

It will be seen from the foregoing how frequently functional murmurs have been found when no apparent cause was discovered; neither anæmia, fever or other usually recognised cause; and further, that in site and rhythm of murmur some unusual conditions occur.

In the *true anæmias* are included, pernicious anæmia, chlorosis, Hodgkin's disease and anæmia secondary to hæmorrhage or carcinoma. These form 87 cases of which 24 have apex murmurs; 36 have murmurs at apex and base, while in only 21 were the murmurs mainly at the pulmonary cartilage.

The *origin* of the murmur cannot always be read from its situation; Dr. Heitler, in an article on "The Localisation of Systolic Mitral Murmurs"⁴ makes an exhaustive study of this point. He states that his researches lead him to disbelieve the dogma that murmurs of different *timbre* are necessarily of different origin, even though they be heard less loudly in the interspace. He argues that murmurs are formed of a mixture of sounds which are not transmitted as a whole in any direction, but that certain parts are heard best where the conditions for transmission are most favorable, and he cites a case, seen post-mortem to be one of pure mitral regurgitation, where there was a loud musical murmur at the apex growing fainter towards the base and a loud murmur at the aortic cartilage of the same quality as that at the apex.

This is confirmed by other authorities in the case of regurgitant murmurs due to endocarditis where roughened surfaces combine with altered blood currents to produce a mixture of sounds, but in functional cases there are probably less complicated conditions. In these anæmias where the double murmurs which occurred, are often described as of different *timbre*, rough at one orifice, blowing at the other, they are frequently transmitted in two directions: into the axilla from the apex, and upwards from the pulmonary orifice, indicating that they really are the double murmurs of a relative mitral insufficiency and of a physiological pulmonary stenosis. Such at all events seems quite as plausible an explanation as any other.

Leube, in his article lays much stress on the site of the murmur. He states that in lesser degrees of blood alteration, accidental murmurs are produced in the great vessels at the base from lowered tonus of their walls through the action of impoverished nerve centres, while the more severe grades of anæmia and intoxication lead to a myoasthenia or even a myodegeneratio cordis, and to the *apical* murmurs of relative mitral insufficiency.

The anæmic cases I have studied tend emphatically to confirm this