of high air temperatures and muscular exertion upon colliers."

Miners' cramp has hitherto been observed only among the workers in hot mines where the temperature varies between 98° and 102° F. dry bulb, and 83° to 87° F. wet bulb, and, as far as Moss knows, only in Agcroft and Pendleton pits. Where cases of severe cramp do not occur miners may be partially disabled in respect of working capacity by the same cause that leads finally to attacks of cramp. This subject is of general importance, therefore, in connexion with deep mining problems of the future, and in connexion with other industries where men are performing hard work at high temperatures.

The number of cases severe enough to warrant the carrying of the men out of the pit was only nine in two years, but minor attacks of cramp occurred more frequently, and would no doubt have developed into severe cases had not the men ceased work immediately.

The cramp may be attributed to: (a) high air temperature, (b) excessive drinking of water due to (a), (c) continued hard work. Men are generally affected by it during the second half of the shift, and always in the muscles actually being strained at the time. Sufferers are generally men of poor physique. If a man is attacked whilst lifting a full tub on to the rails cramp might occur in the arms, legs, or abdomen. If the latter, the man is put out of action immediately, the contortion of the abdominal muscles being so great as to form a lump the size of a cricket ball.

In severe attacks of cramp it may take half a dozen men to hold down a sufferer and straighten out the affected limb. Such treatment produces excessive exhaustion of the sufferer, and sal volatile is usually administered to revive him. Professor J. S. Haldane suggested that cramp may depend on excessive loss of chlorides by continued sweating, and the matter was then investigated by Professor Moss, Mr. J. B. S. Haldane, and Professor A. V. Hill at a deep coal face at Pendleton Colliery. A sample of urine obtained at the end of the shift from one of the colliers who was subject to cramp gave not the slightest cloudiness with silver nitrate, though only 5 c.cm. were secreted during four and a half hours. This excessive shortage of chlorides in the urine must have been brought about by a combination of excessive sweating and drinking of water. Sweating by itself could have no such effect, as sweat contains only about 0.2 per cent. of chloride, and sweating by itself would tend to concentrate the chloride in the blood plasma.

Rowntree produced water poisoning in animals by injection of large quantities of water into the stomach through a tube. The animals showed the severest symptoms, including twitching of muscles, passing into convulsions.

Water poisoning, or miners' cramp, can be avoided by supplying the miners with a drink containing just sufficient salt to balance the loss of salt by sweating—that is, 10 grains of sodium chloride in a gallon of water. The results recorded by Professor Moss are most interesting and of importance, as will be seen from the account of one case in which the saline drink was given.

The man was of poor physique; he drank eight pints of water during the shift. He had been a frequent sufferer, but since taking salt each day for three months had had no sign of cramp. His evidence was as follows: Appetite much improved; feels quite fresh after a shift's work, where formerly he was obliged to cease work at about 12.30 p.m. each day owing to excessive fatigue; his life at home was changed from one of laziness and sleep to one full of energy; in general he feels a changed man.

My own patient was given a similar saline to drink and he has kept well at his work up to date.

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PREGNANCY ASSOCIATED WITH DIABETES MELLITUS.

BY

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PREGNANCY in a diabetic patient is commonly regarded as an extremely rare event. Not only is there a predisposition to sterility in diabetes, but it was, until recently, held that there is a strong probability of death or miscarriage should pregnancy occur. A. L. Walker¹ last year reported a case of pregnancy and labour in a diabetic woman, the first to be treated in the department of obstetrics at the Middlesex Hospital in a series of 10,000 confinements. Not a single case could be found in the records of the City of London Maternity Hospital among 27,567 patients confined. In reviewing the problem Walker argued that with the advent of insulin, and by the abolition by this agent of hyperglycaemia and acidosis, the risks attending pregnancy in a diabetic woman are not so great as in the days before the isolation of the internal secretion of the pancreas. It further seems to us that by the employment of insulin pregnancy in diabetic patients is rendered more likely.

The following case is of interest since it illustrates certain features of the association of diabetes with pregnancy, and it further throws some light upon the effect of insulin in this combination.

The patient, aged 34, was admitted to the Middlesex Hospital under the care of Dr. C. E. Lakin on June 14th, 1928, on account of diabetes associated with pregnancy.

There was nothing relevant in the family history except that one cousin had diabetes. There had been one previous pregnancy, in 1918, when a healthy child of 6½ lb. was delivered at term. In 1924 the patient began to lose weight, and sugar was discovered in the urine. She was then treated for diabetes in the Middlesex Hospital for four weeks, continuing to attend thereafter as an out-patient. In 1926 her condition deteriorated, and she was readmitted and put on insulin treatment. Equilibrium was established and maintained by doses of 10 units twice daily on a diet representing 2,130 calories.

In the autumn of 1927 she became pregnant; the date of the last menstrual period was not accurately known, but she thought it was at the end of October, 1927.

