

Origin and Construction of the Diatonic and Chromatic Scales

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## CORRESPONDENCE.

## THE FAUST LEGEND.

TO THE EDITOR OF "THE MUSICAL TIMES."

SIR,—In common, doubtless, with many of your readers I have greatly enjoyed Mr. Corder's papers on the musical treatment of the Faust legend. I trust he will not think it ungracious on my part to express regret that, among the items omitted, are the instrumental Quartets by Hermann Hirschbach. Schumann wrote enthusiastically of three Quartets and a Quintet by this composer, all written on passages from Goethe's "Faust"; they were performed in private about the year 1838, and were the first compositions that brought the young musician into notice, although he had contributed some remarkable articles to the *Neue Zeitschrift für Musik*. Perhaps Mr. Corder would supplement his admirable essay by a few words on these compositions, which it is to be feared are unknown in this country. I have never met with the name of Hirschbach excepting in Schumann's writings and in Mendel's Lexicon. He was born at Berlin, February 29, 1812, and for all that I know is still living.—I am, Sir, yours faithfully,

STEPHEN S. STRATTON.

Birmingham, June 21, 1886.

[Schumann's remarks upon Hirschbach are thoughtful and interesting, but it is rather doubtful whether the composer deserved such serious attention. Modern present-day judgment would probably decide that he was one of those ill regulated geniuses who, perhaps, from insufficient or badly directed study, have failed to become genuine artists. As to the Quartets themselves, Schumann says in one place that the mottoes from "Faust" are put "mehr als Schmuck als zur Erklärung" (more for ornament than use), and in another that they were probably affixed after the compositions were written, a course of proceeding which he himself frequently adopted. In any case, they have no more connection with the "Faust," legend than sundry Overtures by Schulz, Sefried, and other small fry, which consideration for the patience of my readers induced me to pass over. I might at least have mentioned their existence, however, and am obliged to Mr. Stratton for the reminder.—F. C.]

## THE WAGNER PERFORMANCES AT BAYREUTH.

TO THE EDITOR OF "THE MUSICAL TIMES."

SIR,—It may interest some of your readers to learn that the performances of "Tristan und Isolde" and of "Parsifal" are not postponed, as was at first announced, on account of the death of the King and the Laudes-Trauer. The rehearsals begin on June 29. As some of your readers may wish to know how to get housed, a difficulty I have myself encountered on former occasions during the performances at Bayreuth, I may mention that at Ruprechtstegen, on the Nürnberg and Bayreuth line, is a very comfortable establishment, where there is a good cook, everything clean, host most obliging, situated in lovely scenery among dolomitic limestone crags, where a visitor can be *en pension* for four shillings and sixpence a day, all included. The special train for the performances from Nürnberg halts at Ruprechtstegen, in going and returning, so that one can lunch there, attend the performance at Bayreuth, sup at Bayreuth, and return to sleep at Ruprechtstegen; moreover, the ticket of admission to the theatre gives the holder free passage on the line to and from Bayreuth to the performance. The second class from Charing Cross to Nürnberg, express, is just £4. Ruprechtstegen is an hour on by train.

As visitors have on former occasions found a difficulty in getting accommodation, and when they have got it have found the accommodation very dear, this hint may be of use to them.—I remain, yours faithfully,

S. BARING-GOULD.

Bayreuth, June 20, 1886.

## ORIGIN AND CONSTRUCTION OF THE DIATONIC AND CHROMATIC SCALES.

TO THE EDITOR OF "THE MUSICAL TIMES."

SIR,—Having recently had occasion to consider the ratios of the intervals of the chromatic scale, I was surprised to find that the majority of writers on the subject ascribe the ratio 25 : 24 to the ordinary chromatic semitone, and 9 : 5 to the dominant seventh. The former error evidently arises from neglecting to note that A in the key of G must be a comma (81 : 80) higher than A in the key of C if the accepted ratios of the scale are to be respected. Thus, measuring from Tonic A, we get  $\frac{5}{4} \times \frac{81}{80} \times \frac{5}{4} \times \frac{1}{2} = \frac{135}{128} = C\sharp$ ; whereas, measuring from Submediant A, we get  $\frac{5}{4} \times \frac{1}{2} = \frac{5}{8} = C\sharp$ . The interval is, however, more properly measured as two perfect fifths from B, thus:  $\frac{3}{2} \times \frac{3}{2} \times \frac{1}{2} = \frac{9}{4} = C\sharp$ .

A similar neglect of the comma gives us the false minor seventh  $\frac{9}{8}$ , instead of  $\frac{16}{9} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{9}$ , as we find it in the familiar series of whole numbers—24 27 30 32 36 40 45 48, extended to the octave of the fourth, thus:—

24	27	30	32	36	40	45	48	54	60	64
				G						F

These positive and commonly quoted errors, and the absence from the text-books of any satisfactory account of the nature of the diatonic scale, have impelled me to examine the subject anew. Some of the results of my inquiries are briefly as follows.

The whole musical scale, diatonic and chromatic, including every possible interval deducible from the accepted ratios 24 27 30, &c., is founded on the three prime numbers 1, 3, and 5; 1 being the primary root, 5 the secondary root, and 3 the generator, thus:—

## Natural Scale of Twelfths.

Primary Root.				Secondary Root.			
$\frac{1}{3}$	1	3	9	$\frac{5}{3}$	$\frac{5}{4}$	$\frac{5}{2}$	$\frac{15}{4}$
F	C	G	D	D	A	E	B
Tonic Group.				Mediant Group.			

Multiplying by 9, we get the above in whole numbers—

3	9	27	81	5	15	45	135
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Multiplying by the various powers of 2, we bring the whole series within the limits of one octave—

96	72	108	81	80	120	90	135
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Reduced to its simplest form, and omitting the fifth term, this series is seen to be identical with the accepted ratios—

32	24	36	27	40	30	45
F	C	G	D	A	E	B

Let it be observed that the *mathematical order* in any of the above series of figures (and, indeed, in any arrangement of the scale whatever) is precisely the same, whether estimated *upwards from the tonic* or *downwards from the mediant*.\*

The number 1 is the primary, natural, sensuous, and obvious *root* of the scale, because it is the simplest prime number from which ratios *can* be measured.

The number 3 is the natural generator of the scale, because it is the simplest prime number from which the ratios of notes, *other than octaves*, can be formed.

The number 5 is the secondary, inverse, and purely mathematical root of the scale, because it is the simplest

\* From this indisputable fact there follows the inevitable corollary, that the only perfect inversion of a melody is that in which the tonic of the original becomes the mediant of the inversion, and *vice versa*, the supertonic being the same in both, thus—

## A perfect inversion of "God Save the Queen."



A melody, thus inverted, has the same mathematical identity with the original, that the *form* of the reflection of an object in a looking-glass has with the form of the object itself.

