ARTICLE V.—*Case in which Ascites, Coma, and Diabetes were combined.* By JAMES L. KING, F.R.C.S.E., Prestonpans.

ON the 1st of June last, a peculiar case came under my notice. Mrs A., aged 82, a well-proportioned and apparently healthy woman, complained of breathlessness, weakness, and pain in the chest and right side. On examination, I found that there was tenderness upon pressure over the region of the liver and upper part of the abdomen; but, on percussion and palpation, while there seemed to be no enlargement of the liver, there was obviously a large collection of fluid within the cavity of the abdomen. The heart was of large size, and probably flaccid, for it was weak and irregular in its action. The difficulty of breathing was constrictive, and occurred in marked paroxysms, accompanied by pain in the region of the heart; while the patient seemed fidgety and despondent. The pulse, alternately quick and slow, did not exceed 85 per minute. The tongue was red near the margins, and covered with a white coating down the middle. The bowels were sluggish, and the action of the kidneys was much diminished. The urine was loaded with lithates; but the presence of albumen, though suspected, was not discovered on application of the usual tests.

In this case it seemed clear that the state of the liver and the increasing ascites were the diseased conditions mainly requiring the employment of treatment. Accordingly, I commenced a purgative, alternated with a diuretic plan of treatment, and conducted this method for about three weeks, without any abatement of the symptoms. On the contrary, the ascites had increased, and the legs had also become swollen; while the other symptoms were proportionately aggravated. The action of the kidneys had become greatly diminished, and only a mere dribble of high-coloured urine was voided. The bowels had been regularly and frequently evacuated almost every day; though I was afraid of pushing the purgatives too far on account of the weak state of the heart.

The treatment hitherto pursued was now suspended; after using a host of diuretics and purgatives, mercury was administered in small doses, so as slightly to affect the gums. Another week was spent under this plan, after which the patient became daily worse. Scarcely any food was taken, though previously she had partaken at intervals of small quantities of rice and milk, beef-tea, and gin-negus. The treatment, after the exhibition of the mercury, was limited to the use of the acetate of potash in water. I now found that the bowels had not been moved for two days, and therefore determined, weak though the patient was, to risk the administration of a brisk purgative. Accordingly the patient was ordered a dose of calomel and jalap. Next day the bowels were moved frequently, and during the evening, though their action had ceased, I was rather surprised to find that the patient seemed listless, and weaker than she had been during the day.

Soon afterwards I was informed that she had become suddenly worse, and upon hastening to see her, discovered that she had passed into a state of complete insensibility, with loss of muscular power. There was no convulsive character about the seizure, and she had gradually become insensible. She could not speak, and sensibility appeared to be abolished. Her eyelids were half-closed, and the eye was glassy aud turned upwards; the pupils were rather contracted. Reaction set in next day, accompanied with redness and heat of skin. She was restless, and constantly moved her hands, shifting them from one place to another; and the breathing and the pulse, which had been more regular since the occurrence of the apoplectic seizure, again became more irregular in character; and, as a kind of "busy delirium" now began to manifest itself, she would attempt to raise herself in bed to the sitting posture. She was supported in this position by her friends, —the head hanging forward, with the chin leaning upon the sternum. A kind of clonic spasm in the muscles of the limbs was now superadded to restlessness,—the case further undergoing exacerbation through excessive excitement; but, on the beginning of the third day after the apoplectic seizure, and at the height of the paroxysm, all the symptoms underwent remission: the kidneys began to act most freely, the dropsy in corresponding proportion disappeared, and the circulatory and respiratory movements assumed their more normal equilibrium of action. The patient, at this stage, began to recover her consciousness; and, towards the latter part of the day, she passed into a sound sleep; and, after enjoying a slumber of about five hours, she got over the bed, unnoticed by the friends, and voided a large quantity of urine. Her friends, speaking to her in wonder concerning this feat, she only replied in a tone of astonishment,—"Where am I? What has been the matter? for my mind is absent, and my body is very sore." She continued to improve with singular rapidity, and she soon walked about, but occasionally complained of feeling a little tired and giddy. Evidently no lesion of the usual characters followed upon the occurrence of the apoplectic attack; though one could readily detect that there was more than an ordinary difficulty in selecting words for conversation. The ascites and dropsy completely disappeared. The other important fact in the history of this case is that the urine turned out to be diabetic, upon remission of the disorder, during the clearing away of the dropsy. I was at first led to suspect the presence of sugar in the urine from its odour; and, on application of Moore's and Trommer's tests, there was abundant evidence of the saccharine deposit. The sugar, however, gradually disappeared, after the lapse of a week from the remission of the symptoms already described.

