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PART I.
ORIGINAL COMMUNICATIONS.

ART. XI.—*Disease of the Brain dependent on Disease of the Heart.* By ROBERT LAW, M. D., Fellow of the College of Physicians; Physician in Ordinary to Sir Patrick Dun's Hospital, &c. &c.

ALL the organs of the body are so bound up together in the same bundle of life, that it rarely happens that one suffers, at least seriously, without involving others; and in an exact ratio of the importance of each organ, and the extent of sympathetic relations that it exercises, is the degree of mischief that its derangement spreads through the economy. When we apply these considerations to the heart, the central organ of the circulation, and reflect upon the functions it has to fulfil, that it is both the reservoir from which all the organs of the body are supplied with that upon which their very life depends, and that it is the agent to minister such supply, we can readily understand how essential to the health of the general system is the integrity of this important organ.

And as the use of the circulation is not limited to carrying into the different parts the materials of secretions, exhalations, nutrition, &c., but that it also keeps them in an habitual state of excitation by the shock which it impresses on them when it reaches them, and which seems to be derived mainly from the heart; (with which shock Bichat connected very much the energy of the function of each organ, and considered that this object was contemplated in the position which the vessels conveying the blood to each organ have with respect to it, even the most favourable position for communicating such shock;) so also the derangement of the circulation or the interruption of the supply of blood to any organ, does not alone keep back from such organ its material of secretion, nutrition, &c., but also hinders that impulse which appears to be so essential to the due performance of its physiological function. The phenomena of syncope illustrate this point. We know that syncope is a sudden suspension of sensation and motion, produced by a cessation of, or a greater or less interruption of the circulatory movement conducting the blood to the brain. In some cases of great debility and prostration it only requires one to rise up suddenly from the recumbent posture to produce fainting. We would inquire, what has the change of position done to effect this? It has only imposed on the central organ of the circulation the difference of labour required to propel the blood under slight circumstances of mechanical disadvantage, compared to what they were before, a difference of force unheeded and unfelt in ordinary health; as we are not conscious of the heart feeling any difference of fatigue in propelling the blood to the heart when we sit or stand, or when we assume the horizontal position. But when the health is weak, this slight demand of increased power upon the heart, and its not being able to respond to it, produce this serious result, even the suspension of the function of the brain as the organ of sensation and motion. This proves to us the intimate and delicate relations existing between these important organs, and in particular circumstances, upon what very slight causes depend their functional derangement.

The permanent well-being of the system requires an equable and regular supply of blood for all its organs. They all require their due proportion. There is a nice balance of the circulation which must be maintained in order to insure health; the heart is mainly instrumental in keeping this up: and when this organ is diseased, the worst results of its disease are the consequences of the interruption to this equable circulation.

When the heart is in its healthy and normal condition, when its mechanism is perfect, it is well calculated to deal out to each organ its due supply of what constitutes its proper nutriment and stimulus; and with a degree of force consistent with the health and well-being of the several organs. But when disease so affects it as to interfere with its double office, that of being the reservoir and agent of supply, we find the injurious effects of such disease exhibiting themselves, in some organs having more, while others have less than their due quantity of blood, the excess and the deficiency being equally hurtful to the respective organs in which they occur, although in a different way.

Pathologists have almost entirely confined their attention to the excess of the normal quantity of blood or the congestion produced in organs by disease of the heart, but have overlooked the deficiency that must necessarily result to other organs, and consequent hurt to their nutrition and function. Thus in disease so affecting the mitral valve as to lead to a considerable narrowing of the opening between the auricle and ventricle, exclusive attention has been directed to congestion of the lungs, liver, &c. and no notice has been taken of any ill effects resulting to other organs from their supply of blood being proportionably diminished; a diminution, the expression of which we have during life in a small pulse, and in the midst of which the beat is sometimes altogether wanting, denoting the almost entire retrograde motion of the blood from the ventricle into the auricle through the imperfect valvular apparatus; and which we find indicated after death by the aorta being so reduced in size as not to exceed the com-

mon carotid ; a diminution which it has undergone in obedience to the physiological law which establishes a relation between vessels and the size of the stream of fluid which they convey. It is to the effects of this diminution of the quantity of blood upon the brain to which we would now direct attention, a point of pathology which we believe to have been hitherto almost, if not altogether, overlooked.

The influence of diseases of the heart in the production of disease of the brain, under a single modification, was noticed first by Legallois in a communication made to the Society of the School of Medicine in Paris. This was soon followed by one from M. Richerand, of which the case of the illustrious Cabanis was the subject. The particular modification of disease to which we allude was apoplexy or sanguineous effusion into the substance of the brain, dependent upon hypertrophy of the left ventricle of the heart.

M. Bricheteau took up the subject in an article in the *Journal Complimentaire des Sciences Medicales*. He alludes in this article to the notice that had been already taken of the subject both by Legallois and Richerand, but remarks that the few observations or cases that had been adduced to illustrate it, proved that it was not considered as frequent as his experience convinced him that it was. M. Bricheteau considers that there are three kinds of cerebral affection dependent upon hypertrophy of the left ventricle of the heart, viz. congestion, effusion of blood, softening and disorganization of the brain. We are quite satisfied that M. Bricheteau's statements are, to a certain extent, true ; still we are equally convinced that he has mixed up affections both different in their nature and in their mode of production. For while we fully admit that the increased impulse of the heart, determined by the hypertrophy of the left ventricle, must operate injuriously upon the brain, from the peculiarity of its vessels, little able to sustain such impulse, and especially if to their normal unfitness be superadded the change in their structure, which time produces in the arterial tissue

