tonic

(1) The keynote of any scale. The ground tone or basis of a scale or key. (2) The key-chord in which a piece is written, and with which it concludes. [Stainer, John; Barrett, W.A.; A Dictionary of Musical Terms; Novello, Ewer and Co., London, pre-1900]

A letter system of notation. Many attempts have from time to time been made to produce a simpler notation than the stave, clefs, signature, etc. of the so-called "Old Notation". [Stainer, John; Barrett, W.A.; A Dictionary of Musical Terms; Novello, Ewer and Co., London, pre-1900]

Ramsay

"Moreover, he begins his calculations from F, the root of the Subdominant, instead of C, the root of the Tonic, which is the usual way." [Scientific Basis and Build of Music, page 8]

The subdominant, or lowest chord in the key - F, A, C, is the natural product of the first combination of the three primary ratios (2,3,5). Their second combination develops the tonic or middle chord C, E, G. The third combination develops the dominant or highest chord G, B, D.

keynote or root of F F A C - subdominant C E G - **Tonic** G B D - Dominant [Scientific Basis and Build of Music, page 17]

The center fifth of a key-system composed of three fifths. [Scientific Basis and Build of Music]

"lower effect than the fifth; the seventh, B, has a higher effect than the sixth; but the eighth, C, has a lower effect than the seventh. If the effects of notes or chords depended wholly on the mathematical primes by which they are measured and located, or the ratios inherent in them, then the effects of the tonic, subdominant, and dominant chords would have been alike, for these chords are measured by exactly the same primes, and have exactly the same ratios. It is the position of the **tonic chord** which gives it its importance and not any special primes by which it is produced, nor any special ratios inherent in it. Notes by the power of 2 have a pure unmixed and invariable character. Notes by the first, second, and third powers of 3 have different degrees of centrifugal force; and the character of the notes produced by the first power of 5 depends on the character of the notes from which they are derived. The final character of notes and chords is determined by the amount of force which they have acquired from the way in which they have been derived, and from their position in the system. And no matter where these notes may be afterwards placed, like chemical elements, they never lose their original forces and tendencies. What Tyndal says of the inorganic chemical elements of the brain is true of the inorganic notes of music, "They are all dead as grains of shot." It is the organic state which gives the notes and chords their gravities and levities, and these two tendencies, the one upward and the other downward, constitute the vital principle of music. It is true that the mathematical operation is required to give birth and life to music, and that the mathematical system gives the knowledge of causes down to the law of gravitation, yet the artistic effects are fully realized from the tempered system deriving its organic harmony from this vital principle of music. The centrifugal tendencies of the notes of the subdominant, are too strong to be at all disturbed by the system being tempered. The enormous power of these chords corrects the effect which might otherwise arise from tempering, as the enormous power of the sun corrects the perturbations of the planets." [Scientific Basis and Build of Music, page 29]

When the major scale has been generated, with its three chords, the subdominant, **tonic**, and dominant, by the primary mathematical ratios, it consists of forms and orders which in themselves are adapted to give outgrowth to other forms and orders by the law of duality and other laws. All the elements, orders, combinations, and progressions in music are the products of natural laws. The law of Ratio gives quantities, form, and organic structure. The law of Duality gives symmetry, producing the minor mode in response to the major in all that

belongs to it. The laws of Permutations and Combinations give orders and rhythms to the elements. The law of Affinity gives continuity; continuity gives unity; and unity gives the sweetness of harmony. The law of Position gives the notes and chords their specific levities and gravities; and these two tendencies, the one upward and the other downward, constitute the vital principle of music. This is the spiritual constitution of music which the Peter Bell mathematicians have failed to discern: [Scientific Basis and Build of Music, page 37]

If the effects of notes and chords had depended entirely on their mathematical ratios, then the effect of the subdominant, **tonic**, and dominant would have been alike; for these three chords have exactly the same ratios. It is the law of position which gives the tonic chord its importance, and not any special ratios embodied in its structure. The ratio of 2 to 1 has a pure, unmixed, invariable character, always realized in the interval of the octave. The notes produced from 1 by the first, second, and third powers of 3 have different degrees of centrifugal force. The character of the notes produced by the first power of 5 depends on the character of the notes from which they are derived, namely, 1, 3, and 9. The final character of the notes and chords derived by the same ratios is determined by the amount of force which they have acquired from the way in which they have been derived, and from their position in the system; and no matter where these notes may afterwards be [Scientific Basis and Build of Music, page 37]

