July 25th, calling forth a display of divergent opinions. There have been many interesting articles in medical publications on the subject; dentists, physicians, and bacteriologists have all taken a share. Among the more interesting were a paper read by Dr. Horder at the Odontological Section of the Royal Society of Medicine last spring, and a prolonged debate in the same society a year previously, in which a numerous company of practitioners of every conceivable speciality took part. The subject of this debate was the wide one of alimentary toxæmia, but oral sepsis received ample attention. Every medical journal in this country and abroad has been occasionally occupied with the subject, and no small number of books dealing with mouth sepsis have been published within recent years. After consulting a number of these writings, the impression left on my mind is that a gentle spirit of moderation is becoming evident. There are still the stalwarts of blood and iron, who hale their victims straightway to the tormentor, being convinced that oral sepsis is the source of most human disorders, and that a clearance, root and crown, is the only remedy. This is a most attractive theory. It would be a great satisfaction to all concerned if we had the cause of so many of our ills under our very noses, in a most accessible position where it could be attacked with every hope of complete victory. Unfortunately there is not, to my mind, enough evidence to convict the mouth of being the *causa causans* of so many diseases. In the phraseology of the Scottish law courts, the guilt of the accused is "not proven," but he remains under grave suspicion.

In conclusion, I will only say a few words as to the treatment we should advise. Caries of the teeth must not be allowed to remain unrepaired. In the earlier stages of gingival inflammation careful attention to the state of the gums and the application of suitable antiseptics works wonders. Later, when deeper pockets have formed, thorough drainage of the little abscesses and ulcers and frequent cleansing of the septic surfaces may result in a cure. This is denied by some, who state that when once a definite pocket has formed there is nothing for it but to remove the tooth. So long as there is a source of poisoning, they say, which is difficult to remove by mild measures, and which in the meantime is producing arthritis and other maladies, we must have no mercy on the tooth. This is not a sound practice. Before resorting to the sacrifice of a tooth one must make a persevering attempt by local treatment, vaccines, change of air, tonics, etc., to effect a cure.

In the advanced stages of pyorrhoea alveolaris, where there is not merely destruction of the dental periosteum, but where the bone is seriously diseased, there is no hope of any treatment which does not include extraction of the teeth which are involved. Scrupulous care should be given to the thorough cleansing of all artificial teeth and other fittings and foreign bodies in the mouth.

Prevention is, of course, what we should attend to. If one desired to epitomize the prophylaxis, it might be put in four words—active mastication, efficient cleansing. Finally, to summarize in some measure the subjects we have been discussing, I shall submit for your consideration the following conclusions:

Oral Sepsis

1. Is sometimes tolerated by the patient for many years with little apparent injury.
2. Is always a possible source of danger.
3. May give rise to (a) disease in the vicinity of the mouth; (b) disease in situations which come directly in contact with the unhealthy secretions of the mouth, such as the stomach and the intestines; (c) disease in distant parts of the body not in direct communication with the morbid secretion; (d) a state of ill health and lowered vitality without obvious involvement of any organ. It may thus be said to aid and abet disease arising from some other source.
4. Is commonly the result of imperfectly cleansed teeth.
5. Does not necessarily involve the extraction of teeth.

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ON THE TREATMENT OF DIABETES MELLITUS WITH CASEIN AND CREAM.

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RECENTLY I have employed the following method of dietetic treatment in certain cases of diabetes mellitus with more prompt and satisfactory results than I have obtained by any other treatment. The method is worth trying in most cases of diabetes if ordinary diabetic diet does not check the glycosuria. But in some of the most severe forms with marked acidosis, as will be mentioned later, I should not advise it.

