

A Comparison of the Five Monochords of Guido of Arezzo

By Clyde W. Brockett, Jr.

The few words on the form of the modes and neumes which I have set down both in prose and in verse, as prologue to the Antiphoner will perhaps briefly and sufficiently open the portals of the art of music. And let the painstaking seek out our little book called *Micrologus* and also read the book *Enchiridion* most lucidly composed by the most reverend Abbot Odo, from whose examples I have departed only in the forms of the notes, since I have simplified my treatment for the sake of the young, and in this . . . following Boethius, whose treatise is useful to philosophers, but not to singers.¹

With these words, Guido of Arezzo closes his *Epistola Michaeli Monacho* ("Letter to Brother Michael"), advocating recourse to the already-published doctrines of *Enchiridion* by Abbot Odo (which probably refers to the French theory cycle *Musica enchiriadis*), and Boethius' treatise.² Guido, in addition to commending his own earlier works, claims that his *Epistola*, his last work, is essentially a simplification of ideas already in circulation. On the contrary, it includes a remarkable innovation: solmization interpreted through *ut, re, mi, fa, sol, la*. When Oliver Strunk translated Guido's procedure, he brought to a wide readership the origin and language of a paradigm for singing, "do-re-mi," which has become both facile and ubiquitous. However, Strunk did not translate all of Guido's *Epistola*; he left out the portion on the monochord, which represents another way of facilitating singing. It is not surprising that Guido's monochords have made little impression upon scholars and have engendered little separate comment.

The monochord of Guido's day was a single-stringed "pitch-pipe" and musical interval-measuring device both in one convenient instrument. It was the physical model of theoretical precepts that Guido needed to illustrate his treatises. He constructed monochords in three of his treatises, and it is through these constructions that we can correlate the *Micrologus*, Chapter 3; the rhymed antiphoner prologue which Guido entitled *Regulae rhythmicae de ignoto cantu* ("Rules in verse on unrecognized chant"); and the *Epistola*. Such comparison among his treatises is invited by Guido; it is particularly useful in strengthening a grasp of Guidonian doctrine.

Since comparisons must rely on Guido's own words, they must avoid complexities of which Guido was uninformed and by which he could not have been perturbed. Mathematical abstractions, high-order functions, and involved logarithmic apparatus unavailable to Guido, would be perhaps as unscientific as they would be anachronistic in the schemes set forth here. On the other hand, computations not actually written in by Guido, but inevitable in devising all monochords, are presented in the examples as the simplest estimates of those he could have made.³

FIGURE 1 *Micrologus*, Main Turning



1) By ninths

A: $72 \div 9 = 8$, LR64

B: $64 \div 9 = 7\frac{1}{9}$, LR56 $\frac{1}{9}$



2) By quarters

C: $72 \div 4 = 18$, LR54

F: $54 \div 4 = 13\frac{1}{2}$, LR40 $\frac{1}{2}$

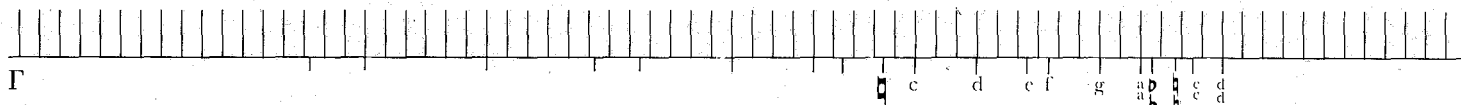
D: $64 \div 4 = 16$, LR48

G: $48 \div 4 = 12$ (= $\frac{30}{22}$), LR36

E: $58\frac{2}{3} \div 4 = 14\frac{1}{3}$, LR42 $\frac{2}{3}$

a: $42\frac{2}{3} \div 4 = 10\frac{1}{3}$, LR32

b: $40\frac{1}{2} \div 4 = 10\frac{1}{4}$, LR30 $\frac{1}{4}$.



