

is so much in the right ventricle, so little in the left—circumstances which led the ancients to suppose that the arteries, as their name applies, contained nothing but spirits during the life of an animal. The true cause of the difference is this, that as there is no passage to the arteries, save through the lungs and heart, when an animal has ceased to breathe and the lungs to move, the blood in the pulmonary artery is prevented from passing into the pulmonary veins, and from thence into the left ventricle of the heart, just as we have already seen the same transit prevented in the fœtus by the want of movement in the lungs, and the alternate opening and shutting of their minute orifices and invisible pores. But the heart not ceasing to act at the same precise moment as the lungs, but surviving them, and continuing to pulsate for a time, the left ventricle and arteries go on distributing their blood to the body at large, and sending it into the veins; receiving none from the lungs, however, they are soon exhausted, and left as it were empty." In support of this reading of the subject under consideration, Dr. Richardson now adduced various experiments and observations of his own. He had watched the process of dying in men and in animals on numerous occasions during the past two years, and had observed that whenever the act of dying was at all prolonged, the cessation of the heart's beat prior to the cessation of respiration was followed by fulness of the arteries after death; and, *vice versa*, that the cessation of the respiration prior to the cessation of the heart's beat was followed by emptiness of the arterial trunks. To this general rule there were a few exceptions, however. Thus the arteries may be left empty after death from hæmorrhage, although the respiration may have outlived the heart. In cases of death from failure of the right side of the heart, or from obstruction there, the arteries may again be empty, though respiration continued longer than the circulation. In cases of obstruction in the left side of the heart, again, the arteries may be full, though the heart may have outlived the circulation; while in sudden death, where the heart and lungs ceased to act almost simultaneously, the arteries may be found as full as the veins. Dr. Richardson next remarked on that condition of blood in which it was found in the arteries in long coagulated threads. In these cases the arteries had probably been left full; but the blood in them having coagulated and become separated into two parts, clot and serum, the serum was drawn off by osmotic action, first into the tissues, and afterwards into the veins or tissues, in the same manner as water is taken out of arteries injected with it in dissecting-room subjects.

A very animated discussion followed the reading of this paper.

Dr. SNOW contended that the power of the left ventricle was not sufficient to empty the arteries. The contraction of the arteries during life was shown in the gradual feebleness of the pulse during exhaustive diseases. There must be some other kind of force in the capillaries to cause the arteries to empty themselves completely.

Dr. CRISP denied the muscularity of the arteries, and their active contractile power. The elasticity of the fibrous coat of an artery was contrary to the idea of muscularity. The act of blushing showed a relaxed state of the vessels, and in the arteries no kind of contraction could be elicited by irritation similar to that action which could be so long kept up after death in the intestines and other organs possessing muscular fibres.

Dr. PAVEY urged that the left ventricle could not by its contraction alone empty the arterial tubes. It must push something, such as a column of air, before it, in order to produce such an effect. In experiments on animals, he had often observed the contractility of arteries, and had seen an artery reduced by contraction to the condition of an impervious cord. The contraction of arteries after death resembled the contractile power of the bladder, by which the urine was sometimes expelled in the dead.

Mr. HIRD doubted if the same physical effects could be produced in the living artery as were produced in the dead. The condition of the blood itself had not a little to do with its motion; in the main, however, he agreed with Dr. Richardson.

Dr. HARE contended that the heart could not of itself empty the arteries. More than this, the arteries could be seen contracting in the frog's foot. In anæmic states, where the heart was feeble, the action of the arteries was often most active.

Mr. PILCHER remarked on the elastic property of arteries, and on their faculty of shortening during a diastole. He believed that cadaveric rigidity extends to the arteries. The contraction of an artery was analogous to contractions in other canals, such as the urethra and lachrymal duct.

Dr. MURPHY thought that all the causes that had been named might lead to the results described. The causes named

by Dr. Richardson were probably the main ones, but the others might be subsidiary.

Dr. O. WARD observed that strictures of the urethra or lachrymal duct resulted from local irritation, and could not therefore bear on the subject of arterial contraction or non-contraction.

Dr. HENRY said that some of the exceptions to the Harveian rule described by Dr. Richardson were scarcely exceptions, but rather extensions of the rule itself. He would like to hear how Dr. Richardson accounted for the oscillations of blood in the arteries during feeble states of the circulation, without the aid of arterial contraction.

Dr. CHOWNE would like to hear from Dr. Richardson what he supposed the arteries contained in cases where they were quite empty of blood. They certainly were not vacuous. He did not think that sufficient facts were before us to explain all the phenomena connected with the state of the circulation and respiration in the act of death.

Dr. RICHARDSON, in reply, observed, that if the arteries really contracted after death so as to empty themselves in any one case, they ought to do so in all. He asserted from observation that the arteries did not undergo cadaveric rigidity. He believed, with Dr. SNOW, that there was a force exerted by which fluids in the arteries could be drawn into the tissues, and thence into the veins; that this force was osmotic, and went on in the dead as well as in the living subject for a time. The violent action of the arteries in exhaustive diseases showed a want of tone in the arterial tunics, and the hæmorrhagic pulse was essentially characteristic of the same condition. He could not answer the important question put by Dr. Chowne as to what the arteries did contain when empty of blood; certain it was, however, that they were not vacuous. Mr. Pilcher's argument about stricture of muscular tubes could only be brought to bear on this subject when the muscularity of the arteries was proved to be a fact. Oscillations in the arteries, in feeble states, were produced merely by the systole and diastole of the heart during a period when there was diminished supply of blood in the arterial system.

ROYAL SOCIETY.

ON THE FREQUENT OCCURRENCE OF INDIGO IN HUMAN URINE, AND ON ITS CHEMICAL, PHYSIOLOGICAL, AND PATHOLOGICAL RELATIONS.

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(Communicated by Professor SHARPEY, Sec. R.S.)

THE present communication embraces some further observations and experiments on the occurrence of indigo in human urine. From these it appears that the presence of that substance is even more common than the author was led to anticipate from his first inquiries, the results of which were communicated to the Society in June last. The author furnishes additional proofs of the blue colouring matter in question being really indigo, by converting it into isatine and aniline; for this purpose it was necessary to obtain the pigment in considerable quantity. Contrasting its chemical and physiological relations with hæmatin and urine pigment, he shows that indigo is closely allied in its nature and origin to those substances, and he considers that when indigo is met with in urine in considerable amount, it forms a vehicle for the elimination of any excess of carbon contained in the system. This view is borne out by the important fact, that the greater number of cases in which indigo has been observed to be developed in the urine in large amount, have been cases in which the decarbonizing functions are greatly impaired, as in extensive tubercular disease of the lungs, and in most cases of cholera.

Reviews and Notices of Books.

A Manual of Pathological Anatomy. By C. HANDFIELD JONES, M.B., F.R.S.; and EDWARD H. SIEVEKING, M.D. Foolscep 8vo, pp. 788. London: Churchill. 1854.

EVERY ONE who has studied the science of Medicine as such a science ought to be studied, must long ere this have arrived at the conclusion that there are two of its departments—those of pathology and therapeutics—in which there is yet much to