

Dr. W. B. Richardson, an English physiologist, has conducted experiments showing that pure oxygen becomes devitalized by repeated inhalations that in breathing the oxygen had undergone some change unknown to the chemist, and that if the oxygen be electrically charged it is revitalized and will again support life.

The chief functions of life we are interested in during anæsthesia are circulation and respiration. To properly understand the science of anæsthesia, we must recognize the double circulation in every animal, the one dependent upon the other. Arterial and venous circulation is as dependent upon neural circulation in the nervous system as life is dependent upon the functions of life. The brain is the heart of the nervous system, and it might be designated the animal electric storage battery.

From the basic element *free oxygen animo electricity* is generated by the pneumogastric glands of the lungs and the cerebral glands of the brain, and stored in this storage battery to be sent out through the motor nerves as a force to move the organs of the body. This circulation through the nervous system brings back to the brain the greater portion of the electricity, through the sensory nerves, and thus information and impressions are received from the material world by the mind or spirit of man.

Interrupt or arrest this circulation in the nervous system, and you suspend sensation and the force and functions of life, and then you have the first stage of death. From what has been said it is obvious that a true anæsthetic must contain sufficient free oxygen to fill this storage battery with animo-electricity, or nerve-vital fluid, that the functions of life may not be interfered with. In administering an anæsthetic, death can only be caused by either asphyxia or by shock. Shock is produced by the mind or by the intended anæsthetic agent, or by both acting simultaneously.

What is asphyxia, and how is it produced? Blood which contains a normal proportion of oxygen excites the respiratory centre, and consequently the respiratory muscular movements are normal. A deficiency of oxygen gives a condition of muscular movements called dyspnoea (difficult breathing). When respiration is stopped by interference with the passage of air to the lungs by supplying air devoid of oxygen, a condition ensues which passes rapidly from the state of dyspnoea to what is termed asphyxia, or suffocation, which quickly ends in death.

The ways by which asphyxia may be produced are numerous; for example, by prevention of the due entry of oxygen into the blood either by obstruction of the respiratory passages or by the introduction of a gas devoid of oxygen, or of a gas containing oxygen which is not *free*, and, consequently, a due interchange in the blood cannot take place (a gain of oxygen and a loss of carbonic acid).