3) By halves

b: $56\frac{2}{3} \div 2 = 28\frac{1}{3}$

f: $40\frac{1}{2} \div 2 = 20\frac{1}{4}$

c: $28\frac{1}{3} \div 2 = 14\frac{1}{6}$

c: $54 \div 2 = 27$

g: $36 \div 2 = 18$

c: $27 \div 2 = 13\frac{1}{2}$

d: $48 \div 2 = 24$

a: $32 \div 2 = 16$

d: $24 \div 2 = 12$

e: $42\frac{2}{3} \div 2 = 21\frac{1}{3}$

b: $30\frac{1}{3} \div 2 = 15\frac{1}{6}$

b

In his *Micrologus*, Guido produces two versions of the monochord. Figure 1 reconstructs Guido's main scheme,¹ in which he says:

After marking Γ at the beginning, divide the space beneath the string from there to the other end into nine parts, and at the end of the first ninth put the letter A, with which all the ancients began. When you have likewise measured a ninth part [of the length] from A to the far end of the string, in the same way place the letter B. After this, going back to Γ , divide the string from there to the other end by four, and at the end of the first quarter, you will find C. By a similar division into quarters, just as C was found from Γ , in the same way you will find successively D from A, E from B, F from C, G from D, a from E, and b-flat from F. The following notes are all easily obtained one after the other as halfway points of notes similar in sound and the same in letter: so, halfway from B to the far end of the string, you put another \flat . Likewise C will point out another c, D will point out another d, E another e, F another f, G another g, and the rest of the notes in the same way.²

This tuning is apparently adapted from an anonymous Lombard's *Dialogus de Musica*, to which, as Michel Huglo makes plain, Guido was indebted.³ Although it has six pitches fewer than Guido's, the *Dialogus* starts tuning by octaves, logically enough, at G, rather than B, two tones higher, as Guido does. Guido's revision obviously sprang from a desire not to interfere with b-flat, which is the last letter he derives from the quartal division. Although the same tuning is recommended in the *Dialogus*, here the b-flat, termed the first ninth and also derived from F, is detached from the rest of the order in a separate paragraph. The anonymous Lombard's own résumé, which comes on the heels of his tuning instructions, reattaches the two b's in a third paragraph. This résumé is quoted below after Strunk, who also translated much of the *Dialogus* including passages on the monochord.⁴

	Γ		
First step	A	Eighth step	a
Second step	B	First ninth step	\flat
		Second ninth step	\flat
Third step	C	Tenth step	c
Fourth step	D	Eleventh step	d
Fifth step	E	Twelfth step	e
Sixth step	F	Thirteenth step	f
Seventh step	G	Fourteenth step	g
		Fifteenth step	a

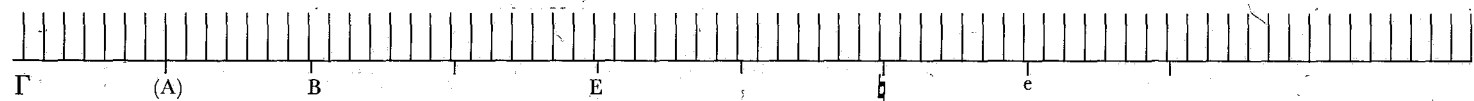
Guido's alternate tuning he describes as "harder to memorize" but by using it he says, "the monochord is more quickly divided." The instruction, shown in Figure 2, reads as follows:

You make nine steps, that is [equal] segments, from Γ to the other end.

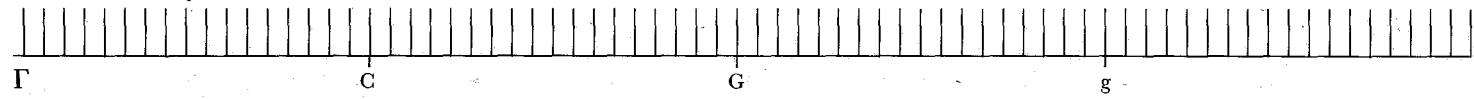
FIGURE 2 *Micrologus*, Alternative Tuning



1) By ninths
 $72 \div 9 = 8, LR64$
 upper limit of all further tunings



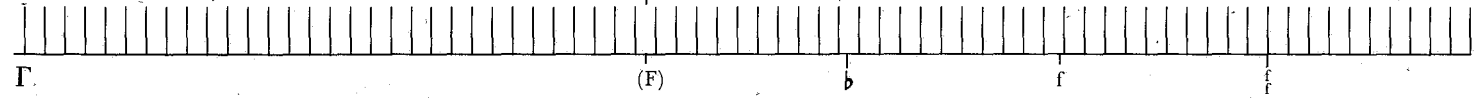
2) By ninths
 $64 \div 9 = 7\frac{1}{9}$



