



## LXVII. Comparative tables of the beats of the tempered consonances in M. Kirnberger's and the isotonic or equal temperament systems of tuning; with remarks on the common system used by organ tuners, compared with that of M. Kirnberger

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means. The main spring, or first mover of the system, is thereby, as it were, wound up; and although the several subordinate operations of so complicated a machine cannot be regulated in detail by mere external agency, they must each be performed with greater freedom, in consequence of this general supply of power.

In almost every treatise on the subject of chronical diseases, are to be found numerous instances of the benefit produced by the several modes of gestation which have been most generally adopted; as riding on horseback, in carriages, sea-voyages, and swinging. And in many cases which might be adduced, it has appeared too clear to admit of a doubt, that the cure of the patient has been owing *solely* to the external agitation of his body, which must be allowed, at least, to have had the effect above explained; that of relieving the heart and arteries from a great part of their exertion in propelling the blood, and *may* therefore have contributed to the cure, by that means only.

The different modes above mentioned are adapted from their nature to different degrees of bodily strength; and if there are cases in which that which appears most eligible may not suit the situation or circumstances of the patient, it cannot be difficult to contrive other means of giving motion, so as least to incommode, and yet to give the greatest relief. A very gentle and long continued, or even incessant motion, may suit some cases better than any more violent and occasional agitation; and in this way, probably, it is, that sea-voyages have sometimes been attended with remarkable advantage.

LXVII. *Comparative Tables of the Beats of the Tempered Consonances in M. Kirnberger's and the Isotonic or Equal Temperament Systems of Tuning; with Remarks on the common System used by Organ Tuners, compared with that of M. Kirnberger. By the Rev. C. J. SMYTH, Minor Canon of the Cathedral, Norwich.*

THE opinions of profound theorists are ever entitled to attention; but should not be received with implicit faith. If such a man as Sir Isaac Newton was capable of a mistake, so is an Emanuel Bach, or a Kollmann. To the latter gentleman the musical world is under the greatest obligations for reducing the theory of Composition to a degree of

of simplicity, before his writings unknown. But the opinions he has advanced, with respect to the temperament of the musical scale, require that minute investigation and submission to calculation, which, if they had been advanced by a person of less celebrity, might have been passed over in silence.

One of the grand objects at which he appears to aim, is to establish an *equal temperament* on the piano-forte (that is, that all chords of the same kind shall be alike, as to their degree of imperfection): to this I raise no objection; the rage for modulation at present exerting its energies, to their utmost possible extent; a rage very favourable to the talents of those, who have not invention sufficient to produce novel and beautiful melodies, and yet aspire to the character of interesting composers.

I shall first presume to offer a few observations on the *unequal temperament* of Kirnberger, which Mr. Kollmann supposes "one of the best hitherto known." Not having the happiness to be able to read German, I know not what M. Kirnberger has offered in its behalf; or those important observations which major Templehoff (in an Essay in that language published in 1775, Berlin) is said by Dr. Robison in the Encyc. Brit., art. *Temperament*, to have made, on Kirnberger's system.

Preferring at all times experiment to theory, I tuned my piano-forte according to Mr. Kollmann's printed directions, with a view to hear the effect of one of "the best unequal temperaments." I cannot speak favourably of the result. I will below subjoin a table of the *beatings* of the tempered consonances, in order to give those professors who may feel no inclination to submit to the drudgery of calculation, some idea of what the effect of this temperament would be on an organ, where those *beatings* are most distinctly heard: a formidable host of foes, inimical to correct, and even tolerable tune. It appears to me, in the outset, doubtful whether a tempered system should have any *perfect* chords (but the octaves); as those chords, whenever they are heard, will render the ear less disposed to be pleased with the imperfect harmony which follows.

We will suppose the performer on the organ, to begin with Kirnberger's system in the key of C, answering to the tenor clef; here is a chord absolutely *perfect*; so also is the chord of G, the fifth of the key; but the chord of the fourth of the key ranks, in point of importance, next to the key-note and its fifth; and here unfortunately is a chord of which A, the major third to F, beats 149 times

in 15". From the key of C a modulation will naturally be expected into the key of G; which modulation will require the dominant of G, viz. the chord of D with a major third, fifth, and seventh. Now the A is half a comma too flat, as a fifth above D, and will beat 75 times in 15". And this we may take, as the first instance of "a very fine variety of perfection." Surely Mr. Kollmann would have been more consistent in the use of terms, if he had said "varieties of imperfection." The next chord which occurs is that of E, the fifth of which is perfect, but the major third beats 255 in 15". The chord of F has already been spoken of; proceed we then to examine the chord of Bb; the fifth is perfect, the major third beats 399. This chord on Eb beats 266.

