creasing, in spite of the rigid observance of a diet from which sugar and amylaceous compounds were excluded. But this case exhibited, in addition, the much more remarkable spectacle of a considerable and permanent reduction in this amount occurring concurrently with the recovery of the patient from a state of wasting and extreme weakness to one of good condition and comparative health, on substituting for this diet a scheme which not only included a large proportion of vegetable food, but *more than half a pound daily of sugar in substance.*

CASE. The subject of this case, Joseph Snailum by name, an agricultural labourer, 18 years old, was admitted on March 19th, 1857, into Ward 6 of the Bristol Royal Infirmary, where he still remains under observation. At that time, he had already been fifteen months ill. As in most cases of the kind, his malady had stolen insensibly upon him. Frequent calls to make water, by night and day; an unnatural thirst, together with loss of flesh and gradually increasing weakness, were the first circumstances that excited his attention. He had been unable to work almost from the beginning. Meanwhile, these complaints had gone on gradually increasing. For some time before he fell ill, he had been working in wet and marshy ground; but, apart from this, he could assign no distinct cause for his failing health. His immediate relatives appear to have been healthy people.

On admission, his state was very characteristic. A peculiarly dry and harsh skin, a brown and dry tongue, ardent thirst, and a voracious appetite, were the leading symptoms. The pulse was only 68 in the minute. He was much reduced in flesh and strength. For the first week, the quantity of urine passed varied from nine to twelve and a half pints; its specific gravity, from 1039 to 1042. The presence of sugar in the urine was ascertained by the copper test, and by the extraction of sugar in bulk from the secretion. Within a few days after his admission, he was put on a diet consisting entirely of meat, eggs, a carefully prepared diabetic bread, a small quantity of butter, and a few ounces of wine. Under this regimen, contrarily to what usually happens, the diabetic symptoms began to grow worse almost from the first. The quantity of urine passed rose, in the course of a week, from nine to seventeen pints, its specific gravity remaining much the same. The patient's thirst increased, and he became daily thinner and weaker. At the end of that time, an attack of diarrhœa occurred, which lasted, with more or less severity, very nearly ten days. During that interval, he took very little food, and the precise amount of urine passed could not be estimated. When the bowels had become settled, he was found to be voiding from seven to ten pints of urine *per diem*, of specific gravity ranging from 1036 to 1044.

On March 31st, the stomach rebelled so much against the diabetic bread, that six ounces of common bread were allowed in place of it; and these six ounces were soon afterwards raised to sixteen. His health now began to improve somewhat, and he gained a little in flesh and strength. The diabetic symptoms proper remained much as before.

This improvement, however, was not of long continuance. In the beginning of May, he had grown so weak as to be obliged to keep his bed, and I had become very anxious about him. His tongue was very dry and brown; his pulse had become frequent; and he was much harassed by cough and pain in the chest. He seemed, in fact, to be rapidly entering upon the downward course which leads to the fatal event so common in such cases.

Many considerations which I have not now time to detail, but some of which have already been hinted at, had long made me desirous of trying what would be the effect of freely giving sugar in such circumstances.* I was turning the matter in my mind, when I accidentally saw it stated in the *Gazette Médicale* that M. Piorry had already tried this measure in one case with very marked success. I therefore, on May 22nd, entirely reversed my plan of treatment, and ordered the patient to be put on a varied and generous diet, with the addition of eight ounces of sugar candy and four ounces of treacle daily. This change had very little effect at first either on the quantity of urine passed or on its specific gravity. It is worthy of remark, however, that what little there was was in both respects on the side of diminution. But the effect on the general health was marked and immediate. The new articles of diet were taken with great relish, and the patient improved in health and strength from day to day. What is especially worthy of attention is, that, as he became stronger, the diabetic symptoms also gradually lessened—to such a point, indeed, that on July 22nd, exactly two months after the adoption of the new scheme, only three pints of urine, of specific gravity 1032, were passed in the twenty-four hours; and yet, at this very time, the patient was taking, in addition to much vegetable food, as much *as eight ounces of sugar and six of honey daily;* the honey having been substituted, at his own desire, for the treacle previously given. Since that time, the quantity of urine passed has somewhat risen, its present daily average being from four to five pints, of specific gravity varying from 1032 to 1034. In other respects, his state is very satisfactory. He is ruddy, looks in very good condition, and declares himself to be strong and well. His tongue is moist; he no longer suffers from thirst; and his skin, from being dry and harsh in the extreme, has become soft and natural. He has increased in weight from 107 lbs., which was what he weighed shortly before beginning the sugar treatment, to 126½ lbs.