3) By quarters
 $72 \div 4 = 18, LR54$



4) By quarters
 $54 \div 4 = 13\frac{1}{2}, LR40\frac{1}{2}$



5) By quarters
 $40\frac{1}{2} \div 4 = 10\frac{1}{8}$

The first step will end at A, the second will have no letter, the third will end at D, the fourth will be unlettered, the fifth will end at a, the sixth at d, the seventh at $\overset{a}{a}$ and the others will be unlettered. Likewise, when you divide [the length] from A to the other end into nine parts, the first step will end at B, the second will be unlettered, the third will end at E, the fourth will be unlettered, the fifth will end at $\overset{b}{b}$, the sixth at c, the seventh at $\overset{c}{c}$, and the rest will be unlettered. When you divide [the length] from Γ to the other end into quarters, the first step will end on C, the second on G, the third on g, the fourth at the end of the string. Of the four similar steps from C to the other end of the string, the first will end on F, the second on c, the third on $\overset{c}{c}$, the fourth at the end of the string. Of the quarter-length steps from F, the first will end on b-flat, the second on f.⁸

As this instruction tells the reader, this monochord, although lacking the high b-flat and high d, the eighteenth and twenty-first steps of Guido's first series, still goes far enough to indicate an acceptance of the b-flat, ninth above.⁹

In his *Regulae rhythmicae*, Guido approximates the same main tuning advocated by the author of *Dialogus*. Guido's verses 24–33, 39–46, and 51–53 describe this monochord. To quote Guido's rhymes, realized in Figure 3:

Verse

24 They place the Greek gamma in front of the first letter
 25 from which the whole line is divided into nine increments.
 26 Where the first increment ends, the first letter will occur.
 27 Similarly, they make the same number of steps from the first letter
 28 and the location of the second is plain in the above order.
 29 This interval learned musicians call the tone.
 30 Going back to gamma, divide the entire string by four.
 31 The third [letter] straightway sings next to the second.
 32 The diatesseron is only slightly higher than the two tones.
 33 That short space is called a semitone.

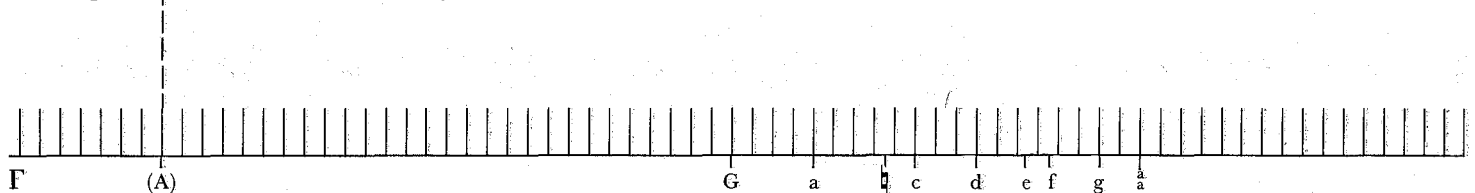
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39 In this way the first [letter] gives evidence of the fourth in
 quarters,
 40 and by the same number, the second [letter] serves to show the
 fifth.
 41 The third brings the sixth without changing the calculation.
 42 For the sake of the seventh, take the middle of the whole length
 from gamma,
 43 from here the octave from the first [sic Γ] will assume its proper
 place.
 44 From the bottom the first [letter] octave from the first occurs
 without changing the number.
 45 The second produces the second, and the third the third,
 46 the fourth the fourth, the fifth the fifth, each its letter

1) By ninths: A-B derived as in Figure 1, division 1)



2) By quarters: C-F derived as in Figure 1, division 2) but not continuing to b-flat, as shown above



3) By halves: $\frac{1}{2} - \frac{a}{a}$ derived as in Figure 1, division 3)

$$G: 72 \div 2 = 36$$

$$a: 64 \div 2 = 32$$

FIGURE 3 *Regulae Rhythmicae*, Main Tuning

- 51 . . . The entire line
 52 is divided by two steps into the same letter
 53 which twice replicated terminates the monochord.¹⁰

