕΝΤΙΚΟΣ] should be expanded to *echos protos authentikos*, but Frøyshov points out that the abbreviation 'auth' could be expanded either to *authentēs* or *authentikos*. Frøyshov adds that the same abbreviation appears in Sinai, Greek N.E. M 167, a manuscript fragment dating to the ninth/tenth century.

¹² The *papadikē*, as described by Jørgen Raasted and Christian Troelsgård, was a short elementary manual of Byzantine music theory and notation that was included as an introduction to *Akolouthiai* manuscripts from the fourteenth century onwards. The earliest example may be found in the sticherarion Paris, BnF, gr. 261, dated to 1289 (Jørgen Raasted, rev. Christian Troelsgård, 'Papadikē', *The New Grove Dictionary of Music and Musicians*, 2nd edn (London, 2001), 19: 52–3). See also Christian Hannick, 'Die Lehrschriften der Byzantinischen Kirchenmusik', in *Die hochsprachliche profane Literatur der Byzantiner*, ed. Herbert Hunger, II (Munich, 1978), 196–218.

Ἑρμηνεία τῆς αὐτῆς παραλλαγῆς ὠφελιμωτάτη διὰ τοὺς ἀμαθεῖς καὶ ἀπλούστερα
(Explanation of this *parallagē*, most useful for students and rather simple):

Ἐὰν καταβῆς ἀπὸ τοῦ α μίαν φωνὴν, εὐρήσης πλ. δ, καὶ ἐὰν καταβῆς ἀπὸ τοῦ πλ. δ μίαν φωνὴν εὐρήσης πλ. γ, μίαν φωνὴν εὐρήσης πλ. β, καὶ ἀπὸ τοῦ πλ. β μίαν φωνὴν πλ. α, καὶ ἐὰν ἀναβῆς ἀπὸ τοῦ β μίαν φωνὴν εὐρήσης γ* καὶ ἀπὸ τοῦ (τρίτου) μίαν φωνὴν εὐρήσης δ, καὶ ἀπὸ τοῦ δ μίαν φωνὴν εὐρήσης πάλιν α.

* γ] ii



Transcription (inverted so as to show proper acoustic relationships):

	Protos
α- υα- υε- α- υε- ε- ε- ε- ες	
	Tetartos
α- α- α- υι- α- α- α- α- α	
	Tritos
α- υε- α- υε- ε- ε- ε- ε- ες	
	Deuterios
υε- α- υε- α- υε- ε- ε- ε- ε- ες	
	Protos
α- υα- υε- α- υε- ε- ε- ε- ε- ες	

Example 11. From the Codex Chrysander, fol. 8v (Oskar Fleischer, *Neumen-Studien: Abhandlungen über mittelalterliche Gesangs-Tonschriften*, Theil III: Die spätgriechische Tonschrift (Berlin, 1904), 38; neumes from the MS. Barberini graecus 300, Biblioteca Apostolica Vaticana, fol. 9r–v, phototypically reproduced in Lorenzo Tardo, *L'antica melurgia bizantina* (Grottaferrata, 1938), 158).

To conclude: We have now seen examples of both diatonic and chromatic modulation in both Byzantium and the West and have discussed the theoretical rationale of each. Given the terminological and structural parallels between the *phthorai* and the *vitia*, and the congruence of the Eastern and Western theories of *parallagē*, I believe we must now consider the probability that not just the nomenclature and intonation

formulas of the Byzantine modes, but also the technique of modulating within a single chant were features shared by both Eastern and Western chant already in the earliest stages of their respective written traditions, thereby revealing to us a greater unity than ever before.

Responses to questions from the audience

In the Q&A period after the paper, Eustathios Makris asked if I could explain why the Byzantine sources treating *παράλλαγή* were so much later than the Western ones.¹³ My reply was the following: it is not so much that the Byzantine sources are ‘later’ than the Western ones, but rather that the Western ones are ‘earlier’, and for a specific reason. There was a break in the Western tradition that took place in the mid-eighth century, namely the imposition of the Roman liturgy and its music upon the churches and monasteries in the Frankish kingdom, which had previously been following their own Gallican rite. The advent of tonaries, a practical system of notation, and theoretical works such as the *Musica* and *Scolica enchiridiadis* dealing with chant is in my mind due in large part to this break. There was no corresponding ‘break’ in the Byzantine tradition.

Jean-François Goudesenne raised a question about the use of intervals smaller than a semitone in Western chant: I answered in the affirmative. In addition to the *Scolica enchiridia*’s mentioning of *limmata*, hence semitones smaller than the ‘sung’ semitone,¹⁴ the special neumes in Montpellier H-159¹⁵ and the instances of microtones treated by Manuel-Pedro Ferreira,¹⁶ Ike de Loos¹⁷ and Leo Lousberg¹⁸ likewise suggest that intervals smaller than a normal semitone were being sung in Western plainchant.

¹³ As pointed out in the preceding footnote, *parallagé*, or what I am calling ‘diatonic modulation’, is discussed in the singers’ manuals known as *papadikaí*, the earliest of which dates to 1289 CE.

¹⁴ The *limma*, sometimes called *diesis*, is the interval that remains between a diatessaron and two 9:8 tones, defined by Boethius in his *Musica* (Bk. 1, Ch. 28; ed. Gottfried Friedlein, *Anicii Manlii Torquati Severini Boetii De institutione musica libri quinque* (Leipzig 1867; repr. Frankfurt, 1966), 260–1) as the ratio 243:256. It is equated with the semitone in the *Musica* and *Scolica enchiridiadis*, but the diagram of the intervals of the octave in part III of the *Scolica* defines it mathematically as the ratio 243:256 (Schmid, ed., *Musica et Scolica enchiridiadis*, 145).

¹⁵ Facsimile edition in André Mocquereau, ed., *Paléographie musicale: Les principaux manuscrits de chant grégorien, ambrosien, mozarabe, gallican, publiés en fac-similés phototypiques*, 8 (Solesmes, 1901–1905); transcription in Finn Egeland Hansen, ed., *H 159 Montpellier: Tonary of St. Bénigne of Dijon* (Copenhagen, 1974). On the presumed quarter-tones in the manuscript, see Joseph Gmelch, *Die Viertelstonstufen im Meßtonale von Montpellier*, Veröffentlichungen der Gregorianischen Akademie zu Freiburg (Schweiz), 6 (Eichstätt, 1911), esp. 14–22 and 68–75; Hansen, *159 Montpellier*, 43*; and Nancy Phillips, ‘Notationen und Notationslehren von Boethius bis zum 12. Jahrhundert’, in *Die Lehre vom einstimmigen liturgischen Gesang*, ed. Thomas Ertelt and Frieder Zamminer, *Geschichte der Musiktheorie* 4 (Darmstadt, 2000), 565–8.

¹⁶ Manuel Pedro Ferreira, ‘Music at Cluny: The Tradition of Gregorian Chant for the Proper of the Mass: Melodic Variants and Microtonal Nuances’, PhD diss., Princeton University (1997).

¹⁷ Josine Francisca Helena de Loos, ‘Duitse en Nederlandse muzieknotaties in de 12e en 13e eeuw: German and Dutch Music Notations in the 12th and 13th Century’, PhD diss., University of Utrecht (1998).

¹⁸ Leo Lousberg, ‘Microtones According to Augustine: Neumes, Semiotics, and Rhetoric in Romano-Frankish Liturgical Chant’, PhD diss., University of Utrecht (2018).