P.S. I have purposely abstained from burdening this narrative by any lengthened comments. There are few maxims in philosophy which are entitled to more respect than that which inculcates caution in drawing deductions from single instances. The striking result here obtained from this new mode of treating diabetes must not only be repeated in other cases of the same kind, but must be sustained for a longer period in this one, before any general inferences can be safely founded upon it. It will be observed, that the effect of the treatment was to palliate only, and not to cure. The patient is still diabetic, and may still, for all I know, die, as so many have done before him, of the disease under which he is labouring. But even although it does not go beyond palliation, I have thought the result sufficiently important to deserve being placed on record. That a diabetic man should not only recover his health by eating sugar, but that his diabetic symptoms should also very nearly vanish under the same treatment, is a fact that stands in startling antagonism to all present views, as well as all prior experience on the subject. If this result should be found to be general, it will not only lead to an entire revolution in the treatment of the disorder, but will help in no mean degree to clear up much that is still obscure in its pathology.

* This idea was first suggested to me by my colleague Mr. Prichard, on the simple ground of supplying to the system the particular article which is running to waste, and the loss of which appears to be the principal cause of the damage sustained by the constitution as the disease advances.

Original Communications.

REMARKS UPON THE TREATMENT OF THREATENED APOPLEXY AND HEMIPLEGIA.

By THOMAS INMAN, M.D., Liverpool.

I HAVE long entertained great doubt whether the ordinary proceedings recommended in cases of threatened apoplexy and in certain forms of hemiplegia, were those most conducive to the patient's speedy recovery. Few can read Dr. Abercrombie's work on the brain, without concluding that the means adopted to arrest the disease, or to cure it when present, frequently had a very opposite tendency; and few can calmly examine the ordinary plan laid down for the treatment of cerebral hæmorrhage, without feeling that it is more dogmatic than rational. An individual who has had hæmorrhage into the brain and recovered from the first shock, is, as far as the effused blood is concerned, precisely in the position of a person who has ecchymosis. The blood has to be absorbed in both cases by a slow process; and as we cannot expedite the removal of blood effused by a bruise by the use of mercury, so we ought not to expect to do it in another part when effused from a different cause. If apoplexy is to be warded off, and if hemiplegia is to be cured, the only rational plan to follow seems to be, to consider the powers of the system and to act accordingly. I beg to give the following cases as contributions to medical science, with a view to assisting others to work out the same problems on which I am myself engaged.

CASE I. Mrs. J., aged 45, stout and florid, and a tolerably large feeder, complained of pain in the head, confusion, and frequent attacks of vertigo. These came on from walking up hill or upstairs, from suddenly turning the head, or moving round a corner. She had never fainted. The bowels were costive; the tongue clean; pulse 80, natural. Quiet and tonics were recommended; and nothing more. Ten years have since elapsed, and she had a great many repetitions of the same set of symptoms; but experience has shown that the attacks

resulted from mental agitation only, and that they are always favoured by debility.

Case II. Mr. B., aged 40, of short stout build, florid complexion, and of somewhat intemperate habits, consulted me respecting threatenings of apoplexy, from which he had suffered some months. I ascertained that both his father and grandfather had died of that disease at an early age—45 and 50; and that he himself was subject to vertigo, confusion of the head, and double vision; and that occasionally the room in which he was lying appeared to be turning round always in the same direction. He frequently had headache, bilious vomiting, and transient loss of memory. His pulse was regular, 70, but rather feeble. The tongue was curiously chapped, and its mucous membrane thickened. The bowels were regular; the appetite was indifferent; and digestion imperfect. I ascertained that he was in an exciting business; that he was unable to eat much at breakfast, but was in the habit of taking stimulants from time to time subsequently to enable him to get through the day till dinner. He then ate sparingly, and took very little wine. His attacks came on usually in the afternoon, but were commonly relieved by lying down, by vomiting of bile, or by brandy and water. At the time of my visit, he had had a more severe one than usual; he was unable to sit up without vertigo, and even when lying down the room seemed to be turning. The pupils of the eye were large; and a close attention detected both eyeballs in constant circular motion on their axis—a movement of which the patient was unconscious. The sounds of the heart were natural, but very feeble. I considered the case to be one of mental agitation and worry, combined with a weak and possibly a fatty heart. I recommended tonics and a generous diet, and had the satisfaction of soon recognising a great improvement. A week or two afterwards, a relative of his informed me that he had suspended payment, which fully accounted for the symptoms which I had attributed to mental emotion.