This latter limit—the same letter “bisque geminata”—may be defined as the first location of the tripling of a letter. With A as the first letter, this termination may be fixed at $\frac{a}{2}$, giving fifteen steps above gamma, identical to the range of the *Dialogus*. But it is *without b-flat*, first ninth step, and herein lies the difference. The sixteen-pitch limit without b-flat is confirmed, as far as we can trust the Guidonian purity of Gerbert’s source, by the *Regulae*’s constitution of pitches inserted between verses 17 and 18, Γ A B C D E F G a $\frac{a}{2}$ c d e f g $\frac{a}{4}$.¹¹ More important than dependence upon the *Dialogus* is this scale’s non-dependence on the *Micrologus*.

For confirmation of Guido’s intention to discard b-flat, yet otherwise to hew to his precursor’s pitch constitution, we need only check the alternate tuning. As in the *Micrologus*, so in the *Regulae*, this “quick” method, verses 60–73, directly succeeds the main tuning. We can follow Guido’s parallel to Chapter 3 of the *Micrologus*, flatless now, and compare this version with Figure 2.

Verse

- 60 Likewise from nine increments, which we have described,
 61 at the first [ninth] the first [A], so the third [ninth] the fourth
 [D],
 62 the fifth [ninth] the first [a], the sixth [ninth] the fourth [d].
 The seventh [ninth] returns the first [$\frac{a}{2}$].
 63 Also to the first [letter], the first increment produces the second
 [B],
 64 and thus the third [ninth] stops on the fifth [E].
 65 The fifth [ninth] generates the second [$\frac{a}{2}$]; the sixth [ninth]
 repeats
 the fifth [e].
 [The seventh ninth repeating the second, $\frac{a}{4}$ is omitted, this pitch
 lying above the limit of $\frac{a}{2}$]
 66 Once again dividing by the aforesaid increments of quarters of
 gamma,
 67 the first [quarter] reveals the third [C], the second [quarter] the
 seventh [G],
 68 the third [quarter] marks the tripled seventh [g].
 69 Dividing the third [letter] now by four, we effect the sixth [F].
 70 In another increment further, we rewrite the third [c].
 71 Dividing this by four, we achieve another sixth [f].
 72 There are those who add next to the first [letter] in the high
 [letters],
 73 but this licentiousness [!] does not please Father Gregory.¹²

Here we have a scheme similar to the *Micrologus*’s alternate tuning but

- 1) By ninths: A-D-a-d^a derived as in Figure 2, division 1)
- 2) By ninths: B-E- \sharp -e derived as in Figure 2, division 2)
- 3) By quarters: C-G-g derived as in Figure 2, division 3)