Remarks.—Though diabetes is known to occur in connexion with several manifestations of disordered function, it is generally regarded

as a special disease, having a definite origin and doubtful prognosis. Yet the production of sugar in the urine can only in rare instances be traced to a definite cause. In the case of this woman, however, it seems to me that there was a decided connexion between the diabetic state of the urine and the head symptoms. It is further worthy of note, that the liver at the outset of the illness showed manifestations of disease, and this might suggest that the derangement of that organ was the source of the glucogensis. The history of the case, however, would seem to make this opinion improbable, and would induce me to believe that the production of the diabetes depended upon a neurosis.

It is still undetermined whether diabetes is not in every case primarily due to some morbid affection of the nervous centres. Already we recognise in the medulla oblongata and brain, a power capable, when exerted upon other organs, "of producing or preventing the saccharine metamorphosis."

To approach nearer the theory of the causation of the disease; Dr Pavy, when speaking of the phenomena produced by experiment, says—"The effect was supposed to depend upon a stimulation of the nervous centres. I cannot now coincide with this: I regard it as a loss of the proper nervous influence." But, after another series of experiments performed upon animals by Dr Pavy, he modifies his opinion, and says—"I have strong reason to believe that it does not depend, as I originally started out with the notion of, on a simple interruption of transmission of nervous force between the medulla oblongata and the liver."

First of all, then, it is to be noticed in this woman's case that the diabetes was merely of a symptomatic temporary character. It had likewise a distinct connexion with the progress of the illness, manifesting itself after the occurrence of the head symptoms.

Dr Goolden's interesting published cases may here be cited, where diabetes and head symptoms were known to exist at the same time; and where, by treating the affection of the head with blisters and purgatives, the saccharine urine was speedily "checked or removed." It also seemed evident that in this case the diabetes originated, or was connected with, the apoplectic attack, and was consequent to it, and a concomitant upon the draining away of the dropsical fluid—the hyperurisis and diabetes existing in that relation; so that after the apoplexy had occurred, recovery began to manifest itself; the dropsy disappearing, when the urine became saccharine.

Supposing, therefore, that the apoplectic attack led to the occurrence of the diabetes, would it seem rash to suppose that the rapid cure of the dropsy was due to the same source? From the facts of the case, such a possible "modus operandi" of one lesion following upon another should not, I think, be lost sight of. It may, indeed, be said that effusion within the head (which possibly was the cause of the apoplectic attack) could not have occurred to so large an extent as to have produced the diabetes in question; for if the apoplexy had

resulted from this cause, the lesions dependent upon its existence would have been more marked and serious in their nature. Still, we may believe that the brain may have been as quickly relieved of the superabundant fluid as the system generally.

Assuming the apoplexy and diabetes to have occurred from the same cause—viz., from a "depression" or interference with the proper balance of nervous power, from the progress and increasing severity of the patient's disease—does the cure of the dropsy, on the simplest estimation, seem to have originated from the same cause? Or, on the other hand, are we to suppose that the fit existed in the relation of a coincidence in the progress of the illness? By way of elucidation, let us view the occurrence of the coma and diabetes as originating from a more general cause, assignable to the head, but nevertheless due to the nervous system; as, for example, in the case of "shock," which presents an array of symptoms very similar to those which existed latterly in this case.

