Now, I can quite conceive a similar phenomenon taking place when the blood is poisoned by the retained elements of the urinary excretion. Indeed, it is a matter of not very unfrequent occurrence in hospital practice to observe a deposit or stagnation of the fibrinous part of the blood in the vessels of those individuals whose blood is altered in quality, such as in cases of chlorosis, phthisis, and other diseases leading to cachexia. I have seen not a few cases of chlorosis and phthisis at this hospital, in which the vessels of the lower extremities had become completely blocked up—a state of things possibly originating in that attraction which exists in health between the blood and the vessels being destroyed—thus necessarily leading to stasis of the blood, and collection of morbid materials retained in that fluid along the sides of the vessels.* In disease of the kidneys there exists that condition of the blood necessary to occasion the same phenomena. Possibly, the retained elements of the urine and the fibrine of the blood deposit on the sides of the vessels, which may produce degeneration or atheroma of their coats, either by undergoing certain transformations, or by setting up a kind of chronic inflammation, terminating in the same pathological changes.

It is hardly necessary to insist upon what is now generally admitted as a well established fact by pathologists, namely, that hypertrophied heart is also caused by this degeneration of the kidneys. There are several conditions existing which call upon increased pressure on the part of the heart, and, consequently, involving increased muscular growth of its left ventricle to meet that emergency, some of which are: the abnormal constitution of the blood from the retained urinary excretion and diminished density, both of which cause that fluid to move through the vessels with less facility; the impeded transit of blood through two such vascular organs in consequence of structural changes; and lastly, the altered state of the vessels. That the heart requires much more power to propel blood through the arteries which have lost their elasticity, is self-evident. Hence, I maintain, first, that cerebral hemorrhage, when associated with renal disease, is almost always found to be dependent upon rupture of one or more of the cerebral arteries, in consequence of certain morbid changes having taken place in their walls; secondly, that these changes in the walls of the vessels are induced by the altered state of the blood, the effect of advanced disease of the kidneys; and lastly, that the enlargement of the heart is the immediate effect of the renal disease, conjointly, perhaps, with the alterations in the coats of the vessels.

* In these cases, I believe no inflammation is set up in the first instance; but subsequently there is reason to suppose that a chronic form of inflammation takes place.

[To be continued.]

NON-COMBATANT OFFICERS. Few, when they heard of the departure of the twelve physicians for Bermuda, ever thought of the dangers they would so soon meet; and yet they are as great as that encountered by assistant-surgeons Manley and Temple in their brave conduct at the recent engagements in New Zealand, and for which their Queen has decorated them with that badge of distinguished bravery the Victoria Cross. We cannot but admire the spirit of true heroism which is exhibited by the man who, at the call of duty, walks to almost certain death, in aid of his fellow-creatures, suffering from a malignant infectious disease; this, in our opinion, is of greater merit, than he who marches to the cannon's mouth, during moments of intense excitement. (*Canada Medical Journal.*)

Original Communications.

PENETRATING WOUNDS OF THE KNEE-JOINT, AND THEIR TREATMENT BY IRRIGATION.

By WILLIAM NEWMAN, M.D. Lond., St. Martin's, Stamford.

IN a paper which was published in the *BRITISH MEDICAL JOURNAL* for June 27th, 1857, I narrated five cases of penetrating wound of the knee-joint, and drew attention to the treatment by irrigation, followed, in each instance, by a speedy and satisfactory recovery.

I have no novelty to bring forward; but I am anxious to supplement the above-named paper by a further contribution, adding the few cases of the same injury which have, within the past seven years, come under my notice; and at the same time I would enter more fully into the merits and employment of continuous irrigation as an agent of extreme value in the every-day requirements of surgical practice.

CASE I. In January 1862, I was asked to see a groom (a man over 50 years of age), who had, twelve days previously, fallen from a haystack upon the cutting-knife, and had laid open, by a slanting incision on the outside, his right knee-joint. The man had been kept quiet in bed, and the injury had been treated by poultices, leeches, etc.; but he was suffering considerable pain, had had very bad nights in spite of frequent opiates, while the joint was swollen, the integuments around puffy and infiltrated, and a gaping wound was freely discharging pus and synovia.

