man of dull sensibility, and moreover very courageous, so that I could not, in fact, ascertain the actual amount of pain he suffered, which was, I think, greater than it seemed.

In respect of the treatment, I am disposed to think that the straight position would be the best adapted to ensure consolidation. I found after death, when I attempted to flex the limb, that this movement occasioned the end of the cervix to pass farther down into the cancellous structure of the bone, and it is obvious on reflection that such would be the case mechanically, and it must be understood that the double inclined plane bed, on which I placed the patient, was so arranged as to render his position very little different from the straight one, which I consider to be the best. Eversion of the limb should be of course prevented. Lastly, in considering what was the proximate cause of the patient's death, it was clear that it was not the direct result of the accident, although the shock produced upon the system might go far to hasten it in so old a man, and I believe that death not unfrequently follows these injuries. But the injury did not seem to occasion so great a shock as I should have thought it might, and had it not been for the bronchitis, which I conceive to have been accidental, I believe that consolidation would have taken place, and I should not have had an opportunity, at least at present, of recording its result.

CASE
OF
UNUSUAL SLOWNESS OF PULSE,
WITH REMARKS.*

By T. B. PEACOCK,

Late House Surgeon of the Chester Infirmary, Pathologist
to the Edinburgh Royal Infirmary.

The gentleman, who is the subject of this communication, first came under my notice in June, 1838; he was then 70 years of age, and enjoyed good health, with the exception of labouring under a remarkable slowness of pulse, of which he gave the following account:—He had attained the age of 60 without suffering from any serious indisposition, and had led a most active life, having been thirty-eight years in the army, and during a considerable portion of this time a non-commissioned officer in one of the regiments of guards, in which he performed the campaigns of the Peninsula, and was present at Waterloo. Since leaving the army, he had spent much of his time in the quieter kinds of field sports. About six years before the date of my seeing him, he was seized with an attack which was regarded as apopleptic by his medical attendant, for which he was bled with advantage; after this, his pulse was usually quicker than it had been when in health, and occasionally interrupted; he suffered from palpitation and uneasiness in the region of the heart, and a sensation which he described as a feeling of something rushing to the top of the head. About two years after the first appearance of these symptoms, he suddenly became faint while engaged in making some slight exertion, and fell down in a state of insensibility; on recovering

his recollection, the feeling of faintness and languor was still felt, and continued some time, and he found his pulse beating only 25 to 30 times in the minute, a rate which, with little variation, it had retained for the last four years. I counted his pulse, and it beat steadily, and with perfect regularity, 28 times in the minute. This, he informed me, he regarded as the healthy standard. Occasionally, under the operation of depressing causes, as over fatigue by muscular exertion, it fell below that point, beating only 20 times, and on one occasion only 18 times in the minute; under these circumstances, the languor and feeling of rushing to the head and faintness came on; on the other hand, excitement of any kind, unusual bodily exertion, taking one or two glasses of wine, or, more frequently, mental excitement, gave rise to increased frequency of pulse, when it would beat 32 or 34, and this was uniformly attended with feeling of oppression and feverishness.

For three years after the change in the rate of his pulse, he was liable to occasional attacks of syncope; for the last twelve months he had, however, been free from them, and during the whole time had been in a pretty good state of health, and capable of taking an ordinary amount of exercise. His general appearance was that of a person of greater strength and activity than most at the same period of life, and though upwards of six feet in height, so far from being in any degree bent by age, his gait was remarkably erect.

