

vib.	. . .	528	down 422·74	down 338·47	down 271·00	up 433·95	down 347·44	down 278·18	up 445·45
beats in 10 sec.		17	13·9	11·2	17·5	14	11·4	17·9	
vib.	. . .	528	a Fourth down 396	another Fourth down 297			a Fifth up 445·5		

The Fourths and Fifths are taken just, and the result agrees to ·05 vib. It must be remembered that the cyclic major Thirds are too close, hence in tuning down the *lower* note must be sharpened. On the contrary the cyclic minor Sixths will be too wide, and hence in tuning up, the *upper* note has to be sharpened. Having completed this set of 7 proceed to another, till the cycle is complete. This method also only suits qualities of tone, like reed-tones, with powerful 5th and 8th partials.

The process thus carried out would of course be tedious, and Mr. Paul White seems to assume a tolerably uniform beat, perhaps of 15 in 10 seconds, for he says: 'The beats cannot of course be made, or be made to remain uniform, but if they are nearly so, or if a few do not beat at all, the temperament is still good. I have found that the Fifths can be kept almost entirely free from beats by taking good care of the very slow beats of the Thirds. I have long been convinced that beats in the middle octave do much more good than harm in a musical cycle, for it would be impossible to tune a musical cycle of any size correctly without them. The least scratch on a reed will change a beat, while it often takes quite a scrape to cause a beat where none existed.' The processes Mr. Paul White has worked out with the ingenious system of checks, shew that he is a thorough master of the whole art of tuning, and, a rare thing to be met with among professional tuners or even musicians, perfectly understands its rationale.

Art. 18.—A succession of just Fifths, as mentioned in art. I, is very difficult to tune; and one of just major Thirds is still more difficult. Hence an auxiliary stop on an organ or an auxiliary harmonium is required when just intervals have to be tuned.

It is not difficult to ascertain by ear whether a Fifth or major Third is considerably too flat. Suppose we start with c' , then tune an auxiliary g' (indicated by a roman letter) decidedly flat, beating 40 times in 10 seconds with c' . Then $3c' - 2g' = 4$, so that $\frac{3}{2}c' = g' + 2$, but $\frac{3}{2}c'$ is the perfect Fifth to c' , hence we must tune the required Fifth $g' = g' + 2$, that is, sharper than g' by 2 beats in a second. For the next Fifth in order to remain in the same octave we should take the Fourth down. Tune the auxiliary d' so that it should be too flat, and beat 4 times in a second with the correct g' . Then $3g' - 4d' = 4$, and $\frac{3}{4}g' = d' + 1$. But $\frac{3}{4}g'$ is the correct d' , or Fourth below g' . Hence it must be

tuned 1 beat in a second sharper than the auxiliary d' . And in this way by a laborious double process the succession of Fifths could be tuned with great accuracy. For the major Thirds, tune an auxiliary e' decidedly flat and beating 4 in a second with c' . Then $5c' - 4e' = 4$, and true $e' = \frac{5}{4}c' = e' + 1$. In the same way we could get $g_2 \frac{7}{4}$ and $b_2 \frac{7}{4}$. But for a^1b , f^2b , d^3b we must tune auxiliary minor Sixths, which is troublesome and not feasible except on reed instruments. Tune an auxiliary a^1b flat, so as to beat 5 times in a second with c' . Then $8c' - 5a^1b = 5$, and true $a^1b = \frac{8}{5}c' = a^1b + 1$. And so on.

It appears, then, that tempered intervals which present beats of their own are more easy to tune than just intervals for which an auxiliary beating tone has to be supplied. The only satisfactory way, however, of tuning perfect and tempered intervals is by a fork tonometer, one of which suffices for every possible case that can arise, when once the pitch numbers of the notes have been calculated as in sect. A.

SECTION H.

THE HISTORY OF MUSICAL PITCH IN EUROPE.

(See note p. 16.)

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Art 1.—The *pitch number of a note* has been already defined as the number of double vibrations which the sonorous body producing it makes and communicates in one second (p. 11a).

Art. 2.—The *pitch number of a musical instrument*, or briefly its *musical pitch*, is taken to be the pitch number of the *tuning note* at a temperature of $59^{\circ}\text{F.} = 15^{\circ}\text{C.} = 12^{\circ}\text{R.}$

The tuning note is here assumed to be the a' of the violin, from which the pitch number of all the other notes in the scale must be calculated, or determined approximately by ear from the temperament (sect. A.) and system

of tuning (sect. G.) in use. By taking a' as the tuning note, the inquiry is practically limited to European music within the last 500 years.

Art. 3.—The following passage from *C., Tomus Secundus, de Organographia*, early pitch.

'In the first place it must be known that the pitch, both of organs and other musical instruments, varies greatly. Since the ancients were not accustomed to play in concert with all kinds of instruments at the same time, wind instruments were very differently made and intoned by instrument makers, some high and some low. For the higher an instrument is intoned in its own kind and manner, as

Syntagmatis musici Michaelis PRETORII 1619, p. 14, explains the condition of

trumpets, shawms, and treble viols, the more freshly it sounds and resounds. On the contrary, the deeper trombones, bassoons, bassanelli, bombards, and bass viols are tuned, the more majestic and magnificent is their stately march. Hence when the organs, positives, clavicymbals, and other wind instruments are not in the same pitch with each other the musician is much plagued.'

Art. 4.—The authorities on whom I rely are minutely specified in my 'History of Musical Pitch' in the *Journal of the Society of Arts* for 5 March and 2 April 1880, and 7 Jan. 1881. The two last papers contained indispensable corrections and additions. In the privately printed copies there was an addendum on U.S. America from Messrs. C. R. Cross and W. T. Miller, *American Journal of Otology*, Oct. 1880.

Here it must suffice to say that after learning to determine pitch to $\frac{1}{15}$ vib. (p. 444) I obtained the loan of authentic forks from the Society of Arts, Mr. A. J. Hipkins, Rev. G. T. Driffield (Handel's), Frau Naeke of Dresden, Prof. Rossetti of Padua, Mr. Blaikley, and Dr. W. H. Stone. I procured compared copies of forks in the Conservatoire at Paris, and others tuned at known temperatures to remarkable organs at Vienna, Dresden, Hamburg, Strasbourg, and Seville. Then, with the assistance of many organists, I measured numerous organs in England of which the pitch had not been changed, or with the kind help of several organ-builders, obtained untouched pipes of altered organs. When these failed I had models made of pipes of which the dimensions were given by Schlick 1511, Pretorius 1619, Mersenne 1636, Tomkins 1668, Bédos 1766,

and others, which were obligingly presented to me by Mr. T. Hill, the organ-builder, on whose bellows I measured them. These constituted my own materials. Then I had recourse to the measurements and lists of Cagniard de la Tour, Cavallé-Coll, de la Fage, Delezenne, de Prony, Euler, Fischer, French Commission on Pitch, Koenig, Lissajous, McLeod, Marpurg, Naeke, Sauveur, Scheibler, Schmähl, Dr. R. Smith and others. From these I constructed the lists which follow. In my original papers each pitch is accompanied with full details. Here I give the smallest possible account.

Art. 5.—The pitch given is always that of a' , where possible at 59°F. But this was not always the note measured. When it was not, a' was calculated on the assumption of either meantone or equal temperament. Assuming a lowest ideal pitch of $a'370$, which has never

yet been found, I give the cents by which any other pitch exceeds this, so that the interval between any two pitches is immediately determined by subtracting the cents. I give also the date, adding occasionally *a* for *ante*, before, *p* for *post*, after, and *c* for *circa*, about; and the authority, or observer, where E. means that I am responsible for the measurement, directly or indirectly. Finally, I add a list,

classified by countries, stating the kind of pitch. I have not thought it necessary to give absolutely every fork and pitch entered in my 'History,' but have reported a large number of these entries, and especially all the most interesting of them. A complete German translation of my paper is in preparation, and will be published at Vienna.

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST.