Now let us compare this temperament with that upon organs tuned in the usual manner. I do not give the beats in extreme keys, because they are too rapid to be heard as *beatings*, except in the lowest part of the scale, and have a *rough* effect, which is more tolerable than beatings not too rapid to be perceived as beatings. One chord, viz. that of Ab or G\* has a peculiar character, (it is called the *wolf*) the fifth being almost the fifth part of a minor tone *too sharp*, and the beatings are distinctly heard in the middle and lower part of the scale.

*Chords on the Organ, as tuned in the usual Manner.*

C, G, D, A, and E, good.

B, F\*, C\* and G\*. The major thirds almost one-fourth of a minor tone too sharp, and Ab (or G\*) has also a fifth almost

F, Bb and Eb, good. one-fifth of a minor tone too sharp, as before observed.

When we hear an organ tuned in this manner, we may consider ourselves at a feast, in which there are dishes of various qualities; while in M. Kirnberger's feast of *exquisite viands*, but *eight dishes* are very palatable, and those who are fond of sour crout and olives, and, like many of our best composers, have no objection to a slice of wolf, though they would not choose to dine entirely upon that outlandish animal, have an opportunity of gratifying their peculiar palates. Until, therefore, some irrefragable arguments are produced, to prove the superiority of M. Kirnberger's temperament to that in common use, I presume our organ-builders and organ-tuners will, in spite of any charges of obstinacy, ignorance, or policy, continue to tune as their ancestors did before them: as I cannot flatter myself the  
public

public will ever go to an enormous expense, for many additional pipes, in order that our old and young organists may perform their wonderful feats of modulation (which require as little genius as application) without torturing those who prefer tolerable tune, to the parade of science. Further observations, on mean-tone temperaments, may be offered hereafter.

C. J. SMYTH.

M. KIRNBERGER'S TEMPERAMENT, Beats in 15".

(The Vibrations communicated by Mr. FAREY.)

Keys.	Vibrations in 1".	3ds.	11lds.	4ths.	Vths.	6ths.	Vlths.
c	480						
B	450	0	383	0	0	0	383
B <sub>b</sub>	426.6667	474	399	0	0	574	399
A	402.4922	224	153	150	112	299	188
A <sub>b</sub>	379.2593	383	355	0	0	510	355
G	360	399	0	0	0	533	0
G <sub>b</sub>	337.5	188	287	0	17	0	287
F	320	355	149	0	0	474	300
E	300	0	255	112	0	0	255
E <sub>b</sub>	284.4444	287	266	0	0	383	266
D	270	300	0	0	75	399	0
D <sub>b</sub>	252.8395	255	237	17	0	153	237
C	240	266	0	0	0	355	112
		3131	2484	279	204	3680	2782
		2484					
		279					
		204					
		3680					
		2782					
		12560	Sum total.				

THE ISOTONIC SCALE\*, Beats in 15".

(The Vibrations communicated by Mr. FARREY.)

Keys.	Vibrations in 1".	3ds.	3lds.	4ths.	Vths.	6ths.	Vlths.
c	480						
B	453.0613	366	269	30	22	428	308
*	427.6307	345	254	28	21	403	291
A	403.6312	326	240	27	20	381	274
*	380.9784	308	226	25	19	360	259
G	359.5939	291	214	24	18	339	244
*	339.4127	274	201	22	17	320	230
F	320.3612	259	190	21	16	302	218
E	302.3819	244	180	20	15	285	205
*	285.4090	230	169	19	14	269	194
D	269.3913	218	160	18	13	254	183
*	254.2725	205	151	17	12	240	173
C	240	194	142	16	12	226	163
		3260	2396	267	199	3807	2692
		2396					
		267					
		199					
		3807					
		2692					
		12621	Sum total.				

LXVIII. *On Crystallography.* By M. HAUY. Translated from the last Paris Edition of his *Traité de Minéralogie.*

[Continued from p. 363.]

GEOMETRICAL CHARACTERS OF CRYSTALS.

16. *Forms. Nucleus or primitive form.*

IT is very rare to find a mineral under its primitive form given immediately by nature, and there is a certain number of species in which this form is known only from the results of mechanical division and by theory. The just measurement of actions susceptible of producing it is only as

\* See our xxviii<sup>th</sup> volume, p. 65, and our xxix<sup>th</sup> volume, p. 347.—EDIT.