

the significance of signs on experience, the analytical method of study protects against fallacies which must occur if it be assumed that the abnormal sounds contain intrinsic evidence of the nature of the physical conditions which they represent, or if it be considered indispensable to ascertain fully the mechanism of signs. By attempting to deduce the significance of sounds from their acoustic characters, the play of the imagination and the bias of preconceived notions cannot fail to lead to error.

It is a trite statement that the point of departure for the study of morbid physical signs is the study of healthy signs, inasmuch as the former are either deviations from, or additions to, the latter. But it may not be amiss to state, as a conclusion resulting from an experience of more than a quarter of a century in practical teaching, that neglect of a proper study of healthy signs is the secret of the failure of many who undertake to master auscultation and percussion. Moreover, knowledge of the characters of the more important, and the most difficult to master, of the morbid respiratory and vocal signs, is already obtained when a thorough study has been made of the sounds produced by respiration and the voice over the larynx and trachea, over an area on the chest corresponding to the primary and secondary bronchi, and over the remainder of the thorax.

Proceeding, after these preliminary remarks, to consider the physical signs furnished by auscultation and percussion as determined and differentiated by analytical study, a natural division of the auscultatory signs is referable to: 1st, respiration; 2nd, the loud voice and speech; and 3rd, the whispered voice and speech. Having considered the signs belonging to these divisions, it will remain to consider the signs produced by percussion.

#### SIGNS REFERABLE TO RESPIRATION.

The number of morbid respiratory signs which require nicety of discrimination is not large. They are among the signs grouped as abnormal modifications of the normal sounds. The adventitious sounds or rales are readily discriminated. The chief cause of confusion and difficulty, as regards the latter signs, has been a needless redundancy of them. The list need not extend beyond the crepitant and the sub-crepitant r le, the coarse and fine moist bronchial or bubbling r les, the sibilant and the sonorous dry bronchial r les, pleural friction sounds, gurgling and splashing sounds, amphoric respiration, and metallic tinkling. These signs are readily recognized and differentiated; there is no fault to be found with the names, and the significance of each has been sufficiently established. Of the signs belonging to the group of the abnormal modifications of the normal sounds, suppressed, simply weakened, and interrupted respiratory murmur require no analysis. The remainder of the signs in this group claim analytical study. The latter signs are as follows: 1.

Bronchial respiration; 2. Gradatory combinations of the bronchial respiration and the normal respiratory or vesicular murmur, which I include under the name broncho-vesicular respiration; 3. Cavernous, broncho-cavernous, and caverno-vesicular respiration; and 4. Prolonged expiration.

Under the name bronchial respiration, Laennec embraced the normal laryngeal and tracheal respiration, together with the morbid respiratory sign representing solidified lung. He considered them all as essentially identical: and that they are so is easily demonstrated by analysis and comparison. He distinguished the morbid sign from the normal respiratory murmur by the absence of what he called the slight crepitation, which is characteristic of the inspiratory sound in the normal respiratory murmur—the absence, in other words, of its vesicular quality—by dryness, and by a sensory impression as if the air passed into a large empty space. Laennec did not compare auscultatory sounds in respect of pitch. Skoda, Walshe, Barth, and Roger, in the early editions of their works, made mention of pitch in comparing bronchial respiration with the normal respiratory murmur, without apparently attaching to it much importance. With these exceptions, comparisons in respect of pitch had not, so far as I know, entered into the descriptions of respiratory signs by writers in different countries, prior to thirty years ago, when I was led to the analytical study of these signs with special reference to variations in this respect. The results were published in the "Transactions of the American Medical Association" in 1852.\* I hope not to incur the charge of having exceeded the bounds of modesty in claiming, by my studies at that time and subsequently, to have established, on the basis of variations in pitch, characters by which these and other respiratory signs may be positively and easily differentiated.

The normal respiratory murmur and the bronchial respiration may be considered as extremes between which are abnormal modifications other than those pertaining to the latter morbid sign. The differential characters of intermediate signs are to be determined by analytical study and comparison with those of the normal respiratory murmur, on the one hand, and, on the other hand, with those of bronchial respiration. As a preliminary step, the normal respiratory murmur and bronchial respiration are to be contrasted in respect of the characters of each as ascertained by analysis.

The inspiratory sound in the normal respiratory murmur is of variable intensity in different persons. Intensity, therefore, does not enter into its characteristics. Its pitch is low, and its quality, for lack of a better term, may be called vesicular. The vesicular quality is *sui generis*. It cannot be

\* Prize Essay on Variations of Pitch in Percussion and Respiratory Sounds, and their application to Physical Diagnosis.