Under what influence then were the kidneys made to act so freely at this juncture? Was it from the brisk action of the purgative powder, which took effect at the expense of the "shock" imparted to the nervous system—the case having become latterly more asthenic in its nature? This view is supported by the success of the treatment recommended in congestion of the kidneys with suppression of urine. Independently of bleeding, purgatives have been found to give peculiar relief, and often to work a speedy cure; and it must be kept in mind that for the most part they have to be repeated often, in order to effect the desired result. And if, from such a proceeding in such cases, recovery ensue, it must simply arise from a "depression or deprivation" of that morbid power which has promoted the unbalanced action of the nervous and vascular systems, and upon a similar hypothesis of the nature of the causation of diabetes as has been advanced by Dr Pavy and others.

But the recovery did not seem to occur from a like direct result as is herein indicated, and as is due to the employment of medicine; for the apoplexy having manifested itself, probably led to an abnormal excitation of the nervous centres (as was noticeable during the fit), and this state being continued would subsequently induce a more specific "depression" of that nervous power, which very possibly brought the kidneys into increased action, and at the same time led to the production of the saccharine urine.

The fit which occurred in this case, I have designated as being of an apoplectic character, yet it was rather indicative of a form of epileptic seizure. But the slow invasion and protracted nature of the fit afford a presumption that it may have been primarily due to the presence of urea into the blood; and probably, therefore, it was more properly a uraemo-apoplectic attack, uncontrolled by the course of treatment employed.

It would not therefore seem proper to attribute much value to the treatment in effecting the ultimate cure, especially if we

view the apoplexy as influencing the production of the diabetes, ending in the recovery. And otherwise, whatever might be the danger incurred in treating similar cases in younger persons, in this aged female's case the practice may have led to a more fortunate result than could have been anticipated in such circumstances.

Article VI.—*Experiments on the Influence of Ozonised Air upon Animals.* By W. W. Ireland, M.D. Edin.

The first means used to produce ozone was by burning phosphorus in closed vessels. The gas was then passed through water, in order to get rid of the phosphoric acid. This, however, did not separate it completely: the air was still charged with the white vapours of phosphoric acid, which, of course, would tend to vitiate the experiment. Moreover, by producing ozone in this way, the relative proportion of oxygen to the nitrogen in the included air was notably diminished by the large amount of oxygen taken up in the oxidation of the phosphorus. I then tried another way to procure ozone—two parts of powdered hypermanganate of potash with three parts by weight of sulphuric acid were introduced into a glass bottle. The sulphuric acid acts slowly on the hypermanganate, setting free some of its atoms of oxygen in the form of ozone, which is thus added to the enclosed air. The permanganate of potash and sulphuric acid were introduced successively into a glass bottle, the cork of which was fitted with two tubes; one of these communicated with a smaller double-necked bottle containing water; the second neck gave passage to a tube which communicated with the spout of a glass jar. This jar had a short broad neck and a large wide shoulder, which became like a balcony when turned upside down in a plate of water. This jar received the ozonised air when pushed through the water, which was done by a pair of bellows communicating with the other cork tube of the first bottle. If the action was allowed to go on too rapidly, the ozone became mixed with a violet-coloured vapour,[1] which, after some days' use, gave a rose tint to the pipes down nearly to the water, but not to those that received the ozone after passing through the water, which ozonised air, as before said, was collected in a jar turned upside down in a plate with water slightly heated.

[1] No doubt the same mentioned by Berzelius as produced by the action of sulphuric acid on hypermanganate of potash at a temperature of 130° Centigrade, and found to be a mixture of permanganic and sulphuric acids. Professor Fresenius, to whose kind advice and encouragement I owe much, approves of my apparatus, but remarks that, to purify the produced gas, "tubes filled with powdered pumice-stone are more efficacious than water alone." I imagine, however, that the Professor refers more particularly to the ozone produced by phosphorus.