No new symptoms had been experienced since she became pregnant, and on admission the patient appeared to be in good health. The urine contained a trace of sugar; Rothera's and Gerhardt's tests were positive. The blood contained 202 mg. of sugar per 100 c.cm. This and subsequent routine estimations were conducted four hours after breakfast. The tests for albumin were negative. No physical signs were observed in the cardio-vascular system, in the respiratory system, or in the nervous system. She was then from 31 to 32 weeks pregnant. The vertex was below, the back in front and to the right. Foetal movements could be felt, and on June 30th the foetal heart was heard.

The patient was put on Allen's twelfth day diet (1,560 calories) and given 10 units of insulin daily. While under this treatment the blood sugar fluctuated between 200 and 220 mg. per 100 c.cm., but the excretion of sugar by the kidneys increased, the urine on the fifth day after admission containing 1 per cent., or 32 grams of sugar in twenty-four hours. The dosage of insulin was accordingly increased to 20 units twice daily, under which treatment the blood sugar gradually fell to a normal level, which was reached two weeks after admission. With this dosage of insulin and on Allen's tenth day diet (1,300 calories) the hyperglycaemia did not recur and the urine remained sugar-free but for occasional traces. Rothera's test, however, remained constantly positive, while Gerhardt's test was generally negative.

At 7.30 p.m. on August 15th, nine weeks after admission to the hospital, she went into labour and was transferred to the department of obstetrics under the care of Mr. Comyns Berkeley. Labour was normal; the presentation was a second vertex; the three stages of labour occupied respectively 2 hours, 15 minutes, and 15 minutes. The puerperium was apyretic and involution took place normally. The condition of the urine remained the same as before labour, a trace of lactose being present occasionally and Rothera's reaction remaining positive.

The child, a male, was healthy at birth and weighed 7 lb. 11½ oz., measuring 20 inches in length. It was fed at the breast from birth. During the first three days of life the weight fell to 7 lb. 4½ oz. On the eighth day after delivery the weight was the same as that recorded at birth. Thereafter a steady gain in weight was recorded. The content of sugar in the child's blood was normal and the urine showed no abnormality.

On August 16th, the day following delivery, the blood sugar of the mother was normal—100 mg. per 100 c.cm.; but by August 20th it fell to 45 mg. per 100 c.cm. A specimen of blood withdrawn before breakfast on August 21st contained only 41 mg. of sugar per 100 c.cm. of blood, while the patient complained of drowsiness and blurred vision. She became hot and cold alternately. An onset of hypoglycaemic coma being feared, she was at once given two teaspoonfuls of sugar with the juice of an orange. By 2 p.m. on the same day, as a result of this treatment, the blood sugar had risen to 185 mg. per 100 c.cm. and she had lost her feeling of drowsiness.

Thereafter the dose of insulin was reduced to 10 units twice daily in association with Allen's tenth day diet (1,300 calories). The blood sugar during the remainder of the patient's stay in hospital fluctuated between 65 and 90 mg. per 100 c.cm. She was discharged on September 6th, and seven weeks later was found to be sugar-free on the same diet and insulin dosage.

This case illustrates several important points and confirms Walker's conclusions. First, it shows that treatment with insulin renders sterility less probable in diabetic patients. Far-reaching conclusions cannot be drawn from a study confined to one case, but it appears to us at least possible that the patient would not have become pregnant before the days of insulin. Support is given to this conclusion by one of Bowen's cases.² Secondly, it suggests that the dangers associated with pregnancy and labour in diabetic women no longer exist. Thirdly, there can be no doubt that the requirements of a growing foetus put a strain upon the resources of a diabetic patient, as was taught by the older writers. This is shown by the fact that six days after delivery the blood sugar fell to an alarmingly low level. Only half as much insulin had to be given after the birth of the child as before. Parsons, Randal, and Wilder³ recorded two cases of pregnancy in association with diabetes in which the dose of insulin required reduction after labour. In both their cases the larger dosage had to be resumed some time later. Fourthly, a warning arises in that hypoglycaemic coma may occur after delivery if the dose of insulin is not reduced. The reduction should, of course, be made in accordance with frequent blood sugar estimations.

We are indebted to Dr. C. E. Lakin and to Mr. Comyns Berkeley for allowing us to publish this case, and to Dr. E. C. Dodds, the Courtauld Professor of Biochemistry, under whose direction the blood and urinary investigations were conducted.

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PROTEIN THERAPY IN INSANITY OF PUERPERAL ORIGIN.

BY

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THE successful employment of protein therapy in a case of puerperal mania may well be a matter of general interest. The following clinical details of such a case suggests that it is possible in some instances to avoid the necessity of certification.

