

normal broncho-vesicular respiration. I need not add that the characters of this normal broncho-vesicular respiration are more marked on the right than on the left side of the chest; the area within which they are confined being the sternal portion of the infra-clavicular and the upper part of the inter-scapular regions.

Cavernous respiration was described by Laennec as having essentially the characters of bronchial respiration, the only difference being a sensory impression of air entering a large space. Subsequent authors have generally held that these two signs are not to be differentiated by intrinsic differences. Skoda affirms that they are absolutely identical, and in this he is followed by the most recent of German publications. The nearest approach to the characters distinctive of the cavernous respiration is the description of Walshe, in the early as well as the late editions of his work on diseases of the lungs.

The analytical study of respiratory signs led me to recognize well marked and easily-recognizable characters distinctive of cavernous respiration as long ago as 1852.* This sign is to be differentiated, on the one hand, from bronchial respiration, and, on the other hand, from the normal respiratory murmur. The differential characters are as follows: The inspiratory sound, as compared with that of bronchial respiration, is low in pitch and non-tubular; as compared with that of the normal respiratory murmur, it is non-vesicular. It has a simple blowing quality. The expiratory sound differs from that of bronchial respiration in being low in pitch and devoid of tubular quality. The pitch is lower than that of the inspiratory sound. In pitch and quality it resembles the expiratory sound in the normal respiratory murmur. These characters, limited to a circumscribed space, without the boundaries of which is often found either bronchial or broncho-vesicular respiration, are readily appreciated, and they point unmistakably to the site of a cavity. The characters are so distinctive that the sign cannot be confounded with either bronchial or broncho-vesicular respiration. The liability to error is inconfounding cavernous respiration with simply weakened respiratory murmur, the only essential point of distinction being the presence of vesicular quality in the normal inspiratory sound, and the absence of this quality in the cavernous inspiration; hence, if the respiratory murmur within a circumscribed space be so weak that the vesicular quality is not clearly appreciable, it cannot be distinguished from feeble cavernous respiration. The associated vocal sounds should always prevent this error.

Cavernous respiration is not infrequently modified by solidification of lung surrounding or situated in proximity to cavities. A combination of the bronchial and the cavernous characters is some-

times rendered apparent within a circumscribed area by comparison with a purely bronchial or a broncho-vesicular respiration without the limits of this area. This modification may be distinguished as broncho-cavernous respiration. A cavity without adjacent solidification of lung may furnish a cavernous inspiratory sound, combined with more or less of the vesicular quality. This may be distinguished as vesiculo-cavernous respiration. It is recognized by comparison with the respiratory murmur without the limits of a circumscribed area, the latter corresponding to the site of a cavity. The fact of the existence of the cavity may be further established by associated vocal signs.

Other varieties may be mentioned. A cavernous inspiration is sometimes associated with a bronchial expiration. This happens in some cases when lung, completely or considerably solidified is in contact with, or in close proximity to, a cavity. The bronchial inspiration is not heard over the cavity, but the more intense bronchial expiratory sound extends beyond the solidified lung, and displaces, or, more properly speaking, drowns the cavernous expiration over the cavity. In another variety the expiratory sound is at its beginning either bronchial or broncho-vesicular, and it becomes cavernous before its termination. The probable explanation is that air enters the cavity, not at the beginning of the inspiratory act, but before the conclusion of the act; hence, prior to the development of the cavernous respiration the sound represents adjacent solidification of lung*.

As is well known, Laennec gave very little attention to the sounds produced by the expiratory act. A young American physician (James Jackson the younger) was the first to study these sounds, twenty years after the discovery of auscultation. Jackson ascertained the importance of a prolonged expiration, having something of the bronchial character, as a diagnostic sign in the early stage of pulmonary phthisis. The characters which a prolonged expiration may have are of importance when an inspiratory sound is present, but especially so when an inspiratory sound is either wanting or too weak for its characters to be appreciated.

The significance of a prolonged expiration depends on the characters pertaining to pitch and quality. If the pitch be high and the quality tubular, it denotes solidification of lung as if the respiration were completely either bronchial or broncho-vesicular; in other words, as if associated with either a high-pitched tubular or a vesiculo-tubular inspiration. If the pitch be low and the

* Under the name metamorphosing respiratory murmur (*metamorphosirendes Athmungs geraus*) Seitz has described a variety of broncho-cavernous respiration in which, using his terms, the first part of the respiratory sound is rude, and the latter part bronchial in character. Inasmuch as by German writers the cavernous and the bronchial respiration are considered as identical, the latter part of the respiratory sound, in the variety described by him, is probably cavernous.

* Vide Essay: "Trans. American Med. Association," 1852.