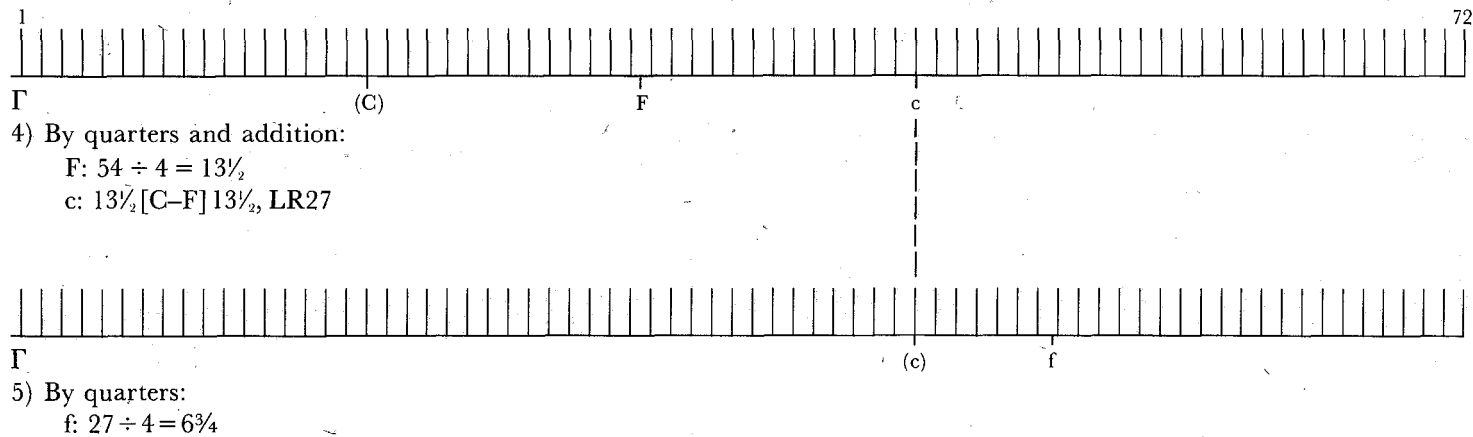


FIGURE 4 *Regulae Rhythmicae, Alternative Tuning*

without b-flat. Divisions (1) through (3) as shown in Figure 2, are retained, omitting \flat in division (2). Because quartal division of f generates the dreaded b-flat, Guido must undertake the division of c in order to achieve high f (verse 71). This complicates his procedure, because he cannot enter the division from the remainder of division (4), but instead must, in a new step, calculate the remainder from stopped c, and only then divide by four, as shown in Figure 4.

In Guido's third treatise on constructing the monochord, we find confirmation of the tunings of the *Regulae*. It is also here that Guido's simplifying is manifest in his decision to include just the main tuning without the alternative. Thus, through the course of his writings his descriptions of monochords number five, instead of three pairs.

Here is what Guido has to say about this fifth and ultimate version, which in the course of reading shall be found closely comparable to the third, earlier demonstrated in Figure 3.

Put first the Greek Γ , that is, the Latin capital G. Next, at the beginning of the entire line, drawn underneath the sounding string, divide it carefully into nine sections, and where the first ends next to gamma, put the first letter A. From this point to the end of the string likewise divide into nine sections, and where the first section ends, add the second letter B. Next, going back to Γ divide the string from it to the end into four sections, and at the end of the first of these, put C; likewise from A, divide into four and mark the fourth letter D. In the same fashion in which you have located the fourth letter with the first, you will find the fifth, E, with the second, the sixth, F, with the third, and the seventh, G, with the fourth. From there, returning to the first A, you will find another a, halfway between the first and the end of the string, and similarly you will find another \flat with the second letter, c with the third, and so also the rest by the same means throughout the octave.¹³

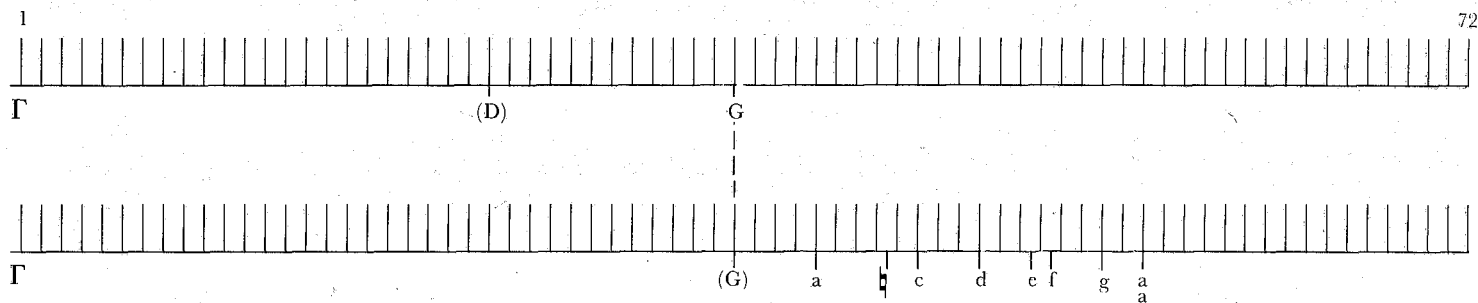
Both the extent of the scale and this flatless approach are patent in Guido's construction represented in Figure 5. Only one difference in concept separates this from the first monochord of the *Regulae*; its tuning the G octave from D, the fourth below, rather than from gamma, of which it is half. Also, it disagrees with the *Micrologus* in initiating the octave tunings from the a instead of the \flat .