generally, a change which we have, perhaps, more frequently observed in the arteries of the brain than elsewhere ; yet we are equally convinced that M. Lallemand has well suggested this qualification to M. Bricheteau's statement, that in order that the brain be exposed to this impulse, resulting from hypertrophy of the left ventricle, *the impediment to the circulation, upon which the hypertrophy most commonly depends, must be situated more remote from the heart than the origin of the vessels which convey the blood to the cerebral organ*. This qualification of M. Lallemand is partially true, and shows why apoplexy is not nearly as common as hypertrophy of the left ventricle of the heart. In fact one of the most frequent cases of hypertrophy of the left ventricle is an obstruction placed at the very mouth of the aorta, owing to an altered condition of the valves situated here. In this case the augmented action of the organ (which is sure to lead to permanent hypertrophy) expends itself upon the obstruction, and is not propagated beyond it, as we may judge from the pulse, which is not characterized by tone or strength. The obstruction, when placed here, serves as a protection, or if I may be allowed the expression, a kind of breakwater to the parts situated beyond it. But with the hypertrophy and with the obstruction occupying this position, we still find cerebral disease. It is to this point that we would draw especial attention, as we consider it to have been either completely overlooked, or its nature and mode of production to have been misunderstood. In this case the hypertrophy has no share in the lesion of the brain ; it is quite independent of it, and solely due to the obstruction to the passage of the blood to the head. In truth, at the time that this point of pathology—disease of the brain caused by disease of the heart—was first noticed, to use the phrase of M. Bouillaud, the law of progressive development of pathology had not so far extended to the morbid conditions of the brain as to place the physician of that day in a position to appreciate the difference between the particular lesion to which we allude, and which we exclusively

ascribe to the disease of the valves of the aorta, or rather to their effect on the supply of blood to the brain, and the lesion produced by hypertrophy of the left ventricle without the disease of the valves, namely, the breaking down of the substance of the brain by a *coup de sang*. The exact nature of ramolissement of the brain was but imperfectly, if at all understood; and even now we would ascribe to this ignorance of the nature of this lesion, its being confounded with others widely differing from it.

Whoever is acquainted with the history of this particular modification of cerebral disease knows that M. Rostan was the first to direct very special attention to it. The particular circumstances under which he had occasion to observe it led him to regard it as an affection unconnected with and independent of inflammation; as, in fact, an effect of imperfect nutrition. The Salpêtrière at Paris was the field of M. Rostan's observations; and all its inmates being persons of advanced life, he found in all the cases of the disease that occurred to him there, the exact conditions necessary to support his view of it. He drew the general conclusion that it was in all cases a lesion independent of inflammation. M. Rostan had not long promulgated this view of the nature of this particular lesion, when M. Lallemand as dogmatically asserted that ramolissement of the brain was always the result of inflammation. Here, as in many such cases, the advocate of either opinion had some grounds to sustain him, the truth lying between the opposing statements. The different opinions would have found their confirmation in the effects of disease of the heart upon the brain. Thus M. Lallemand could have referred to the coagulum of blood effused into the substance of the brain from a heart whose action had been greatly increased by hypertrophy of its walls, and this coagulum acting as a foreign body on the surrounding cerebral matter, and exciting an inflammatory action in it; while M. Rostan would have found a stronger confirmation of his particular view in such cases as I shall presently adduce, than he could

have had from the more indirect grounds which led him to form his too general conclusion. The first case which drew my attention to this morbid complication, and discovered to me its exact nature, was one which I had occasion to observe in 1834 in the Richmond Hospital: the case was that of a female aged 17, labouring under disease of the heart, and hemiplegia of the right side. The heart's action was very strong and tumultuous, and accompanied with *bruit de râpe*; the pulse was very small and irregular; in addition to the hemiplegia she had lost the power of speech. The account that her mother gave of her illness was, that for two years she had been labouring under distressing palpitation of the heart, and oppression of breathing; and that the paralytic affection had come on at a much later period, and very gradually. She only survived her admission into hospital four days. The examination of the body disclosed the following appearances:—The brain scarcely exhibited any trace of blood; it was in a complete state of anemia; when cut in at the upper and back part of the left hemisphere, a quantity of a greenish-yellow fluid, of the consistence of cream, poured out, leaving a regular depression under the surface. There was considerable hypertrophy of the left ventricle of the heart; the mitral valve was quite unfitted for the performance of its functions by induration of its structure, and having warty vegetations attached to its free margin; the aorta was much smaller than natural, as also its primary branches; the lungs were very much congested, and exhibited many nodules of pulmonary apoplexy. The circumstances of this case first suggested, nay proved to me, that ramolissement of the brain, the result of disease of the heart, is not the inviolable effect of the blood impelled to the brain with undue violence, but that it sometimes takes place under precisely opposite circumstances. The anemic condition of the brain, and the smallness of the aorta and the branches proceeding from it on the one hand; and the congested state of the lungs with the pulmonary apoplexy on the other, lent their united testimony

in proof of this. By as much as the brain was deprived of its due supply of blood, by so much were the lungs over supplied ; and that this state of things was of considerable duration we concluded from the diminished size of the aorta and its branches, which was a physiological accommodation of these vessels to the diminished stream of blood that they had now to carry, the greater proportion of which regurgitated or was driven back through the imperfect mitral valve. The lungs in fact in this case were very much in the condition of the brain, when affected from the increased impulse of a hypertrophied left ventricle ; the pathological conditions of the two organs were reversed, the impulse of the hypertrophied ventricle being directed backwards towards the lungs, instead of in the direct course of the circulation and towards the heart.

The next case of complicated heart and cerebral affection was Metcalf, a shoe maker, aged 34, who came under my care in May, 1838. He had complete paralysis of the right arm and leg, and his speech was so affected that it was in vain that he tried to make himself intelligible. He pointed to his forehead as the seat of pain. The heart's action was accompanied with a strong impulse and a bruit de soufflet in the superior internal cardiac region. There was a marked disproportion between the strength of the pulse and the action of the heart ; the calorific function was very weak, especially observable in the cold, livid, congested state of the paralyzed hand. We could procure no information as to the duration of his illness, or the order in which the heart affection and paralysis had come on, from his utter inability to express himself. Our diagnosis was ramolissement of the brain consequent upon disease of the heart, which from the locality of the bruit de soufflet, and the strong impulse, we referred to the aortic valve. We felt,* at the same time, that

* The size of the pulse at the wrist, is in general a true measure of the extent of contraction of the left ariculo-ventricular opening. But we shall have a very small pulse, or even no pulse at all, when this opening, so far from being smaller, is larger than natural ; when the diseased mitral valve admits of the complete or partial regurgitation of the blood. But in the former case, when the contraction is considerable, the pulse is constantly small, while it is only occasionally so in the latter.

