which was placed on the far Side of the Monſtrous Head, the other as uſual in other Calfs. It breathed equally at both Mouths, and had Communication with the ſame Throat, but took its Nouriſhment only at the perfect Mouth: The under Jaw of the other being ſo weak, that the Mouth always ſtood open and drivell'd. It appeared on the Left ſide to be a perfect Calf, and look'd very lively, and was, at Three Days Old, as large and ſtrong as other Calfs uſually are at Ten Days or a Fortnight.

IV. *A Queſtion in Muſick lately propoſed to* Dr. Wallis, *concerning the Diviſion of the Monochord, or Section of the Muſical Canon: With his Anſwer to it.*

Queſtion.

TAKE a String of any Muſical Inſtrument, and divide the ſame into two equal Parts, and ſtop the String there; it ſhall be an Eighth, which conſiſts of twelve Semi-tones.

Hence it appears, that the Frets are nearer to one another toward the Bridge, and wider toward the Nut or Head of a Viol. And that they decreaſe or proceed in a Geometrical Proportion.

Quære, How is it poſſible, from the foreſaid Hypotheſis, to divide the other 11 Semi-tones, in their due Proportion, and to demonſtrate the ſame. And whether the other Diſtances aſſigned by *Simpſon* in his *Compendium of Muſick*. (and Chapter of Greater and leſſer Semi-tones) are demonſtrable from the ſaid Hypotheſis.

Anſwer.

Answer.

March 5. 169$\frac{7}{8}$.

WHAT Method is used by *Simson* (in the Book mentioned) to divide a String or *Chord*, I know not: Nor have I the Book at Hand to consult.

That a String *open* (or at its full Length) will sound (what we call) an Octave (or *Diapason*) to that of the same String *stopped in the Middle* (or at half its Length) is very true. And hence it is that we commonly assign, to an Octave, the *Duple* Proportion (or that of 2 to 1:) because such is the Proportion of Lengths (taken in the same String) which give those Sounds.

And (upon a like Account) we assign to a Fifth (or *Diapente*) the *Sesqui-alter* Proportion (or that of 3 to 2:) And, to a Fourth (or *Dia-tesseron*) the *Sesquitertian* (or that of 4 to 3:) And to a *Tone* (which is the Difference of a Fourth and Fifth) The *Sesqui-octave* (or that of 9 to 8:) Because Lengths (taken in the same String) in these Proportions, do give such Sounds.

And (universally) whatever Proportion of Lengths (taken in the same String, equally stretched) do give such and such sounds; such Proportions (of Gravity) we assign to the Sounds so given.

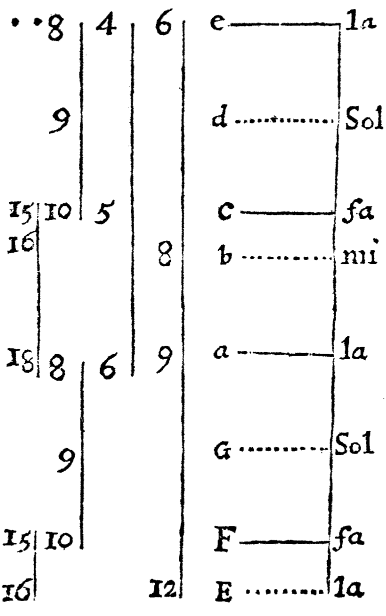
But when an Eighth (or Octave) is said (in common Speech) to consist of 12 Hemi-tones, or 6 Tones; this is not to be understood according to the utmost Rigour of Mathematical Exactness, (of such 6 Tones, as what they call the *Diazeuctick Tone*, or that of *la mi*, which is the Difference of a Fourth and Fifth;) but, as exact enough for common Use. For Six such Tones (that is, the Proportion of 9 to 8 Six Times repeated) is somewhat *more* than that of an Octave (or the Proportion of 2 to 1:) And, consequently, such an *Hemi-tone*, is somewhat *more* than the Twelfth Part of an Eighth, or Octave, or *Dia-pason*. But the Difference is so little, that the Ear can hardly distinguish it: And therefore (in common Speech) it is usual so to speak.

