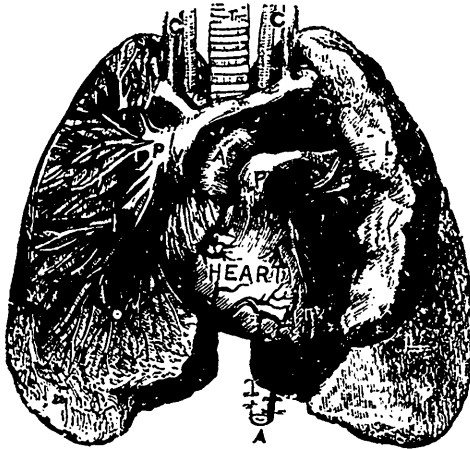


familiar with the anatomy and physiology of these organs will kindly bear with the following brief description of them for the benefit of those who are not so familiar.

Fig. 1.



Heart, lungs, and great vessels;—front view. L.L., left lung, with front edge turned back. The cut represents a portion of the right lung cut away, showing division of vessels.

The lungs are made up of two vast membranes (one for each lung), folded into minute bladders, called air cells, with little tubes, called bronchial tubes, leading from the wind pipe, for conveying air into the cell. The air cells are irregular in shape, and each is covered with a close net-work of minute blood vessels; so that the blood is on the outside of the air cells and the air is within them. The cells cluster around the little tubes and the branch tubes somewhat like grapes upon their stems. Imagine a great many clusters of grapes packed closely together, and the stem of each cluster fastened to a larger stem, like the branches of a little bushy tree, and imagine all the stems and grapes hollow, and each grape wrapped in a close net-work of hollow threads, and one will have in mind something in structure not very unlike a lung. The stems represent the bronchial tubes; the grapes, the air cells; and the threads, the blood vessels, called capillaries. Only something to represent the arteries and veins, for conveying the blood to and from between the capillaries and heart would be wanting. These in the lungs extend along beside the bronchial tubes. There

are two lungs, one on each side, which with the heart and other large vessels quite fill the chest (Fig. 1). After air once enters the lungs, at birth, they always contain some air, and will float on water; hence the vulgar name, 'light.' The membrane forming the air cells is elastic and will stretch considerably; as one will find by blowing into the lungs of a small animal.

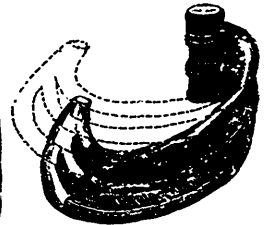
The walls of the chest are formed chiefly by the ribs, with two layers of muscular fibres, the intercostal muscles, between each pair of ribs (Fig. 3). The ribs are attached behind to the spine, each by a movable joint, and as one may see by examining his own ribs or those of another person, they are considerably lower in front than at the spine, so that when the front ends are raised by the muscles, the breast bone is lifted and moved forward, thus the circumference of the chest is much increased. The floor of

Fig. 2.



Portion of trachea with bronchial tubes of one side, leading to air cells.

Fig. 3.



Three ribs showing the two layers of intercostal muscles between.

the chest (dividing it from the abdomen) is formed by a broad, thin muscle, the diaphragm, which arches up deeply into the chest, like an inverted dish (Figs. 4 and 5). When its fibres contract, it becomes flattened, and presses forward the contents of the abdomen, as one can feel by placing the hand on the stomach when drawing in air, and the *depth* or *length* of the chest is thereby greatly increased.

In inspiration, the front ends of the ribs are raised, chiefly by the outer layer of intercostal muscles, making the chest broader; and the diaphragm is flattened and drawn down by the contraction of its fibres, making the chest deeper or longer; and air rushes through the nostrils, throat, and wind-pipe into the lungs,