Cents	<i>a</i>	Date	Observer	Place and other particulars
1. Church Pitch, Lowest.				
000	370	—	E.	Ideal lowest pitch or zero point
15	373.1	—	Delezenne	Calculated from D.'s measurements of an open wooden pipe 1.3 metres long, taken as <i>c</i>
17	373.7	1648	E.	Paris, from a model after Mersenne
19	374.2	1700a	Delezenne	Lille, organ of l'Hospice Comtesse
31	376.6	1766	E.	Paris, from a model after Bédos
33	377	1511	E.	Heidelberg, from a model after Arnold Schlick (see 535 cents)
2. Church Pitch, Low.				
66	384.3	1700c	Delezenne	Lille, old fork found 1854a by M. Mazingue
69	384.6	1851	"	Lille, organ of St. Sauveur, rebuilt, with old pitch
100	392.2	1739	Euler	St. Petersburg, a clavichord according to Marpur, but Euler gives no particulars
104	393.2	1713	Stockhausen & E.	Strassburg Minster, great organ by A. Silbermann
114	395.2	1759	Dr. R. Smith	Cambridge, Bernhardt Schmidt's organ at Trinity College, 1708, after being new voiced and 'shifted' in 1759
"	"	1720	"	Rome, pitch-pipes observed by Dr. R. Smith
117	395.8	1789	McLeod & E.	France, Versailles, copy of fork No. 410 at the Musée du Conservatoire, Paris, compared with the original by Cavaillé-Coll
119	396.4	1615	E.	Palatinate of the Rhine, from a model of pipe described by Salomon de Caus
129	398.7	1854a	Delezenne	Lille, old organ of La Madeleine restored
3. Chamber Pitch, Low.				
148	402.9	1648	E.	Paris, Mersenne's Spinet, from his statement that $B\frac{2}{2}$ = Bédos's 4-foot <i>c</i> (see 31 cents)
152	403.9	1730	E.	Padua, from copy sent by Prof. Rossetti of the old lower <i>f''</i> fork of the bellfoundry of Colbacchini
163	406.6	1704	Sauveur	Paris, result of several experiments on an <i>e</i> pipe
166	407.3	1854	Delezenne	Lille, organ of St. Maurice repaired, old pitch kept
169	407.9	1762	Schmahl & E.	Hamburg, organ of St. Michaelis Kirche, built by Hildebrand of Dresden, under the direction of Handel's friend, J. Mattheson (1681-1764), in the chamber pitch of the period, still preserved; now, and probably always, in equal temperament
174	409	1783	Lissajous	Paris, Court clavocins, fork of Pascal Taskin, their tuner
178	410	—	"	Paris, 18th century pitch-pipe found in the cabinet of the Faculty of Sciences
184	411.4	1688	Schmahl & E.	Hamburg, chamber pitch on the former 8-foot <i>Geduct</i> of the St. Jacobi organ (see 484 cents)
191	413.3	—	Naeke	'Schneider's Oboe,' date and place unknown
196	414.4	1776	Marpurg	Breslau, clavichords
4. Mean Pitch of Europe for Two Centuries.				
199	415	1754	E.	Dresden, organ of the Roman Catholic Church by Gottfried Silbermann, pitch of the chained fork placed there by King August der Grette, 1763-1827, who would not allow the pitch to be changed; the fork was lent me by Frau Naeke

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	<i>a'</i>	Date	Observer	Place and other particulars
4. <i>Mean Pitch of Europe for Two Centuries</i> — <i>continued.</i>				
201	415.5	1722	Naeke . . .	Dresden, organ of St. Sophie, built by G. Silbermann
211	418	1780	Euler . . .	St. Petersburg, organs; no particulars
212	418.1	1878	E.	Dresden, present pitch of the organ of the Roman Catholic Church, from a fork tuned for me there
215	419	1700c	E.	London, Renatus Harris's organ at St. John's, Clerkenwell
217	419.5	1714	Naeke . . .	Freiberg, Saxony, G. Silbermann's organ
218	419.6	1858	de la Fage . . .	Madrid, ton de chapelle, calculated
"	"	1785	E.	Seville, Spain, pitch of the old organ of Torje Bosch, from a fork said by the organist Don Yñiguez to be in exact unison with its <i>a'</i> at a mean temperature
219	419.9	1715c	E.	England, rude tenor <i>a</i> fork, belonging to Rev. G. T. Driffield, who held it to have been made by John Shore, the inventor of tuning-forks
220	420.1	1780	E.	Winchester College organ, from one of the pipes added by Green when repairing R. Harris's organ of 1681
224	421.2	1860	E.	Russian Imperial Court church band from fork lent by Frau Naeke
225	421.3	1780	Naeke . . .	Vienna, fork of the Saxon organ-builder Schulze, who lived at Vienna in Mozart's time
226	421.6	1780	Naeke & E. . .	Vienna, copy of fork of Stein, who made Mozart's clavichords and pianos, lent me by Frau Naeke
229	422.3	1780	Naeke . . .	Dresden, fork of former Court organist Kirsten
"	"	1780c	E.	Verona, from a copy of a <i>c'</i> fork believed to be the Roman pitch of 1780, preserved at the bell-foundry of Cavedini, procured by Prof. Rossetti of Padua
230	422.5	1751	E.	England, Handel's fork belonging to Rev. G. T. Driffield. The organ at Cannons in the private chapel of the Duke of Chandos, built by Jordans, and afterwards bought by Trinity Church, Gosport, has been recently (in 1884) examined by the organist, Mr. Howlett, and found to have had in Handel's time, when he used to play on it, a <i>B₂</i> (now <i>B₃</i>) pipe of 12.3 inches long, and 1 inch in diameter; this shews that its pitch, was then <i>A</i> 423.5, or practically the same as Handel's fork
"	"	1820a	E.	Westminster Abbey, as originally tuned by Schreider and Jordans, from indications by Mr. T. Hill, who retuned it to <i>a'</i> 441.7. It had been altered by Greatorex to <i>a'</i> 433.2, Smart's pitch
"	"	1838	E.	Bath Abbey Church, as rebuilt by Smith of Bristol, from indications by Mr. T. Hill
"	"	1877p	E.	England, Mr. J. Curwen's Tonic Solfa standard <i>c'</i> 507, using the just <i>a'</i> only
"	422.6	1790a	E.	Kew Parish Church, Green's organ, untouched and in meantone temperament when measured in 1878, built as a chamber organ for George III.
"	"	1754c	Delezenne . . .	Lille, very old fork found in workshops of M. François, musical instrument maker there
"	"	1780c	E.	Padua, from copy of the higher <i>f''</i> fork of the bell-foundry of Colbacchini (see 152 cents)
231	422.7	1800c	E.	England, from old fork, <i>c'</i> 505.7, belonging to Messrs. Broadwoods
232	423	1820	McLeod and E. .	Paris, Théâtre Feydeau, Opéra Comique, from copy of fork at the Conservatoire, Paris, compared with the original by Cavallé-Coll
233	423.2	1778	E.	London, Green's organ at St. Katherine's, Regent's Park, still (when I measured it) in meantone temperament (see sect. G., p. 484 <i>c'</i>)
"	"	1815-1821	E.	Dresden, band of the Opera while C. M. von Weber (1786-1826) was conductor (<i>Kapellmeister</i>)
"	423.3	1813	E.	London, second copy of Peppercorn's fork by which the pianofortes of the Philharmonic

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	a'	Date	Observer	Place and other particulars
4. <i>Mean Pitch of Europe for Two Centuries—continued.</i>				
235	423·7	1813	E.	Society were originally tuned; this copy was prepared for the Society of Arts in 1860, and is now in the possession of Messrs. Broadwoods London, first copy of Peppercorn's fork made before 1860, belonging to Mr. Hipkins; see last entry, the original is lost, and it is impossible to say which was correct. The difference, 2 cents, is utterly insignificant
236	424·1	1740–1812	Naeke.	Eutin (18 miles N. of Lübeck), fork of Franz Anton von Weber, father of Carl Maria von Weber
237	424·2	1619	E.	Brunswick, from a model made from Prætorius's drawing of an organ pipe at a 'suitable' church pitch
"	"	1823	Fischer	Paris, Italian Opera, mean of twenty measurements of a fork given by Spontini
"	424·3	1750a	E.	London, old forks formerly belonging to Prof. Faraday, lent me by Mr. D. J. Blaikley
"	"	1749	E.	London, organ at All Hallows the Great and Less, Upper Thames Street, built by Glyn & Parker, by whom Handel's Foundling Hospital organ was built
238	424·4	1833	E.	Weimar, from a model of Töpfer's wide principal c''-pipe
239	424·6	1800c	E.	England, old fork said to have been used in Plymouth Theatre, lent me by Dr. Stainer
240	424·9	1805	E.	London, old D fork of Elliott's, by which he tuned the organ built for the Ancient Concerts at the Hanover Square Rooms, lent me by his successor, Mr. T. Hill
"	"	1800c	Naeke.	Germany, fork of the bassoonist Kummer
241	425·2	1730c–1780c	E.	Padua, mean of two ancient pitch-pipes belonging to the bellfoundry of Colbacchini, lent me at the request of Prof. F. Rossetti there
242	425·5	1829	Lissajous	Paris, pitch of opera piano as distinct from the orchestra, verified by Monneron for de la Fage
"	425·6	1740–1780	E.	England, Schnetzler's organ at the German Chapel Royal, St. James's Palace
"	"	1764	E.	Halifax, Schnetzler's organ, from indications by Mr. T. Hill
243	425·8	1824	Lissajous	Paris, pitch of opera, suddenly lowered on 31 March for Mme. Branchu, whose voice was failing. The piano for rehearsals was also lowered, and was not raised immediately when the orchestra was raised; this was called opera pitch
"	"	1839	de la Fage	Bologna, Italy, pitch of fork of Tadoliui, the best tuner in the town
244	425·9	1740	Tunbridge & E.	Great Yarmouth, St. George's Chapel, by Byfield, Jordan & Bridge
246	426·5	1843	E.	Wimbledon Church, organ built by Messrs. Walker
248	427	1811	Scheibler	Paris, Grand Opera
249	427·2	1878a	E.	Norwich Cathedral organ before it was altered by Bryceson, supposed to be by R. Harris
250	427·5	1877a	E.	Tonic Solfa pitch to 1877, afterwards 422·5
250	427·6	1823	Fischer	Paris, Théâtre Feydeau, fork given by Spontini
251	427·7	1696	E.	London, old organ built by R. Harris, a pipe of St. Andrew Undershaft, from Green's Organ, preserved by Mr. T. Hill
"	427·8	178 8	E.	St. George's Chapel, Windsor, measured in Feb. 1880, while still in meantone temperament
255	428·7	1670	Ions	Newcastle-on-Tyne, St. Nicholas Church organ built by Renatus Harris, frequently altered except in pitch
5. <i>The Compromise Pitch.</i>				
260	430	1810c	Lissajous	Paris, Fork of M. Lemoine, a celebrated amateur
262	430·4	1701	E.	Fullham Parish Church organ, built by Jordans. This pitch was officially adopted in Italy in 1884