The extremes of the levities and gravities of a key-system are always at the extent of three fifths; and whatever notes are adopted for these three fifths, the center fifth is the **tonic**. As there never can be more than three fifths above each other on the same terms, so there can never be more than one such scale at the same time. A fourth fifth is a comma less than the harmonic fifth¹; and this is Nature's danger-signal, to show that it is not admissible here. Nature does not sew with a knotless thread in music. The elements are so place that nothing can be added nor anything taken away without producing confusion or defect. What has been created is thus at the same time protected by Nature. [Scientific Basis and Build of Music, page 38]

Subdominant - The fifth below the tonic in a key. [Scientific Basis and Build of Music, page 63]

Tonic - The middle fifth in a key. [Scientific Basis and Build of Music, page 63]

Dominant - The fifth above the tonic in a key. [Scientific Basis and Build of Music, page 63]

Now we come to a remarkable arrangement of Nature. The minor does not grow in the same way out of this third chord's top. Two features come before us: first the minor chord grows out of the major, but it is *taken not from the middle*, from a rib out of his side. B, the middle of the major dominant chord; B, the last-born of the major genesis; B is the point of departure in the outgrowth of the minor mode. The feminine is a lateral growth from the masculine. Another feature: it *grows downward*, like a drooping ash or willow. Its first generated chord is its dominant, and its last is its subdominant. Its middle chord, like the middle one of the major, is its **tonic**. Still further, it is *generated by division*, not multiplication; B45 is divided by 3 and by 5 for the root and middle of this highest chord, E and G. E15 is divided by 3 and 5 for the root and **middle of the tonic chord**, A and C. A5 is divided by 3 and 5 for the root and middle of the elements of music, six generations of harmony, like the six days of creation. Up to this point the whole process and aspect is *inverse*; growing from a middle; growing downward; growing by division;-while the major is growing from the top; growing upward; growing by multiplication. But here the inverse aspect ends. The generating primes of the major are 3 and 5; 3 and 5 are also the generating primes of the minor. In this essential phase of their creation their comparison is *direct*, not inverse. [Scientific Basis and Build of Music, page 67]

The peculiar effects are exhibited when the *chord-scale* is next set forth. We have seen that there are six chords evolved in the genesis upward and downward, 3 in the major form and 3 in the minor. In the fifths of the minor the semitone is always in the lower third, occurring between the second and third in the subdominant and **tonic**, and between the first and second in the dominant chord; whereas in the major it is always in the upper third, between the fourth and fifth in the subdominant, and between the third and fourth in the **tonic** and dominant chords. While the thirds which the fifths contain are thus so varied, the fifths themselves have always one magnitude, whether major or minor. [Scientific Basis and Build of Music, page 68]

The number of Diatonic Chords. In the major there are three simple chords, two compound chords, and two

double compound, seven in all - subdominant, **tonic**, dominant, subdominant sixth, subdominant fourth, dominant seventh, and dominant ninth. In the minor there are the same number and order, making fourteen. It is not normal to the **tonic chord** to compound, but it may, in exceptional instances; the major tonic may, in a certain cadence, assume the top of the minor subdominant; and the **minor tonic** may assume, in a cognate case, the root of the major dominant.¹ [Scientific Basis and Build of Music, page 70]

"The whole of this mediatorial intervention on the part of the **tonic** is under the wondrous law of assimilation, which is the law of laws all through creation;" [Scientific Basis and Build of Music, page 71]

How far does this compounding process go? The dominant seventh has the first note of the subdominant; the dominant ninth has the second; if we should add a third note, where are we? G B D F A C; here would be the dominant with the whole of the subdominant welded to it; it would have to be called the dominant eleventh, and it has brought us right through to the root of the tonic C. What would be the use of such a chord? We might, in a similar way, add the dominant to the subdominant till we should be through to the tonic on the other side; it would be G B D F A C, and so we should have reached the top of the tonic G. This process shows us, however, that there is just a certain length that we can go, and there is satisfaction in seeing exhaustively that so it is. When the beautiful becomes the useless, it ceases to be the beautiful. [Scientific Basis and Build of Music, page 72]