Case III. Miss B., aged 30, came under my care for extremely disagreeable symptoms, which led her to anticipate a more serious attack. She suffered from distressing vertigo, and had on several occasions nearly fallen down stairs; she had when mounting them frequently to stay and rest for support on the banisters. She had singing noises in her ears, confusion of head, and loss of memory occasionally; but what gave her most trouble was, that when reading, writing, or drawing, she would suddenly lose her vision. She could see the first half of a word, but not the last; half a picture, but not the whole. This would last for an hour, and then go away. The animal functions were all correct. She was extremely active and of strong good sense; but she had exhausted herself by nursing for five weeks with unremitting attention, both by day and night, a mother, to whom she was devotedly attached. Her rest had been of course greatly curtailed; and her appetite had failed entirely. Fortunately, her charge had now improved in health, and her anxieties diminished. I readily induced her to take some quinine, and at least three glasses of wine daily; and was soon gratified to find that all her troublesome symptoms had left her. But it was not without interest that I learned that on one occasion she had gone shopping without taking wine or other refreshment. She was out for a long time; and when she returned home and mounted the stairs to her own room, she had the sensation of an opaque bar placed right across the eye. This went away as soon as she had lunched and had her wine. Singularly enough, her mother, whom she had been nursing so long, complained of a similar symptom the first day she ventured out for a drive—the exertion proving to be beyond her strength. It soon went off, however.

Case IV. Mr. C., aged 47, of red bloated countenance, and weighing nearly twenty stone, with a harsh husky voice, was supposed to be threatened with apoplexy. He was very drowsy, slept heavily, and snored almost as if comatose. There was mental confusion and headache. For the last week he had been on low diet, and had taken aperients, but was getting steadily worse. The pulse was feeble; the heart's action weak. He was ordered a generous diet and full doses of liquor potassæ. He felt relief in half an hour after the medicine, and was as well as usual in four days.

Case V. Mrs. H., aged 44, of stout build, and occasionally intemperate, had been seized one evening with an alarming apoplectic seizure. She had had a vigorous cathartic on the previous night, which had operated freely during the day. She was taking a walk at the moment of attack. The case was deemed hopeless by those who were called in; but the husband gave her some brandy and water, and she rapidly recovered. I saw her next day, in consultation. There was no paralysis; the head was clear; she had no pain; the pulse was feeble; the heart weak. As she was a devotee of purgatives, a very mild one was agreed upon, but it was to be combined with bitter tonics. I did not see her again; but in three weeks I heard of her. The purging plan had been pushed with vigour; the tonic had languished. A second attack of apoplexy followed, and the patient died.

Case VI. Mrs. B., aged 65, of pallid complexion and spare frame, consulted me for confusion and dizziness in the head, and such an amount of thickness of speech, that it was with difficulty I could understand her. There was difficulty in protruding the tongue, but no other sign of paralysis; the pulse was quiet, about 80; and the bowels were regular. She was strictly temperate. As this was her first attack, and she had a great dread of apoplexy, it unnerved her considerably. I prescribed quiet and a stimulating tonic. She soon recovered. Since then she has had many similar seizures, but is always able to trace them to mental emotion or bodily fatigue. She has recently borne a severe illness, in which she has taken large quantities of brandy, opium, and wine, without any recurrence of the cerebral symptoms.

Case VII. Mr. I., aged 50, complained of pain and confusion in the head, pain in the right forearm, and inability to read or write more than a few lines, without all the letters appearing to run into one. He had previously had two attacks of regular gout, and was in the habit of living somewhat generously. He was of stout build and great activity, but the complexion was pallid. The pulse was 60; the appetite indifferent; the bowels were regular; his sleep was disturbed. I ascertained that he was much harassed by business peculiarly distressing to his feelings, and that he was depressed in consequence. I found out accidentally that the confusion in reading or writing was due to the want of spectacles. The pain in the right arm I could not explain. The treatment was as strengthening as possible; and, as the mental emotion diminished, the symptoms subsided too. Eight years have since elapsed, without any return.