Two more features are significant here: no b-flat is authorized and the last term, "throughout the octave," seems to mean that this monochord must terminate at the end of the second octave, in other words, at $\overset{a}{a}$. This is nearly exactly what happened in the first scheme in Guido's *Regulae rhythmicae*. The presence of this similar scheme in the *Epistola* necessitates the correction of Gerbert's source, which reads $\Gamma-\overset{d}{d}$ without b-flats, to read $\Gamma-\overset{a}{a}$ without b-flats.¹⁴

In his analysis of this final monochord, Hans Oesch, noting that, indeed,

FIGURE 5 *Epistola Michaeli Monacho*

- 1) By ninths: A-B derived as in Figure 1, division 1)
- 2) By quarters: C-G derived as in Figure 1, division 2)



- 3) By halves: a-a derived as in Figure 3, division 3)

b-flat is missing, went so far as to assume that Guido disliked b-flat.¹⁵ Whether or not this overstates the case *contra* b-flat, which I believe it does not, we cannot impute to Guido much accrued concern in the last monochord for this distant secondary, or, according to the alternate tuning in the *Micrologus*, tertiary pitch. Certainly, b-flat could not have meant enough to Guido to name a clef after it, as one fairly recent writer has flatly stated.¹⁶

In the *Epistola* and his earlier treatises Guido's use of the monochord is considered. In this regard, Guido's cue appears to have been taken from the *Dialogus*, whose author declares that both first and second ninth steps "are not regularly found in the same melody."¹⁷ Could this not explain the monochord's function to accompany singing or execute a melody? Guido may have understood singing to the monochord as a practical application of melody and the concomitant discipline central to the two antiphoner prologues, with their explanation of the melodies' notation. The following excerpts from the prose prologue address the clear relation between chord steps, notated pitch, and chanting:

And in order that you may also understand to which lines or spaces each sound belongs, certain letters of the monochord are written at the beginning of the lines or spaces and the lines are also gone over in colors . . .

and continuing:

For we use two colors, namely yellow and red, and by means of them I teach you a rule that will enable you to know readily to what tone and to what letter of the monochord every neume and every sound belong, most useful if, as is very convenient, you make frequent use of the monochord and of the formulas of the tones.¹⁸

The employment of a well-tuned monochord, as well as the tonary, in the cells of monks where organ or bells would not fit, could not be brought, or might be too loud, is probably meant by the latter recommendation.

Summarized by Virgil's *septem discrimina vocum* axiom (or as Guido writes, "The letters of the monochord are seven"),¹⁹ Guido's monochords of both the *Regulae rhythmicae*, probably the promised sequel to the prose redaction, and the *Epistola* assume their authority from that axiom. It is stressed that these companions to the practice of intoning and chanting, the prologues and *Epistola*, have a purpose more pragmatic than the *Micrologus* itself, which was intended predominantly for study and musical learning. Yet, the monochord is mentioned in Chapter 17 of *Micrologus*, alongside Guido's primitive solmization scheme: a-e-i-o-u, used to translate pitches C-D-E-F-g.²⁰ It comes as no surprise that Guido should limit this monochord's range, previously constituted in Chapter 3, to the range described in the prologue, $\Gamma-\frac{3}{2}$. Nor is his eliminating b-flat in Chapter 17 surprising.

Finally, in the *Epistola*, Guido confirms the two scalar intervals upon which his monochord is based: the tone and semitone. He carefully specifies their positions in the following remark:

Note that between the second and third or the fifth and sixth [letters] the smallest intervals called semitones occur. Larger intervals called tones occur between the other notes.²¹

Again no place for a b-flat is found in this scheme. The reason, as was implied earlier, may have been that the practice of pitching the voice to the accurately tuned monochord while interpreting the written *note* and the determined *mode* did not require it. Moreover, the pitches marked in order beneath the string, when sung thus, were bound to confuse the voice unaccustomed to a placement or existing chant passage, recalling the anonymous author of the *Dialogus* and his implication that consecutive ninth steps were irregular (both first and second ninth steps "are not regularly found in the same melody"). Let it be underscored, however, that the withdrawal of b-flat from the *Epistola* could not have altogether resulted from Guido's policy of simplification, since already in his antiphoner monochords he had rejected that "first ninth." Indeed, in so doing he had even invoked the highest mortal authority, Gregory himself. The significance of this fifth monochord, then, is one of tipping the scales toward denial of b-flat: three against, two for.