There is nothing extraordinary in this. It is another fact which gives this one its importance, and that is that the musical system is composed of *three fifths* rising one out of another; so this note by 3/4 becomes the root not only of a chord, but the root of all the three chords, of which the middle one is the **tonic**; the chord of the balance of the system, the chord of the key; the one out of which it grows, and the one which grows out of it, being like the scales which sway on this central balance-beam. Thus F takes its place, C in the center, and G above. These are the 3 fifths of the system on its masculine or major side. The fractions for A, E, and B, the middle notes of the three chords, are 4/5, 3/5, and 8/15; this too tells a tale; 5 is a new ingredient; and as 3 gives fifths, 5 gives thirds. From these two primes, 3 and 5, along with the integer or unit, all the notes of the system are evolved, the octaves of all being always found by 2. When the whole system has been evolved, the numbers which are the lengths of the strings in the masculine or major mode are the numbers of the vibration-numbers of the notes of the major or masculine mode. These two numbers, the one for lengths and one for vibrations, when multiplied into each other, make in every case 720; the octave of 360, the number of the degrees of the circle. [Scientific Basis and Build of Music, page 76]

In a musical air or harmony, *i.e.*, when once a key has been instituted in the ear, all the various notes and chords seem animated and imbued with *tendency* and motion; and the center of attraction and repose is the **tonic**, *i.e.*, the key-note or key-chord. The moving notes have certain leanings or attractions to other notes. These leanings are from two causes, *local proximity* and *native affinity*. The attraction of native affinity arises from the birth and kindred of the notes as seen in the six-octave genesis, and pertains to their harmonic combinations. The attraction of local proximity arises from the way the notes are marshalled compactly in the octave scale which appears at the head of the genesis, and pertains to their melodic succession. In this last scale the proximites are diverse; the 53 commas of the octave being so divided as to give larger and lesser distances between the notes; and of course the attraction of proximity is strongest between the nearest; a note will prefer to move 5 commas rather than 8 or 9 commas to find rest. Thus far PROXIMITY. [Scientific Basis and Build of Music, page 91]

By affinity the notes group in chords. The **tonic** is the center chord, the key of the harmony; the dominant is the fifth above it and the subdominant the fifth below it, and these two are balanced on the center chord as the scales on a balance beam. The dominant chord is vigorous and active, tending to soar; the subdominant is solemn, soft, and grave, tending to sink; the tonic is melodious and restful, and in it the harmony finds equilibrium. This far AFFINITY. [Scientific Basis and Build of Music, page 91]

THE OPENING FOR MODULATIONS.

In passing from one key to another in the fellowship of keys in a composition, the new key *grows* out of the top of the dominant and converts the old dominant into a **tonic**. The dominant and subdominant being at the opposite extremes of the key, with the **tonic** between them, are not related by affinity. This want of affinity *makes an opening* in the system for the new chord to come in by, and it, being related by affinity to the chord of the old dominant, which is now the new **Tonic**, comes in and establishes itself and the new key for the time. It is this gap between subdominant and dominant, along with the affinity existing between the new key and the old dominant, which makes this musical event to be so gracefully accomplished. This is what is called *natural modulation*, the passing for a time into another key in the course of a composition; and its abundant and habitual use in music, even in the simplest chorales, shows how natural and acceptable it is. The young student will find illustrations in the second lines of the Psalm tunes - Watchman, Sicily, Tranquility, Eaton, Birmingham, Jackson, Bethel, Bedford, and Sheffield. Take Watchman, for example, and let the young student follow carefully, noting each chord of the little passage, which we shall analyse for his help. It is by such practice that he will become by-and-by familiar with the kinship of keys and the legitimate resources of harmony. [Scientific Basis and Build of Music, page 93]

This tune is in the key of E? Major, and the key into which it moves for a passage is the next above it, B? Major. The first chord, E? G B?, is the tonic; the second and third are the **tonic** and dominant; the fourth, C E? G, whose full form would be C E? G B?, is the compound subdominant of the new key, which suggests the approaching modulation. The next two chords, in which the measure closes, may either be viewed as the **tonic** and dominant of the key, or the subdominant and **tonic** of the new key. The second measure opens with the same chord which closes the first measure, and is best defined as the **tonic** of the new key; the second chord is clearly the dominant of the new key, and the whole of the second measure is in the new key, and reads, **T. D. S. T.** compound **D. T.** Some of these chords might be read as chords of the old key, so near to each other and so kindred are the contiguous keys. All contiguous keys to a certain extent overlap each other, so that some of the chords may be variously read as belonging to the one or to the other. [Scientific Basis and Build of Music, page 94]