the small pulse was rather the pulse of mitral valve disease, neither had it the thrill of the pulse of aortic valve disease, nor was it visible, while he was under our care. At the same time that we never missed the *bruit de soufflet* from where we had it first, we heard it occasionally, but not very distinctly, a little inferior and external to the left mamma, or in the situation of the mitral valve. We regarded the cerebral portion of the complication as the most serious, and to it directed our chief attention. He was ordered mercury in the minute doses that we have recommended in a previous number of this Journal: a grain of calomel to be made into twelve pills, with extract of gentian, and one of these to be taken every hour. In four days he was freely salivated. After this he took James's powder in small doses, and had leeches applied behind his ears from time to time, when he complained of headach, which his own imperfect expression, and flushing of the face, with heat of the head, sufficiently announced to us. Besides these means he had cold lotion to the forehead, and mustard foot baths occasionally. In the beginning of August he had recovered almost the complete use of the paralyzed limbs, and had but slight imperfection of his speech, nor did the heart affection distress him much. He now left us, and resumed his trade of shoemaker.

Before Metcalf left the hospital, H. Dooley, aged 40, cornporter, was admitted, complaining of most urgent dyspnœa, so distressing at night as to oblige him to sit up. Percussion yielded a dull sound, much beyond the normal limits of the cardiac region, particularly internally. A double *bruit de soufflet* was heard in the superior internal cardiac region, or in the situation of the aortic valves, and this seemed to be continued up into the large arteries proceeding from the aorta. As the stethoscope was applied external and a little inferior to the left mamma, a more obscure single *bruit de soufflet*, accompanying the first sound of the heart, was perceptible. The heart's action was attended with a strong impulse; the pulse was full and jarring, (vibrating,) and visible at the wrist; there was a

marked palish, or rather greenish yellow hue of face, with pallid lips: no dropsical swellings. He referred his illness to his mode of life, which subjected him to sudden alternations of heat and cold, and considered it to be of three months' duration. Our diagnosis was—disease of the heart, consisting in imperfection of the aortic valves, with consequent hypertrophy of left ventricle, and probable disease of mitral valve. We ordered for him small doses of the tincture of the muriate of iron, with a few drops of tincture of digitalis, with occasional leeches to the region of the heart. His condition was such, in fact, from the time of his coming under our care, that our main consideration was to alleviate as great anguish and suffering as I ever witnessed; and in this, as in many similar cases, the patient referred his principal pain and distress to the epigastrium. Leeches applied here afforded little, if any relief. He died a little more than a fortnight from his admission. Examination of the body discovered to us an enormous enlargement of the heart. As the organ lay in situ, in the pericardium, it seemed to be at least twice its normal size. Its greatly increased bulk was due partly to large coagula distending it, but principally to the effects of disease upon itself. The left ventricle was both hypertrophied and dilated; its walls were an inch thick, and its cavity much enlarged (eccentric hypertrophy.) The right ventricle was alone dilated, its walls retaining their normal thickness. The valves of the aorta were thickly studded, especially on their free margin, with warty, cauliflower vegetations. A column of water, poured on them from the artery, filtered through into the ventricle. The mitral valve had the same vegetations, although in a less degree, on its ventricular surface and free margin. The lungs were cedematous and congested.

On opening the head, and removing the brain from its position, we found on the inferior surface of the anterior lobe of the left hemisphere, where it rested on the orbital plate, an irregular oval patch of softened structure, about the size of a section of a walnut, of a dirty greenish colour, occupying and destroying the surface of the convolutions, but not extending deeply into

their substance. We were quite unprepared for this lesion, as the patient made no complaint during life which led us even to suspect it: there was no paralysis, nor any mention of weakness of either side.

The cardiac disease presents us with a good specimen of that modification of disease which my friend Dr. Corrigan was certainly the first accurately to describe, although others have set up a claim to its discovery. It consists in such an affection of the aortic valves as prevents them closing the mouth of the artery, and therefore allows the regurgitation of the blood into the ventricle. Its signs are—a double *bruit de soufflet*, generally a marked impulse, a peculiar vibrating pulse, and a visible pulsation of the larger arteries; a sallow, pallid complexion, too, is almost constant. If we be now asked, how do we explain our theory of the ramolissement of the brain being caused by deficient nutrition in this case, our answer is, that the ordinary disease of the valves of the aorta, in this case, acts in a two-fold manner to deprive the brain of its due supply of blood. In the first instance, the nature of the lesion is generally such as to prevent the valves closely applying themselves to the sides of the artery; and these, forming an obstruction at the mouth of the vessel, hinder the blood issuing in a full stream from the ventricle; and in the next place, the regurgitation into the ventricle through the imperfect valves. And that our views upon this point are correct, we are fully persuaded from the fact of the perfect coincidence that exists between the signs and symptoms of this lesion and those of hæmorrhage: we have the same *bruit de soufflet* of heart and larger arteries in both; the same vibratory character of pulse; the same visible pulsation of the arteries; the same sallow, pallid complexion; and we have also observed, as a symptom of this cardiac lesion, the same vertigo and giddiness which are so constantly observed in profuse hæmorrhage: and, as Dr. Gooch observes that remedies are a kind of test or reagent to establish the nature of a disease, if the mode of treatment applicable to this modification of heart