And, accordingly, when we are directed to take the Lengths (for what are called the 12 *Hemi-tones*) in Geometrical Proportion: it is to be understood (not, to be so in the utmost Strictness, but) to be accurate enough for common Use; for placing

placing the Frets on the Neck of a Viol, or other Musical Instrument; wherein a greater Exactness is thought not necessary. And this is very convenient, because (thus) the Change of the Key (upon altering the Seat of *mi*) gives no new Trouble, for this doth indifferently serve any Key; and the Difference is so small, as not to offend the Ear.

But those who choose to treat of it with more exactness, go this way to work.

Presupposing the Proportion for an Octave (or *Dia-pason*) to be that of 2 to 1; they divide this into Two Proportions; not just *equal* (for that would fall upon *surd* Numbers, as of $\sqrt{2}$ to 1;) but *near-equal* (so as to be expressed in small Numbers.) In order to which, instead of taking 2 to 1, they take (the double of these Numbers) 4 to 2; (which is the same Proportion as before;) and interpose the middle Number 3. And, of these Three Numbers, 4, 3, 2, that of 4 to 3, is the Proportion for a Fourth (or *Dia-tesseron.*) And that of 3 to 2, the Proportion for a Fifth (or *Dia-pente.*) And these Two put together, make up that of an Octave (or *Diapason,*) that of 4 to 2, (or 2 to 1.) And the Difference of those Two, that of a *Tone* or 9 to 8. As will plainly appear in the ordinary Method of Multiplying and Dividing Fractions. That is, $\frac{4}{3}\text{x}\frac{3}{2}=\frac{4}{2}=\frac{2}{1}$. And $\frac{4}{3}$) $\frac{3}{2}$ ($\frac{9}{8}$



Thus, in the common Scale (or *Gam-ut*) taking an Octave, in these Notes, *la, fa sol la, mi, fa sol la*; suppose, from *E* to *e*, (placing *mi*, in b *fa* ♮ *mi*; which is called the *Natural Scale*;) the Lengths for the Extremes *la la*, an Octave, are as 2 to 1, or 12 to 6. Those for *la la* (in *la fa sol la*) or *mi la* (in *mi fa sol la*) a Fourth, as 4 to 3, or 12 to 9, or 8 to 6. Those for *la mi* (in *la fa sol la mi*) or *la la* (in *la mi fa sol la*) a Fifth, as 3 to 2, or 12 to 8, or 9 to 6. Those for *la mi*, the *Diazeuctick-Tone* (or difference of a Fourth and Fifth,) as 9 to 8. So have we for those Four Notes *la la mi la*, their Proportionate Length in the Numbers 12 9 8 6.

Then

Then, if we proceed in like manner, to divide a Fifth (or *Dia-pente*) *la fa ſol la mi*, or *la mi fa ſol la*, or the Proportion of 3 to 2, into *near-equals*, (taking double Numbers in the ſame Proportion, 6 4; and interpoſing the middle Number 5;) of theſe Three Numbers, 6 5 4; that of 6 to 5, is the Proportion of a leſſer Third (called a *Tri hemitone*, or Tone and half,) as *la fa* (in *la mi fa.*) And that of 5 to 4, is the Proportion of the Greater Third (commonly called a *Ditone*, or Two Tones,) as *fa la* (in *fa ſol la*) which Two put together, make a Fifth, as 3 to 2; That is $\frac{6}{5}$x$\frac{5}{4}$=$\frac{6}{4}$=$\frac{3}{2}$. And their difference is as 25 to 24: That is $\frac{6}{5}$ $\frac{5}{4}$($\frac{25}{24}$ So have we for theſe 3 Notes *la fa la*, their proportionate Lengths in Numbers, as 6 5 4.

In like manner, if we divide a *Ditone* (or Greater Third) as *fa la* (in *fa ſol la*) whoſe Proportion is as 5 to 4 (or 10 to 8) into Two *near-equals* (by help of a middle Number 9;) then have we (in theſe Three Numbers 10 9 8) that of 10 to 9, for (what they call) the *Leſſer Tone*: And that of 9 to 8, for (what they call) the *Greater Tone*.