In the opening of the third measure the tune returns to its own key by striking the **tonic**. This case is a very simple illustration of how a composition will move with perfect naturalness in more keys than one, the keys so *grow* out of each other, and may either merely snatch a passing chord from a new key, or pass quite into it for a phrase or two, or for a whole measure, then return as naturally, either by a smooth and quiet or by a strongly contrasted turn, according to the chords between which the turn takes place. In such modulation there may or there may not be marked a *#*, ?, or ?, in the air itself; the note which Nature *raises* in the new key may occur in one of the other parts of the harmony. In Watchman it is A, the fourth, which is altered; from being ? it is made ?. The change which takes place in the *sixth* of the scale, which is C in Watchman, is only *one comma*, the ratio of 80 to 81, and it slips into the new key as if nothing had happened. No mark is placed to it, as the comma difference is never taken notice of, although it is really and regularly taking place, with all the precision of Nature, in every new key. It is, however, only the note which is altered *four commas*, which is marked by a *#*, ?, or ?, as the case may be. [Scientific Basis and Build of Music, page 94]

"There are three chromatic chords, and each of these three is related to eight particular tonic chords. When one the these chromatic chords goes to any one of its eight tonic chords, three of its notes move in semitonic progression, and the other note moves by the *small tone*, the ratio of 9:10. There is exception to this rule, whether the key be major or minor. But when the chromatic chord which should resolve to the **tonic** of C is followed by the subdominant, or the **tonic** of F (the example in Mr. Green's book), only two of its notes move in semitonic progress. Your friend describes the chord as if it had gone to the **tonic** of B; and what he said about it, and about D going to C, is what is supposed to be [Scientific Basis and Build of Music, page 94]

"The notes as they naturally arise from unity have different degrees of development, and according to the degree of development of each note is its specific levity or gravity. The three notes which form the subdominant chord have different degrees of gravity; the three which form the dominant chord have different degrees of levity. The remaining note is the center of the tonic chord -

Tonic Subdominant - F, A, C E G, B, D - dominant

Center

The middle one of these three chords is called the **tonic**; the chord above is called the dominant; and the chord below is called the subdominant. The order in which these three chords contribute to form the octave scale is as follows:- The first note of the scale is the root of the tonic; the second is the [Scientific Basis and Build of Music, page 96]

In the first six chords of the scale the **tonic** is the first of each two. The **tonic chord** alternating with the other two produces an order of twos, as - tonic dominant, tonic subdominant, tonic subdominant. The first three notes of the octave scale are derived from the root, the top, and the middle of the tonic dominant and **tonic**; the second three are derived from the root, top, and middle of the subdominant, **tonic**, and subdominant. The roots, tops, and middles of the chords occurring as they do produce an order of threes, as - root, top, middle; root, top, middle. The first, third, fifth, and eighth of the scale are from the **tonic chord**; the second and seventh from the dominant; and the fourth and sixth from the subdominant. In the first two chords of the scale the **tonic** precedes the dominant; in the second two, the subdominant; and in the third two the **tonic** again precedes the subdominant; and as the top of the subdominant chord is the root of the tonic, and the top of the tonic the root of the dominant, this links these chords together by their roots and tops. The second chord has the top of the first, the third has the root of the second, the fourth has the root of the third, the fifth has the top of the fourth, and the sixth has the root of the fifth; and in this way these successive chords are woven together. The only place of the octave scale where there are two middles of chords beside each other is at the sixth and seventh. The seventh note of the octave scale is the middle of the dominant, and the sixth is the middle of the subdominant. These two chords, though both united to the **tonic**, which stands between them, are not united to each other by having a note in common, inasmuch as they stand at the extremities of the system; and since they must be enabled to succeed each other in musical progression, Nature has a beautiful way of giving them a note in common by which to do so - adding the root of the subdominant to the top of the dominant, or the top of the dominant to the root of the subdominant, and this gives natural origin to compound chords. The tonic chord, being the center one of the three chords, is connected with the other two, and may follow the dominant and sub- [Scientific Basis and Build of Music, page 97]

