

constructed a series of high forks accurately tuned and proceeding according to the intervals of the perfect (major) scale, from c_7 to the enormous pitch of 180,000 v.s., and that without reaching a limit to the number of such vibrations.

As to the audibility of these high forks, it has been remarked by Kœnig that those between c_7 and c_9 are generally audible, whilst c_{10} and those above are entirely inaudible. He further remarks that the limit of audibility, which thus lies between c_9 and c_{10} , largely depends, as in the case of low sounds, on the intensity, and varies with the individual.

Intensity.—With regard to the question of intensity of sound, it is only necessary to say that there exists here a great lacuna in our acoustical knowledge, as we do not yet possess a means of measuring the physiological intensity of sound.

Timbre.—To Helmholtz belongs the credit of first elucidating the question of timbre by showing that the timbre of a sound depends upon the number and intensity of the harmonics which accompany the fundamental. The question of timbre is thus intimately connected with the study of the phenomena produced by the coexistence of two or more sounds. With regard to such phenomena it was stated by Helmholtz that when two notes of different pitch are sounded together, they give rise to two other sounds, the pitch of which is measured the one by the difference, and the other by the sum of the vibrations of the two primary sounds. Further, that these resultant sounds are not due to beats.

These propositions of Helmholtz are controverted by Kœnig, who, on the contrary, has proved that the sounds actually heard accompanying two primary sounds are always due to beats. Kœnig asserts, moreover, that the sounds referred to by Helmholtz, even if we could prove that they had a real existence, would always be inaudible, and therefore without effect on the acoustical phenomena. He further establishes the curious fact that even interruptions of a sound give rise to another sound.

As to timbre, Helmholtz's theory was that it depended solely on the number and relative intensities of the harmonics which accompany the fundamental, and that it is not affected in any degree by differences in the phases of these components. This latter proposition is combated by Kœnig, who holds that differences of phase as regards harmonics exercise a very important influence on the timbre of a sound, so that according to him timbre depends on the number, relative intensities and differences of phase of the harmonics which accompany the fundamental. Kœnig's experiments on this disputed point were performed