ON A METHOD OF ISOLATING THE MAMMALIAN HEART.

BY H. NEWELL MARTIN (Johns Hopkins University.)

To obtain a mammalian heart isolated from the rest of the body and keep it alive for a time sufficient to allow the examination of the effect of various conditions upon its activity has long been a physiological desideratum. The frog's heart has for years been the subject of minute study but hitherto the mammalian heart has been a baffling object. It seems to have been forgotten that while the frog's heart is a spongy structure having no arteries of its own, the mammalian heart is a dense organ dependent for its life on a continuous blood flow in its capillaries; and all attempts hitherto made, so far as I know, have been efforts to apply to the mammal the methods found successful with the frog, with merely the addition of arrangements adapted to keep up the comparatively high temperature at which the mammalian heart normally beats. By working in another way I have recently succeeded in keeping the mammalian heart alive for more than an hour, and beating with perfect rhythm and normal force; the organ is thus made almost as available for study as the heart of the frog. The method adopted is as follows: The animal having been narcotised and the chest opened, the aorta is tied just beyond its arch; then the trunk which, in the cat, gives origin to the right subclavian and the two common carotids, is ligatured close to its origin, and a cannula put in the left subclavian; finally, the inferior and superior venæ cavæ and the azygos vein, and the root of one lung are tied.

Artificial respiration is of course started so soon as the thorax is opened, and kept up henceforth. The course of the circulation is thus:—left auricle, left ventricle, commencement of aorta (and along the left subclavian to the cannula which is connected with a manometer), coronary system, right auricle, right ventricle, pulmonary vessels of one lung, and then back to the left auricle; in other words, the only section of the systemic circulation left is that through the vessels of the heart itself. Since the physiological actions taking place in the lung are among the best known of all occurring in the body, they may be eliminated, and we have practically an isolated and well-working living mammalian heart for study. The nerves going to the heart may be divided if desired, but that is hardly necessary as the want of blood-flow in the nerve centres of the body incapacitates them after a very short time, and they no longer are capable of exerting any influence on the heart. It is possible, however, that changes in the lung vessels may affect the results of experiments made on the heart's work under different conditions (*e. g.* when defibrinated blood is sent into it from a vein under various pressures, or when drugs are administered to it), and an investigation of the nerves, if any, governing the lung vessels must be undertaken as a preliminary to a further study of the direct action of various conditions on the heart's work.

EDINBURGH ROYAL SOCIETY.

There was a very large attendance at the meeting of the Edinburgh Royal Society held recently, to hear Professor Helmholtz, who was announced to make a communication "On Electrolytic Convection." Professor Helmholtz stated to the Society the results of certain later experiments which he had made in working out his theory of electrolytic convection—experiments which, he said, had succeeded better than his former ones had done. He had entered upon his experiments on account of certain objections that had been made to Farraday's electrolytic law, in connection with experiments which showed that a very feeble galvanic current could be kept up by moderate electro-motive force between platinum plates dipped in a slightly acidulated solution, even if the electro-motive force of the battery was not sufficient to decompose the water. He had found, in his earlier experiments, that the only effect of the current was to absorb oxygen given off from the atmosphere and to form a new portion of water, and that the whole electrolytic effect was, not to decompose water and to produce a new quantity of elements—hydrogen and oxygen—but only that on the surface of one plate of platinum oxygen was collected and taken away from the surface of the other. He had, therefore, called these currents electrolytic convection. It was not really a decomposition, but only a transport of one of the products of electrolytic decomposition from one place to another. In his later experiments he had got rid of the atmospheric oxygen, by inclosing the whole electrolytic fluid in a sealed glass vessel. As a result, he had found that the smallest electromotive force, down to the thousandth of a Daniell's cell, produced a strong deflection which went immediately back to zero, that there was no continuous current, and that, if they broke the current, they got a deflection of the same character in the opposite direction to the first and direct one. Sir William Thomson, in speaking on the paper, stated that Professor Hemholtz's theory of electrolytic convection formed quite an era in electrolytic chemistry. Sir William himself made a communication "On the average pressure due to impulse of vortex-rings on a solid," following up inquiries suggested by Helmholtz's vortex theory. Professor Tait stated the result of certain calculations which he had made "On the crushing of glass by pressure," and which had been suggested by his recent inquiry as to error-corrections in the use of the *Challenger* thermometers. The result was that with cylindrical tubes made from ordinary Leith plate-glass, he found the glass gave way under a shear of about 1-250th, and that the strength of the tube was greater as the walls were thicker and the internal diameter decreased. But, however thick the walls might be, or however small the internal diameter, a pressure of 22 or 23 tons on the square inch would inevitably crush the strongest glass.

NOTES.

M. DAUDIGNY, electrical engineer in Paris, has sent to the Municipal Council a petition asking for authority to establish on the top of the Colonne de Juillet a large electric lamp fed by a magneto-electric machine of fifty horse-power. This enormous light is to be diffused by a large reflector of special construction.—*Nature.*

SIGNOR MANET, we learn from an Italian journal, whitens the albumen of blood by means of the electric light; which is projected by a system of mirrors and lenses, giving a strongly luminous effect. The time required varies according as the albumen is more or less separated from the fibrine. In general, 24 hours suffices to give complete decoloration.

PROFESSOR LOOMIS appears still to be experimenting in aerial telegraphy—telegraphing without wires—and it is now said that he proposes to establish communication, through the current which he claims is always found at a great altitude, between one of the highest peaks of the Alps, in Switzerland, and a similarly situated station on the Rocky Mountains, on this continent.

IT has been found by M. Laurent that any ordinary good silvered glass mirror, plane, concave, or convex, and of any thickness, may be rendered a magical one by means of heat. A simple way of doing this is to heat a brass tube, and apply the end of it to the silvered face. If the mirror surface is opposite a screen, the section of the tube is reproduced in white; if the former is turned away from the screen, the image (which is seen only after removing the tube) is dark. A cold tube may be used with a hot mirror, and the experiment may be otherwise varied.

M. DUCHEMIN, the inventor of the compass with a circular magnet, now adopted in the French navy, has recently devised, for correcting compasses, a system of magnetic compensators. In place of the straight magnetic bars generally employed he uses magnets of an annular form. If we magnetise a steel ring, it may have two poles at opposite extremities of a given diameter and two neutral lines. Such rings—round, oval, or of any other form, and with or without interruption of continuity—may be utilised for the correction of a compass, by being placed either on the bridge of the vessel or in the binnacle.—*Revue Industrielle.*