dominant; and either of these chords may also follow the **tonic**; but when the dominant follows the subdominant, as they have no note in common, the root of the subdominant is added to the dominant chord, and this forms the *dominant seventh*; and when the subdominant follows the dominant, the top of the dominant is added to the subdominant, and this forms the subdominant sixth. The sixth and seventh of the octave scale is the only place these two compound chords are positively required; but from their modifying and resolvable character they are very generally used. When the dominant is compounded by having the root of the subdominant, its specific effect is considerably lower; and when the subdominant is compounded by having the top of the dominant, its specific effect is considerably higher. In the octave scale the notes of the subdominant and dominant chords are placed round the notes of the **tonic chord** in such a way was to give the greatest amount of contrast between their notes and the **tonic** notes. In the **tonic chord** the note which has the greatest amount of specific gravity is its root; and in the octave scale it has below it the middle and above it the top of the dominant, the two notes which have the greatest amount of specific levity; and in the octave scale it has above it the middle and below it the root of the subdominant - the two notes which the greatest amount of specific gravity. The third note of the scale, the middle of the tonic chord, is the center of the system, and is the note which has the least tendency either upwards or downwards, and it has above it the root of the subdominant, the note which has the greatest amount of specific gravity, and it has below it the top of the dominant, the note which has the greatest amount of specific levity. Thus the root of the subdominant is placed above, and the top of the dominant below, the center of the system; the specific gravity of the one above and the specific levity of the one below cause them to move in the direction of the center. [Scientific Basis and Build of Music, page 98]

"If it had been the case that D resolved to the root of the major tonic, the resolving notes to the **tonic** would then have been one upwards and three downwards, instead of two upwards and two downwards, according to the Law of Duality. [Scientific Basis and Build of Music, page 99]

"What we have thus said about the resolving notes to the major tonic has been allowed in the case of the minor. No one ever said that the second of the minor scale resolved to the root of the tonic. Notwithstanding the importance of the **tonic** notes, the semitonic interval above the second of the scale decided the matter for the Law of Proximity; and no one ever said that D, the root of the subdominant minor, did not resolve to C, the center of the tonic minor, on the same terms that two notes are brought to the center of the tonic major; with this difference, that the semitonic interval is *above the center* in the major and *below* it in the minor. The other two notes which resolve into the tonic minor are on the same terms as the major; with this difference, that the semitonic interval is above the center in the tonic minor. And the small tone ratio 9:10 is above the top of the tonic major and below the root of the tonic minor. If it has been the case that D resolved to the root of the tonic major, then, according to the Law of Duality, there would have been another place where everything would have been the same, only in the inverse order; but, fortunately for itself, the error has no other error to keep it in countenance. This error has not been fallen into by reasoning from analogy. [Scientific Basis and Build of Music, page 99]

PLATE IV. OSCILLATION AND VIBRATION.

Fig. 1 - The pendulums in this illustration are suspended from points determined by the division of the Octave into Commas; the comma-measured chords of the Major key being **S**, 9, 8, 9, 5; **T**, 9, 8, 5, 9; **D**, 8, 9, 5, 9. The pendulums suspended from these points are tuned, as to length, to swing the mathematical ratios of the Diatonic scale. The longest pendulum is F, the chords being properly arranged with the subdominant, **tonic**, and dominant, the lowest, center, and upper chords respectively. Although in "Nature's Grand Fugue" there are 25 pendulums engaged, as will be seen by reference to it, yet for the area of a single key 13 pendulums, as here set forth, are all that are required. It will not fail to be observed that thus arranged, according to the law of the genesis of the scale, they form a beautiful curve, probably the curve of a falling projectile. It is an exceedingly interesting sight to watch the unfailing coincidences of the pendulums perfectly tuned, when started in pairs such as F4, A5, and C6; or started all together and seen in their manifold manner of working. The eye is then treated to a sight, in this solemn silent harp, of the order in which the vibrations of sounding instruments play their sweet coincidences on the drum of the delighted ear; and these two "art senses," the eye and the ear, keep good company. Fig. 2 is an illustration of the correct definition of a Pendulum Oscillation, as defined in this work. In watching the swinging pendulums, it will be observed that the coincidences [Scientific Basis and Build of Music, page 104]