disease be what is suited to the system when suffering from hæmorrhage, it will serve to establish a closer analogy between them. Dr. Corrigan, in illustration of the injurious effects of the lowering system of treatment in this form of disease, and of the advantage of the opposite mode, adduces the first case of it that he met with. The patient had undergone the ordinary treatment for heart disease, viz. repeated bleeding, strict regimen, digitalis, repose, &c. These means, long persisted in, reduced him very much; and his disease, instead of getting better, appeared to become worse. A lucky turn of circumstances now took him to the country, where medical advice was not so attainable. He changed his mode of life, laid aside medicine, improved his diet, took exercise, and in a short time his health underwent such a decided amelioration as to allow him to take charge of a country dispensary, in the active and laborious duties of which he exercised himself for sixteen years. He, at length, sunk under the disease. Dr. Corrigan had an opportunity of exhibiting the heart at the Pathological Society; it afforded a most striking specimen of vegetations on the aortic valves, which effectually interfered with the function of these valves. The results of this case suggested to Dr. Corrigan a mode of treatment, in this particular disease of the heart, very different from that which had hitherto been pursued; and he saw the reason for the suitableness of such change in the nature of the lesion. He fancied that the hypertrophy of the left ventricle, which is constant in the diseased condition of the aortic valves, was a wise provision of nature to sustain the regurgitating blood, and that any treatment which had a debilitating effect (which, indeed, was the general effect of all modes of treatment usually and indiscriminately employed in all diseases of the heart,) must necessarily tend to frustrate this intention; he therefore adopted in subsequent cases a tonic and invigorating plan. We have adopted the same plan, but we own we see for it other reasons, in addition to those which suggested themselves to Dr. Corrigan. We see the hypertrophy of the ventricle not alone

required to sustain the returning blood, but also to propel it through the mouth of the aorta, not allowing a free exit, from the state of the valves. To weaken the system generally, would be to weaken this propelling power of the ventricle, and so disable it from sending on even the smaller quantity of blood, which the unimpaired ventricles could discharge through the diminished aortic orifice. We, in fact, see in the lesion the system deprived of its due supply of blood in two ways—both by the diminished quantity of blood that passes from the ventricle into the artery, and by the passing back again into the ventricle of much of that diminished quantity. We see the pallid ensanguineous face, with the frequent symptom of vertigo and giddiness added to all the physical signs of hæmorrhage, all pointing to the same treatment that the system, when it has been weakened by hæmorrhage, requires.

When we reflect upon other diseases, whose constitutional symptoms are nearly the same as those of hæmorrhage, as that form of chlorosis whose essential feature consists in an imperfect elaboration of the blood, when this fluid seems to want its due consistency, and find that these diseases exhibit all the physical signs presented by the cardiac lesion in question, we see additional reason to believe that the applicability of the same treatment to all depends upon their close connexion, if not upon their identity, and that this relation consists in the privation of either the proper quantity of blood, or in the cases of imperfect sanguification, in its altered quality; the same, both physical signs and constitutional symptoms, resulting from such alteration.

Metcalf, to whose case we before alluded, after being absent from the hospital a year, was re-admitted July 9, 1839, with his symptoms very much aggravated from what they were when he left us. His articulation was so very indistinct that we were quite unable to procure any information from him. The signs of the heart affection had undergone a very marked change: instead of hearing the *bruit de soufflet* superiorly and internally

as we did before, its maximum of intensity was inferior and external to the left mamma. As we continued our examination round the body, and posteriorly, we still heard it, and so loud as almost entirely to mask the respiration. It was much louder in the posterior right than left. The pulse, when he was admitted, was small, while the heart's action was strong, and attended with impulse. There was considerable fulness and dull sound in præcordial region. After being a few days in the hospital he got an acute attack of rheumatism in the right thumb, which caused considerable pain, redness, and swelling of it. The radial artery at the corresponding wrist beat much stronger than the other. His breathing was very much embarrassed. Through the loud sound of the heart posteriorly we could detect a crepitus in both lungs. The surface of the body exhibited a whitish, doughy appearance, such as we often observe to be present in acute rheumatism. The face was occasionally flushed, but generally had the same pallid hue as the rest of the body. The change in the signs of the cardiac affection, from the time he had been under our care before, consisted principally in the altered locality of the *bruit de soufflet*, which formerly pointed to the aortic valves, but which now seemed to indicate an affection of the mitral valve. He retained the weakness of the right side, which had been paralyzed. His symptoms did not amend; his breathing became more laboured; the crepitus in both lungs more distinct; the heart's action could be heard through all parts of the chest; but the *bruit de soufflet* was always loudest a little below and external to the left mamma. The cardiac sound, too, was always more distinct in the posterior right than in the left. Percussion posteriorly yielded a more dull sound in inferior posterior right than in left, upon the cause of which we charged the heart's action being more distinct here. The right foot was the first to swell; after some days the left also became œdematous. The report on September 5 was: considerable œdema of both feet and legs; face pale and greasy; pulse 96, very small, but regular; he cannot lie down at night;

crepitus in both lungs posteriorly ; dulness, on percussion, in postero-inferior right. Although his intellect was intact, he could not render himself in the least intelligible. He suddenly expired the next day, having spit a little blood.

Examination of the Body.—The brain seemed smaller than natural, and as if it did not fill the cranium ; the arachnoid was of a greyish white appearance, and thickened ; there was a gelatinous effusion on the surface of the brain. On making a section of the left hemisphere, about midway between its anterior and posterior extremities, on a level with the *corpus callosum*, we found a portion of the substance of the organ, about two inches in length, and an inch in depth, broken down into a soft greenish substance. The anterior portion of the *corpus callosum* also was of a green colour, and of a creamy, cheesy consistence. On the surface of the right hemisphere, near its posterior part, there was a depression or indentation, which, when cut into, exhibited the same altered structure and appearance as that on the left side : all the medullary portion of the organ was of a greenish hue.

When the sternum was raised, the heart, with its investing pericardium, exhibited an enormous size ; it seemed to have pushed aside both the lungs. The right side of the pericardium adhered to the internal surface of the right lung ; the pericardium contained about eight ounces of pale straw-coloured serum ; the right auricle was immensely distended with black grumous blood. The cavity of the right ventricle was very much enlarged, and its thin muscular wall exhibited a striking contrast with that of the left ventricle, which was very much thickened, and its cavity also very large. The *septum cordis* was nearly an inch thick. The *carneæ columnæ* of the left ventricle were considerably hypertrophied. The valves of the right side were healthy. There appeared to be only two aortic valves ; two being so united together as only to make one. To the free margin of each valve were attached warty, cauliflower vegetations, of various sizes and lengths ; some clustered toge-

ther ; others hanging down singly, among which one, about two-thirds of an inch in length, hung into the ventricle. The mitral valve was very much thickened in its substance ; to its free edge, also, were attached smaller vegetations : upon both its ventricular and auricular surfaces were granules, which gave it a rough, scabrous appearance. These same granules studded the surface of the auricle. The *cordæ tendineæ* were very much thickened ; the auriculo-ventricular opening was not contracted ; the heart, when emptied of its blood, weighed twenty-two ounces. The right lung was so congested and condensed in the structure as to sink in water ; it was of a rose-pink colour. The left was also congested, but in a less degree. The abdomen contained some serum, with flakes of lymph in it. The liver was enlarged, but exhibited no abnormal appearance.

