

CHAPTER X.

THE VOICE.

Voice and Speech—The Larynx, or the Organ of the Voice—
The Vocal Cords—The Laryngoscope—The Production
of the Voice—The Use of the Tongue—The different
Varieties of Voice—The Change of Voice—Its Compass
—Purity of Tone—Ventriloquy.

1. Voice and Speech.—In common with the majority of the nobler animals, man possesses the power of uttering sounds, which are employed as a means of communication and expression. In man, these sounds constitute the voice; in the animals, they are designated as the cry. The song of the bird is a modification of its cry, which is rendered possible from the fact that its respiratory function is remarkably active. The sounds of the animals are generally, but not always, produced by means of their breathing organs. Among the insects, they are sometimes produced by the extremely rapid vibrations of the wings in the act of flight, as in the case of the mosquito; or they are produced by the rubbing together of hard portions of the external covering of the body, as in the cricket.

2. But man alone possesses the faculty of speech, or the power to use articulate sounds in the expression of ideas, and in the communication of mind with mind. Speech is thus an evidence of the superior endowment of man, and involves the culture of the intellect. An idiot, while he may have complete vocal organs and full power of uttering sounds or cries, is entirely incapable of speech; and, as a rule, the excellence of

the language of any people will be found to be proportional to their development of brain. Man, however, is not the only being that has the power to form articulate sounds, for the parrot and the raven may also be taught to speak by rote; but man alone attaches meaning to the words and phrases he employs.

3. Relation of Speech to Hearing.—Speech is intimately related to the sense of hearing. A child born deaf is, of necessity, dumb also; not because the organs of speech are imperfect, for he can utter cries and may be taught to speak, and even to converse in a rude and harsh kind of language; but because he can form no accurate notion of sound. And a person, whose hearing is not delicate, or as it is commonly expressed, who "has no ear for music," cannot sing correctly. A person who has impaired hearing commonly talks in an unnaturally loud and monotonous voice. These examples show the necessary relation of intelligence and the sense of hearing with that form of articulate voice, which is termed speech.

4. The Organ of the Voice.—The essential organ of the voice is the Larynx. This has been alluded to in its relation to the function of respiration; and, in the chapter on that subject, are figured the front view of that organ (Fig. 25), and its connection with the trachea, tongue, and other neighboring parts (Fig. 28). It is situated at the upper part of the neck, at the top of the trachea, or tube by which air passes into and out of the lungs. The framework of the larynx is composed of four cartilages, which render it at once very strong and sufficiently flexible to enable it to move according to the requirements of the voice.

5. The names of the cartilages are (1) the *thyroid*, which is a broad thin plate, bent in the middle and placed in the central line of the front part of the neck, where it is known as the *pomum Adami*, or Adam's apple (Fig. 43, B), and where it may be felt moving up and down with each act of swallowing; (2) the *cricoid*, which is shaped like a seal ring, with the broad

part placed posteriorly (Fig. 43, E). At the top of the cricoid cartilage are situated the two small *arytenoid* cartilages, the right one of which is shown in Fig. 43, C. These latter little organs are much more movable than the other two, and are very important in the production of the voice. They have a true ball and socket joint, and several small muscles which contract and relax with as perfect regularity and accuracy as any of the larger muscles of the body.

6. The interior of the larynx is lined with a very sensitive mucous membrane, which is much more closely adherent to the parts beneath than is usually the case with membranes of this description. The epiglottis (A), consisting of a single leaf-shaped piece of cartilage, is attached to the front part of the larynx. It is elastic, easily moved, and fits accurately over the entrance to the air-passages below it. Its office is to guard these delicate passages and the lungs against the intrusion of food and other foreign articles, when the act of swallowing takes place. It also assists in modifying the voice.

7. **The Vocal Cords.**—Within the larynx, and stretched across it, from the thyroid cartilage in front to the arytenoid cartilages behind, are placed the two sets of folds, called the vocal cords. The upper of these, one on each side, are the false cords, which are comparatively fixed and inflexible. These are not at all essential to the formation of vocal sounds, for they have been injured, in those lower animals whose larynx resembles that of man, without materially affecting their charac-

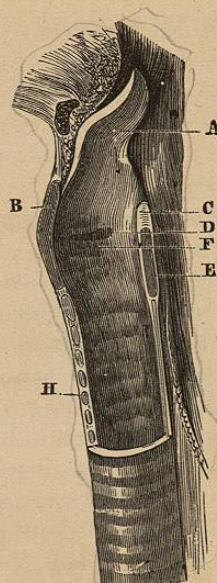


FIG. 43.
SECTION OF THE LARYNX AND TRACHEA.

A, The Epiglottis.
B, The Thyroid Cartilage.
C, Arytenoid Cartilage.
D, Ventricle of the Larynx.
E, Cricoid Cartilage.
F, Right Vocal Cord.
H, The Trachea.

teristic cries. Below these, one on each side, are the vocal cords (Fig. 43, F). They are composed of a highly elastic, though strong tissue, and are covered with a thin, tightly-fitting layer of mucous membrane. Their edges are smooth and sharply-defined, and when they meet, as they do in the formation of sounds, they exactly match each other.

8. If one or both of these cords are injured or become diseased, voice and speech are weakened; or when the mucous membrane covering them becomes thickened, in consequence of a cold, the vocal sounds are rendered husky and indistinct. When an opening is made in the throat below the cords, as not infrequently occurs in consequence of an attempt to commit suicide, voice is impossible except when the opening is closed by external pressure.