But, whether *fa ſol* ſhall be made the *Leſſer* (as 10 to 9) and *ſol la* the *Greater*, as 9 to 8;) or, This the *Leſſer* (as 10 to 9) and That the *Greater* (as 9 to 8) or ſometime This and ſometime That, as there is occaſion, (to avoid what they call a *Schiſm*;) is ſomewhat indifferent: For, either way, the Compound will be, as 5 to 4; and the Difference (which they call a *Comma*) as 81 to 80. That is, $\frac{9}{8}$x$\frac{10}{9}$=$\frac{10}{9}$x$\frac{9}{8}$=$\frac{10}{8}$=$\frac{5}{4}$. And $\frac{10}{9}$) $\frac{9}{8}$ ($\frac{81}{80}$.

Laſtly, If from that of the *Tri-hemitone* (or Leſſer Third) *la mi fa*; whoſe Proportion is as 6 to 5; we take that of the Tone *la mi* (which is the Difference of a Fourth and Fifth) as 9 to 8; There remains for the Hemi-tone *mi fa* (or *la fa*) that of 16 to 15. That is $\frac{9}{8}$) $\frac{6}{5}$ ($\frac{48}{45}$=$\frac{16}{15}$.

Or, the *Tri-hemitone* (or Leſſer Third) whoſe Proportion is as 6 to 5; may be divided into Three *Near-equals*, (by taking Triple Numbers, in the ſame Proportion, 18 15; and interpoſing the Two Intermediates, 17 16;) which will therefore be as 18 to 17, and as 17 to 16, and as 16 to 15; That is, $\frac{18}{17}$x$\frac{17}{16}$x$\frac{16}{15}$=$\frac{18}{15}$=$\frac{6}{5}$.

Where alſo the *Greater Tone*, who's Proportion is as 9 to 8, or 18 to 16, is divided into its Two *Near-equals* (commonly called *Hemi-tones*,) that of 18 to 17, and that of 17 to 16: That is, $\frac{18}{17}$x$\frac{17}{16}$=$\frac{18}{16}$=$\frac{9}{8}$.

And

And the *Lesser Tone*, that of 10 to 9, or 20 to 18, may be in like manner divided into that of 20 to 19, and that of 19 to 18: That is, $\frac{20}{19} \times \frac{19}{18} = \frac{20}{18} = \frac{10}{9}$.

Which Divisions of the *Greater* and *Lesser* Tone, answer to what is wont to be designed by *Flats* and *Sharps*.

So that (by this Computation,) of these Eight Notes, *la, fa sol la, mi, fa sol la*; their Proportions stand thus; that of *la fa* (or *mi fa*) is as 16 to 15. That of *fa sol* as 10 to 9, and that of *sol la* as 9 to 8: (or else that of *fa sol* as 9 to 8, and that of *sol la* as 10 to 9,) That of *la mi* as 9 to 8. And if either of the Tones (Greater or Lesser) chance to be divided (by Flats or Sharps) into (what they call) Hemi-tones, their Proportions are to be such as is already mentioned.

There may be a like Division of a Fourth (or *Dia-tessaron*) into Two *Near equals*: And of some others of these, into Three *Near-equals*. Which might be of use for (what they were wont to call) the *Chromatick* and *Enarmonick* Musick. But those Sorts of Musick, having been long since laid aside, there is now no need of these Divisions, as to the Musick now in use.

V. *Part of a Letter from Mr.* Ray, *F. R. S. to Dr.* Sloane, *giving an Account of the Poysonous Qualities of* Hemlock-Water-Drop-Wort.

I Shall now communicate to you, a Story or Two of the direful Effects of *Oenanthe aquatica, Cicutæ facie succo Viroso* of *Lobel*, which we may English *Hemlock-Water-Dropwort*, upon several Persons that eat of the Roots of it, sent me not long since in a Letter from Dr. *Francis Vaughan*, a Learned Physitian in *Ireland*, living at *Clonmell*, in the County of *Tipperary*. This Gentleman observing me, notwithstanding what Dr. *Johnson* in his *Gerardus emaculatus*, and *Lobel* in his *Adversaria*