So as to keep Guido's construction simple and to appreciate any similarities and differences, as he would have it, before concluding our own reconstruction, let us examine tuning procedures in their economy of means. Guido needs to position only the absolutely required pitches from gamma to erect the entire monochord: Γ - a , not requiring b-flat. These are, in fact, the limits to which Guido confines himself. In the rhyming prologue he tunes with bases A-f and in the *Epistola* with bases A-g. This standard of economy adds to simplification while it diminishes b-flat's value to the system. For if Guido had desired to tune b-flat here, he would have had to continue the quartal tunings, as described in the *Micrologus*, all the way up to F-b-flat. The similarities and differences among Guido of Arezzo's monochords are thus made clear. The similarities, in summary, are noticed in the diatonic range of at least two octaves with b-flat occasionally added; the differences lie in extensions beyond two octaves and in whether or not b-flat is admitted in both higher octaves.

Perhaps one cannot fully appreciate the intentions of such a renowned theorist as Guido until having dissected and compared the anatomies of the monochords, as we have essayed. Nor can one, I believe, reconstruct these tabletop instruments, either on paper or sounding, without a deep satisfaction, which Guido, or for that matter, Euclid, long before him, must also have felt at the rediscovery of the laws of Nature. One cannot thereby help but be astounded at the simultaneous complexity and simplicity of these laws. It is in such a satisfying rediscovery and visual representation of natural truth that ancient and medieval teachings link with modern.²² It is also in such an actualization of principles that Guido of Arezzo, transmitter of ancient speculations and interpreter of them for singers—as he advertised himself in the quotation heading this article—continues posthumously to earn recognition as a master.

NOTES

¹ Oliver Strunk, transl., *Source Readings in Music History* (New York, 1950), p. 125. Cf. Martin Gerbert, *Scriptores ecclesiastici de Musica* (St. Blasien, 1784), vol. II, p. 50b. Readers familiar with this passage will notice the omission of "not" ("in this *not* following Boethius") of Strunk's translation. The uncorrupt and consentient reading of the manuscript is: "Boethium in hoc sequens." See Joseph Smits van Waesberghe, *Guidonis 'Prologus in Antiphonarium.' Divitiae Musicae Artis*, A. III (Buren, 1975). My ellipsis is a step toward revising Strunk's translation.

² Michel Huglo, "L'Auteur du 'Dialogue sur la Musique' attribué à Odon," *Revue de Musicologie* LV (1969), pp. 131-32.

³ To explore the faculty to calculate precise lengths before the eleventh century, one is referred to the treatise chiefly on organ-pipe measurement, *Mensura fistularum et monochordi*, widely attributed to Gerbert of Aurillac. Cf. Gerbert, *Scriptores*, vol. I, pp. 314-30. Gerbert of Aurillac is commonly claimed to have introduced Arabic numerals into general use in the West.

⁴ In all these constructions the string's length is fixed at 72 increments. The abbreviation LR will indicate the length of string remaining, a vital factor in all required divisions.

⁵ Warren Babb, transl., *Hucbald, Guido, and John on Music*, edited with introduction by Claude V. Palisca (New Haven, 1978), p. 60. Cf. Joseph F. Smits van Waesberghe, ed., *Guidonis Aretini Micrologus*, Corpus Scriptorum de Musica (CSM) no. 4 (Rome, 1955), pp. 96-8. On the letter-pitch notation prior to Guido, see Joseph Smits van Waesberghe, "Les Origines de la notation alphabétique au moyen âge," *Anuario Musical* 12 (1957), pp. 3-16. On Guido's system, see Huglo, "L'Auteur," pp. 143-47. A rationale which I suspect may have underlain the prefacing of gamma to the Latin alphabet for the "open" string was to allow the first "stopping" of the monochord to correspond to the "first" letter. This makes as much sense, when dealing with the monochord at least, as the provision of gamma, without which a chant "would have nowhere to descend to if Γ were not appended," as John of Afflighem maintains in *De Musica cum Tonario* (ca. 1100); see *Hucbald, Guido, and John*, p. 108.

⁶ Huglo, "L'Auteur," pp. 170-71.

⁷ *Source Readings*, p. 106. Cf. Gerbert, *Scriptores* vol. I, pp. 253a-b. The *Dialogus-Micrologus* relationships in tuning are discussed by Hans Oesch, *Guido von Arezzo* (Bern, 1954), pp. 80-1. Unfortunately, Oesch noticed neither of the crucial differences between the two authors' tunings: the octave-division base, G versus B, and the integration of b-flat versus its separation.