are always when they have returned to the side from which they were started. The Pendulographer, also, when writing the beautiful pictures which the musical ratios make when a pen is placed under the control of the pendulums, always finds his figure to begin again when the pendulums have finished their period, and have come for a fresh start to the side from which the period began. This confirms our author's definition of an oscillation of a pendulum. Fig. 3 is an illustration of the correct definition of a Musical Vibration, as also given in this work. Although the definition of an oscillation is not identical with that of a vibration, yet on account of their movement in the same ratios the one can be employed in illustration of the other as we have here done. Fig. 4 is a uniform rod suspended from the end as a pendulum; it will oscillate, of course, at a certain speed according to its length. In such a pendulum there are three centers related in an interesting way to the subject of Music in its three chords - subdominant, tonic, and dominant, which roots are F, C, and G. The center of gravity in the middle of the rod at 2, suspended at which the rod has no motion, corresponds to F, the root of the subdominant, in which there is the maximum of musical gravity. The center of oscillation at 3, which is one-third of the length of the rod from the end, is like the root of the tonic whose number is 3 in the genesis of the scale from F1. In this point of suspension the oscillations are the same as when suspended from the end at 1. The point at 9 is at a *ninth* from the center of oscillation. Our author discovered that, if suspended at this point, the pendulum had its highest rate of speed. Approaching the end, or approaching the center of oscillation from this point, the rate of speed decreases. Exactly at one-ninth from the center of oscillation, or two-ninths from the end, is this center of velocity, as Ramsay designated it; and it corresponds in some sort also to the root of the dominant G, which is 9 in the genesis of the scale from F1; its rate of vibration is nine times that of F1. The dominant chord is the one in which is the maximum of levity and motion in music. [Scientific Basis and Build of Music, page 105]

THE AREA OF A SCALE.

This plate is a representation of the area of a scale; the major scale, when viewed with the large hemisphere, lowest; the minor when viewed the reverse way. It is here pictorially shown that major and minor does not mean larger and smaller, for both modes occupy the same area, and have in their structure the same intervals, though standing in a different order. It is this difference in structural arrangement of the intervals which characterizes the one as masculine and the other as feminine, which are much preferable to the major and minor as distinctive names for the two modes. Each scale, in both its modes, has three Fifths - subdominant, **tonic**, and dominant. The middle fifth is the **tonic**, and its lowest note the key-note of the scale, or of any composition written in this scale. The 53 commas of the Octave are variously allotted in its seven notes - 3 of them have 9 commas, 2 have 8, and 2 have 5. The area of the scale, however, has much more than the octave; it is two octaves, all save the minor third D-F, and has 93 commas. This is the area alike of masculine and feminine modes. The two modes are here shown as *directly* related, as we might figuratively say, in their marriage relation. The law of *Duality*, which always emerges when the two modes are seen in their relationship, is here illustrated, and the dual notes are indicated by oblique lines across the pairs. [Scientific Basis and Build of Music, page 106]

The Plate shows the Twelve Major and Minor Scales, with the three chords of their harmony - subdominant, tonic, and dominant; the tonic chord being always the center one. The straight lines of the three squares inside the stave embrace the chords of the major scales, which are read toward the right; e.g., F, C, G - these are the roots of the three chords F A C, C E G, G B D. The **tonic chord** of the scale of C becomes the subdominant chord of the scale of G, etc., all round. The curved lines of the ellipse embrace the three chords of the successive scales; e.g., D, A, E - these are the roots of the three chords D F A, A C E, E G B. The tonic chord of the scale of A becomes the subdominant of the scale of E, etc., all round. The sixth scale of the Majors may be written B with 5 sharps, and then is followed by F with 6 sharps, and this by C with 7 sharps, and so on all in sharps; and in this case the twelfth key would be E with 11 sharps; but, to simplify the signature, at B we can change the writing into C, this would be followed by G with 6 flats, and then the signature dropping one flat at every new key becomes a simpler expression; and at the twelfth key, instead of E with 11 sharps we have F with only one flat. Similarly, the Minors make a change from sharps to flats; and at the twelfth key, instead of C with 11 sharps we have D with one flat. The young student, for whose help these pictorial illustrations are chiefly prepared, must observe, however, that this is only a matter of *musical orthography*, and does not practically affect the music itself. When he comes to the study of the mathematical scales, he will be brought in sight of the exact very small difference between this B and C?, or this F# and G?; but meanwhile there is no difference for him. [Scientific Basis and Build of Music, page 108]

PLATE X.