Case VIII. John S., aged 45, a seaman, of robust appearance, was admitted into the Liverpool Northern Hospital with hemiplegia. He was unable to articulate more than one or two words, but seemed to understand what was said to him. The face was drawn slightly; but the loss of power in the arm and leg was complete. He was treated simply by a solution of chloric ether as a gentle stimulant, and full diet. No other medicine was given. He rapidly and steadily recovered; in a week he was able to converse and move the leg; in a month he could walk, and move the finger; and at the end of six months he could raise his arm above his head, and walk with an almost imperceptible limp. He told us that prior to his attack, he had had pain in the head for six weeks; that he had been taken suddenly by the fit, and had been perfectly unconscious for nearly two days. There was no disease of the heart. From the first day after his admission, improvement was perceptible and continuous. I have never seen a bad case in which it was so rapid and complete.

Case IX. James S., aged 35, a seaman, was admitted into the hospital with hemiplegia and loss of speech. We got no history with him, beyond that he had just come from sea, and had been ill some time. He looked very much "out of condition". He was ordered aperients every three or four days, and five grains of quinine three times a day, with generous diet and wine. In four days he was able to tell us that he had been much exposed to cold and wet, and had had very insufficient food. The attack had come on suddenly; but he had not been insensible at any time. In ten days the paralysis had left him, and he was able to walk about the wards. In a few days more he went away of his own accord. There was no cardiac disease.

Case X. A German seaman was brought into the hospital, with whom I was unable to converse. The junior house-surgeon, who spoke German, informed me that the man could only say a few words, with which he answered all questions. He seemed a strong burly man, with a coarse deep red face, aged about 45 or 50. He was hemiplegic, but his face was not drawn. The pulse was natural. He looked, however, as if he had met with much hard usage, and I ordered him quinine and occasional aperients, as in the former case, and full diet, with wine. In a few days he spoke intelligibly; and at the end of the week was able to walk about the ward. In three weeks from his admission, he was discharged cured.

Case XI. William J., aged 35, an engineer, was admitted with incomplete hemiplegia. He was a strong built large

boned man, but had a pallid complexion and dilated pupil. His account of himself was, that he had been working much amongst machinery, and had been exposed for hours together to cold wind, this chiefly on the affected side—the left. The attack had commenced a fortnight ago, with a feeling of numbness running up the arm; and when he awoke the next day, he found himself unable to stand, or to move the left hand. The heart was healthy, and the pulse natural. From deference to "authorities", I commenced the treatment with mercury, but with strict directions to the house-surgeon to administer quinine if the medicine should seem to have a depressing effect. In two days, I found the first indication of improvement. The mercury, a grain of calomel, had acted strongly on the bowels, and depressed him considerably, and the dose administered was then reduced to half a grain twice a day; quinine had at once been adopted. The mercurial was still further diminished the next day; the quinine continued, and wine prescribed; in two days more the mouth was faintly sore, and motion had returned to the hand. Up to this time, about five grains only of calomel, combined with opium, had been taken. It was now entirely suspended, and in three days more the gripe of the left hand was nearly as strong as that of the right. The tonics were continued, and in a few days more he was able to leave the house.

CASE XII. John C., aged 40, labourer, addicted much to intoxication, was admitted into the Northern Hospital, on November 1st, under the care of one of my colleagues, with a stab-wound at the outer angle of the scapula. It had penetrated through the bone and penetrated the lung. There was considerable external bleeding and a little hæmoptysis. Next day he was found to have lost the use of the arm on the same side. As it was clear that the wound could not have injured any nerves supplying the arm, the paralysis was attributed to loss of blood. No treatment was adopted specially directed to the loss of power, as there was no indication to point out the condition of the nervous system on which the phenomena depended. In two days, sufficient strength had returned to the arm to enable him to move the fingers close to the hand and flex the arm. At this period he began to perspire freely, and to have other appearances common to men who have drunk hard and lost their usual stimulus. There were no signs of delirium tremens from the first. Alcoholic stimulants were now used, and the patient has steadily recovered up to the present time.

