

has been given and where every possible precaution has been taken, cardiac failure supervenes and is not recovered from, whereas in other cases it is recovered from. He reported a case last summer of a boy whose pulse stopped and gave him a great scare, but who fully recovered. In the present case Dr. Bell thought the fact that so little bleeding followed his preliminary scratching of the scalp, a region where bleeding should be profuse, was of considerable significance. This took place four minutes before the heart stopped, and might go to show that even then there was some inhibitory process at work in the circulation at its distal extremity which travelled towards the centre. This was to him a new thought, as he had not been accustomed to think of the arrest of the heart's action being brought about in that way, from the periphery towards the centre; still, he was confident the scratches he made in the scalp did not bleed as they should have done, and their not doing so he believed of some significance.

Dr. ELDER recalled the objection made by Dr. Campbell. He could not believe that the mere aeration of the blood in the lungs could so affect the lividity of the general surface as to lead Dr. Bell to think everything was coming right.

Dr. LAFLEUR asked if rhythmic traction on the tongue, after the method used by Laborde and in great favor with the Parisians, had been tried.

Dr. JAS. BELL, in answer to Dr. Elder, re-read the portion of his written report bearing on this point. He further said, the apparent recovery was never so complete as to give them any hope of resuming the operation; the cardiac impulse never returned. Dr. Lafleur he answered in the negative.

Dr. MILLS believed that though Dr. Campbell's point had been well taken, it might be pressed too far. Very few people properly estimated the importance of the respirations on the venous circulation; thus, to dilate the lungs was to enlarge the arterioles, and to allow blood to get out of the right heart, and some to take its place, so that it is not impossible to understand how a certain amount of lividity might disappear were the heart beating ever so faintly. He thought the investigations heretofore had been conducted on far too narrow a basis, and the conclusions drawn from altogether insufficient data. He thought the experiments of Gaskell and Shore proved that the heart may not only fail, but fail early. With reference to Dr. Bell's suggestion of some failure of the peripheral circulation first, it is possible to understand some derangement of the vaso-motor centres by which great dilatation of the vessels of one region may take place, while the heart still beats, causing a corresponding anæmia in other parts. The vessels

of the abdominal area, for instance, may be so dilated as to suck up all the blood of the body, and there would then be practically no circulation elsewhere. Other points which he thought Dr. Bell might have laid more emphasis upon were: (1) the fact that the surgeon is dealing with individuals diseased, or at least not perfectly normal as to health, whereas the experimenters dealt with animals generally in good health; (2) the influence of psychic impressions of dread, which, existing in the mind and kept under control during perfect consciousness, may be revived in their full force as the individual sinks under the influence of the drug. Something akin to this is seen in hypnotism, where impressions made in one state of consciousness were revived and acted upon in another; (3) there were the special peculiarities of the heart muscle itself to consider. This was seen in the fact that we may act with chloroform upon hearts completely severed from their nervous connections, and get results as diverse and inexplicable as when we act upon the heart *in situ*.

Dr. BLACKCARD remarked so far as pharmacologists were concerned, he believed he was justified in stating their opinion to be that the experiments of Gaskell and Shore were altogether too complicated to be relied upon.

Dr. ADAMI agreed with Dr. Blackcard that the work and experiments of Gaskell were very complicated. Nevertheless in some cases where the experiment came off successfully, the results were striking, as instanced in the case of the cross-ligatures and anastomosis performed between two dogs, so that the blood of one dog exclusively supplied the cerebral vessels of the other, while his own cerebral vessels received their supply from the other. They then chloroformed one of them, and as a result of the cross anastomosing, the dog who received the chloroform had his brain supplied with pure blood, while the dog who did not inhale it had his cerebral blood supply charged with the drug. In some of these experiments it was found that the animal inhaling the drug, although his nerve centres were supplied with pure blood, died of heart failure, that showing that chloroform had a direct action upon the heart itself. Some experiments of his own were in the same line. He found that when certain quantities of chloroform were given, sudden and great dilatation of the chambers of the heart followed; this occurred so rapidly as to seem as though we had here an action upon the muscle fibres themselves, or upon the fine nerve endings (which Berkley and others have now shown to be more common than supposed hitherto), rather than upon the nerve centres in the brain or cord. Dr. Adami thought the conclusion to be drawn from the observations of Gaskell and Shore was that chloroform could act directly upon the heart.