My first impression, on feeling his pulse at the wrist, was, that the case would prove to be one of those described by Laennec, in which the alternate cardiac pulsations are so weak as not to be propagated to the distant arteries. On the hand being, however, applied over the region of the heart, its pulsations were found to correspond with those in the radial artery; the sounds of the heart did not present anything unusual, and were heard most distinctly between the sixth and seventh ribs; the first was short, and terminated rather abruptly by the second; the action of the heart was perfectly regular, and its impulse rather powerful, the pulse at the wrist being also not deficient in strength; percussion did not indicate any increased size of the organ, and was good over the rest of the thorax except on the right side, where the liver was found to advance considerably into the cavity of the chest. The respiration was natural as to frequency, and was performed with ease, except when he was engaged in unusual bodily exertion; no indications of any cerebral disease were present. In consequence of absence from home I did not again see him till 1840; during the interval, he informed me, he had but once suffered from an attack of faintness, after which he was left languid and oppressed, and incapable of much exertion for some time; with this exception, his health had been good, and he had been able to follow his usual occupations. His pulse I now found somewhat slower than before, beating only 26 times in the minute. On examination of the chest, the sounds of the heart were still natural, or nearly so, giving evidence of some degree of hypertrophy, with more or less dilatation of the left side, but with no valvular disease. On occasion of our first interview I had recommended the adoption of a moderately

* Read before the Royal Medical Society.

stimulating diet; latterly, however, he informed me that he had abstained almost entirely from fermented liquors, and he imagined with advantage; during his whole life he had, indeed, been very temperate. After this time I had not another opportunity of seeing him. He continued in his usual state of health till the following year, when he was suddenly seized with an attack of syncope, and expired—seven years after the remarkable slowness of pulse had first manifested itself. He was at this time residing at a distance, and no examination of the body took place.

My interest having been excited by this case, I was led to search for others of a similar description; with the exception, however, of several cases recorded in different periodical publications, I find the only account to be that contained in Mr. Mayo's paper, read before the Royal College of Physicians in 1838, and published in the "Medical Gazette" of the same year.

The cases detailed by Mr. Mayo are of two kinds—first, those in which the slowness of pulse was present from early life, or at least in which it was not known to have had at any former period a different rate; and secondly, those in which the pulse formerly beating at the ordinary standard suddenly fell to a lower average.

On the first class of cases I have no remarks to offer, bearing, as they do, but little analogy to the one related, and being, probably, not of very unfrequent occurrence. The examples given by Mr. Mayo are four in number; all occurred in males; two at the middle period of life, the other two in advanced age. The average of the pulse was in three from 30 to 40, and in one from 28 to 30. All seem to have possessed a fair share of health, and one was remarkable for his bodily activity.

The second division of cases are regarded by Mr. Mayo as dependant on lesion of the brain—general depression, exhaustion, and reduction of strength—sympathy with the digestive organs—on atrophy of the heart, dependant on ossification of the coronary vessels, with or without passive dilatation.

The cases of slowness of the pulse, dependant on lesion of the brain, possess little interest, being of such frequent occurrence; the only case referred to by Mr. Mayo is that of Lord Liverpool. I may add that related by Mr. Holburton before the Medico-Chirurgical Society, in 1841, of a gentleman who laboured under peculiar fainting fits, with general slowness of pulse—the supposed result of injury to the medulla oblongata. The following are the particulars:—The patient, 64 years of age, sustained, in a fall from his horse, an injury to the back of the neck, the nature of which was not clearly understood. From this he recovered in the course of a year, with, however, the remains of some difficulty of moving the head. Two years after he was suddenly seized with a fainting fit, and while in this state his pulse beat only 20 times in the minute; the syncope returned at irregular intervals on any unusual excitement; his ordinary pulse was 32, but during the fits it fell to 12, 10, 9, 8, on three or four different occasions as low as 7. He died suddenly in one of those attacks five years and a quarter after the receipt of the injury. On examination, the medulla oblongata was found small and very firm, the antero-posterior diameter of

the foramen magnum greatly diminished, the odontoid process pushed back, the occiput, atlas, and dentata firmly ossified together, and the canal so small as not to admit the little finger: the state of the heart was not ascertained. No paralytic symptoms had been present during life. The case related by Dr. Speers, in the 17th volume of Dr. Duncan's Medical Communications, was also regarded as dependant on disease of the brain. A man, 54 years of age, who had been drinking over night, was suddenly seized with a fainting fit in the street. When seen, his pulse beat only 24; he was perfectly collected, and complained of feeling of faintness; after this his pulse, in the intervals between the fits, varied from 24 to 26; when in them it occasionally fell to 10; stimulants would, however, then raise it to the former point, and give temporary relief to the faintness. On the second day he was so far recovered as to walk out to his workshop, but, on his return, was again seized with syncope, and the fits continued to recur till his death—nearly four days from the first attack. He was perfectly sensible to the last, but was observed during the last night not to move one arm and leg. Some gelatinous exudation was found on the surface of the hemispheres, and two ounces of fluid in the ventricles; his heart was healthy. The natural standard of his pulse at the time of attack was not ascertained, but three years before, when labouring under fever, it rose to 120, and on convalescence was 75.