I predicted the nature of the cerebral lesion that would be found in this case, a year and half before I had an opportunity of verifying it ; and subsequent to making this diagnosis I met with Dooley's case, which exhibited precisely the same, both cerebral and cardiac lesion, and which, of course, made me more confident in my diagnosis. The difference between the two cases consisted in the cerebral lesion not announcing itself, by any symptoms during life, in Dooley's case ; but the extent of disorganization was much more considerable in Metcalf's case. The nature of the cardiac lesion was precisely the same in both. In our former mention of Metcalf's case we alluded to the lower temperature of the paralyzed side : our statement would have been more correct had we declared that the calorific function generally was less energetic than natural. The occurrence of the cerebral lesion, in these two cases of heart disease, seems to us to illustrate both the nature of the one disease and the other. The cerebral lesion was precisely the same as that which we observed in the first case which came under our notice, in which the ensanguinous condition of the brain, and the smallness of the aorta and its primary branches, on the one

hand ; and the gorged, congested state of the lungs, and the state of the mitral valve allowing regurgitation, on the other, contributed their both direct and indirect testimony to the deficiency of blood transmitted to the brain. The identity of the lesion would argue that this other modification of heart disease, with which we have seen it connected, operated in the same way to produce it as the former ; and as the former acted by depriving the brain of its due supply of blood, that this likewise was the mode of operation of the other. This goes to establish a still closer analogy between the cardiac affection and hæmorrhage, which we have seen already to resemble each other in so many of their physical signs and constitutional symptoms.

In the two cases to which we have just alluded we saw the condition not only of the aortic valves, but also of the mitral valve, co-operating to produce the cerebral lesion, in the way in which we supposed it to take place. We saw such a condition of the aortic valves, as not only to prevent them closely applying themselves to the sides of the vessel, and so not *admitting* a full stream to pass from the ventricle into the artery, but also so altered as to allow the blood freely to flow back into the ventricle ; while we also saw the mitral valve so changed in its structure, and so imperfectly to fulfil its office, as to present a difficulty to the blood in its direct passage from the auricle into the ventricle, and also to allow it to regurgitate from the ventricle into the auricle. The congested condition of the lungs in each case proved this to have been the fact.

We shall content ourselves with the details of one other case, although we might produce more.

Mary Murray, aged 20, unmarried, admitted into hospital August 6, 1838, with symptoms of fever. Pulse 108 ; skin hot and dry ; tongue loaded ; thirst ; heart pulsates strongly. She complains much of pain of her back and head ; bowels confined ; abdomen full.

Enema Terebinthinæ statim ; Lotio frigida fronti ; Haustus effervescens.

7th. Pulse 108, soft and compressible ; skin not particularly hot ; face rather flushed ; tongue dry, of a reddish-brown colour ; she is in a heavy, lethargic state ; discharges passed unconsciously during the night.

Hirudines quatuor pone singulas aures ; Fomentationes Terebinthinatæ Cruribus ; Pulv. Jacobi veri gr. ii. quartis horis.

We directed that if she continued in the heavy, lethargic state till towards evening, a blister should be applied to the nape of the neck.

8th. The stupes had the effect of rousing her from the stupor for a time, but she relapsed into it again, and the blister was applied. Pulse very soft and compressible ; heart beats with a strong impulse, and with a loud *bruit de soufflet* ; tongue more moist ; no headach ; she muttered a little during the night ; respiration laboured ; bowels torpid. We were somewhat perplexed by the opposite indications of the heart and pulse, and began to suspect that they were not connected with her present illness, but depended upon a previous affection of the heart. Upon this point we could not procure any information from the patient herself, owing to the state in which she was. We directed a repetition of the turpentine stupes to the legs, and James's powder, and, from her state of weakness, allowed her two ounces of wine. We continued this treatment for three days, and increased the quantity of wine, under which she improved. The heart's action was not increased, and the pulse diminished in frequency. She still retained a heaviness and lethargic state, for which we applied a blister to the vertex, which quite roused her. Her bowels continued torpid, and only responded to enemata. On the 14th we began to allow her beef tea, and to diminish her wine. On the 18th we substituted porter for the wine. The relation between the action of the heart and the pulse continuing the same under all circumstances of her illness, confirmed us in our first conjecture, that there was a previous heart affection. This she now admitted, and dated its existence from some time back. We supposed it

to be disease of the mitral valve, from hearing the *bruit de soufflet* most distinctly towards the left mamma, and also from the smallness of the pulse. On the 20th she was reported convalescent, and ordered a mutton chop.

On the 21st, without her making any complaint on the subject, we perceived that she had a weakness nearly amounting to paralysis of the left hand and arm, which she thought so little of as to believe it to have been the effect of her having lain upon it during the night. However, we soon saw that it was more than this, for her speech was thick and less distinct. When she protruded her tongue the point turned to the left (affected) side. On being questioned, she said she had some difficulty in swallowing. We found that the left leg was also weak. All these symptoms came on when she had laid aside all medicine, and when, every symptom of her fever having completely disappeared, we felt ourselves warranted in putting her on full diet. There was no flushing of the face; no heat or pain of head. The pulse was reduced in frequency, although the heart still retained its strong action, with its accompanying *bruit de soufflet*. The hand of the affected side was blue and livid, and of an inferior temperature to the opposite one. There seemed to be a general languor of the system. We directed for her a combination of extract of *nux vomica* and James's powder, and *infusum arnicæ*. She took these medicines for some time, and had occasional blisters to the nape of the neck, but did not seem to derive any benefit from them. Her mind seemed to become weaker, and her countenance began to be quite idiotic. Her mother now removed her from the hospital, and kept her at home for some time, when she became almost quite imbecile, so that she sought to gain her admission into the lunatic department of the House of Industry; but not succeeding, she sent her to the country to lodge with a farmer. While there her clothes took fire, and her body was extensively burned. In six weeks, although her life had been in imminent danger, she not only recovered the effects of the burn, but her general health

became greatly improved. I saw her November 1st, 1839, and was greatly struck with the amendment in her appearance since I had last seen her. Her countenance bespoke some degree of intelligence, instead of the vacant, unmeaning expression that it had before. Her general health and strength were very much improved. Her left side still continued weak, and the left hand much colder than the right. The heart still beat strongly, and with the *bruit de soufflet*, while the pulse was small and feeble. She quite lost a distressing pain in the left side of the head, from which she had been scarcely ever free. All this amendment dated itself from the time of her recovery from the burn. We forgot to observe, in the course of the case, that when she was with her mother, after leaving the hospital, she used to faint frequently.