Irrigation was recommended, and continued steadily for twenty-four hours; so securing to the patient a good night's sleep, the first since the accident happened. After that time, from disturbing causes, other treatment was determined on, and employed. A week afterwards (nineteen days from the infliction of the injury), irrigation was again resorted to, at the patient's own request; and the progress to recovery was steady and satisfactory. Sedatives were no longer necessary; the nights were good, and the wound healed. Constantly used at first, the water was, after some time, only allowed to drop on the knee when the joint became, even in slight degree, hot and painful.

CASE II. In May 1862, I saw a labourer, who had, two days before, sustained a punctured wound of the knee. The left knee-joint was distended by effusion, and painful in some measure; but the symptoms were not of the same urgency as those usually met with. Possibly, the extreme *nonchalance* and indifference which the man strongly showed existed physically as well as mentally; and his nervous system may have been singularly insusceptible of external impressions.

Irrigation was suggested, and carried out for six or seven days. At the end of that time, all joint-irritation had subsided; the swelling, also, had quite disappeared.

CASE III. The details of this I propose to give at length, since some of the main points are well illustrated.

W. P., aged 40, agricultural labourer, came to my house on August 24th, 1864, having walked a mile from his own house to a side railway-station, and thence travelled by rail; the transit had given him a good deal of pain.

On the preceding day, August 23rd, he had sustained a punctured wound of the right knee-joint from a hay-fork. The point entered on the inner side, half an inch below the level of the mid-line of the patella, and passed upwards and outwards directly into the joint. He had walked a mile or more to his house after the accident. The joint was soon swollen, and became very painful, so as effectually to prevent his having any sleep through the night.

At midday on the 24th, when I saw him, the knee was much swollen, and the joint tense with effusion. Pain was constant, and increased by pressure; and there was a blush of redness on the skin. He was told to return home, to go to bed, and to keep up constant irrigation of cold water.

August 25th. He had had some sleep in the night, and said he had much less pain. The knee was still hot and swollen. The treatment was continued.

August 26th. He was doing well. He had a threatening of shivering in the evening, which was stopped at once by taking some ammonia; no feverishness succeeded. The joint was easy, but still swollen.

The irrigation was continued constantly until the 28th.

August 28th. The knee was less swollen, not painful, not hot. He slept fairly well. He was ordered to discontinue the dropping for an hour or two at a time; resuming it at once if any pain or heat should occur about the joint.

August 30th. The knee was much smaller; the patella a little thrown forward; otherwise, the external conditions differed very slightly from those of the uninjured joint. There was no pain on pressure; and very faint evidence of fluctuation. He was ordered to continue irrigation for three or four hours each day, with longer intervals between the applications.

Sept. 1st. He was going on well. The swelling was even less than when he was seen two days previously. There was no heat, nor pain. He was told that he might cease the water-dropping unless pain or heat should come on; and also that he might sit up a little, supporting the limb in its whole length. (For this he had special and clear directions.)

Sept. 4th. He had a relapse; was not nearly so well. The knee was more swollen, and was distinctly hot to the touch. This was easily explained. He had been up daily, and had not used any irrigation since the 2nd instant; but had been seated (contrary to orders), with the limb extended, and resting by the heel only, on a low stool, so having no support behind the seat of injury. Further, as the limb, from this new position, began to ache, and the knee became hot, he had been applying for the past twelve hours cloths wet with cold water, *propria manu*; and to do this had, on his own showing, moved his trunk forwards every five or ten minutes to reach the basin of water. I put a firm splint behind the knee, retaining it in place by a figure-of-8 bandage, sent the man to bed, and requested him to resume continuous irrigation.

Sept. 5th. He was better; was not in so much pain. The knee was still hot.

For the next seven or eight days, rest and continuous irrigation were insisted on; and, so much was the patient in fear that mischief in the joint might return, that he used the water even too thoroughly by voluntarily increasing the number of points from which the water dropped. Hence, he induced a heat of reaction, transitory, however, and not accompanied either by pain or swelling.

Sept. 15th. He was ordered to discontinue the use

of water entirely, and to move very cautiously, still wearing the back-splint.

Sept. 26th. The knee was normal in size and appearance. He could bear a little weight on it, and was now beginning to walk a little.

Oct. 12th. He walked well; had nothing to complain of, and would go to work the next day.