REMARKS. It is almost superfluous to add any comments on the above cases, inasmuch as they speak for themselves. I may be asked, however, the grounds on which I have based my views, and why I eschew mercury, blisters, purgation, cupping, and the like, in the so-called threatenings of apoplexy, and the actual occurrence of hemiplegia. I am not able to add paraplegia to the category; for I have only had one case under my care recently, and that terminated fatally, from the supervention of acute disease. The inquiry naturally divides itself into—the condition of the brain at the time of the threatened apoplexy; and the condition of the brain when hemiplegia is actually present.

First of all: What is the probable condition of the brain at the time of the threatened apoplexy? A moment's reflection will show that this condition cannot be an uniform one; for there are no fewer than three well marked forms of the disease. One, in which there is actual effusion of blood; another, in which there is simple softening; and a third, in which there is no perceptible alteration recognised after death. In consequence of the great uncertainty of the real condition of the brain during the attack in the last category of cases, we will leave them out of our inquiry.

We inquire, first, into the probable condition of the brain prior to cerebral hæmorrhage. We can only approximately discover this, and by analogical reasoning solely.

In what complaints can we find an analogue to cerebral hæmorrhage? We find it in the hæmoptysis of the consumptive, and the epistaxis of the aged. What do we know respecting these? That they depend upon an altered condition of the blood-vessels, and possibly of the blood. They are commonly heralded by some or other mark of debility. A microscopic examination of the capillaries shows that they are changed in a very remarkable manner: either their walls are studded with oil-globules, and they are in a state of fatty degeneration, or they are thickened with some semitransparent material, which a little manipulation proves to be very brittle. A similar change is to be met with in the capillaries of the brain in all subjects who are prone to or have had apoplexy.

When fatty degeneration takes place, it fortunately happens that the vessels are usually plugged up entirely by the oil-globules distending their walls. Where this is not the case, as soon as the elastic and resistant wall is replaced by non-resisting oil, it gives way, and allows an exit to the blood. The rupture of course will be favoured by a great stress being laid on the vessel by increased action of the heart or excessive mental emotion; but it will take place equally when there is no greater force than ordinary. This is evidently true; for we find in practice, that while some cases of apoplexy follow some strong effort, others come on when the individual is perfectly quiet. An analogous phenomenon occurs when the capillaries undergo what I will designate, for want of a better word, "brittle" degeneration; the walls give way after a time, either under the natural strain or upon some forcible exertion.

Cerebral hæmorrhage primarily depends, therefore, upon a certain condition of the capillary vessels in the brain. Its extent depends upon the comparative size of the canal which has given way, and on the area of the rent.

It has, however, been remarked, that cerebral hæmorrhage rarely if ever occurs without a certain amount of softening of the brain; and still further, that the same classes of persons are equally obnoxious to both complaints; that there is, in fact, a very close relationship between the two diseases.

We again turn to the microscope to elucidate the subject. Taking the capillaries from a softened brain, we see the same changes that we found in cases of apoplexy: some are blocked up with fatty matter; others are greatly diminished in calibre by the brittle degeneration; some are entirely impervious. A similar change takes place in the capillaries of the lower extremities in elderly people, and is the cause of senile gangrene. The natural result of these alterations is a diminished flow of blood through the vessels; the further consequence of this is deficient nutrition; and this in the brain at least is synonymous with softening. But another cause of deficient local circulation may be present. Some of the large arteries are invariably atheromatous in these cases; and a small atheromatous fragment is occasionally carried into the circulation only to be arrested in some smaller artery, which it completely plugs up.

The changes to which I have alluded are common in phthisis; but they are still more common in old age. They are attended not only with atheromatous arteries, but also with cardiac debility. The degeneration which we have seen in the vessels is also to be met with in the muscular fibres of the heart. Coincident, then, with diminished calibre of the arteries and capillaries, we have diminished power in the heart; and the two combined, materially modify the circulation through the brain.

A diminished supply of blood to the brain will produce symptoms similar to those which are commonly (though probably incorrectly) attributed to an excess of that fluid.

Our next inquiry must be into the causes that produce that change in the capillaries, upon which so much depends. We find it, in phthisical subjects, in men who have deteriorated their constitutions by hard living, and in elderly people whose vital power is low. It is not an invariable product of age, but occurs chiefly in those who have inherited disease. We do not find it in the robust and strong; it is rare in the country—it is common in the town. Whatever, then, the real cause may be, it is unquestionably to be classed amongst debilitating agencies.