This very interesting case seems to us strongly to illustrate the point we are considering. We have little doubt that disease of the mitral valve was the cardiac lesion. The want of relation between the heart's action and the pulse, and the locality of the *bruit de soufflet*, are the principal grounds upon which we form this conclusion. The small pulse is a measure to us of the small quantity of blood issuing from the left ventricle into the general circulation, and the consequent deficient supply to all parts deriving from this source, to the brain among the rest ; and perfectly consistent with this view is, what we readily admit, that many of the symptoms which she exhibited in the fever, such as the disposition to coma, oppression, obstinate torpor of the bowels, &c., were attributable, in a certain degree, to the congestion of the brain consequent upon this cardiac lesion, as we see the same effects, although in a modified form, almost constant in the lesion ; but all these symptoms had, in a great measure, disappeared when the hemiplegia came on. Nor does congestion often produce hemiplegia ; and as it is transient in its nature, if it pass away without destruction of life, its effects also will soon disappear.

We shall only cursorily observe on another case, that of a

female aged 32, who exhibited the combined lesion of heart disease, indicated by a constant bruit de soufflet in the region of the mitral valve, with a pulse very disproportionate to the force of the heart's action, and of cerebral disease indicated by hemiplegia. Her speech was so affected that she could give us no information. We learned from her friends that she had been long labouring under distressing palpitations, but that the hemiplegia was comparatively of a recent date. She was a good while under our care in hospital, and left us considerably improved. We gave her mercury in fractional doses, so as to produce tenderness of the gums, with three grains of calomel. We then put her on small doses of James's powder and extract of nux vomica, and from time to time had leeches applied behind the ears; she also had foot-baths with mustard. At times she became intelligible; in fact in these cases we found, in general, the state of the speech a tolerably good index of the state of our patient, it being plainer and more distinct as he or she improved.

We shall close our observations on this part of our subject with the *post mortem* examination of a distinguished individual, exhibiting this complication. As the case occurred under circumstances to prevent our procuring its details, we could alone learn that there was during life a remarkably infrequent pulse, sometimes not exceeding twenty-five beats in the minute. We also heard that he had been subject to syncope.

Appearances observed on examining the Body of the Earl of K—, October 19, 1839.—The cranium was thick, and the bony substance very hard, so that the incision of it with the saw was more difficult than usual. The arachnoid was thickened and opaque over the entire convexities of the cerebral hemispheres. The cellular texture of the pia mater was universally and considerably infiltrated with serum.

Several convolutions of the cerebral substance were shrunk, so as not to be more than half their size. The lateral ventricles were enlarged and filled with a limpid fluid. *The substance of*

the left hemisphere, both cortical and medullary, was so softened as to present an almost creamy consistence. This change occupied about one-third of the hemisphere, towards its middle and posterior part, extending from the external surface on the one side, to that of the ventricle on the other.

The principal arterial ramifications at the base of the brain were thickened by opaque yellow depositions in the substance of their tunics. When the brain had been removed, a considerable quantity of fluid remained at the base of the skull, and much had escaped in the course of the examination.

The pericardium was adherent to the left ventricle of the heart for a small space. In the mitral valve there was a small scale of bone, apparently not sufficient to interfere with the function of the part. *The semilunar valves of the aorta were thickened and partially ossified, so that they could have neither effectually closed the entrance of the artery, nor have lain smoothly against the side of the vessel.**

From our experience of other cases, where the *post mortem* appearances resembled exactly those which we have just transcribed, and where we had every reason to believe that the cerebral stood to the cardiac lesion in the relation of effect to cause; we would venture to believe this might have been the order of pathological development in the present instance. And we can easily understand how the cardiac lesion may have eluded observation until it had attained such a height as materially to interfere with the functions of the heart, while no sooner was the brain affected than it announced its injury by symptoms plain and obvious. Many such instances do we meet with in pathology, where the disease of one organ will not materially derange the health of the system generally, until it implicates in its sufferings an organ more important than itself,

* I am indebted to my friend, Dr. Croker, for the preceding details. The examination was conducted by Mr. Lawrence and Dr. Tweedie. Since I transcribed the above, Dr. Tweedie, under whose care the case latterly was, kindly furnished me with some particulars of it, confirming the facts of the state of the pulse, the disposition to syncope, &c.

when the affection of this organ, secondarily engaged, will draw upon itself exclusive attention, and thus divert us from what was the real *point du depart* of the disease. And that disease, of even so important an organ as the heart, may exist unnoticed, we have often seen in cases of acute rheumatism, where, without any complaint from the patient, we have applied the stethoscope to the cardiac region, and there discovered a distinct *bruit de soufflet*. Our further inquiries generally elicited that the patient had before suffered from acute rheumatism, but had completely recovered; however, to our interrogatory if he could walk as fast, or ascend a height with as much facility as before he had the attack, he then generally admitted that "his wind was not quite as good," although he never thought of noticing it until he was now reminded of it. We have under notice at present not a few cases, which have been long since affected with acute rheumatism, and in whom a constant *bruit de soufflet* bespeaks an organic disease of the heart, from which they have so slight inconvenience as to be able to engage in the duties of active life. We can easily believe that the cardiac lesion, in the case of the distinguished individual in question, may have been the result of an insidious growth in its earlier period, and that subsequently the more prominent and striking phenomena of cerebral disease diverted attention from it. Although we conceive this to be not only possible, but likely, yet there is nothing to prevent the cerebral lesion taking place first, and then, and independently, the cardiac lesion; and this latter then modify the cerebral symptoms, so as to impress them with the stamp of an original cerebral affection, dependent on cardiac lesion.

