in that institution, and am gratified to hear from him that it worked well. To another friend, Professor FitzGerald, F.T.C.D., I am also indebted for the advice he kindly gave me on the theoretical side of the mechanics involved; and I am strengthened by the opinion of such an authority that the forceps described has essentially the same mechanical power as Tarnier's.

I believe that, for the reasons given, this axis-traction forceps is superior to any with which I am acquainted; but, though attaining its results in a different and simpler way than that which, following Tarnier, has hitherto been constantly adopted, the objects aimed at are precisely the same. Whatever modifications have hitherto or may hereafter be made, with a view to perfecting the mechanism of these instruments, the credit must always remain with Tarnier of having been the first to formulate the essentials of a good forceps with scientific exactness, as well as of having shown in no crude form how the theoretical indications might be practically fulfilled. I do not doubt that in doing so much he has made an epoch in the history of the forceps, or that in one form or another the principles for which he contended—axis-traction and liberty of movement for the head during traction—will gradually be universally adopted. I hope that the instrument I have described may prove at least to be a suggestive simplification of those previously designed to admit of the practical application of these principles.

ART. XVII.—*A Case of Diabetes Mellitus, with Remarks.* By J. STRAHAN, M.D., Belfast; Fothergillian Gold Medallist, Med. Soc., London.

MANY of our best authorities (Sir W. Roberts, Beale) consider that diabetes in the aged, or in the obese, is attended with hardly any danger to life. One writer of high standing says he does not believe that in the aged life is even shortened by the affection.

The rule, in cases occurring in the young and the spare middle-aged, is that life is never safe with persistent glycosuria, as even where a case seems to be doing well, sudden failure may occur, and various nerve lesions or coma cause death. My case would go to show that the rule had better be extended to all ages and conditions. The patient in this case was a very large, tall woman, enormously stout, weighing for many years 20 stone (280 lbs.), and was over seventy-one years before serious symptoms developed.

Diabetes commencing at so late an age is very uncommon;

hence, perhaps, the failure to note its dangers. Especially is this the case in hospital practice, whence most of our statistics are drawn. Dr. Pavy, in the statistics of his private practice, only met with 35 cases commencing at 70 or over, out of 1,360—or 2·56 per cent. He says that his hospital practice would show few cases commencing at over 40 years (*Brit. Med. Jour.*, Dec. 5th, 1885).

In the following case I had the great advantage of consultation and co-operation with Professor Dill, Queen's College, Belfast, our worthy city coroner, but he is not in any way responsible for the statements or opinions here expressed:—

CASE.—Mrs. M. had been a widow for thirty years; had lived well, but was almost an abstainer from alcohol; had a very comfortable, and not very anxious, life as mistress of her brother's house, a well-to-do medical man. She had always enjoyed good health, until shortly before her brother's death, early in 1882, when she had a severe carbuncle on the nape of the neck, followed by peculiar patches of deep-seated cellulitis on the toes and soles of the feet, which quickly sloughed, leaving cavities about the shape and size of a hen's egg cut in half. For eight months or so, these spots kept appearing in groups of two or three, at intervals of weeks or months, and for these she first came under my care. They healed very slowly, no matter what local applications were made, and there was a marked absence of foul smell even when the slough was separating (without any antiseptic). This absence of bad smell has been noted in cases of gangrene of the lung occurring in diabetes. She sometimes noticed a large excess of urine for a time, but only intermittently. Her general health was excellent, with the exception of slight constipation. The recurrence of the sloughs gradually ceased while taking opium and arsenic. I suspected diabetes, but, depending on authority, and considering her good health and vast weight, did not think it essential to alarm and distress her by making an analysis of the urine. She was at times very irritable, sad, and hypochondriacal, but at the same time apathetic. From the confidence existing between her and her attendant (a servant of twenty-eight years' standing), I could not have obtained a specimen of urine without her knowledge, so I considered it best to content myself with directing her to live chiefly on meat, fat, and vegetables, and to avoid sugar and all starchy articles. According to our authorities, this is the best and quite sufficient treatment under the circumstances. While suffering from the local gangrenes she contracted very sedentary habits, which were continued after her recovery, so that she hardly ever left the house again, until the occasion which upset the balance of her system and was the exciting cause of her death. Still, I could not ascertain that she had any of that feeling of weakness

and languor which is so marked a feature in most cases of diabetes. She had a good, but not voracious, appetite; did not notice any particular thirst; tongue inclined to be dry, but not extra red. As her brother (a man of 18 stone) had died, as was said, of heart disease, she had her heart examined. The action was weak, the impulse faint, the first sound short and valvular, no murmur—only deep percussion gave any result, owing to the thick chest wall, and that indicated slight enlargement—in fact, one could hardly say whether the heart was fatty or only loaded with fat. But as fatty heart is usually found in diabetes in the aged, and from the mode of death, the probability is that both conditions existed.