In illustration of exhaustion being productive of slowness of pulse, Mr. Mayo quotes the case of a young lady who, in consequence of a neuralgic affection of the face and throat, was advised by her medical attendant to abstain from taking any food by the mouth; to this she submitted; nutritive enemata were administered twice or thrice a-day; in four days symptoms of fever supervened; and in fourteen the catamenia, which had been repressed for nine months, reappeared; the pulse was now between 70 and 80, but suddenly fell to 35; food was then cautiously given by the mouth, and she entirely recovered her strength, and the spasms were cured. The subsequent state of the pulse is not mentioned. A case, illustrating this form of the disease, fell under my notice about a twelvemonth ago. A patient, about 35 years of age, during convalescence from a severe attack of maculated fever, experienced a gradual reduction in the frequency of the pulse, till it fell to 45 and 40. At this point it continued several days, during which time his appetite was good, and he was able to leave his bed and take exercise in the ward, and latterly to go out into the garden. With the recovery of his strength the pulse again rose, and was of ordinary frequency at the time of his discharge from the hospital.

The next case related by Mr. Mayo is apparently regarded by him as one dependant on exhaustion, acting in combination with disorder of the digestive functions. A medical student had sat up for six nights successively, without taking rest in the day. At the end of that time he became feverish, free purging was had recourse to, and under its depressing influence his pulse fell to 35, at which point it continued two or three days; it then rose to 40, but did not attain the natural standard till after the lapse of many years. In the next two cases given by Mr.

Mayo, the heart was evidently the subject of organic disease. They are as follows:—A gentleman, 52 years of age, had threatenings of apoplexy, for which he was subjected to purging and a reduction of the free diet to which he had been accustomed. After this had been continued some time, he became subject to occasional attacks of faintness, during which his pulse fell from between 70 and 80, its former average, to 34, 30, and occasionally to 27. Under the use of a more stimulating regimen he gradually recovered his strength, but the pulse retained the same rate, and occasionally, under exposure to cold, or other depressing influences, it would sink to 24, and once to 21. He experienced hurried breathing on unusual exertion, had a bellows murmur with the systole of the heart, and at the earlier period of his illness the second sound could not be heard. After some time, however, it returned, and shortly before its reappearance a double beat of the heart took place for one pulsation at the wrist. The last case is very similar to the one just quoted. A medical gentleman, 59 years of age, had an attack of influenza, for which he had himself twice bled, and lost fifty ounces of blood. From the debility thus induced he did not recover for a twelvemonth, and soon after, on rising one morning, he experienced a sensation of faintness, and, on feeling his pulse, found it beating only between 30 and 40. The faintness soon went off, and his pulse rose to its former rate of 70. About a year after, the attack recurred under similar circumstances, and, though after continuing three or four weeks the pulse rose again, it never exceeded 68. He then continued free from any further attack till a year had elapsed, when his pulse again fell, and continued to beat only 33 in the minute, occasionally falling to 22. Sometimes, while in this state, the action of the heart was neither to be heard nor felt, and occasionally it was only to be seen beating on the right side; he suffered under a feeling of constriction of the chest, difficulty of breathing, especially on any exertion, and pain in the right arm; his complexion was nevertheless ruddy, his appetite good, and his powers of exertion considerable; the heart did not exhibit any sign of disease on physical examination, with the exception of beating over a somewhat larger space than usual.