We now come to the consideration of the most important part of our subject, the practical results of it. And if our observations be true, as we confidently believe they are, the practical consequences involved in them are of the most important nature, as they must lead to a mode of treatment widely different, and in many cases the exact opposite of what has

hitherto been pursued in such cases, where the cardiac lesion has been overlooked as the cause of the cerebral affection, or even where it has been recognized, but has been considered to have acted differently from the way in which we have now described.

As we fully admit that serious cerebral mischief will result, and has been proved in many instances to have resulted, from an hypertrophied left ventricle impelling the blood with undue force to the brain, a first point in all these cerebral affections, whether of apoplexy or paralysis, ought to be, to determine the actual state of the heart, if it be in a normal healthy condition ; and if not, in what its deviation from such state consists. If it be in a hypertrophied condition, we have physical signs to declare it to us. If this hypertrophy depend upon an obstruction to the course of the blood interposed between the heart and the origin of the vessels which convey the blood to the brain, whether this obstruction reside in the mitral valve or in the sigmoid valves of the aorta, the characteristic signs of these respective lesions will be present, and will serve to guide us. The pulse, especially, will yield us most valuable information. In cases of aortic valve disease, it will have the peculiar vibrating, jarring character which we have already noticed, and will also be visible in the longer arteries ; while in mitral valve disease it will be small, and even sometimes be altogether absent, and never in proportion to the strength of the heart's action : whereas if the obstruction and consequent cause of the hypertrophy be more remote than the origin of the vessels leading to the head, the same impulse, which forcibly drives the blood to the brain, will be communicated to the vessels leading to the wrists and constituting the pulse. Here the force of the pulse is a measure of the impulse to the brain. In no case of apoplexy or paralysis should a careful examination of the heart's action be omitted. When we find a full, strong pulse, with an equally strong action of the heart, attended with marked impulse, or shock, we may calcu-

late upon that modification of this complication of cerebral and heart disease which has been so long noticed. And to the treatment in this case, we have only to repeat what we have remarked in a former number of this Journal, that while such an affection as apoplexy, and under such circumstances, demands the most untemperizing practice, yet the extent to which depletion should be carried has its limits; for we have not unfrequently met with cases in which a large abstraction of blood has been followed by a collapse or failure of innervation, which required to be immediately met by stimulants.*

* At a late meeting of the Pathological Society, Mr. Carmichael made some judicious observations on the practice of copious bleeding, in cases of sudden apoplectic seizure. The occasion of Mr. Carmichael's making these observations, reprobating the indiscriminate practice, was in bringing before the Society a case of sudden death of a Presbyterian clergyman, beyond the middle period of life, who had just performed the marriage ceremony, and while at breakfast fell lifeless. The suddenness of the death led to the suspicion of its cause being either in the heart or larger blood vessels. Examination of the body discovered the muscular substance of the heart completely converted into fat. The respected individual, during life, often complained of præcordial oppression, and was subject to fainting; to avert which he constantly kept within his reach some stimulant, such as Madeira wine, although a man of rigidly abstemious habits. Mr. Carmichael attributed the death in this case to cerebral congestion, consequent on the inability of the right ventricle to propel the blood through the lungs; and therefore commended the effort that had been made to save life, by opening the jugular vein, and thus more directly relieving the congestion; rather than by adopting a mode of depletion, which, by weakening the system generally, would have rendered the right ventricle still less able to propel the blood through the lungs, and so rather augment than diminish the congestion. We saw the cause of death in a different light from Mr. Carmichael, considering it to depend not on the congestion, as the symptoms were not indicative of congestion, but upon the failure of the power of the left ventricle to propel the blood to the brain, and the consequent failure or suspension of innervation. It was a disposition to this of which the patient complained during life, and against which he sought and obtained relief from stimulants. When we consider what syncope or fainting consists in, that it is a sudden loss of sensation and motion, caused by the cessation or great weakening of the circulatory movement conducting the blood to the brain, do we not find its exact conditions fulfilled in the case in question? The state of the left ventricle was such as to render it an unfit instrument to deal out to

We shall not enter into the detail of the treatment of the cerebral affection dependent on the disease of the heart, under these circumstances, as it is now a new point of pathology ; we only ask that due discrimination be exercised, to distinguish between it and the cerebral affection dependent upon the other cardiac lesions to which we have alluded.

We have little to add to what we have already stated of disease of the brain, produced by disease of the aortic valves. Quite adopting Dr. Corrigan's views of the treatment and management of the cardiac lesion, from our practical experience of it, and from our theoretical views of its nature, and its close analogy of physical signs and constitutional symptoms with hæmorrhage, we have employed in it a tonic mode of treatment, especially so when the cerebral was added to the cardiac lesion. Observing, as we before remarked, a close relation of signs and symptoms not only between this heart affection and the physical signs and symptoms of hæmorrhage, but also between it and those diseases whose essence seems to consist in an imperfect state of the blood, and in whose treatment we find chalybeates especially beneficial, we selected our tonics from this class of remedies, and we conceive with some advantage. When the cerebral affection co-existed, we united the treatments suited to the complication. We found the cerebral affection to require an occasional carefully modified depletion, which generally consisted in a few leeches applied behind the ears. We also employed blisters to the nape of the neck ; foot-baths, with mustard.

the brain the fluid, upon whose constant supply, as a stimulus, depended the function of this organ, as the source and centre of innervation. But we may be told that this condition of the ventricle was no new thing. That is true ; but the occasion was one in which the feelings of the individual were very deeply engaged ; and we may remark, that a comparatively slight cause will be competent to produce death, when it acts upon an organ whose integrity has been already infringed on to an extent barely consistent with life. While we agree with Mr. Carmichael that a full depletion is injurious in such cases, our rationale of the reprobation of the practice differs from his ; his having respect to the right ventricle, ours to the left.