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	a'	Date	Observer	Place and other particulars	
5. <i>The Compromise Pitch</i> — <i>continued.</i>					
264	431·3	1625	Lewis . . .	as the pitch of the Italian army brass bands, giving $B\flat 456$, the nearest whole number to equal $B\flat 456\cdot13$, which would correspond to the 'arithmetical' pitch $C512$	
267	431·7	1826	Fischer . . .	Lavenham ($1\frac{1}{2}$ miles W.N.W. of Ipswich), from a famous old tenor bell sounding $d288\cdot4$	
269	432·2	1854a	Delezenne . . .	Paris, Grand Opera, fork given by Spontini	
270	432·3	1846c	E.	Lille, organ of St. André repaired	
¶	272	433	1820c	E.	England, old fork which belonged to the father of Messrs. Bryceson, organ-builders, and had not been tuned since 1848, when it had been sharpened slightly
	273	433·2	1828	E.	London, fork approved of by Sir George Smart, conductor of the Philharmonic Concerts, in possession of Mr. Hipkins, from $c'' 518$ using meantone temperament; if equal temperament were used it would give $a'435\cdot4$ and be a 30 years' anticipation of French pitch. Used in this way it is Broadwoods' lowest pitch. Long sold in shops as 'London Philharmonic'
	275	433·6	1847	Byolin & E. . .	London, Sir G. Smart's own Philharmonic fork. Sir G. Smart considered this a' fork of his to agree with $c''518$ (see last entry). This shews that he used meantone temperament
	276	433·9	1834	Scheibler . . .	Shrewsbury, St. Mary's, built 1729, by John Harris and John Byfield, pitch altered in 1847 by Gray & Davison
	"	434	1829	Cagniard de la Tour	Vienna, fork I., Delezenne's Vienna minimum
¶	"	1834c	Scheibler . . .	Paris, opera, verified by M. Montal, after the opera had recovered its pitch, the opera piano remaining at $a'425\cdot5$, which see, and also $a'425\cdot8$	
	278	434·3	1818	McLeod & E. . .	Paris Opera, fork by Petitbout, luthier de l'opéra
	"	434·5	1869	E.	Paris, Chapelle des Tuileries, from a copy compared by Cavaillé-Coll of fork No. 493 in the Conservatoire
	279	434·7	—	E.	Baden, fork sent officially to Society of Arts
	280	435	1826	Nacke	London, from a model of pipe representing $b'486\cdot1$, one foot long and one inch diameter, on Renatus Harris's organ at All Hallows, Barking
	"	1859	Fr. Com.	Dresden, opera, fork of Kapellmeister Reissiger, successor to C. M. von Weber. Nacke considers this to have been Dresden pitch from 1825 to 1830	
	282	435·2	1834a	Scheibler . . .	Carlsruhe, opera, the fork which determined the French <i>Diapason Normal</i>
	"	435·4	1859	Koenig & E. . .	Paris, Conservatoire, fork made by Gand, luthier du Conservatoire
¶	283	435·9	1868	Cross & Miller . .	Paris, the <i>Diapason Normal</i> in the Conservatoire, used extensively in Germany, officially adopted for the Belgian army in 1885. The various imperfect copies used are not cited
	284	436	1802	Sarti	U. S. America, E. S. Ritchie's standard pitch
	"	1846p	E.	St. Petersburg, five-foot organ pipes	
	"	"	"	"	London 'Philharmonic,' from Mr. Hipkins's vocal pitch, $c''518\cdot5$, which for equal temperament gives $a'436$, but on meantone temperament, for which it was first used, gave $a'433\cdot5$; the fork with which Mr. E. J. Hopkins compared the pitch of the organs at Lübeck, Hamburg, and Strassburg, see his <i>The Organ</i> ed. 1870, art. 791, p. 189
	"	"	1878	E.	London, Messrs. Bishop's standard for church organs
	285	436·1	1878	E.	London, fork to which Messrs. Bryceson tuned the organ at Her Majesty's Theatre
	286	436·5	1834c	Scheibler . . .	Vienna, opera, fork II.
	287	436·7	1845	Delezenne . . .	Florence, fork lent by M. Marloye
	"	436·8	1740–1780	E.	Dublin, Green's organ in the Refectory of Trinity College, probably sharpened
	288	436·9	1869	E.	Württemberg, fork sent officially to the Society of Arts

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	a'	Date	Observer	Place and other particulars
<i>G. Modern Orchestral Pitch, and * Church Pitch Medium.</i>				
288	437	1859	Fr. Com.	Toulouse, Conservatoire
289	437·1	1666	E.	*Worcester, cathedral organ built by Thomas and Renatus Harris, from a pipe at Mr. T. Hill's
„	437·3	1872	Fischer	Berlin, from a fork furnished by Pichler, who tuned the piano of the opera
„	437·4	1854a	Delezenne	Paris, opera, from four forks purchased before 1854, and found to be in unison
„	„	1744	Streatfield & E.	*Maidstone, Old Parish Church, built by Jordans, altered, but not in pitch, in 1878 in meantone temperament
291	437·8	1862	E.	Dresden, fork given by the direction of the Court Theatre to its librarian, Herr Moritz Fürstenau, after the conference on pitch held there, by whom it was lent me to measure, meant for a'440
295	438·9	1696	E.	*Boston, England, organ built by Christian Smith, from a pipe preserved by Mr. T. Hill
297	439·4	—	Delezenne	Lille, old fork formerly belonging to the Marquis d'Aligre
„	„	1834c	Scheibler	Vienna, opera, fork III.
„	„	1878	E.	Dresden, opera pitch at date, from a fork specially prepared for me by the Court organ-builder, Jehmlich, and sent by Herr Moritz Fürstenau, librarian of the theatre
298	439·5	1812	McLeod & E.	Paris, Conservatoire, from copy of a fork preserved there, verified by Cavallé-Coll
„	„	1855	E.	England, Barking, Essex, Parish Church organ (probably originally a'474·1), built by Byfield & Green, 1770, after alterations by Messrs. Walker
299	439·9	1845	Delezenne	Turin, fork lent by Marloye
300	440	1829	Lissajous	Paris, opera orchestra, verified by Monneron for de la Fage
„	„	1878	E.	London, Messrs. Gray & Davison's standard pipe
301	440·2	1834	Scheibler	Stuttgart pitch, = 440 at 69° F., Lissajous measured it, as 440·3 to French <i>Diapason Normal</i> , reckoned as 435, which then when corrected to 435·4 gives 440·7
„	„	1879	E.	London, Messrs. Walker & Sons' standard pipe
„	440·3	1834c	Scheibler	Vienna Opera, fork IV.
302	440·5	1878	E.	London, Messrs. Bevington's standard pipe
303	440·9	1834c	Scheibler	Paris Conservatoire, not trusted so much by Scheibler as 435·2
304	441·0	1836–1839	Delezenne	Paris Opera, fork of M. Leibner, who kept the pianos to pitch of orchestra, verified by Meyerbeer
„	„	1836	Cagniard de la Tour	Paris, Opéra Comique
„	„	1859	Fr. Com.	Dresden, fork sent to Fr. Com. by the Kapellmeister Reissiger
„	„	1879	E.	London, church organ pitch of Messrs. Lewis & Co.
„	441·10	1834	Scheibler	Vienna Opera, fork V., given by Prof. Blahetka as trustworthy; in 1879 this fork was found and lent to me, and then from rust and ill-treatment measured only 439·9, the greatest loss of pitch I have found in any fork
305	441·2	1878	E.	London, Covent Garden Opera, fork for Messrs. Bryceson to tune the organ to
„	441·3	1842	E.	London, the equal a' corresponding to the late Dr. John Hullah's standard fork, c''524·8, purporting to be c''512; J. H. Griesbach measured it as 521·6
307	441·7	1690	E.	Hampton Court Palace, Bernhardt Schmidt's organ from an original pipe, 12 inches long and 1·2 inch in diameter, giving b''472·6
„	„	1660	E.	Whitehall, Chapel Royal, organ by Bernhardt Schmidt, according to indications by Mr. T. Hill
„	„	1878	E.	London, standard pipe of Messrs. Hill and Sons, from c''525·3