I would remark on this case that the first error was one of distinct omission on my own part. I ought to have applied a splint behind the knee in the first instance, and so provided against the possibility of any ill result from thoughtless movement. On this omission, in a measure, followed the relapse of Sept. 4th. More especially, however, was the recurrence of joint-irritation, due to want of care on the part of the patient. He failed to give to the limb, on first rising from bed, the support which he had been requested to ensure; and hence the terminal points, hip and heel, alone having a resting place, the articular surfaces of the femur and tibia were in constant and close apposition at the knee, as the central point; these surfaces having been the seat of subacute inflammation but a few days previously. Again, too, the continual movement of the trunk necessitated by the choice of wet cloths in lieu of irrigation, destroyed the chance of rest to the injured part, and kept the articular surfaces of the bones constantly rubbing one upon the other.

No sooner, however, was complete rest insisted on, and cold thoroughly applied, than the threatening symptoms began to subside, and the progress to recovery was uninterrupted, though slow. There was still, on Oct. 12th, a shade of general thickening around and about the joint; but the movements were not impaired, nor was pain induced by extreme flexion or extension.

If cold be the appropriate remedy for any surgical affection, it is but a bare truism to maintain that it should be applied effectually. If this, then, is to be done in the case of some acute inflammation—of a joint, for example—the constant presence of an attendant will be imperative, who may apply thin coverings moistened with some frigorific or evaporating lotion to the part affected, and change these coverings at very frequent intervals, as they become either warm or dry. But to speak of such procedures as available or possible in everyday surgical practice would be absurd. How is cold, then, applied? Usually, a lotion is prescribed, and some material soaked in this is applied to the seat of injury. More frequently than not, and despite distinct orders, some three or four folds of material are used; thus more lotion is taken up, and the attendant's trouble is proportionally diminished. But the result is precisely the opposite to that desired by the surgeon—the surface of the cloth very speedily steams with moist vapour, while the deeper layers are reservoirs of moist heat; practically, indeed, a poultice is concocted, without the efficiency of that time-honoured compound, and this, too, employed under conditions where warmth and moisture are not desired.

This may be an extreme view; but I, nevertheless, claim for irrigation, or water-dropping, advantages which do not attend on the most careful employment of cold in the more ordinary forms. It is easily arranged; when once put in order, it is self-acting, even for hours; it is cleanly and effective. The absence or stupidity of an attendant will not interfere with the application; and for its employment, no appliances are needed other than may be found even in the poorest cottage.

A reservoir of water (iced, if possible), a jug, some other convenient vessel, may be hung to some hook in the ceiling; tied to the frame of a bedstead, or, more elegantly still, some such stand as that, the

base and upper part of which are shown in the accompanying engraving, may be employed. It may be quickly constructed by any village carpenter.

The distance, from the injured part, of the water-supply, should not be less than three or four feet. If time be a great object in the treatment, or the symptoms of local injury be severe, a more speedy effect will result on the placing the jug at a greater distance above the bed on which the patient lies.

A few threads of lamp-cotton or Berlin wool, a narrow shred of flannel, or a strip of lint from the pocket-case, may do duty as a syphon. First well-soaked in water, the shred must so be placed that one end lies at the bottom of the jar, while the other one hangs outside at a lower level. A continual dripping will so be kept up until the cistern is exhausted.

The injured part should be kept immovable; the knee-joint should be fixed by a back splint sufficiently long and well padded, this being kept in place by a figure-of-8 bandage. The turns of the bandage must not be too tight, for, when wetted, the material shrinks very perceptibly; nor is it necessary to cover the joint itself with the folds. From hip to ankle the limb should be thoroughly supported; and, to insure this, the patient should be kept in bed. Waterproof sheeting, or an oil-cloth covering from a table, should be stretched beneath the limb, so as to prevent the wetting of the mattress; and, by adjusting this covering, a channel may readily be made, so as to direct the waste water into some dish placed on the floor.

Next, as to the time during which this mode of treatment may be carried on. I have continued the dropping uninterruptedly for eight or ten days more than once, and without ill result; then, intermitting the flow for an hour or two at a time, I have continued the same plan for a second similar period of time—three weeks in the whole. The time usually employed is about seven or eight days; and this may be extended or shortened, according to the special requirements of each case.

There seems to be little if any advantage from the addition of pharmaceutical compounds to the water in the jar. Possibly, when the rapid exhaustion of heat from the damaged part is a matter of impor-

tance, it would be well to add some spirits of wine to the water; or even the hydrochlorate of ammonia or nitrate of potash might be of some benefit. The instances (one or two) in which I have used some such salt, have not impressed me with any decisive idea of increased good.