THE GROWTH-LIKE CONTINUITY OF CHORDS AND KEYS.

Under the symbol of a music plant this plate gives us to realize the *growth-like* continuity of chords and scales. The roots of the three chords of a key are represented in F, C, and G of the key of C. The plant might be represented as a creeping stem, like the creepers of the strawberry, with its progressive roots struck into the earth; but it is better to show an upward stem with *aerial roots*, for such are the roots of the musical plant. The main stem of the plant has the three chords, F a C e G b D; that is, F a c, C e g, G b d, the subdominant, **tonic**, and dominant. The terminal chord, D f# a, is to show that the keys as well as the *chords* GROW out of each other. Include the side branches which terminate with the octave notes of the chords, read thus - F a c f, G e g e, G b d g, because a chord is felt to be most complete in its unity when thus shut in by the octave note of its root. This is the reason why the great three-times-three chord does not stop at D, the top of the dominant chord, but goes on to the sixth octave of the fundamental root, shutting all in by the great peacemaker, F, in order to preserve the unity of the effect which this chord of chords produces. Before D. C. Ramsay showed that the scale of Harmonics extended to *six octaves*, it was by teachers of the science of music only extended to *four*. [Scientific Basis and Build of Music, page 110]

Major and Minor.

The Octave being divided into 53 commas, the intervals are measured, as usual, by these, the large second having 9-commas, the medium second having 8, and the small second 5. These measures are then made each the radius by which to draw hemispheres showing the various and comparative areas of the seconds. The comparative areas of the thirds are shown by the hemispheres of the seconds which compose them facing each other in pairs. The comma-measures of the various thirds thus determined are then made the radii by which to draw the two hemispheres of the fifths. The areas of the three fifths are identical, as also the attitudes of their unequal hemispheres. The attitude of the six thirds, on the other hand, in their two kinds, being reversed in the upper and under halves of the scale, their attitude gives them the appearance of being attracted towards the center of the **tonic**; while the attitude of the three fifths is all upward in the major, and all downward in the minor; their attraction being towards the common center of the two D's of the dual genetic scale, - the two modes being thus seen, as it were, revolving [Scientific Basis and Build of Music, page 113]

PLATE XIV. THE VERTEBRAL COLUMN IN MODULATION.

When Plate XIII. is divided up the middle of the column, as in Plate XIV., so as that one side may be slipped up a fifth, representing a new key one-fifth higher, its subdominant made to face the old **tonic**, the two new notes are then pictorially shown, the second being altered *one comma* and the seventh four commas. The key at this new and higher pitch is by Nature's unfailing care kept precisely in the same form as the first; and wherever the major scale is pitched, higher or lower, the form remains unaltered, all the intervals arranging themselves in the same order. The ear, and the voice obedient to it, carry Nature's measuring-rule in them, and the writing must use such marks as may truly represent this; hence the use of sharps, flats, and naturals; these, however, be it observed, are only marks in the writing; all is natural at any pitch in the scale itself. All this is equally true of the minor mode at various pitches. These two plates are only another and more pictorial way of showing what the stave and the signature are usually made to express. [Scientific Basis and Build of Music, page 114]

Hughes

combinations of dissonance, rests, sounding neither scale nor chords. Dissonance does not express opposition or separation, for there is no principle in musical tones which is productive of contraries; the dissonances follow the attraction of the **tonic**, or key-note, and the neutralization of the musical disturbance is implied in the disagreement in their motion with the repose of the unit, or key-note. So far is this from producing separation, that the apparent discord is simply a preparation for growth, the life of harmony causing an inherent tendency towards closer union. [Harmonies of Tones and Colours, Combinations of dissonance, rests, page 24]

See Also

369 center of the system center fulcrum Fundamental gravity center of control Keynote middle in the majors middle in the minors middle of the dominant middle of the major subdominant middle of the minor dominant middle of the subdominant minor middle of the tonic Ramsay - The Great Chord of Chords, the Three-in-One17 seesaw Subtonic Supertonic tonic chord Tonic Function top of the tonic