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	a'	Date	Observer	Place and other particulars
6. <i>Modern Orchestral Pitch, and * Church Pitch Medium</i> — <i>continued.</i>				
307	441·8	1834c	Scheibler . . .	Berlin opera
310	442·5	1859	Fr. Com. . . .	Toulouse opera
"	"	"	"	Brussels, opera under direction of Bender
*311	442·7	1878	E. "	*Vienna, small Franciscan organ kept at modern pitch, from a fork tuned for me by the organ-builder Ullmann
312	443·0	1859	Fr. Com. . . .	Bordeaux opera
"	"	"	"	Stuttgart opera
"	443·1	1815c	E. "	*Durham organ, as altered by shifting from a'474·1; a'444·7, the present pitch of new organ, is by Willis
"	"	1869	E.	Bologna, Italy, Liceo Musicale, from fork sent officially to Soc. of Arts
313	443·2	1878	E.	*Vienna, St. Stefan cathedral organ, from a fork tuned for me by organ-builder Ullmann
"	443·3	1836	Wölfel.	Paris, Wölfel's pianos
"	"	1859	Fr. Com. . . .	Gotha, opera
"	443·4	1878	E.	London, from Messrs. Bryceson's standard pipe
314	443·5	1859	Fr. Com. . . .	Brunswick, opera
315	443·9	1880	Cross & Miller .	U.S. America, Boston, organ of Church of the Immaculate Conception
"	444	1860	"	Intended but unexecuted standard of Society of Arts to c''528
316	444·2	1880	"	U.S. America, from c''528, the 'low organ pitch' of Hutchings, Plaisted & Co.
317	444·3	1840	Cavaillé-Coll . .	*France, St. Denis Cathedral, organ built by Cavaillé-Coll
"	"	1880	E.	*London, Temple Church organ after rebuilding by Messrs. Forster and Andrews, who retained the pitch which they found, which was Robon's, originally built by Bernhardt Schmidt, with both <i>E</i> ₂ and <i>L</i> ₂ , and both <i>A</i> ₂ and <i>G</i> ₂ keys, and perhaps then having a'441·7
318	444·5	1858	Lissajous	Madrid, Theatre Royal, fork sent to de la Fage by the Maître de Chapelle. French pitch was adopted on 18 March 1879
"	444·6	1877	E.	*London, St. Paul's, after rebuilding by Willis, from a fork belonging to Mr. Hipkins at 57 ^o ·5
"	444·7	1879	E.	*Durham Cathedral organ, rebuilt by Willis; for its original state, see a'474·1
319	444·8	1859	Fr. Com.	Turin opera
"	"	"	"	Weimar opera
"	"	"	"	Württemberg concerts
"	444·9	1857	Lissajous	Naples, San Carlo opera, Guillaume's fork
"	"	1880	Hipkins	London, Her Majesty's opera, fork of the theatre
320	445·0	1862	Næke	Vienna, piano of Kapellmeister Proch
"	"	—	Schmahl	Hamburg 'old pitch,' date unknown
321	445·1	1834c	Scheibler	Vienna opera, fork VI., 'a monstrous growth' (<i>Auswuchs</i>) in Scheibler's opinion
"	445·2	1878	E.	*London (from c''529·4), Mr. H. Willis's church pitch, to which he tuned the organs of the cathedrals of St. Paul's (London), Durham, Salisbury, Glasgow (established), St. Mary's (Edinburgh)
322	445·4	1845	Delezenne	Vienna Conservatorium, fork lent by Marloye
"	445·5	1879	Hipkins & E. . . .	London, Her Majesty's opera during performance
"	445·6	"	E.	London, Covent Garden opera, fork in possession of Mr. Pitman, organist, and Sig. Vianesi, conductor. Mr. Pitman said the pitch was thus in 1878 because oboe, bassoon, and flute would not play lower
323	445·8	1867	E.	London, Exeter Hall, both organs as originally built, from a pipe at the makers', Messrs. Walker; since sharpened to a'447·3
"	"	1856	Lissajous	Paris opera, from the fork of M. Bodin, professor of the piano and music

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	a'	Date	Observer	Place and other particulars
6. <i>Modern Orchestral Pitch, and * Church Pitch Medium</i> — <i>continued.</i>				
323	445·9	1849-1854	E.	London, from Broadwoods' original medium pitch of c''530·6, fork of the tuner Finlayson; since 1854 Messrs. Broadwoods use a'446·2 as their medium pitch. This pitch was chosen empirically
..	446	1859	Fr. Com.	Pesth, opera
324	446·2	1856	Lissajous	Paris, opera and Conservatoire
..	..	1859	Fr. Com.	Holland, the Hague at the Conservatoire
326	446·6	1845	Delezenne	Milan, fork lent by Marloye
327	446·8	1851	E. "	Lille, festival organ, fork of the tuner Mazingue
..	..	1878	E.	Vienna opera, from a fork sent me by the organ-builder, Ullmann, who had charge of the organ there
..	447·0	1859	Fr. Com.	Marseilles Conservatoire
328	447·3	1879	E.	London, Exeter Hall organ, from a pipe of the makers, Messrs. Walker, see 445·8
329	447·4	1856	Lissajous	Paris, Italian opera, Bodin's fork
..	447·5	1878	Hipkins	London, Covent Garden opera harmonium
330	447·7	1877	E.	Gloucester Festival organ, built by Messrs. Walker; from the fork to which it was tuned at 64° F., the temperature of the pipe being reduced to 59°
331	448	1854	Lissajous	Paris, Grand Opera—also at Lyons and Liège
..	..	1839-1840	Schmahl	Hamburg, opera, under Krebs
..	448·1	1859	Fr. Com.	Munich, opera
332	448·2	1869	E.	Leipzig, Gewandhaus Concerts, from fork sent officially to the Society of Arts
333	448·4	1857	Lissajous	Berlin, opera, fork of the conductor Taubert
..	..	1860	E.	London, from Cramer's, c''533·3, purporting to be the Society of Arts' pitch, intended for c''528
..	448·5	1880	Cross & Miller	Boston, Nichol's fork of Germania Orchestra, as corrected to 59° F.
334	448·8	1859	Fr. Com.	Leipzig Conservatoire
335	449	1855	Lissajous	Paris opera, experiments by Lissajous and Ferrand, the first violin
336	449·2	1877	Hipkins	Covent Garden Opera, pitch of the harmonium
337	449·4	1860	E.	London, from Griesbach's c''534·5, tuned for the Society of Arts as c''528; he tuned a' as 445·7
338	449·7	1879	Hipkins	London, Covent Garden opera, taken from organ a' during performance
..	449·8	1859	Fr. Com.	Prague, opera
339	449·9	1877	E.	London, from copy of Collard's standard fork
340	450·3	1856	Lissajous	Milan, opera
..	450·5	1848 & 1854	Delezenne	Lille, from forks tuned by the oboist Colin, during the performances of <i>Robert le Diable</i> , 27 April 1854, between the acts, and carefully verified
341	450·6	1877	E.	Glasgow Public Halls organ, from fork settled by the organist W. T. Best and the late H. Smart, lent me by the builder Lewis
342	450·9	1880	Cross & Miller	U.S. America, Boston Music Hall, reduced from pipe c271·2 at 70° F.
345	451·5	1858	Fr. Com.	Russian opera, from a c'' fork, probably miscalculated, as the a' from Broadwoods' c'' forks were
345	451·7	1874	E.	Belgian army pitch, reduced from Koenig's 451 vib. by his old standard, and also measured from copy sent by Mahillon. On 19 March 1885 the Belgian Government adopted French pitch, A435
..	..	1867	Lissajous	Milan, Scala Theatre
..	..	1880	Cross & Miller	U.S. America, New York, from Chickering's c268·5 standard fork
346	451·9	1878	E.	British Army regulation, from fork lent by Dr. W. H. Stone
..	452	1885	E.	The International Inventions and Music Exhibition of 1885 adopted this as the pitch of all instruments for the Exhibition, being the nearest whole number to the next preceding and next following. The fork was verified by myself

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	<i>a'</i>	Date	Observer	Place and other particulars
6. <i>Modern Orchestral Pitch, and * Church Pitch Medium</i> — <i>continued.</i>				
349	452·5	1852-1874	E.	London, mean of the pitch of the Philharmonic Band under the direction of Sir Michael Costa 1846-54, tuned during that period by Mr. J. Black of Broadwoods', approved by Sir Michael Costa, and recorded by Mr. Hipkins, who lent me the fork. Used as Broadwoods' highest till 1874, No. 3 of French Commission
"	"	1880	Chambers & E.	Newcastle-on-Tyne, Schulze's Tynedock organ, from a fork tuned by Mr. Ch. Chambers, Mus. B.
350	452·9	1878	E.	Kneller Hall Training School for Military Music, from a fork lent by Dr. W. H. Stone
"	453	1645	Schmahl	*Holstein, Glückstadt organ, built 1645, improved by Schmitzer 1665, measured 1879
354	453·9	1878	E.	London, Willis's concert organ pitch, to which he tuned the large organs in the Albert Hall and Alexandra Palace, from pipe <i>c''</i> 543·2 at 65° F., and 541·2 at 61·5° F.
"	454	1862	Naeke	Vienna, piano of Kapellmeister Esser, while the orchestra was at <i>a'</i> 466, the regular fork at <i>a'</i> 456·1, and the piano of the other Kapellmeister Proch at <i>a'</i> 445
355	454·1	1877	E.	Crystal Palace, from a fork <i>c''</i> 540 lent by Mr. Hipkins, to which the piano for concerts was tuned
"	454·2	1715c	E.	London, very old fork found at Brixton 1878 of the same make as Rev. G. T. Driffield's tenor <i>a</i> , see <i>a'</i> 419·9
357	454·7	1874	E.	London, from <i>c''</i> 540·8, a fork representing the highest pitch of the London Philharmonic observed by Mr. Hipkins since 1874; at the suggestion of Mr. Charles Hallé, used as Broadwoods' highest pitch
"	"	1879	E.	London, Messrs. Steiunway's London pitch
"	"	1878	E.	London, Messrs. Bryceson's band pitch, to which they tuned their organ in St. Michael's, Cornhill, London
358	455·1	1877	Hipkins & E.	London, Wagner Festival at Albert Hall, temperature probably 61·5° F., see above <i>a'</i> 453·9
359	455·2	1749	Schmahl & E.	Hamburg, old <i>positiv</i> or chamber organ, built by Lehnert, in possession of Herr Schmahl
"	455·3	1879	E.	London, Erard's concert pitch, from their fork
"	455·5	1859	Fr. Com.	Belgium, band of Guides; probably no such fork existed. M. Bender used to give the pitch on a small clarinet, from which M. Mahillon has a fork of at least <i>a'</i> 456
362	455·9	1877	E.	London, fork used by one of Chappell's tuners, lent me by Dr. Stone
"	456·1	1880	Cross & Miller	U.S. America, Cincinnati, pitch used in Thomas's orchestra. [This is said by de la Fage to have been the pitch sent by Bettini in 1857 for the London Italian opera—evidently an error]
"	"	1859a	E.	Vienna, fork tuned for me by the pianoforte makers Streicher in Vienna from a fork in their possession, giving the celebrated 'sharp Vienna pitch' before the introduction of the French <i>Diapason Normal</i> . Naeke says he heard <i>a'</i> 466 in the actual playing of the orchestra
366	457·2	1879	E.	U.S. America, New York, from a fork obtained for me by Messrs. Steinway as representing their American pitch
369	458·0	1880	Cross & Miller	U.S. America, New York, from a fork furnished by R. Spice as Steinway's pitch
380	460·8	"	"	U.S. America, highest New York pitch, from a fork furnished by R. Spice; these two last are sharper than the next, but they are put first because they belong to modern orchestral or pianoforte pitch