In the hot weather of summer, I have been glad to resort to the use of ice; adding this to the water in the jar, so as to reduce the temperature much below that of the surrounding atmosphere.

The good effects which follow the persevering use of irrigation have seemed to me to depend far more on the constant evaporation of the thin layer of fluid which spreads itself over the injured part, than on the exact temperature of the water employed, or on any qualities which may have been obtained from its admixture with other substances, frigorific or sedative.

This mode of application of cold should be used more to prevent than to arrest inflammation; to bar the development of increased vascularity, with its subsequent bad results, rather than to procure the removal of this morbid condition, once established. Hence the rule, that irrigation should be used as speedily as possible after the injury has been inflicted. When so applied, the conditions of heat, swelling, and pain will not appear; and this good result is probably to be attributed both to the sedative influence of the cold on the cutaneous nerves, and to the diminution, from the same cause, of the absolute amount of blood circulating in the capillary vessels in and around the joint. Not, however, that the occurrence of actual inflammation in an injured joint should prevent the surgeon from resorting to this most effective means of reducing the abnormal temperature. The first case noted in this paper sufficiently proves its usefulness under such conditions. Still, if irrigation be used for the first time in the second stage, the good effects will be less speedy, more slowly evident; and certain subsequent changes in the affected textures must be expected to occur—thickening, stiffness in movement, etc.

Even under these less favourable secondary conditions, I incline to believe that irrigation has a material advantage, in comparison with the more ordinary plans of treatment. Cases may well happen in which the immediate local abstraction of blood will appear to be indicated, if only with the intent of relieving the pain of intense local congestion; but, after this, the use of cold would again be available.

Dr. Esmarch's valuable paper, issued in one of the volumes of the New Sydenham Society for 1861, will have brought before the readers of this JOURNAL the uses of cold in surgery. There may be a shade of presumption in venturing to maintain the possible superiority of irrigation over the use of ice-bags, or of thin iron vessels filled with cold water; yet I would still think this agent in the first form more thoroughly efficacious in the treatment of a punctured joint; whilst it is certainly not open to some of the objections which seem to attend, occasionally at all events, the use of ice-bags.

I am glad to be able to adduce the testimony of high professional authority in favour of the plan I suggest. Mr. Hilton, in his *Lectures on Rest and Pain*, p. 439, cites a case of incised wound of the knee-joint treated by irrigation of iced water, continued day and night for twenty-three or twenty-four days. Experimental removal of the cold irrigation was followed almost immediately by pain, heat, and swelling of the joint. The final recovery was perfect.

It may seem—and there is truth in the objection—that this paper is but a weary and tedious reiteration of the advantages of cold as an external application—so small a matter, and so universally acknowledged,

that a tithe of the space occupied would have sufficed to enumerate the material points. At the same time, the minor points of surgical practice are just those which need most frequent enforcing; and on their observance will often turn the issue of a serious injury. I would venture to claim for my paper honesty of purpose, while I believe that its dicta have truth as their foundation.

Transactions of Branches.

READING BRANCH.

REPORT OF THE READING PATHOLOGICAL SOCIETY.

By FRANK WORKMAN, Esq.

[Concluded from page 602.]

Amputation at the Knee-joint. Mr. G. MAY described a recently introduced method of amputating at the knee-joint, which had been practised two or three times at the hospital. A long anterior flap was made by reflecting the skin from the knee and head of the tibia, the knee-joint was then opened and disarticulated, and the knife passed nearly straight through the tissues behind. The anterior flap was thus made to furnish nearly entirely the covering to the stump, and the thickened skin of the knee came just where the stump would afterwards have to bear pressure. The patella might be removed or left without disadvantage. In the latter case, the quadriceps extensor drew it out of the plane of pressure. The case on which he had recently operated was that of a child, who had been under Mr. Harrington's care with acute necrosis of the tibia; a large amount of matter formed, to which free exit was given, but pyæmia followed, and very nearly carried the child off: under careful treatment it rallied, however, and was then sent into the hospital, where the above operation was performed, and the child has since been doing well.