On August 1st, 1885, I was called to her. She stated that on going to church that morning her limbs had suddenly given way below her, without any loss of consciousness or even mental confusion (as would occur in cerebral hæmorrhage or softening), and without any pain or feeling of weight in the back (as would occur in spinal hæmorrhage from unwonted exertion). She reached home with difficulty, leaning on her nephew. In the evening there was almost complete paraplegia, motility being quite, and sensibility almost, abolished. Reflex movement to tickling, &c., abolished; skin very cold; no œdema of legs, although Dr. Garrod says such is constant in diabetes. There was now a great deal of languor and feeling of extreme tiredness; tongue red and dry, but not beefy; breath sweetish; complete anorexia; bowels confined. The temperature was 93° F., although the weather was very hot; room at 70° F. The heart's action very feeble; pulse 70, small, short, and soft. The paralysis affected the bladder, so that the patient had no power to empty it, and the catheter had to be used. There was not the slightest symptom of a cerebral origin of the paralysis; pupils normal, and reacting to light; mind perfectly clear; speech perfect; swallowing perfect; no deviation of tongue or features; no symptom, in fact, of hemiplegia. The arms were not at this time paralysed. No pain in back, limbs, or elsewhere; no spasms; no fever. There was a tendency to syncope, from faint action of the heart; and, immediately after I left, she fainted, even in the horizontal posture, so that I had to return, and with difficulty restored animation. She was ordered very hot milk, with half-ounce doses of spirits frequently; hot applications and plenty of blankets; also, a large hot enema, with carbonate of ammonium and belladonna, to recover her from the state of collapse.

The urine passed was about 100 ozs. in 24 hours, pale yellowish green in colour, acid, with a smell like stale vinegar; sp. gr. 1050; no albumen; urea a good deal increased. Fehling's test showed plenty of sugar. On employing Sir W. Roberts' quantitative fermentation test, the specific gravity was reduced to 1010, thus losing 40 degrees of density; so that the urine contained about 40 grains of sugar per ounce; she was thus excreting 9 ounces, 162·5 grains daily.

For four days the case remained much the same, but the symptoms gradually extended and deepened. The paralysis extended to the arms—the left first. At the end of the fourth day she could move no part of the body except the head and the right arm feebly. Deglutition now failed rapidly, and soon even the head could not be turned or lifted. Still the features were undeviating and the speech perfect, but faint; mind clear.

On the fifth day prostration was complete. She was quite incapable of moving; sensibility and motility abolished; pulse frequent and thready; tongue dry and dark; the temperature 90° F.; skin corpse-like in coldness. There was violent dyspnœa, characterised by deep inspiration and expiration, rapid and regular, just as if out of breath from exertion, without intermittence or hissing, as in uræmia; urine plentiful, had still to be drawn off; quantity of sugar had remained pretty constant. It seemed as if diabetic coma were coming on, when death suddenly occurred from cardiac failure, in presence of Professor Dill and myself. Consciousness remained perfect till the end.

Remarks.—There was no *post mortem*. The case seems an illustration of the extensive derangements of tissue changes generally, which lead to general deterioration, to many local diseases, and often to death. The muscular tissue of the heart is relaxed and fatty in diabetes in old age, and the small and medium-sized vessels atheromatous, the atheroma being more decided in the cerebral vessels at the base than elsewhere. The immediate cause of death in this case seemed to be failure of the heart from glycæmic degeneration of its fibres, combined with nervous failure; while the whole train of serious symptoms seemed to be set up by the, for her, unusual exertion of walking half a mile to church. As diabetes is so strongly hereditary and so distinctly runs in families, it seems to me that the brother of this patient was also diabetic, and seemed to die in much the same way, by cardiac failure—in fact, of diabetic heart disease.