⁸ *Hucbald, Guido, and John*, p. 60; cf. CSM no. 4, pp. 99-100.

⁹ John of Afflighem, who by his own admission imitated Guido often, uses this tuning, but completes and thereby improves this monochord on his own. (*Hucbald, Guido, and John*, p. 109). John again acknowledges Guido as the originator of the twenty-one-pitch range (p. 108):

¹⁰ Gerbert, *Scriptores* vol. II, p. 26.

¹¹ *Ibid.*, p. 25. The only original source to which I presently have access, B.N. lat. 10508, fol. 143^r, has the scale exactly as it is copied above from Gerbert's edition.

¹² Gerbert, vol. II, pp. 26-7.

¹³ *Ibid.*, pp. 46a-b. See Guido of Arezzo, *Epistola Michaeli Monacho*, parts hitherto not rendered in English, translated by C. W. Brockett, Jr. (Brooklyn, N.Y., AMS/MLS Translations Center, 1970), pp. 1-2.

¹⁴ According to B.N. lat. 10508 at least, on fol. 147^v, the scale runs A-G minus introductory Γ, then a-g minus b-flat, then $\overset{a}{\text{a}}$, thus following Guido's written out requirements exactly, excepting the Γ prefix.

¹⁵ Oesch, *Guido von Arezzo*, p. 83. But the monochords of the *Regulae rhythmicae* are overlooked in Oesch's inference that the omission of b-flat, "dropped" in the *Epistola*, was there innovative.

¹⁶ In a quite casual, disappointing, one-page generalization of Guido of Arezzo's contributions, false and indifferent with regard to documentation, George F. Strickling ("Sixth Degree-Guido's Scale," *Choral Journal* X/2 (July-August, 1969), p. 16, abstracted in *RILM*, VIII/2-3: No. 3886ap, p. 270) credits Guido with the assignment of b-flat to a green line-clef. Actually, the b-flat clef was anonymous and the least frequently used of all. See Joseph Smits van Waesberghe, *De musico-paedagogico et theoretico Guidone Aretino: eiusque vita et moribus* (Florence, 1953), p. 66. Clefs which Smits reports are, in order of descending frequency: F, c, f, C, D, a, g, c, F, B, $\overset{a}{\text{q}}$, and $\overset{b}{\text{b}}$.

¹⁷ *Source Readings*, p. 106. Cf. Gerbert, vol. I, p. 253b.

¹⁸ *Ibid.*, p. 119. Boethius' works, other than his *Music*, deserve scrutiny as possible phraseological models. A rhymed correlation of strings, tuning, and vocal practice,

*Illic blanda sonantibus
Chordis carmina temperans*

("tuning beguiling songs of praise on resounding strings"), in its reference to contemporary kitharody may have set a precedent, even if not literally borrowed by the medieval apologist. See *Boetii De Consolatione Philosophiae . . . ad Usum Delphini* (London, 1823), p. 305 (Liber II, Metrum XII, vv. 20–21). Guido's reasoning in attaching the monochord's use to singing and the notation of pitches to be sung probably resulted in the incorporation of low G (vocal notation) to adapt to the monochord's gamma. In his *Breviarium de musica*, Frutolf of Michelsberg (d.1103) writes "*ad gamma scilicet Γ assumens tonum a modernis necessario pro facilitate canendi monochordi additum*" ("assuming gamma, that is Γ, the whole-step added by the 'moderns' [is] necessary for the facilitation of the measurement of singing to the monochord"). Around 1100, however, the monochord's function as a tuning device was evidently beginning to wane. John of Afflighem advises the substitution of the pitch-jointed hand, which, incidentally, he does not credit to Guido. John further advises use of the hand over the monochord to "test, correct, or compose a song." (*Hucbald, Guido, and John*, p. 104).

¹⁹ *Source Readings*, p. 119; Gerbert, vol. II, p. 28 (v. 107). Cf. *Micrologus*, ch. 5; *Hucbald, Guido, and John*, p. 62; CSM 4, p. 112.

²⁰ *Hucbald, Guido, and John*, p. 75; cf. CSM 4, p. 188.

²¹ Gerbert, vol. II, p. 46b.

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