In this treatment casein and cream are given in small quantities every two hours. The patient is kept at rest in bed, or on the sofa, and every two hours, from 8 a.m. to 10 p.m., receives a glass of artificial milk prepared from casein, cream, and water. One tablespoonful of casein is well mixed in a tumbler with one tablespoonful of cream until a paste is formed; then hot water (or cold if preferred) is added gradually until the tumbler is full, the mixture being well stirred with a teaspoon whilst the water is being added. A white fluid is thus prepared which has the appearance of milk. It contains milk albumin and fat, but only a very small percentage of milk sugar derived from the cream. The fluid may be sweetened with saccharine or saxon if desired, or a pinch of salt may be added, or it may be flavoured with nutmeg, according to the patient's taste. Most patients prefer the fluid warm. Usually the patient takes this artificial milk quite well, and likes the taste; some take it well, but do not find the taste quite satisfactory; but a few patients complain that it causes nausea, and in such cases it should be at once discontinued. The fluid may be taken well when it is hot, but may cause nausea when lukewarm or cold. When it produces nausea, or is distasteful even when the fluid is warm, another preparation of casein should be tried; or, in place of casein, biogene should be employed, but double quantity of the latter should be used—that is, two tablespoonfuls of biogene with two of cream to the tumblerful of water. I have employed usually a cheap casein preparation, sold at 1s. a pound, but a more expensive casein, dietetic casein (A), is more palatable to some patients. Recently I have chiefly employed biogene (which is a casein preparation) though it is more expensive (3s. a pound). It may be obtained from Mr. Bonthron, 50, Glasshouse Street, London, W. Most patients like the taste of biogene much better than casein.

The diet of casein and cream, as just described, is sufficient to satisfy some patients at least for several days; but many, of course, feel very hungry, and in a few cases the casein treatment causes the patient to feel very exhausted.

When the patient feels very weak or exhausted on the casein treatment alone, he may be allowed, in addition to the casein and cream, a cup of tea and beef-tea twice a day; if he still feels very weak on this diet, two eggs (buttered) may be allowed daily, and after a few days one casein pudding may be added. The casein pudding is prepared as follows:

- One tablespoonful of casein.
- One egg well beaten up.
- A small pinch of salt.
- One teaspoonful of baking powder.

Mix well together, adding the baking powder just at the last. Then bake in the oven like a custard for thirty minutes. The addition of a little water may be necessary if the egg is a small one. This forms a cheap and palatable pudding.

Usually the treatment with the casein and cream causes a little loss of weight; but for a week or two if the patient rests in bed or on the sofa all day, the loss is only a few pounds, and it is desirable to keep the diet down to the minimum amount; but it is important not to allow the patient to become exhausted by the treatment.

In milder cases of diabetes and in many cases of medium severity the urine becomes quite free from sugar in two or three days or in a few days, even when an ordinary very rigid diabetic diet has failed to check the glycosuria. In many cases the casein treatment can be continued for two or three weeks, or a little longer, without much loss of

weight and without producing much weakness or unpleasant symptoms; and the urine may be kept free from sugar during this period. The patient's condition, however, should be carefully watched, and if he should become weak or exhausted at the end of the first week (or earlier) additions to the diet should be made at once. If he tolerates the casein treatment it may be continued for two weeks or a little longer. But then, if not earlier, additions to the diet should be made. A buttered egg or casein pudding may be allowed once a day, then a little suitable diabetic bread (3 oz. daily) may be allowed (casein bread, or cocoanut and biogene cakes, or casoid, or akoll biscuits), or two buttered eggs may be allowed daily. If these additions to the diet cause the sugar to return in the urine, they should be cut off and the diet restricted to the casein and cream. Whilst these additions to the diet are being made the amount of casein and cream should be gradually diminished to three or four glasses daily.

The following is another diet which is often useful if the patient feels very weak; or if the biogene and cream be unpalatable, or if he should be losing weight considerably:

- 8 a.m. Cream, 1 oz., and tea; one buttered egg.
- 10 a.m. Cream, 1 oz., with beef-tea, 10 oz.
- 12. Biogene and cream and water (or egg and cream).
- 2 p.m. Custard.
- 4 p.m. Cream, 1 oz., and beef-tea, 10 oz.
- 6 p.m. One egg, boiled or buttered; cream, 1 oz., and tea.
- 8 p.m. Biogene and cream (or egg and cream or beef-tea).
- 10 p.m. Cream, 1 oz., and beef-tea, 10 oz.

If the additions to the diet are not followed by a return of the glycosuria further additions may be made. The following is a diet I often allow at this period:

Breakfast.

Coffee (or tea) with cream, or casein and cream.
Eggs buttered (poached or boiled), or tomatoes, or mushrooms.

