theory of music

Ramsay

When Leonhard Euler, the distinguished mathematician of the eighteenth century, wrote his essay on a *New Theory of Music*, Fuss remarks - "It has no great success, as it contained too much geometry for musicians, and too much music for geometers." There was a reason which Fuss was not seemingly able to observe, namely, that while it had hold of some very precious musical truth it also put forth some error, and error is always a hindrance to true progress. Euler did good service, however. In his letters to a German Princess on his **theory of music** he showed the true use of the mathematical primes 2, 3, and 5, but debarred the use of 7, saying, "Were we to introduce the number 7, the tones of an octave would be increased." It was wise in the great mathematician to hold his hand from adding other notes. It is always dangerous to offer strange fire on the altar. He very clearly set forth that while 2 has an unlimited use in producing *Octaves*, 3 must be limited to its use 3 *times* in producing *Fifths*. This was right, for in producing a fourth Fifth it is not a Fifth for the scale. But Euler erred in attempting to generate the *semitonic scale* of 12 notes by the use of the power of 5 a second time on *the original materials*. It produces F# right enough; for D27 by 5 gives 135, which is the number for F#. D27 is the note by which F# is produced, because D is right for this process in its *unaltered* condition. But when Euler proceeds further to use the prime 5 on the middles, A, E, and B, and F#, in their original and unaltered state, he quite errs, and produces all the sharpened notes *too low*. C# for the key of D is not got by applying 5 to A40, as it is in its birthplace; A40 has already been altered for the key of G by a *comma*, and is A40 1/2 before it is used for producing its third; it is A40 1/2 that, multiplied by 5, gives C#202 1/2, not C200, as Euler makes C#. Things are in the same condition with E before G# is wanted for the key of A. G# is found by 5 applied to E; not E in its original and unaltered state, E30; but as already *raised a comma* for the key of D, E30 3/8; so G# is not 300, as Euler has it, but 303 3/4. Euler next, by the same erroneous methods, proceeds to generate D# from B45, its birthplace number; but before D# is wanted for the key of E, B has been raised a comma, and is no longer B45, but B45 9/16, and this multiplied by 5 gives D#227 13/16, not D225, as Euler gives it. The last semitone which he generates to complete his 12 semitones is B?; that is A#, properly speaking, for this series, and he generates it from F#135; but this already altered note, before A# is wanted for the key of B, has been again raised a comma [Scientific Basis and Build of Music, page 107]