TABLE I.—HISTORICAL PITCHES IN ORDER FROM LOWEST TO HIGHEST—*continued.*

Cents	<i>a'</i>	Date	Observer	Place and other particulars
7. Church Pitch, High.				
368	457·6	1640c	E.	Vienna, Great Franciscan organ, stated by organ-builder Ullmann to be 240 years old in 1878, and to possess its original pitch; only used for leading the ecclesiastical chants
429	474·1	1668	E.	England, in the <i>Pars Organica</i> of Tomkins's <i>Musica Deo Sacra</i> as quoted in Sir F. A. Gore Onseley's <i>Collection of the Compositions of Orlando Gibbons</i> , 1873, makes the <i>f</i> pipe 2½ feet long
„	„	1688	Armes & E.	Durham, Bernhardt Schmidt's original organ at Durham, which had both <i>ab</i> and <i>g'</i> . The pipe I measured in Feb. 1879 as <i>a'</i> 443·1 had been shifted, and was originally <i>g'</i> , which gives the above pitch. This results from an examination of the original pipes by Dr. Armes, the organist
„	„	1708	E.	Chapel Royal, St. James's, Bernhardt Schmidt's organ, now in Mercers' Hall, which I found on examination had had the pipes shifted a great Semitone. Handel played on this organ, and hence his note ordering the voice parts of an anthem written for the Chapel Royal to be transposed one Tone, and the organ part <i>two</i> Tones, referred to this organ
„	„	1748	E.	The Jordans' organ, Botolph Lane, from indications by Mr. T. Hill
454	480·8	1879	Degenhardt & E.	Hamburg, St. Catherine Kirche, built by Hans Stellwagen in 1543, and frequently repaired. Herr Degenhardt, the organist, declares that even at the last repairing, 1867-9, the pitch was not altered. The original pitch, however, is doubtful, and Herr Schmahl thinks it was altered formerly
465	484·1	1878	Jimmerthal	Lübeck Cathedral, small organ, which according to the organist Jimmerthal has its <i>g'</i> in unison with the pipe on Schulze's new great organ there, which gives French <i>a'</i> in summer at 68° F.; whence the above was calculated at 59° F.
484	489·2	1688	Schmahl & E.	Hamburg, St. Jacobi Kirche, built by Schnitger of Harburg originally in equal temperament, played on and approved by J. Sebastian Bach; pitch determined from an old pipe preserved in the organ case. Herr Schmahl the organist is accustomed to transpose all music at sight one Tone lower, which brings it to French pitch
8. Church Pitch, Highest.				
502	494·5	1879	Schmahl & E.	Hamburg, St. Jacobi Kirche, present pitch, used since 1866 in order to agree with Scheibler's forks, taking his <i>a'</i> 440 for <i>g'</i>
506	495·5	1700	Schmahl	Holstein, Rendsburg, a large organ recently broken up
534	503·7	1636	E.	Paris, Mersenne's <i>ton de chapelle</i> with <i>G</i> 112·6 on the French four-foot pipe, this being the lowest note of his own voice
535	504·2	1511	E.	Heidelberg, from a model after Arnold Schlick, who recommends that his 6½-foot Rhenish pipe, having 301·6 vib., should give <i>F</i> or <i>c</i> . If it gives <i>F</i> we have <i>a'</i> 377, if it gives <i>c</i> we have the present pitch
541	505·8	1361	E.	Halberstadt organ, built 1361, repaired 1495, described by Prætorius, who gives the dimensions of the largest pipe <i>B</i> , whence constructing a model I arrived at the above pitch, confirmed by the four preceding pitches

TABLE I.—HISTORICAL PITCHES IN ORDER FROM HIGHEST TO LOWEST—*continued.*

Cents	<i>a'</i>	Date	Observer	Place and other particulars
9. Chamber Pitch, Highest, and Church Pitch, Extreme.				
726	563·1	1636	E.	Paris, Mersenne's chamber pitch calculated from <i>F</i> being the pipe of 4 French feet giving 112·6 vib. See <i>Harmonie Universelle</i> , liv. 3, p. 143, but from faulty measurements Mersenne makes this pipe to have only 96 vib. But even with that assumption the pitch would be <i>a'</i> 480·1, as at Hamburg, St. Catherine Kirche; but compare the next entry
740	567·3	1619	E.	North German church pitch, called by Prætorius chamber pitch, taken as a meantone Fourth (503 cents) above Prætorius's 'suitable pitch' <i>a'</i> 424·2, which see

TABLE II.—CLASSIFIED INDEX TO TABLE I.

The countries are arranged in alphabetical order: I. Austro-Hungary; II. Belgium; III. England, including Scotland and Ireland; IV. France; V. Germany; VI. Holland; VII. Italy; VIII. Russia; IX. Spain; X. United States of America, which for musical purposes are included in Europe.

Under each country the pitches are classified as: 1. Standards; 2. Old Forks; 3. Church Organs; 4. Concert Organs; 5. Operas; 6. Concerts, including Conservatoriums; 7. Pianofortes; 8. Military Music; 9. Other instruments.

The cents and pitch are as in the former table, to which, therefore, immediate reference can be made.

Within each division the pitches are arranged first geographically and then chronologically, but for England the organs by the same makers are generally put together.

The mark „ means that the number or date above is to be repeated, and — that the date or place is unknown.

The pitches are cited with the greatest brevity which will allow of identification.

Date	Place	Pitch	Cents	<i>a'</i>
I. AUSTRO-HUNGARY.				
3. Church Organs.				
1640c	Vienna	Large Franciscan organ	368	457·6
1780	„	Organ-builder Schulz	225	421·3
1878	„	St. Stefan	313	443·2
„	„	Small Franciscan organ	311	442·7
5. Opera.				
1834a	„	Scheibler, fork I.	276	438·9
„	„	„ „ II.	286	436·5
„	„	„ „ III.	298	439·4
„	„	„ „ IV.	301	440·3
„	„	„ „ V. (Blahetka)	304	441·1
„	„	„ „ VI. ('monstrosity')	321	445·1
„	„	Vienna Old Sharp Pitch	362	456·1
1878	„	Ullmann	327	446·8
1859	Pesth	Fr. Com.	323	446·0
„	Prague	„ „	338	449·8
6. Concerts.				
1845	Vienna	Marloye (Conservatoire)	321	445·4
7. Pianofortes.				
1780	„	Stein, for Mozart	226	421·6
1862	„	Esser, per Naeke	354	454·0
„	„	Proch, „	320	445·0
II. BELGIUM.				
1. Standards.				
1879	Brussels	Mahillon's Army Standard	345	451·7

