ON PEROXIDE OF HYDROGEN: A PHYSICAL, MEDICAL RESEARCH.

Peroxide of hydrogen was discovered and described in the year 1818 by the illustrious French chemist, Baron Thenard. In 1860 I made my first report to the Medical Society of London, and in 1862, I made a second report on the medicinal use of the peroxide. I had by this time used it in two hundred and twenty-three cases of disease, including phthisis, diabetes, anæmia, sub-acute and chronic rheumatism, strumous enlargement of the cervical glands, mesenteric disease, pertussis, chronic bronchitis, chronic laryngitis, mitral disease and dyspepsia. In epitome of results I drew the conclusions; That in diabetes the peroxide reduced the specific gravity of the urine, whilst it rather increased the quantity: That in chronic and sub-acute rheumatism it afforded relief; That in valvular disease of the heart with pulmonary congestion it gave relief to the dyspnœa; That in mesenteric disease and in jaundice it caused an improvement in the digestion; That in pertussis its effect for good was very remarkable, since it cut short the paroxysms of cough, and seemed decidedly to shorten the period of the disease; That in chronic bronchitis it lessened the dyspœna, and rendered the expectorated matter less tenacious; That in chronic laryngitis it gave pain on being swallowed, and did not appear to be useful; That in anæmia it did not of itself render any service, but favored the good effect of iron; That in the first stage of phthisis it caused improvement in the digestion, and in the latter stages gave unquestionable and even wonderful relief to the breathlessness and oppression, acting, in fact, like an opiate without narcotism, and assisting oxidation.

In the discussion which followed upon the reading of this paper I was warmly supported in several points by Drs. Gibbon, Symes, Thompson, and Gibb, all of whom had been prescribing the peroxide on the suggestion, made in my previous paper of 1860. Dr. Gibb bore special testimony to its value in affording relief during the last stage of phthisis, for which I had recommended it in the case of a member of his own family. But the most important new observation I had to communicate to the Society in 1862 was that in free and frequently repeated doses the peroxide could be made to produce a modified salivation, a fact which led to two suggestions: firstly, that in the use of mercurial and iodide preparations it was the chlorine or iodine in them which caused the ptyalism; secondly, that the peroxide would oe a good substitute for mercury and the iodides in the treatment of syphilis.

Hydrogen peroxide must be looked upon as water containing so many atmospheres of ozonized oxygen. It is an ozonized oxygen atmosphere in solution. It is not, however, a mere mixture, but a peculiar chemical compound. The oxygen can be made to accumulate, volume by volume, until the volume of water, say as much as would fill a pint measure, can rise to ten, twenty, thirty, and some say even a hundred and twenty pints of oxygen, before complete saturation is reached and a volatile body is formed. We hold, therefore, in a specimen of the peroxide, condensed oxygen combined either with the hydrogen of the water, or with the oxygen of the water, or with the elements HO acting as a radical. There is here not much difference, at first sight, from what is common in combinations where there is accumulation of one element on another; as, for example, in the combination of carbon with one equivalent of oxygen in carbon monoxide, and carbon with two equivalents of oxygen in carbon dioxide. But now comes a distinction. The combination of the added oxygen in hydrogen peroxide is stable in the presence of some substances, unstable and easily evolved in the presence of others. Some substances, inorganic or organic, when added to the solution are neutral; other substances, inorganic or organic, evolve the oxygen and are themselves unchanged; a third kind evolve the oxygen, and with that some of their own contained oxygen; a fourth kind absorb the oxygen into themselves.

To an animal deep under chloroform I introduced the peroxide solution, directly, by injecting it through a fine needle into the lung structure itself, puncturing through an intercostal space. This caused an oxygen diffusion into the lung, during which the animal lived, in one instance for five minutes, with the respirationentirely cut off.

In an experiment on the muscles of an animal under choloform I repeated what I had already done for removing muscular rigidity, but in a different way. Ammonia injected into a living muscle excites contraction tetanic in character. When this had been produced, the peroxide solution warmed to the temperature of 100° Fahr., was injected slowly, with the effect of producing relaxation. In a further trial the muscles of a narcotized animal were brought into contraction by a Faradic current, and in this state the muscles were injected with the solution at blood temperatures, with the effect of overcoming the resistance produced by the current, and of relaxing the muscles until the tension was increased.

Purulent matter possesses strongly the power of liberating oxygen from the peroxide, and probably the white corpuscles of the blood do the same. It may also be that the minute organisms called bacteria have the like power. In all cases the starting of the process is one of infinite subdivision of particular kinds of matter having a common property, and we may expect that in due time the common mode of their action as reducers of such