We do not know how rapidly it is possible for debilitating agencies to bring about the degenerations we have described; but there is reason to believe that a very short time suffices. We have met with instances in which the hair has turned grey in one single night from intense mental agony. We have cases on record in which fright has produced almost instant death from its operation on the contractile power of the heart. We have met with instances in which a heart has ruptured from excessive grief—the fibres, probably, in some part, having been previously converted into fat. But these are approximative examples only; and we must be content with them as corroborating proofs, that great debility will encourage degeneration.

If then we find in any of our patients evidences of debility, or known that they have been exposed to any deteriorating agencies; if we find signs of a weak heart and languid circulation; it stands to reason that our efforts should be directed to arrest the degenerating processes. This can only be done through the medium of the constitutional or vital forces, and every means is to be adopted to improve the quality of these. Everything that depresses them naturally tends to foster the

progress of the dangerous alteration already begun; and we can thus understand how depletion or venesection may convert a threatening of apoplexy into a real attack, and how it is warded off by quinine and tonics. Of course, under these circumstances, it is of the utmost importance that no unusual strain shall be laid upon the weakened capillaries; and both bodily and mental exertions must be avoided.

It is an interesting question to consider how far vessels which have become degenerate may recover themselves. We cannot answer this satisfactorily; but we know that if they do, it must be through the medium of the systemic powers, and that these cannot act with effect as long as the individual is in a depressed condition. Supposing, again, that we have evidence of cerebral hæmorrhage having taken place, how is the blood to be taken up again? It is clear from the nature of things that it will not return into the vessels again by the same route it left them. It can only be taken up then by the ordinary means that are adopted by nature elsewhere. A clot in the brain is analogous to ecchymosis in the skin, and follows much the same laws. A bruise is readily recovered from in youth, but not so in old age: and, as we often have occasion to remark, the phthisical and the aged have far more extensive ecchymosis from a given injury than the robust and strong. The extent of the effusion evidently depends on more extensive rupture of vessels (most probably caused by degeneration) in the one than in the other. An apoplectic clot then must be taken up by the surrounding healthy brain; but it must be borne in mind that the surrounding brain is probably not healthy—its vessels are degenerate in the same manner as those which gave way, and are themselves obnoxious to be completely closed. The circulation in them, necessarily languid from their diminished calibre, may now be arrested altogether by the *squeezing effect* of the effused blood. This would probably occur constantly, if the heart were not able to propel the blood through them in spite of the obstacle. But when the heart is enfeebled at the same time that the vessels are compressed, however slightly, circulation through the parts surrounding the clot ceases, and the brain softens and dies. Anything, therefore, that depresses the system and diminishes the power of the heart, has in reality a direct tendency to produce softening around the clot; nor would it be difficult to adduce cases from Dr. Abercrombie's works, and those of other systematic writers, in which softening round the clot has been brought on by the means used with the intention of preventing such a catastrophe. (See a case given in Dr. Watson's *Practice of Medicine*, vol. i, p. 511; third edition.)

The effect of mercury, which is very commonly given with a view to "stimulate the absorbents", is generally prejudicial in cases of cerebral hæmorrhage. That it should ever be administered by any one who had read the following observation, is almost incredible. Dr. Porter remarks:—"Almost all the aged people treated with mercury for syphilis have, according to my observation, died shortly after of hæmoptysis or apoplexy. Nor are such casualties confined to the aged; for I have seen several instances of young persons under similar circumstances being seized with hæmoptysis, and dying rapidly of consumption." (*Ranking's Abstract*, vol. v, p. 66.)

Many practitioners do not push calomel far in cases of apoplexy, and use it in simply aperient or alterative doses; but even this is prejudicial, unless there is some special reason for acting on the bowels, and the patient is buoyed up by tonics and generous diet. Few can take, even when in health, a dose of calomel or blue pill without feeling low and good for nothing the next day. The same occurs in the sick; but as they are for the most part in the recumbent posture, it is not equally noticed. Surely, if in the main it is undesirable to depress a patient with apoplexy by such powerful means as bleeding, it ought to be considered undesirable to depress him by more gentle plans. It would sound absurd for a thief to say he had not abstracted a sovereign, because he had only taken it by sixpence at a time. It is true, that a pilferer may abstract many a shilling without being found out, who would be detected at once if he took a five-pound note; and so many a doctor abstracts by driblets an amount of strength which he dare not take at once. The robbery would be too patent both to himself and the patient.