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	<i>a'</i>
II. BELGIUM— <i>continued.</i>				
5. Opera.				
1859	Brussels	Bender's pitch	310	442·5
6. Concerts.				
"	Liège	Conservatoire	331	448·0
8. Military Instruments.				
"	Brussels	Band of Guides (Fr. Com.)	359	455·5
III. ENGLAND, SCOTLAND, AND IRELAND.				
1. Standards.				
1842	London	Hullah's <i>e''</i> 512, really 524·8	305	441·3
1860	"	Society of Arts intended <i>e''</i> 528	310	444·0
"	"	Griesbach's attempt at <i>e''</i> 528 = 534·5	337	449·5
"	"	Griesbach's <i>a'</i> to his <i>e''</i>	322	445·7
"	"	Cramer's <i>a'</i> and <i>e''</i>	333	448·4
1877a	"	Tonic Solfa College	250	427·5
1877p	"	" " "	230	422·5
2. Old Forks.				
—	"	Faraday's	237	424·3
1715c	"	Rev. G. T. Driffield's <i>a</i>	219	419·9
"	"	Fork found buried at Brixton, <i>a</i>	355	454·2
1751	"	Handel's own fork	230	422·5
1800c	"	Broadwoods' <i>e''</i>	231	422·7
"	Plymouth	Dr. Stainer's <i>a'</i>	238	424·6
1846c	London	Bryceson's <i>e''</i>	270	432·3
3. Church Organs and Bells, and Organ-builders' Church Standards.				
1625	Lavenham	Church Bell <i>d'</i> 288·4	265	431·3
1668a	London	Tomkin's Rule	429	474·1
<i>Bernhardt Schmidt :</i>				
1660	"	Whitehall, original	—	—
—	"	" altered	308	441·7
1683	Durham	Original	429	474·1
1815p	"	(Altered)	312	443·1
1879a	"	(New, by Willis)	318	444·7
1690	Hampton Court	Chapel	308	442·0
"	"	Old pipe of original	307	441·7
1708	London	St. James's Chapel Royal, original	429	474·1
1759	Cambridge	Trinity College, after shifting	114	395·2
1683	Temple	Original	—	—
1879	"	Altered	317	444·3
<i>T. & R. Harris :</i>				
1666	Worcester	Cathedral	280	437·1
<i>Renatus Harris :</i>				
1670	Newcastle	St. Nicholas	255	428·7
1696	London	St. Andrew Undershaft	251	427·7
1700	"	St. John's, Clerkenwell	215	419·0
1878a	Norwich	(?) Cathedral	249	427·2
<i>Green :</i>				
1778	London	St. Katharine's, Regent's Park	233	423·2
1780	Winchester	Restoration of College organ	220	420·1
1788	Windsor	St. George's Chapel	251	427·8
1790	Kew	Parish Church	230	422·6
—	Dublin	Trinity College (altered ?)	287	436·8
<i>Christian Smith :</i>				
1696	Boston Line.	Parish Church (restored ?)	295	438·9
<i>Glyn & Parker :</i>				
1749	London	All Hallows the Great and Less	237	424·3
<i>Schreider & Jordans :</i>				
1730	Westminster	Original	—	—
1820a	"	(Altered)	230	422·5

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	<i>a'</i>
III. ENGLAND, SCOTLAND, AND IRELAND— <i>continued.</i>				
3. Church Organs, &c.— <i>continued.</i>				
1740p	London	<i>Schnetzler:</i> German Chapel Royal	242	425·6
1764	Halifax	Parish Church	"	"
—	Barking	<i>Byfield & Green:</i> Original probably	429	474·1
1855	"	(Restored by Walker)	298	439·5
—	Shrewsbury	<i>J. Byfield & J. Harris:</i> Original	—	—
1826	"	(Altered by Blythe)	—	—
1847	"	(Altered by Gray & Davison)	275	433·6
1740	Gt. Yarmouth	<i>Byfield, Jordan, & Bridge:</i> St. George's Chapel	244	425·9
1744	Maidstone	<i>Jordans:</i> Old Parish Church	289	437·4
1748	London	St. George's, Botolph Lane	424	474·1
—	Fulham	Parish Church (altered?)	262	430·4
1838	Bath	<i>Smith of Bristol:</i> Abbey Church	230	422·5
1843	Wimbledon	<i>Walker:</i> Parish Church	246	426·5
1878	London	<i>Bryceson:</i> St. Michael's, Cornhill	357	454·7
—	Newcastle	<i>Schulze:</i> Tynedock	350	452·8
1879a	Salisbury	<i>H. Willis:</i> Cathedral	320	445·2
"	Glasgow	Established Church Cathedral	"	"
"	Edinburgh	Episcopalian Cathedral	"	"
"	London	St. Paul's, present state (like the other three at 59° F., but) at 57°·5 F.	318	444·6
<i>Organ-builders' Standard Pipe.</i>				
1878	"	Bishop, <i>c''</i> 518·5	284	436
"	"	Gray & Davison, <i>c''</i> 523·2	300	440
"	"	Walker, <i>c''</i> 523·6	301	440·2
"	"	Bevington, <i>c''</i> 523·7	302	440·5
"	"	Lewis, <i>c''</i> 524·4	304	441·0
"	"	Hill, <i>c''</i> 525·3	307	441·7
"	"	Bryceson, <i>c''</i> 527·3	313	443·4
"	"	H. Willis (church), <i>c''</i> 529·4	320	445·2
<i>Experiment of English 1-foot Pipes.</i>				
Diam. 1·2 inch; wind 2½ inch.; vib. 477·0				
taken as <i>c''</i> gives			133	398·7
" " <i>b'</i> " } in meantone temperament			247	426·6
" " <i>b''</i> " }			323	445·8
" " <i>a'</i> " }			440	477·0
Same diam.; wind 3¼ inch.; vib. 478·7				
taken as <i>c''</i> gives			136	400·2
" " <i>b'</i> " } in meantone temperament			253	428·2
" " <i>b''</i> " }			329	447·4
" " <i>a'</i> " }			446	478·7
Bernhardt Schmidt's, same dimensions; wind 2½ inch.; vib. 472·9				
taken as <i>c''</i> gives			115	395·3
" " <i>b'</i> " } in meantone temperament			231	423·0
" " <i>b''</i> " }			308	442·0
" " <i>a'</i> " }			425	472·9
Diam. ·95 inch; wind 3¼ inch.; vib. 488·7				
taken as <i>c''</i> gives			171	408·5
" " <i>b'</i> " } in meantone temperament			289	437·1
" " <i>b''</i> " }			365	456·7
" " <i>a'</i> " }			482	488·7
Diam. ·75 inch.; wind 3¼ inch.; vib. 498·6				
taken as <i>c''</i> gives			206	416·8
" " <i>b'</i> " } in meantone temperament			323	446·0
" " <i>b''</i> " }			400	466·0
" " <i>a'</i> " }			516	498·6

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	a'
III. ENGLAND, SCOTLAND, AND IRELAND— <i>continued.</i>				
4. Concert Organs.				
1805	London	<i>Elliott</i> : Ancient Concerts from d''568·3	239	429·9
1867	"	<i>Walker</i> : Exeter Hall, original	323	445·8
1879	"	" " sharpened	328	447·3
1877	Gloucester	" Festival organ	329	447·7
"	Glasgow	<i>Lewis</i> : Public Halls	341	450·6
1877a	London	<i>H. Willis</i> : Concert Standard at Albert Hall and Alexandra Palace	354	453·9
1877	"	Albert Hall observed at 61·5° F.	358	455·1
"	Sydenham	<i>Gray & Davison</i> : Crystal Palace	355	454·1
"	London	<i>Bryceson</i> : Band pitch	357	454·7
5. Opera.				
1857	"	Opera, Bettini's fork (correct?)	362	456·1
1877	"	<i>Covent Garden</i> Harmonium	336	449·2
1878	"	Organ (Bryceson's fork)	305	441·2
"	"	Harmonium	329	447·5
1879	"	Organ (heard)	322	445·6
"	"	Band (performing)	338	449·7
1880	"	Theatre fork (season 1880)	282	435·4
"	"	<i>Her Majesty's</i> : Organ	285	436·1
1879	"	Band (performing)	320	445·5
1880	"	Theatre fork	319	444·9
6. Concerts.				
1813–	"	<i>Philharmonic</i> : Copy of original fork	235	423·7
28	"	Another copy	233	423·3
1826	"	Approved by Sir G. Smart	272	433·0
1846–	"	Mean pitch while the concerts were under the direction of Sir M. Costa	349	452·5
1854	"	Highest	357	454·7
1874	"	Crystal Palace band	355	454·1
1877	Sydenham	Wagner Festival at Albert Hall	358	455·1
"	London			
7. Pianofortes.				
1826	"	Broadwoods' lowest, London No. 1 of Fr. Com.	272	433·0
1849–	"	medium, London, No. 2 of Fr. Com.	323	445·9
1854	"	copy now used.	324	446·2
1854p	"	copy made for Society of Arts.	321	445·5
1860	"	highest, London No. 3 of Fr. Com. (which calculated all these forks wrongly)	349	452·5
1852–	"	present highest	357	454·7
1874	"	Hipkins's Vocal pitch (meantone)	274	433·5
1874p	"	" " (equal)	284	436·0
1846a	"	Collard	339	449·9
1846p	"	Erard	359	455·3
1877	"	Steinway (in England)	357	454·7
1879	"	Chappell	362	455·9
1877	"			
8. Military Music.				
1878	"	British Army regulation	346	451·9
"	"	Kneller Hall Training School	350	452·9

