

The Nursing of Children's Diseases.

By J. PORTER PARKINSON, M.D., M.R.C.P.,
*Physician to the North-Eastern Hospital for Children;
and to the London Temperance Hospital, etc.*

LECTURE V.

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THE RESPIRATORY SYSTEM.

The air around us consists of a mixture of two gases, oxygen which is the active ingredient, and nitrogen which dilutes the oxygen in the proportion of about one in four. Oxygen is necessary for the needs of the body and is converted in the body into carbonic acid gas which is removed from it by the expired air. Respiration is the process by which the oxygen is taken into the body and carbonic acid gas thrown off.

The lungs are two bags contained in the chest and separated below from the abdomen by a muscular partition called the diaphragm. These bags are composed of innumerable small cavities containing air in whose walls there are numerous fine blood vessels called capillaries, which enable the gases of the air in the air cells to interchange freely with the gases of the blood with the result that the blood loses carbonic acid gas and gains oxygen while the air in the air cells loses oxygen and gains carbonic acid gas.

Air is sucked in through the nose and mouth by means of the movements of the chest and diaphragm, and passes through the pharynx and larynx to the trachæa, or windpipe, which is a cartilaginous tube dividing below into two branches, one for each lung, these divisions called bronchi divide again and again till they become exceedingly minute and then end in the small cavities called air vesicles in whose walls, as mentioned before, are the capillary vessels which are the final divisions of the pulmonary artery which conveys the blood to the lung to be aerated. The proper channel for air to be inhaled through is the nose, the function of which is to warm, filter and moisten the air, and so render it more suitable for the delicate parts through which it has to go; if the nose be obstructed, as is often the case in children through adenoids, etc., the air is taken in by the mouth and may irritate the respiratory passages, leading to

bronchitis or other troubles. The larynx which has been mentioned above is fixed to the upper end of the trachæa, it is composed of cartilage and has an opening continuous with the trachæa below and the pharynx above, within it are two thin horizontal folds of membrane, running from before backwards, which are drawn apart at each inspiration to allow the passage of air; but when drawn together can be made to vibrate and cause a sound such as the "voice." A cough is produced by a sudden expiratory effort suddenly bursting through the previously closed vocal cords. This opening between the vocal cords called the "glottis" is especially small in children and so is easily obstructed by any inflammation; when the glottis is narrowed the sound of air being sucked through it is called "stridor" and is a sign of great danger.

All the respiratory tract, that is the nose, larynx, trachæa and bronchi, is lined by what is called a mucous membrane, which secretes a fluid containing mucous to moisten and protect the air passages; if inflamed there is an excess of this secretion causing discharge from the nose, or in the case of the bronchi the coughing up of sputum.

The lungs are covered by a smooth membrane called the "pleura," another layer of which lines the inside of the chest cavity, this pleura secretes just sufficient fluid to make its surfaces moist and move freely one on the other; pleurisy is inflammation of the pleura, then the surfaces stick together and so cause pain, often thin serous fluid is thrown out and this is called "pleurisy with effusion," if the fluid secreted is pus it is called "empyæma."

It has been mentioned that the expired air contains carbonic acid gas. The amount of this is about four parts in a hundred; besides this there are present ammonia and organic impurities. It is these last which gives a badly ventilated room a peculiar odour. In such a room the amount of carbonic acid gas gradually increases, and when it reaches 7 parts in 10,000 it and the organic matters which increase in like ratio are present in an injurious quantity. This carbonic acid gas is formed by the combination of the carbon of the tissues with oxygen by a process of combustion just like that of a fire, and like a fire this combustion causes a production of heat. Carbonic acid gas is very heavy, and sinks to the bottom of a room.

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