Slowness of pulse, as existing in these cases, in connection with disease of the heart, is by no means rare. Of this an example is given by Mr. Worthington, in the volume of the "*Lancet*" for 1841. A gentleman, between forty and fifty years of age, whose pulse, in a state of health, beat 75 in the minute, became affected with shortness of breath, oppression at the chest, and prostration of strength, during which his pulse sank to 40, and occasionally to a lower average. The stroke of the heart was fuller than usual, but the sounds natural. The symptoms continued to increase for two or three years; and stimulants afforded temporary relief; he eventually sunk under a severe fit of dyspnoea, and, on examination, the heart was found embedded in fat, and its substance blanched and softened, so that the finger could readily be made to penetrate its texture. No other diseased appearances were detected. Mr. Worthington also refers to the case of a gentleman of 70, whose pulse had, three years before, fallen from its ordinary rate to 26. The action of the heart was extremely

feeble, the impulse scarcely to be felt, and the period of time occupied by its pulsation scarcely exceeded that of the wrist. In the discussion on the case of Mr. Holburton, Dr. Addison mentioned a somewhat similar affection in a gentleman under his care. He was subject to a kind of epileptic fits, in which he became insensible, and his pulse beat only 20 or 24; from this it gradually rose to between 60 and 70, when it would stop entirely, and the fit come on. When it again begun to beat it was at the former rate, and in this state a double pulsation was often also observed, and a loud thumping and distinct bruit, the seat of which could not, however, be ascertained. He had no symptoms of head affection. Chomel had under his charge at la Charité, a young man labouring under disease of the heart, whose pulse ordinarily beat 28, and occasionally only 20 times in the minute. The only case which I have myself seen of remarkable slowness of pulse, dependant on disease of the heart, was that of a patient who died in the Royal Infirmary of a circumscribed aneurism of the base of the septum ventriculorum. The cardiac beats at the time of his admission, six months before death, were 44 in the minute, and, in the last period of his life, never exceeded 33 or 30, while, at the former low rate, the respirations were 34 in the minute.

The interest of these cases lies in the length of time during which the slowness of pulse continued, that symptom being, in the last stage of all cardiac diseases, of very frequent occurrence. From all these, however, the case I have related differs in presenting but very slight indications of disease of the heart, in having existed with so small an amount of general indisposition, and in the length of time during which it continued, while, with one or two exceptions, the rate of the pulse was much slower than in any of them. Unlike, also, the instances given by Mr. Mayo, and that of Mr. Worthington, stimulants, in whatever form exhibited, were uniformly attended with derangement of the general health—a feature in which it more nearly resembled the first division of Mr. Mayo's cases.

The adoption of any theory explanatory of the condition of the pulse in these cases is attended with considerable difficulty, owing to its occurring under such different circumstances—at one time being a temporary, at another a permanent condition—in one instance existing without any marked signs of cardiac disease, at another evidently combined with serious organic lesion.

Lesion of the brain, though often occasioning a similar condition of the pulse, may, however, be doubted to have given rise to the peculiarity in the two cases quoted. The length of time which, in Mr. Holburton's case, had elapsed between the receipt of the injury and the development of the disease, and the absence of any paralytic symptoms throughout its course, render questionable the dependance of the fainting fits and slowness of pulse on the injury to the medulla oblongata. It must also be borne in mind that, as extensive contraction of a similar portion of the spinal canal has been found where no such symptoms existed during life, and where, indeed, the patient was able, till within a very short period of death, to follow his usual occupation. Of this, Dr. Handyside's case, in the "*Edinburgh Medical and*

Surgical Journal," affords a remarkable instance. In the case quoted from the Medical Communications, it is stated that two ounces of fluid existed in the ventricles; but it is extremely improbable that so large an amount should have accumulated in little more than three days, without giving rise to symptoms of compression. The simple presence of fluid in the ventricle cannot be regarded as a morbid state, Dr. Sims having shown that two, four, and even six ounces, may be found in persons dying of diseases in no way connected with the brain, and in whom no cerebral symptoms were present during life. In the former case it will be observed that the heart was not examined; and in the last, the statement that it was found healthy, when viewed in connection with the imperfect knowledge of its pathology at that period, is not altogether to be relied upon.