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	a'
IV. FRANCE.				
1. Standards.				
<i>One French foot pipe:</i>				
1648	Paris	Mersenne <i>c'</i> 447	17	373·7
1766	"	Dom Bédos <i>c'</i> 450·5	31	376·6
1854	"	Delezenne, <i>c'</i> 446·4	15	373·1
1700p	"	Pitch-pipe at Faculty of Sciences	178	410
1832	"	de Prony's proposal	307	441·7
1834	"	Marloye's	262	430·5
1858	"	Cavaillé-Coll's proposal	316	444·0
"	"	Fr. Com.	280	435·0
1859	"	Diapason Normal, at Conservatoire	282	435·4
2. Old Forks.				
1700c	Lille	Mazingue's	66	384·3
1754	"	François's	230	422·6
1800c	"	Cohen's	255	428·7
1854a	"	Delezenne's	292	432·9
1859a	"	Marquis d'Aligre's	277	439·4
1810c	Paris	Lemoine's	260	430·0
3. Church Organs.				
1636	"	Mersenne's <i>ton de chapelle</i>	534	503·7
1700a	Lille	L'Hospice Comtesse	19	374·2
1789	Versailles	Palace Chapel, fork at Conservatoire	117	395·8
1818	Paris	Tuileries Chapel	278	434·3
1840	"	St. Denis (Cavaillé-Coll)	317	444·3
1851a	Lille	St. Sauveur	69	354·6
"	"	La Madeleine (restored)	129	398·7
"	"	St. André	269	432·2
4. Concert Organ.				
1851	"	Festival organ	327	446·8
5. Opera.				
<i>Grand Opera:</i>				
1811	Paris	Scheibler	248	427·0
1819	"	Cagniard de la Tour	276	434·0
1822	"	Fischer	267	431·7
1824	"	lowered for Branchu	243	425·8
1829	"	recovered pitch	276	434·0
"	"	orchestral pitch	300	440·0
1834c	"	Scheibler's Petitbout	276	434·0
1836-	"	Delezenne's Leibner	304	441·0
1839	"	" forks	289	437·4
1854a	"	Lissajous and Ferrand	335	449·0
1855	"	Bodin	323	445·8
1856	"	Fr. Com.	331	448·0
1858	"	<i>Italian Opera:</i>		
1823	"	Fischer	237	424·2
1856	"	Bodin	329	447·4
<i>Opéra Comique, or Feydeau.</i>				
1820	"	fork at Conservatoire	232	423·0
1823	"	Fischer	250	427·6
1836	"	Cagniard de la Tour	304	441·0
<i>Provincial Opera:</i>				
1859	Bordeaux	Fr. Com.	312	443·6
1838-	Lille	Delezenne	340	450·5
54				
1859	Lyons	Fr. Com.	331	448·0
"	Toulouse	"	310	442·5
6. Concerts.				
1836	Paris	Mersenne's <i>ton de chambre</i>	726	563·1
1812	"	Conservatoire, fork there	298	439·5

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	<i>a'</i>
IV. FRANCE— <i>continued.</i>				
6. <i>Concerts</i> — <i>continued.</i>				
1834a	Paris	Conservatoire, Scheibler I.	282	435·3
"	"	" " II.	303	440·9
"	"	" " III. (Gand)	282	435·2
1856	"	de la Fage	324	446·2
1859	Toulouse	Fr. Com.	288	437·0
"	Marseilles	" "	327	447
7. <i>Pianofortes, Spinets, &c.</i>				
1648	Paris	Mersenne's spinet	148	402·9
1713	"	Sauveur	163	406·6
1788	"	Pascal Taskin	174	409·0
1829	"	Piano of opera	242	425·5
1836	"	Wölfel's	313	443·3
V. GERMANY.				
1. <i>Standards.</i>				
1619	Brunswick	Prætorius's suitable pitch	237	424·2
1834	Stuttgart	Scheibler's pitch (reduced to 59° F.) adopted at the Congress of Physicists	301	440·2
2. <i>Old Forks.</i>				
1740–1812	Eutin	F. Anton von Weber's	236	424·1
1780	Dresden	Kirsten's	229	422·3
1800	—	Kummer's	239	424·9
3. <i>Church Organs</i> (in order of date).				
—	N. Germany	Prætorius (called by him <i>chamber pitch</i>) highest recorded	740	567·3
1361	Saxony	Halberstadt	541	505·8
1511	Heidelberg	Schlick, high pitch	535	504·2
"	"	" low pitch	33	377·0
1543	Hamburg	St. Catherine (in 1879)	454	480·8
1615	Palatinate	Salomon de Caus	119	396·4
1645	Holstein	Glückstadt	350	453·0
1688	Hamburg	St. Jacobi, low stop, old pitch	184	411·4
"	"	" high stops, "	484	489·2
1700c	Holstein	Rendsburg	506	495·5
1714	Saxony	Freiberg Cathedral, Silbermann	217	419·5
1713–1716	Strassburg	Minster, A. Silbermann	104	393·2
1722	Saxony	Dresden, St. Sophie	201	415·5
1749	Hamburg	Lehnert's <i>positiv</i>	351	455·2
1754–1824	Dresden	Chained fork of the Roman Catholic Church	199	415·0
1762	Hamburg	Mattheson's St. Michaelis	169	407·9
1833	Weimar	Töpfer's pipe	237	424·4
1878	Dresden	Roman Catholic Church	212	418·1
"	Lübeck	Cathedral, old organ	465	481·1
1879	Hamburg	St. Jacobi, modern pitch	500	494·5
5. <i>Opera</i> (arranged by towns).				
1822	Berlin	Fischer's Pichler's fork	289	437·3
1834	"	Scheibler, 'trustworthy'	307	441·8
1815–1821	Dresden	Naeke's fork of Weber's time	233	423·2
1859	"	Fr. Com.	304	441·0
1878	"	Jehmlich's fork	297	439·4
1859	Brunswick	Fr. Com.	278	443·5
"	Carlsruhe	"	280	435·0
"	Gotha	"	313	443·3
"	Weimar	"	319	444·8
"	Stuttgart	"	312	443

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	a'
V. GERMANY— <i>continued.</i>				
<i>Opera</i> (arranged by towns)— <i>continued.</i>				
1859	Munich	Fr. Com.	332	448·1
1869	Baden	Sent to Society of Arts	278	434·5
"	Württemberg	Similar " " sent from Berlin and Munich, which had adopted French pitch	288	436·9
1879	Hamburg	Opera under Krebs	331	448·0
6. <i>Concerts.</i>				
—	"	Old orchestral pitch	320	445·0
1859	Leipzig	Conservatoire Fr. Com.	334	448·8
"	Württemberg	Fr. Com.	319	444·8
1869	Leipzig	Gewandhaus, sent to Society of Arts	332	448·2
9. <i>Instruments.</i>				
1776	Breslau	Marpurg	196	414·4
—	—	Nacke's Schneider's oboe	191	413·3
VI. HOLLAND.				
3. <i>Church Organs.</i>				
—	—	The old celebrated Church organs had all been altered, and I have not succeeded in recovering their ancient pitch	—	—
6. <i>Concerts.</i>				
1859	The Hague	Fr. Com.	334	446·2
VII. ITALY.				
1. <i>Standards.</i>				
1720	Rome	Pitch-pipes of Dr. R. Smith	114	395·2
1730c	Padua	Mean of pitch-pipes of the bell-foundry of Colbacchini	241	425·2
1780c				
2. <i>Old Forks.</i>				
1730c	"	From Colbacchini's low f''	152	403·9
1780c	"	" " high f''	230	422·6
5. <i>Opera.</i>				
1845	Florence	Marloye	287	436·7
"	Milan	"	326	446·6
"	Turin	"	299	439·4
1856	Milan	Fr. Com.	349	450·3
1857	"	La Scala (de la Fage)	345	451·7
"	Naples	San Carlo (Guillaume)	319	444·9
1859	Turin	Fr. Com.	319	444·8
6. <i>Concerts.</i>				
1869	Bologna	Liceo Musicale (Society of Arts)	312	443·1
7. <i>Pianofortes.</i>				
1839	"	Tadolini's fork	243	425·8
VIII. RUSSIA.				
3. <i>Church Organs.</i>				
1781	St. Petersburg	Euler	211	418·0
1860	"	Court Church	224	421·2
5. <i>Opera.</i>				
1802	"	Sarti	284	436·0
1858	"	Fr. Com. (French pitch was afterwards adopted)	345	451·5

TABLE II.—CLASSIFIED INDEX TO TABLE I.—*continued.*

Date	Place	Pitch	Cents	a'
IX. SPAIN.				
3. <i>Church Organs.</i>				
1785	Seville	T. Bosch's organ	218	419·6
1858	Madrid	Ton de Chapelle	218	419·6
5. <i>Opera.</i>				
"	"	Theatre (French pitch adopted in 1879)	318	444·5
X. UNITED STATES OF AMERICA.				
1868	New York	E. S. Ritchie's standard, and Mason & Hamlin's French pitch	283	435·9
1880	Boston	Church of Immaculate Conception	315	443·9
"	New York	Hutchings, Plaisted & Co., 'low organ pitch'	316	444·2
"	"	Nichol's Fork, Germania orchestra	333	448·5
"	Boston	Music Hall organ (from 1863 to 1871 at French pitch)	342	450·9
"	Cincinnati	Organ tuned to Thomas's orchestra	362	456·1
1879	New York	Steinway's American pitch, from a fork furnished by Steinway	366	457·2
1880	"	Steinway's, from a fork furnished by R. Spice	369	458·0
"	"	Highest New York pitch, from a fork furnished by R. Spice	380	460·8

CONCLUSIONS.

Art. 6. The two preceding tables contain the facts of the history of musical pitch in Europe since 1361, the date of the Halberstadt organ, that is for 500 years, so far as I have been able to collect information, and I have been fortunate enough to bring together such an amount of historical evidence that probably no new facts could be ascertained which would materially change the conclusions to which I have been led. These are very briefly as follows.

Art. 7. The organ was originally a mere collection of pitch-pipes, each with a fixed tone, to steady the voice of the singers of ecclesiastical chants, replacing the single pitch-pipe with a movable piston or some instrument like the flageolet (whistle) and oboe, which subsequently gave rise to the two distinct series of flue and reed pipes. But when thus collected it was necessary to fix a pitch. The guiding principles were the compass of the male voice, the rules of ecclesiastical song, the ease of the performer, to avoid introducing chromatics as much as possible (Schlick), and the standard measure or foot rule of the country. The latter suggested a whole number of feet for the length of the standard pipe, generally four feet, about the lowest note of the tenor voice, and the question thus rose what note should this tone represent? Here the answer came from ecclesiastical use,—either *F'* or *c*. Schlick recommends both, thus giving pitches for any given note a whole Fourth apart. Schlick's high pitch, arising from giving a $6\frac{1}{2}$ -foot Rhenish pipe to *c*, made $a'504\cdot2$. (All pitches named should be referred to in Table I.) His low pitch arising from giving the *same* pipe to *F'*, made $a'377$. These are a Meantone Fourth apart.

