

*5th stage.* Return to natural state. Nervation of vessels. Reduction of vascularity. Temperature 96° Fahr. Natural sensibility.

The cerebrum of a living animal may be frozen. In this state the consciousness of the animal is lost, but the functions of organic life remain the same. The animal thus placed is in a state of hybernation from which it may recover; on recovery the brain does not seem to have lost power. The phenomena are simply those of awaking from profound sleep.

Having frozen the brain and nerve-substance of pigeons and cold blooded animals, Dr. Richardson attributes the phenomena of disturbed natural function to the transference of the water from a fluid to a solid state. He says: "In freezing nerve matter we take from the water its heat of fluidity, or the force which, holding its molecules apart and giving them motion, supplied the condition for that mobile and active state, which is the fluid state of water. We reduce it by this means from activity towards inertia: therewith we deprive the structure of its power to maintain what is called life."

He further adds that, "In speaking of the crystallization of nerve-matter by cold, I have ventured to insist firstly and chiefly on the solidification of the water: but in nerve-substance there is also a considerable per cent. of fatty matter, which, when heated, is fluid like water, and which also like water loses its heat of fluidity, crystallizes, and becomes solid by cold. When, then, we freeze the brain, we solidify the fat also, and what is more we solidify it at a temperature at least 30 degrees higher than the freezing point of water; and as that fat solidifying first, becomes a bad conductor, so it impedes and limits the freezing of the whole mass of nerve-substance. In hybernating animals I should think the fatty matter of the brain and cord is intensely solidified by the cold."

His experiments have proved "that if the freezing extends to the medulla oblongata, death results from arrest of the respiratory power." Also that in proportion to the rapidity of the freezing, so the reaction diminishes.

Let us now proceed to the practical part of this subject. It is seldom that the surgeon sees a case of Frost-bite before the frost has been removed from the part, and so much depends upon the manner in which it has been extracted, that the mischief is generally done before he is called.

I need not tell you that the affected part should be restored to its natural condition, in the most gradual, cautious, and gentle manner, not violently, lest over-action be produced in a part already greatly weakened.