I believe I have now given you a *résumé* of all the pathological specimens and papers that have been brought before us during this past year; and you will, I hope, agree with me, that though no doubt much more might have been done, yet the retrospect shows that a very varied and instructive set of cases have been discussed in the course of the season—not, it is to be hoped, without some advantage.

I now proceed to miscellaneous subjects, not directly connected with morbid specimens or disease, which have occupied our attention.

Feeding of Children. Mr. G. MAY introduced a subject of great importance to those to whom destiny has assigned the cares of a family—and proportionately more so to medical men, whose advice is sought for guidance under difficulties—that of feeding infants who are deprived of the natural fount; and in few things more strikingly is seen the curse of ignorance than in the agonies inflicted on a wretched helpless infant by being stuffed with thick pap or some indigestible food by its ignorant attendants, and the consequent disturbance day and night of the household by its pitiable shrieks. It was agreed that cow's milk, diluted with water and sweetened with sugar, was a satisfactory diet for most children; and it was suggested that sugar of milk possesses advantages over common sugar in that it is less apt to undergo fermentation, and so to give rise to acidity in the stomach. Care should be taken that the milk should be the unmixed produce of one cow, and that cow not far advanced in lactation. Two causes in particular prevent this diet from always meeting with success: one is the increased amount of caseine met with in cow's milk, nearly one-third more than in human, which, in-

stead of being digested, often forms hard lumps and strings in the child's stomach and bowels, producing the utmost distress until they are ejected. This source of trouble may be avoided by using whey with the addition of a little cream and sugar. The second cause prevails mostly in towns where the cows, fed and housed in a most artificial and unwholesome manner, revenge their wrongs on the superior race which so maltreats them, by supplying them with a depraved fluid in the place of wholesome milk, which speedily becomes acid, and consequently is totally unfit for a child's stomach. When, however, the cow's milk, from whatever cause, does not agree, it is well to make trial of the milk of the donkey or goat; either of these assimilates more nearly to the composition of human milk than does the cow's, and the animals themselves, being more hardy than the cow, and seldom so badly off for food, air, and exercise, are more likely to supply a healthy fluid. A strong testimony to the value of goat's milk is borne by the results of the Dublin Foundling Hospital, which almost alone of the Foundling hospitals of Europe does not show an excessive mortality amongst its infants; and their escape seems due to the fact that, instead of being retained in one crowded building, they are sent up to the Wicklow mountains, where a goat is allotted to each child, and is brought at certain hours for it to suck; on this diet they seldom fail to thrive. Habitual constipation in young children is to be regarded as proof of an unsuitable diet, and all active aperients are with them specially to be avoided, where a carefully regulated diet does not induce regular action of the bowels. The use of salad oil, frictions over the abdomen, and palpation in the course of the colon, will often suffice.

Resuscitation of Drowned Persons. Lastly, I come to a subject which excited some considerable interest at the time, which arose out of a request from the Royal National Life Boat Committee for our opinion on the relative merits of the Plans of Dr. Marshall Hall and Dr. Silvester for restoring persons apparently drowned. Though probably Reading is not much behind most other towns in the opportunity it affords to its medical savans for studying the question, I fear we should have found some difficulty, if left to ourselves, in forming and supporting a reasonable judgment; the truth being that the few cases that occur to individual members, often presenting different features and degrees of suspended animation, are of little use in leading to the discrimination between two methods based on the same principle, and each useful, though it may be in a different degree. Fortunately, Dr. B. W. Richardson of London was present at the meeting, and was kind enough to give us the results of the experiments and researches he had made on the subject. He told us that he had tried respectively the plan of Dr. M. Hall, Dr. Silvester, and the bellows-method; the latter originating with J. Hunter, and having a double action for throwing in and exhausting the air. If these plans are to be judged by the amount of air they introduce into the chest, then the bellows carries off the palm of superiority. Fifteen cubic inches of air seems the best amount of air to inject; and this the bellows will accomplish, and extract it as well. By Marshall Hall's method, eleven inches are drawn into the chest; and by Dr. Silvester's, twelve. So the latter seems to have an advantage over the former, and is, in addition, the most convenient, as it could be practised by a single individual, whereas Dr. Hall's method requires the cooperation of at least two or three. Dr. Richardson, however, went on to say that, in the course of his experiments, his ideas underwent a complete change; the result being, that he came to the conclusion that all artificial means of restoring respiration were not only useless, but inju-