It may be doubted whether atrophy of the heart was present in the last two cases quoted by Mr. Mayo, that gentleman not having had an opportunity of verifying his opinion by dissection. Atrophy of the heart is described by writers on the diseases of that organ as of rare occurrence, except as an attendant on chronic diseases of debility; and of the few cases on record in which it has been found, and the patients were under observation during life, the symptoms were alone referable to the disease which led to the fatal event—a remark which applies to two cases under my own observation, in which the heart was remarkably small; a condition in these cases, probably congenital, being combined with a similar state of the brain. We possess, therefore, no accurate knowledge of the phenomena to which atrophy of the heart would give rise; and Laennec expresses his opinion that it cannot in any case be regarded as a disease; adding, however, that "several hypochondriacs, who were liable to faintings from very slight causes, gave, under the stethoscope, signs of a very small heart."

The only case I have found recorded, in which an examination of the body took place after the pulse had observed a very slow rate, and in which the condition of the heart is stated, is that of Mr. Worthington's patient, who lived two years and a half, and in whom the heart was found very much softened. On the contrary, in the case of aneurism of the heart, to which I have before referred, the substance of that organ, so far from being softened, was unusually firm; the left ventricle was also hypertrophied, and its cavity much larger than usual. There existed in this case, probably, some regurgitation through the aortic orifice, and the symptoms during life were chiefly those of valvular obstruction on the right side, from the pressure of the tumour. In Mr. Worthington's case, no valvular disease was found; but one of Mr. Mayo's, like that seen by myself, gave evidence of such disease.

It would, therefore, appear, that extreme slowness of pulse, though an occasional attendant on different forms of disease of the heart, is not a necessary feature in any, and, as the peculiar condition of that organ, essential to its production, is probably one of deficient power with the absence of excitement, it may be expected to attend the last stage of diseases which, at an earlier period, are of very different types. Deficiency of power and excitement, existing in a less degree, may

be present in those cases in which, for one pulsation in the distant arteries, the heart is found to beat twice—a peculiar mode of action described by all writers of diseases of the heart, and of which examples are afforded in the preceding paper by one of the cases related by Mr. Mayo, and by that of Dr. Addison.

It is probable, also, that the same condition may occasionally be found with a powerful cardiac impulse, and strong pulse at the wrist—the heart, as it were, atoning, by one forcible effort, for the more frequent pulsations which, in a state of health, it should have performed.

Of those cases in which the pulse is found to assume a slow rate without any organic disease being present, and where it is only a temporary peculiarity, either dependant on exhaustion and prostration of strength, or, as occasionally happens, arising without any obvious reason, the imperfect state of our knowledge of the causes of the heart's action precludes our furnishing any decided explanation. It is, however, probable, that there may, in these cases, exist a loss of nervous energy in that organ, by which it is rendered less susceptible of the stimulus of the blood, and a deficiency of power and excitement is induced—a state similar to that which, in the former class of cases, results from advanced stages of organic disease.

Royal Infirmary, Edinburgh, April 13, 1842.

ALBUMINOUS URINE.

TO THE EDITORS OF THE PROVINCIAL MEDICAL JOURNAL.

GENTLEMEN,—I suspect that albumen exists in the human urine in many cases in which its presence escapes detection.

Inferring from analogy that it would be found in the urine of persons affected with *petechiæ sine febre*, although the urine might not contain any of the colouring matter of the blood, I resolved to investigate the matter on the first opportunity. Since last May I have had five cases under my care. In one, the urine was coffee-coloured, and deposited a brown powdery sediment, and coagulated both by heat and upon the addition of nitric acid. In the four other cases the urine appeared natural, and yet, in every one of them, the same tests proved the presence of a large quantity of albumen.

Again, analogy led me to suspect its presence in the urine of females who suddenly wean their infants at a time when they have a full supply of milk. I have since had the opportunity of testing urine under these circumstances in three cases; and in all the quantity of albumen was considerable.

In the petechial disease the urine becomes natural as the patient recovers; and in the cases of weaning, the quantity of albumen gradually diminishes as the milk disappears from the breasts.

I remain, Gentlemen,

Your obedient servant,

JONAS MALDEN, M.D.

Worcester, April 25, 1842.