The nervous phenomena of diabetes, including true diabetic coma, seem to depend on different causes in different cases. None of the common theories will explain all cases. Sanders and Hamilton have suggested fat emboli of the lungs and brain as explaining the dyspnœa and collapse in cases such as that described. But the theory fails in more points of view than one. First, the milky state of the blood is not constant, and Dr. Pavy believes it to be purely a physiological condition, due to the quantity and nature of the food consumed by diabetics, the quantity being usually

large and the quality albuminous and fatty, by prescription. Again, the blood is frequently normal in its appearance; sometimes thick and dark-coloured. Secondly, fat emboli have been found in many conditions without coma, or, indeed, any symptom. In fractures of bones and even in contusions they are usually present, but produce no symptoms whatever. The uræmic theory of Wunderlich, Busch, and Griesmeyer, may be dismissed at once—the great difference between diabetic nervous phenomena and those of uræmia, both in a clinical and pathological view, being strongly against the theory. The evidence in favour of Kussmaul's theory of acetonæmia is still inconclusive; but, no doubt, the presence in the blood of some toxic agent, either acetone, aceto-acetic acid, or some other undetected product of the vinous fermentation, will account for many cases of diabetic nerve phenomena.

The "dehydration of the tissues" theory of Bouchard and Hilton Fagge fails from the fact that the blood in diabetic coma does not constantly present the thick and dark-coloured, or "tarry" appearance, although it is, no doubt, present in many cases.

Dehydration of the tissues must be present to some extent in every case of glycæmia, and is, no doubt, one element in the deterioration of nutrition and consequent degeneration of all the tissues.

But, associated with exosmosis of water from the tissues must be endosmosis of sugar into the tissues, and this is probably an equally efficient element in the depravation of nutrition. However, this endosmotic theory, when applied to diabetic cataract, shows the difficulties in the way of its general application. This theory was suggested by the production of cataract in frogs by immersion in a saccharine solution, or by injecting syrup into the cellular tissue. The objections to it are the temporary nature of the saccharine cataract in the frog; the occasional occurrence of diabetic cataract in one eye only in man; the fact that diabetic cataract usually occurs only in cases of two years' or more duration; that it is present only in from 5 to 10 per cent. of all cases (Beale); and that it does not occur at all in some of the worst cases, while it is well marked in some very mild cases. Again, the usually slow development of the cataract would seem to show that it is a mere degeneration, determined in some unknown way. Still further, intra-venous saline injections have been tried in diabetic coma by Dr. Hilton Fagge with only slight temporary improvement. Dr. Barth (*L'Union Méd.*, Aug. 7th, 1883) and Dr. Dreyfous consider that the glycæmia alone is a sufficient explanation of nervous

phenomena in diabetes; by depraving tissue nutrition generally, life is placed in danger, and any extra fatigue or other cause of nervous derangement causes sudden failure of the powers of life. For the same reason, diabetics are much more liable than others to inflammations of an asthenic character in all the organs, so that any slight exposure may be the cause of death. Thus, pneumonia in the diabetic is commonly fatal. Tubercular disease of the lungs occurs in nearly half the cases lasting more than one or two years.

Dr. Pavy holds the same views. He thinks coma results from "deprivation of power in certain nerve centres." He does not believe at all in acetonæmia, or any other direct poison in the blood.

Various motor disorders, hemiplegia, and paraplegia, have been known to occur in diabetes since the days of John Rollo (1796), who first adopted the animal diet system in diabetes. Such affections often depend on cerebral hæmorrhage, softening, or cerebro-spinal meningitis; but in the case related there was no indication of any local causative lesion whatever within the skull or spinal canal. The paralysis seemed to be a nervous phenomenon belonging to the same category as true diabetic coma—*i.e.*, coma without cerebral hæmorrhage or other coarse lesion.

Nervous phenomena other than coma are probably common enough, but have been overlooked in the same way as coma has been until within a few years. And yet probably more than half of all the fatal cases of diabetes die of coma. For instance, at the London Hospital, in a series of 37 fatal cases recorded by Dr. Stephen Mackenzie, 19 died of coma; and Dr. Frederick Taylor recorded at Guy's Hospital 53 fatal cases—33 of these died of coma.

Frerichs, in his work on Diabetes, gives a similar result from an analysis of a large number of cases. Out of 250 fatal cases of his own, 18 died from exhaustion, 34 from phthisis, 7 from pneumonia (4 of these had gangrene of the lungs), 8 from nephritis, 7 from carbuncle, and 9 from other complications (cancer in 6 cases). In the whole of the remaining 167 cases symptoms of cerebral paralysis appeared—in 10 due to hæmorrhage, in 2 to softening, in 3 to cerebro-spinal meningitis. In all the rest—*viz.*, 152 cases—death occurred from true diabetic coma—*i.e.*, coma without local, cerebral, or spinal lesion.