Although the patient's flushed face generally suggested to us the necessity of these occasional means, yet we generally depended more on the state of the speech, which seemed to us to yield more certain indications. Our constitutional treatment, contemplating both organs, consisted in tonics and stimulants, united to other means, which the individual organs interested in the complication seemed to require. The indications were to impart habitual strength to the heart, to enable it to propel the blood, as well as to sustain its regurgitation, and also to stimulate it. We also had to provide for the cerebral affection. We before remarked that we selected our tonics from among chalybeates, with which, as in the case of Dooley, we associated, but very sparingly, digitalis. The stimulants we employed were camphor, ammonia, infusum arnicæ, our hospital formula of cardiac mixture, composed of camphor mixture, carbonate of ammonia, and Hofman's anodyne, &c. &c. We combined James's powder, (as recommended by Dr. Cheyne in cerebral affections,) with carbonate of ammonia. But the combination which seemed to us especially useful in these cases was that of James's powder and extract of nuxvomica; the former ingredient by determining to the surface, producing an equalization of the circulation, while the latter stimulated the heart, as a muscular organ.

The indications, where the cerebral lesion depends on an affection of the mitral valve, are nearly the same as when it depends on the aortic valves, except that when the mitral valve is affected, physical motions and moral emotions must be equally avoided, as producing that tumultuous action of the organ, and causing those congestions upon which depend the exacerbations to which this affection is so subject.

There are two conditions of the auriculo-ventricular opening in these cases—one consisting in its permanent contraction, the other in its permanent patency. In the one but a small quantity of blood passes from the auricle into the ventricle, and of that small quantity a good deal passes back into the auricle again; in the other there is a free passage to the blood from the auricle

into the ventricle, and nearly an equally free one from the ventricle back into the auricle. The effect is nearly the same in both cases. The system is equally deprived of its due quantity of blood, while there are the same congestions in the heart itself and in the lungs. While the habitual treatment consists in the exact opposite of that which experience has proved salutary in aortic valve disease, in physical and moral quietude, we shall have to meet the tendency to syncope and failure of nervous energy by the same stimulants as in the other modification of the disease. My friend Mr. Fleming communicated a most interesting case, upon the subject, to the Pathological Society. It was that of a gentleman, aged about 45, who first complained that he was suddenly seized with dyspnœa at night, and had palpitation. Mr. Fleming had seen him for some time, when he was sent for in great haste to see him, as he had been seized with what was supposed to be an apoplectic fit. He found him in a state of unconsciousness, with a pulse scarcely perceptible, and perceived that he had hemiplegia. He directed his feet to be put into warm water, with mustard, ordered camphor and ammonia, and a blister to the nape of the neck. By these means, in five hours, and of course before the blister had taken effect, he quite recovered. Between March and November he had four different attacks, all of the same nature, and all treated, and successfully treated, in the same way. All the attacks were attended with jaundice. Mr. Fleming found the necessity of insisting upon the most perfect quiet of both mind and body. The heart's action was very strong with impulse, and had a *bruit de soufflet*, while the pulse was very small and feeble, and sometimes not to be felt. The slightest depletion, even a single leech, produced alarming weakness. There was an extreme susceptibility of the effects of opium.

The gentleman's death, caused by another disease, afforded Mr. Fleming an opportunity of examining the state of the organs of the chest, but unfortunately not of the head. He found the mitral valve of the heart thickened in its structure, and quite

insufficient to close the auriculo-ventricular opening, which was much larger than it should have been. There was eccentric hypertrophy of the left ventricle. The lungs were congested, and in parts exhibited portions of pulmonary apoplexy, and were partially emphysematous. It is matter of regret that the examination of the head could not have been obtained, to ascertain in what state the brain was. Whether there was permanent lesion of the brain or not, is not very material; it proves, at least, how lesion of the heart will influence the circulation to the brain to such a degree as to cause the suspension of the function of the latter organ, to the almost complete, if not to entire destruction of life. Mr. Fleming evinced a sound judgment in the exhibition of stimulants, guided by the weak, faltering pulse, and regarding the symptoms as dependent on the brain being deprived of its proper stimulus. Although we regard this as the main feature of the case, yet we believe the congestion of the brain to have had some share in it. In some of the attacks Mr. Fleming gave brandy, and with great relief.

The conclusions we deduce from the foregoing observations are :

1st. The pathology of the brain is in many instances intimately connected with, and dependent upon, pathology of the heart.

2nd. To limit the pathological relation existing between these two important organs to apoplexy, the result of hypertrophy of the left ventricle of the heart, is to narrow it much within its true limits.

3rd. Ramolissement of the brain occurs in connexion with diseases of the heart, whose effect is either directly or indirectly to diminish the flow of blood to the head.

4th. This cerebral lesion may be connected with either disease of the aortic or mitral valve.

5th. Hypertrophy of the left ventricle of the heart, in order to produce apoplexy, must depend upon some impediment to the circulation, placed at a greater distance from the heart

than the origin of the vessels which convey the blood to the brain.

6th. When ramolissement of the brain occurs, in connexion with an imperfect or patulous condition of aortic valves, the close analogy that we trace between the physical signs and constitutional symptoms of this lesion and hæmorrhage, as well as the results of treatment, render it very improbable that the disease of the brain is the result of too much blood driven to it, and with undue force.

7th. When ramolissement of the brain occurs, in connexion with disease of the mitral valve, the state of the pulse, which, as a diagnostic mark of this lesion, is habitually small, precludes the idea that the cerebral lesion is produced under the usual conditions of inflammation.

8th. While ramolissement of the brain occurs as a result of inflammation, hyperemia, &c., it occurs also under diametrically opposite circumstances.

9th. To confound such opposite modifications of disease, and to apply to them the same treatment, must necessarily lead to the most mischievous practical results.

10th. The circumstances under which we have seen ramolissement of the brain to take place, seem to identify it with gangrene, or death of a part consequent upon a diminution of its due supply of blood.

ART. XII.—*Contributions to the History of Medicine.* By
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M. R. I. A.

[Read at the Evening Meeting of the College of Physicians, in the College Hall, on Monday, the 20th of January, 1840.]

ASSUMING that it will be generally admitted that the author who first publishes his opinions or experiments, is justly entitled to the merit of being considered the original discoverer; I