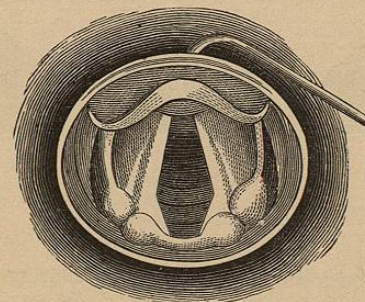


FIG. 44.—A VIEW OF THE VOCAL CORDS BY MEANS OF THE LARYNGOSCOPE.

9. The interval or space between the true cords of the voice is constantly varying, not only when their vocal function is in exercise, but also during the act of respiration. Every time the lungs are inflated, the space increases to make wide the entrance for the air; and diminishes slightly during expiration. So that these little cords move gently to and fro in rhythm with the expansion and contraction of the chest in breathing. These movements and others may be seen to take place, if a small mirror attached to a long handle be placed back into the upper part of the throat; the handle near the mirror must be

bent at an angle of 45° , so that we may look "around the corner," so to speak, behind the tongue. The position which the mirror must assume will be understood by reference to Fig. 28. A view of what may be seen under favorable circumstances, during tranquil inspiration is represented in Fig. 44. The vocal cords are there shown as narrow, white bands, on each side of the central opening, and since the image is inverted, the epiglottis appears uppermost. The rings partly seen through the opening belong to the trachea. This little mirror is the essential part of an instrument, which is called the laryngoscope, and, simple as it may seem, it is accounted one of the most valuable of the recently invented appliances of the medical art.

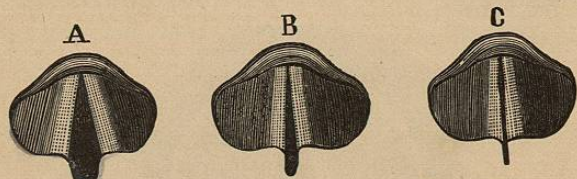


FIG. 45.—THE DIFFERENT POSITIONS OF THE VOCAL CORDS.
A, The position during inspiration. B, In the formation of low notes. C, In the formation of high notes.

10. The Production of the Voice.—During ordinary tranquil breathing no sound is produced in the larynx, true vocal tones being formed only during forcible expiration, when, by an effort of the will, the cords are brought close together, and are stretched so as to be very tense. The space between them is then reduced to a narrow slit, at times not more than $\frac{1}{100}$ of an inch in width; and the column of expired air being forced through it causes the cords to vibrate rapidly, like the strings of a musical instrument. Thus the voice is produced in its many varieties of tone and pitch; its intensity, or loudness, depending chiefly upon the power exerted in expelling the air from the lungs. When the note is high, the space is diminished both in length and width; but when it is low, the space

is wider and longer (Fig. 45, B, C), and the number of vibrations is fewer within the same period of time.

11. The personal quality of the voice, or that which enables us to recognize a person by his speech, is mainly due to the peculiar shape of the throat, nose, and mouth, and the resonance of the air contained within those cavities. The walls of the chest and the trachea take part in the resonance of the voice, the air within them vibrating at the same time with the parts above them. This may be tested by touching the throat or breast-bone, when a strong vocal effort is made. The teeth and the lips also are important, as is shown by the unnatural tones emitted by a person who has lost the former, or by one who is affected with the deformity known as "hare-lip." The tongue is useful, but not indispensable to speech; the case of a woman is reported, from whom nearly the whole tongue had been torn out, but who could, nevertheless, speak distinctly and even sing.

12. The Varieties of voice are said to be four in number; two, the bass and tenor, belonging to the male sex; and two, the contralto or alto, and soprano, peculiar to the female. The baritone voice is the name given to a variety intervening between the bass and tenor. In man, the voice is strong and deep; in woman, soft and high. In infancy and early youth, the voice is the same in both sexes, being of the soprano variety: that of boys is both clear and loud, and being susceptible of considerable training, is highly prized in the choral services of the church and cathedral. At about fourteen years of age the voice changes, as it is termed; that is, it becomes hoarse and unsteady by reason of the rapid growth of the larynx. In the case of the girl, the change is not very marked, except that the voice becomes stronger and has a wider compass; but in the boy, the larynx nearly doubles its size in a single year, the vocal cords grow thicker, longer, and coarser, and the voice becomes masculine in character. During the progress of this change, the use of the voice in singing is injudicious.

13. The ordinary range of each of the four varieties of the voice is about two octaves; but this is exceeded in the case of several celebrated vocalists. Madame Parepa Rosa has a compass of three full octaves. When the vocal organs have been subjected to careful training, and are brought under complete control of the will, the tension of the cords become exact, and their vibrations become exceedingly precise and true. Under these circumstances the voice is said to possess "purity" of tone, and can be heard at a great distance, and above a multitude of other sounds. The power of a pure voice to make itself heard was recently exemplified in a striking manner: at a musical festival held in an audience-room of extraordinary size, and amid an orchestra of a thousand instruments and a chorus of twelve thousand voices, the artist named above also sang; yet such was the purity and strength of her voice that its notes could be clearly heard rising above the vast waves of sound produced by the full accompaniment of chorus and orchestra.

14. **Ventriloquism** is a peculiar modification of natural speech, which consists in so managing the voice that words and sounds appear to issue, not from the person, but from some distant place, as from the chimney, cellar, or the interior of a chest. The ventriloquist not only seems to "throw his voice," as it is said, or simulates the sound as it usually appears at a distance with but little motion of the lips and face, but he imitates the voices of an infant and of a feeble old man, of a drunken man disputing with an exasperated wife, the broken language of a foreigner, the cry of an animal in distress, demonstrating that the performer must be proficient in the art of mimicry. Ventriloquism was known to the ancient Romans and Greeks; and it is thought that the mysterious responses that were said to issue from the sacred trees and shrines of the oracles at Dodona and Delphi, were really uttered by priests who had the power of producing this form of speech.

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