We consider then that a frequent use of mercury is a depressing agent; and that its chief value is when from a combination of favourable circumstances, it promotes the appetite and digestion. Purgatives are obnoxious to the same remarks. Low diet, or an abstinence from a moderate amount of accustomed stimulants, is equally to be deprecated as incompatible with a sustentation of the natural vital or restorative powers.

In all things, the motto of the *medicus* should be:—"Be nature's handmaid—not her tyrant."

P.S.—I may state that the foregoing remarks upon the capillaries are, I believe, original; and that I hope shortly to give to the profession a history of "atheroma in arteries, and the important bearings it has upon pathology and practice."

FURTHER REMARKS ON THE ANALYSIS OF UREA IN URINE FOR CLINICAL PURPOSES.

By J. L. W. THUDICHUM, M.D.

IN a former article on this subject, I endeavoured to define the principles upon which the analysis of urea in urine for clinical purposes was to be based, in order to insure its utility for pathology and patients. I also compared the usefulness to the practitioner of the proceedings for analysing urea by Liebig and Davy. I described some precautions which I had taken for the purpose of making Davy's method more accurate; and then contrasted with these principles the proceeding of Dr. Handfield Jones for analysing urea in urine. It was singular that Dr. Jones should have made use of a method, and termed it a modification of that proposed by Dr. Davy, when the latter author had especially declared this proceeding (upon which he only calculates as the result of accident, not of design), to violate the integrity of his analysis.

From a knowledge, literary and experimental, of the quantity of urea discharged in given times by healthy individuals and by individuals labouring under fever, I came to the conclusion that the quantities of urea alleged to have been discharged by Dr. H. Jones's patients were far below the normal quantities in health, and therefore were opposed to all other analyses on this point, which coincided in finding a larger quantity of urea discharged by fever patients than by healthy persons during equal times. This was ascertained by a comparison of figures, and accounted for by the analytical proceeding. If any reason for condemning the modification was wanted, it has been supplied by the five careful experiments detailed by Dr. Jones in his Supplement to Observations on Elimination in Fever (BRITISH MEDICAL JOURNAL, Oct. 3rd, 1857, p. 830.)

In the first of these experiments, one drachm of a certain urine, with diluted liquor sodæ chlorinatæ, yielded 1·29 cubic inch of nitrogen. (I suppose the dilution was effected with an equal bulk of water, as in Dr. Jones's first experiments; but he has not stated the proportions in which liquor and water were mixed.) One drachm, with 1·6 cubic inch of mercury (and liquor sodæ chlorinatæ, I suppose, so as to imitate Dr. Davy's proceeding, from which I further conclude that the liquor was undiluted) yielded 1·52 cubic inch of nitrogen; one drachm, with undiluted liquor sodæ chlorinatæ, yielded 2·1 cubic inches.

If any one of these three results, or all three, are quite unimpeachable, the following conclusion becomes unavoidable. That Dr. Jones's original analysis, with his modification, yielded little more than one-half of the quantity of urea that can be ascertained, by liquor sodæ chlorinatæ, to be present in a drachm of urine. I say little more than half; for 1·29 is little more than the half of 2·1. Dr. Jones therefore affords experimental proof, that I am quite correct in asserting (p. 789 of this JOURNAL) that in his analysis the loss of nitrogen "*must amount almost to one-half of the nitrogen actually contained.*" Dr. Jones acknowledges having arrived at a similar conclusion, for he says (Supplement, p. 830): "The first experiment shows that with diluted liquor sodæ chlorinatæ a less amount of gas is evolved than in the other cases; a like result was obtained in some other trials."

Dr. Jones does not rest satisfied with this result of his analysis; and having accidentally found more nitrogen by an experiment without mercury than was obtained from an equal quantity of urine with the use of mercury, he has performed more analyses, the results of which are intended to show, "that when undiluted liquor sodæ chlorinatæ alone is employed, the amount of nitrogen disengaged is above, or very nearly equal to that which is obtained, when mercury and liquor sodæ chlorinatæ are used in Dr. Davy's original way." This result would drive us to the conclusion (provided again that the experiments were unimpeachable), that Dr. Davy's method is so bad an analytical proceeding, as to cause large quantities of nitrogen to be lost thereby. A comparison of the figures in the following table will make the apparent loss conspicuous.