Art. 8.—The foot had very different lengths in different countries. If we suppose the 'scale' (or ratio of diameter to length of pipe) and the force of wind to remain the same (both in fact varied much), then the influence of the length of the foot on the pitch of the organ, supposing the four-foot or one-foot pipe to be given to the same note, may be appreciated from the table on p. 512*a*. In this we see a difference of more than a Tone, nearly a minor Third, between the pitch of a 1-foot pipe in France and in Saxony. The difference between the pitches of pipes of the lengths of

the English foot and French foot is more than an equal Semitone. Hence probably it happened that the lowest French pitch measured, $a'374\cdot2$, is a Semitone flatter than the lowest English pitch measured $a'395\cdot2$. Length of foot alone would therefore account for great variety of organ-pitch, to which we must add force of wind (see the notes on experimental English 1-foot pipes, p. 506*c*) and different methods of voicing. The low pitches were (and still are on old organs) prevalent in France and Spain, the high pitches were at home in North Germany (see Table II.).

Names of Feet	Length		Interval
	mm.	cents	
Long old French foot, or <i> pied de roi</i>	325	0	
Long Austrian foot	316	49	
Long German, or Rhenish foot	314	60	
ENGLISH FOOT	305	109	
Old Nürnberg foot	304	116	
Old Augsburg foot	296	162	
Old Roman foot (medieval)	295	168	
Bavarian foot	292	185	
Short Hamburg and Danish foot	286	221	
Short Brunswick and Frankfurt foot	285	227	
Short Saxon foot	283	239	

Art. 9.—The solo instruments were tuned very variously. But it became the custom to have a band to play with the organ, and the princes and petty dukes used the same bands to play in their private apartments or ‘chamber.’ The very high and very low pitch were generally found unsuitable for non-ecclesiastical music. Hence the instruments usually adopted a pitch lower than the high and higher than the low, and this was called ‘chamber pitch,’ the other being distinguished as ‘church pitch.’ But the same instruments had also to play with the organ. Hence the difference had to be a definite number of degrees of the scale, a Semitone, a Tone, or a minor Third. See *a*’407·9, and especially *a*’411·4, which compare with *a*’480·8, and *a*’484·1 respectively. This was, however, not always the case, for the very high church pitch, *a*’503·7 had a still higher chamber pitch *a*’563·1.

Art. 10.—But this great variety occasioned much trouble, and the chamber pitch below the high and above the low church pitch seems to have suggested Praetorius’s ‘suitable pitch’ of *a*’424·2 in 1619. This was in fact a ‘mean pitch,’ and as such rapidly found such favour that it spread over all Europe and, with insignificant varieties (from *a*’415 to *a*’428·7 at the extremes, an interval of 54 cents, or a quarter of a Tone), prevailed for two centuries. Handel’s own fork, *a*’422·5 in 1751, quite a common pitch at the time, and the London Philharmonic fork, *a*’423·3 from its foundation to 1820, are conspicuous examples, but an inspection of the numerous pitches cited in Table I. sect. 4 (pp. 495*d*–7), will prove the fact beyond doubt.

Art. 11.—As this was the period of the great musical masters, and as their music is still sung, and sung frequently, it is a great pity that the pitch should have been raised, and that Handel, Haydn, Mozart, Beethoven, and Weber, for example, should be sung at a pitch more than a Semitone higher than they intended. The high pitch strains the voices and hence deteriorates from the effect of the music, when applied to compositions not intended for it. Of course for music written for a high pitch the compass of the human voice is properly studied (see App. XX. sect. N. No. 1), and so much music has in the last fifty years been written for a high pitch, that to perform both properly two sets of instruments would be required. Two sets are actually in use at Dresden, one for the theatre *a*’439·4, and one for the Roman Catholic Church having *a*’415, difference 98 cents, or about a Semitone.

Art. 12.—The rise in pitch began at the great Congress of Vienna, 1814, when the Emperor of Russia presented new and sharper wind instruments to an Austrian regiment of which he was colonel. The band of this regiment became noted for the brilliancy of its tones. In 1820 another Austrian regiment received even sharper instruments, and as the theatres were greatly dependent upon the bands of the home regiments, they were obliged to adopt their pitch. Gradually at Vienna, pitch rose from *a*’421·6 (Mozart’s pitch) to *a*’456·1, that is, 136 cents, or nearly three-quarters of a Tone. The mania spread throughout Europe, but at very different rates. The pitch reached *a*’448 at the Paris Opera in 1858, and the musical world took fright.

Art. 13.—The Emperor of the French appointed a commission to select a pitch, and this determined on *a*’435, but made a fork called *Diapason normal*, now found to be *a*’435·4, which is preserved at the Musée du Conservatoire, and is the only standard pitch in the world. This pitch was widely adopted, but it is 56 cents,

or over a quarter of a Tone, sharper than Mozart's pitch, although it was 80 cents, fully three-quarters of a Semitone, flatter than the old Vienna sharp pitch $a' 456.1$, and 49 cents, or a quarter of a Tone, flatter than the then French opera pitch $a' 448$. This pitch had been reached independently in many places, and the French commission had been twitted at taking a Carlsruhe pitch. But it is not generally known that Sir George Smart's pitch $a' 433$, adopted with much hesitation for the London Philharmonic Society about 1820, and extensively sold in London as the 'London Philharmonic' for many years before the French Commission of 1859, was in fact an anticipation of the French pitch. Both were compromises, a partial yielding to the new without entirely disregarding the old. The pitches $a' 430$ to $a' 436.9$, therefore (interval 28 cents, or about $\frac{1}{3}$ Tone), forming Table I. Sect. 5, pp. 497-8, are termed the 'compromise pitch.' As instruments exist for this pitch it is the only one that has a chance of being used beside the present sharp pitch of England. Several attempts have been made to restore it, notably at Covent Garden Opera in 1880. But the expense of new instruments for a band, about 1,000*l.*, renders any alteration extremely difficult to carry out. The tendency in England has been to sharpen, and our orchestral and pianoforte pitch is now from $a' 449.7$ to $a' 454.7$, a difference of only 19 cents, not quite a comma. In the United States, however, the pitch has reached $a' 460.8$, that is 23 cents, or about a comma more. In Germany the compromise pitch adopted was $a' 440.2$ as proposed by Scheibler, and it is curious that the standard pipes of the English church organ builders vary from $a' 436$ to $a' 445.2$, 36 cents, but are mostly between 440 and 441.7, an interval of only 7 cents. The concert organs, of course, follow orchestral pitch. (See *Postscript*, p. 555.) ¶

Art. 14.—In England the pitch of organs varied with the note on which the four-foot or one-foot pipe was placed. We have only one record that the one-foot pipe was placed on c'' giving $a' 395.2$, whereas the same pipe made to give b' produced $a' 423$, the mean pitch, which so long prevailed. Put on b'' it produced $a' 442$, which as $a' 441.7$ was Bernard Schmidt's low pitch, and is still the pitch of Mr. T. Hill, the organ-builder. Placed on a' it gave $a' 472.9$, which as $a' 474.1$ was the highest church pitch used in England, just a Tone above mean pitch. (See p. 505*c*, III. 3, for details.) ¶

Art. 15.—If we look into the secrets of the rise of pitch we find it always connected with wind instruments. The first rise was from a military band, and the wind and the brass have constantly rebelled against a low pitch. The singers have not prevailed against them except for a very short time. The great violin school of Cremona in Italy lived in the time of mean pitch with a higher chamber pitch, and the resonance of the boxes of their violins seems to shew traces of the action of both pitches (*suprà*, p. 87, note*), but their great object was to insure tolerable uniformity of reinforcement, and hence they are a treasure for all time.

Art. 16.—The only possible conclusion seems to be that to sing music written for pitches different from our own, we must either transpose a Semitone (always a difficulty, and for some instruments an impossibility) or adopt a new compromise pitch, the French, already once firmly rooted in England as Sir George Smart's, and standing half-way between the extremes. On the continent, as formerly shewn in France, and quite recently in Belgium and Italy, the government has a certain power in fixing musical pitch, by refusing to subsidise conservatories and theatres which do not adopt the pitch ordered, and commanding the regimental bands to make the change. But beyond this their power does not extend, and the various regulations which have been made in the two countries last named shew the great difficulties that have to be overcome in introducing a new pitch even within the area under government control. In England, however, there are no subsidised operas or musical conservatories, and even the instruments of the military bands are not provided by government. Hence the change must be left to the gradual action of musical feeling. We have already changed in England almost imperceptibly. The raising of English pitch from Sir George Smart's $a' 433$ was to a great extent due to the individual action of the late Sir Michael Costa while conductor of the Philharmonic concerts 1845-46 (mean $a' 452.5$, extreme $a' 454.7$), to whose insistence is also due the high pitch of the Albert Hall concert organ, $a' 453.9$. Perhaps a similar energetic conductor will arise to turn the tide of musical opinion in the opposite direction.