A married woman, aged 19, was admitted to Napsbury Mental Hospital on June 10th, 1926. Parturition had occurred six weeks prior to admission. There was no family history of insanity. The patient was very restless and confused, indifferent to her surroundings, incapable of giving any account of herself, and entirely influenced by hallucinations. About three months later she passed into the katatonic state, assuming peculiar attitudes, and exhibiting negativism. This condition was replaced about six months afterwards by one of excitement. She was continuously restless, noisy, destructive, abusive, obscene, very dirty in habits, and incessantly picked her skin. Occasionally she threw herself violently to the ground, sustaining various injuries. This state persisted, and there were signs of impending dementia.

Treatment.

On November 14th, 1927, the patient was put on a light diet; the intestinal tract was well cleared, and a minor degree of dental sepsis was treated. The cerebro-spinal fluid was under tension, but revealed no gross pathological change. The blood had an abnormal tendency to haemolysis and there was a mild degree of chlorosis. A stock mixed vaccine (T.A.B. 2,500 million per c.cm.) was used and a preliminary dose of 100 million was injected into the median basilic vein. The axillary temperature was recorded every half-hour; the maximum pyrexia (104° F.) was noted four hours after the injection, and the patient complained of intense headache; cyanosis was marked. This condition was maintained

for twelve hours, after which the temperature gradually subsided and reached the normal at the end of thirty-six hours.

The intravenous injection was repeated on alternate days with gradually increasing doses of T.A.B. vaccine until fourteen injections had been given, the maximum dosage being 2,500 million. During this period a nourishing light diet was augmented by unlimited lemon juice and bland fluids.

Course of Mental State.

After the third induced pyrexia the patient was on the whole less restless and had occasional lucid intervals. She was very impulsive and occasionally threw herself out of bed. Later she had periods of confusion in the morning, which cleared towards noon. Her hallucinations were freely admitted and discussed, and she developed some insight into her condition. Her habits became clean and she abstained from the use of obscene terms.

The mental state of the patient improved; she began to take an active interest in domestic and other details, and she appeared to be convalescing, although she still admitted hearing "imaginary voices" at times. This abatement of her condition was short-lived, for while attending a patients' party she relapsed spontaneously into an intensely confused state. She became very restless, violent, noisy, destructive, obscene, and filthy in habits.

A second course of intravenous T.A.B. vaccine injections was given consisting of nine increasing doses, from a minimum of 125 million to a maximum of 5,000 million. The reactions in most instances were more severe than in the initial course; they were accompanied by rigors and marked constitutional disturbances. Her mental state at this time compared closely with that of a recent acute mania. She was very violent and aggressive, and had to be treated in a padded room owing to her frequent resort to self-injury and violence. This period of excitement persisted for several weeks, but gradually subsided. Since then a gradual improvement has been maintained. She has developed a bright and sensible manner, talks rationally, and takes a normal interest in her surroundings. She realizes her previous mental state, and her memory is good for recent events and for incidents which occurred prior to her mental breakdown. Her emaciated physical state has benefited considerably; her weight has increased by 3 st., an acneiform skin eruption and a seborrhoeic condition of the scalp have disappeared, and menstruation has recurred and functions normally. After a period of three months' convalescence under careful observation she was discharged recovered.

This history suggests that the intravenous administration of vaccines in a mental case, in which a toxic element is probable, appears to have a beneficial effect; that no very alarming signs or symptoms have resulted from these injections when used cautiously; and that the control of pyrexia is easily maintained. On one occasion a reactionary pyrexia of 105° F. occurred after the expected rise had subsided to normal. This was rapidly reduced by tepid sponging, and remained normal. Constipation was obstinate during the course of treatment, and was most effectually dealt with by daily bowel irrigation.

I am indebted to the medical superintendent, Dr. A. O'Neill, for permission to publish this case.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ACUTE GASTRIC DILATATION ASSOCIATED WITH PULMONARY TUBERCULOSIS.

THE occurrence of acute dilatation of the stomach in a patient suffering from advanced pulmonary tuberculosis may be considered of general interest in view of the relative rarity of the condition and the uncertainty attaching to its etiology. The following clinical details of such a case may therefore be worthy of recording.

A young woman, aged 21, was admitted to the Osler pavilion, Radcliffe Infirmary, on August 21st, 1928, for the second time. Her illness had begun in January, 1924, with left-sided pleurisy. Since that date the patient had been in various institutions, in one of which, during 1925, artificial pneumothorax was carried out for six weeks. The patient was first admitted to the Osler pavilion on June 17th, 1927, and was discharged on November 11th, 1927. There was extensive disease in the left lung, but the right side was comparatively free from physical signs. On discharge, following sanocrysin injections and general routine treatment, the patient was described as being "much improved." Phrenic avulsion, or other surgical intervention, was refused by the parents.

On readmission, nine months later, the patient was obviously very ill. Considerable fever was present and there were frequent night sweats. For the first time tubercle bacilli had been found in the sputum at an examination shortly before admission. The physical signs on the left side were, if possible, even more extensive than at her first admission, and there were gross signs of infiltration and breaking down in the right lung in the neighbourhood of the angle of the scapula.