Biogene and gluten cakes, gluten and cocoanut cakes, cocoanut and biogene cakes; casoid or akoll biscuits, or suitable diabetic bread; butter.

Dinner.

Bacon cooked in any way, or fat of meat (cold), or fish; cabbage, cauliflower, Brussels sprouts, turnips, French beans, spinach, broccoli, boiled walnuts, asparagus, vegetable marrow, tomatoes, mushrooms, salad, lettuce, cucumber, watercress, celery, radishes.

Casein pudding, or cocoanut pudding (free from sugar), or custard.

Suitable diabetic biscuits or bread.
Water, claret, hock, Salutaris water.

Tea or Evening Meal.

Tea and cream, or casein and cream.
Eggs (buttered, poached, or boiled), Welsh rabbit, cheese.
Salad, lettuce, cucumber, radishes, mushrooms, tomatoes, boiled egg and spinach, watercress.

Biogene and gluten cakes, gluten and cocoanut cakes, cocoanut and biogene cakes; casoid or akoll biscuits, suitable diabetic bread; butter.

If this diet is not followed by glycosuria then the patient is allowed an ordinary rigid diabetic diet—meat, fish, or fowl, being given in place of bacon at dinner, and bacon being allowed for breakfast. Much later a small amount of white bread may be added (at first only 3 oz. daily).

As I have only employed this casein treatment for twelve months I cannot say what will be the permanent effects. At present one can only speak of the temporary results. By the casein treatment followed by other additions to the diet gradually made, as just indicated, the urine may often be kept free from sugar for three, four, or six weeks, and after the return to the ordinary diabetic diet it may remain free from sugar for months, though previous to the casein treatment, when the patient was taking an ordinary rigid diabetic diet, sugar was excreted in the urine in considerable or large quantities. Thus in one case the urine was still free from sugar eight months, in another six months, after the casein treatment (and both were young patients).

In the majority of cases, however, in course of time, sometimes rapidly, sometimes slowly, the sugar reappears in the urine after the patient has returned to a less rigid diet. But the benefit of the treatment is shown by the fact that the sugar excretion on such a diet is much less than that when the same diet was taken before the casein treatment. A return to the casein treatment may be then

desirable for a short time; and such periods of casein treatment may be recommended once a month or less frequently.

The casein treatment must not be regarded as a cure for diabetes in the strict sense, but as a powerful method of temporarily removing the sugar from the urine in many cases, and of improving the power of sugar destruction, so that the sugar excretion may be afterwards more easily controlled by ordinary more or less rigid diabetic diets or restricted diets.

In the most severe forms of diabetes with marked diacetic reaction in the urine, I do not at present feel justified in recommending the casein treatment. My experience so far has been that in many such cases it is of little value, and it may be very unsuitable in certain cases. In other cases, however, I have obtained very satisfactory results, and both diacetic acid and sugar have disappeared from the urine for a time under the casein treatment. In spite of the excellent temporary results in some of these severe cases I hesitate to recommend others to employ it. I should use it myself in certain cases after careful examination; but I do not recommend others to employ it in this class of cases, because I fear the treatment may be given to unsuitable cases.

When I do employ the casein treatment in severe forms of diabetes with marked diacetic acid reaction in the urine, I give first, for two days, a small amount of oatmeal porridge and cream twice a day and biogene and cream four or five times daily, and then I discontinue the porridge and follow on with the biogene and cream alone, as described in this article. In some cases I have given oatmeal porridge three times a day for two days and then followed with the biogene and cream with excellent results. But much caution is desirable, and such treatment may not be advisable in certain cases.

The treatment with casein just suggested is a prompt method of removing the sugar from the urine in many cases of diabetes of the milder form, and in many cases of medium severity. The ordinary rigid diabetic diet should be tried first, and if this succeeds the casein treatment is not necessary; but in the numerous cases in which the ordinary rigid diabetic diet fails to remove the sugar from the urine the casein treatment often succeeds, and for some time—weeks or months—the urine remains free from sugar, and this is the value of the treatment. In some cases, of course, the treatment fails.

Advantages of the Casein Treatment.

1. This method will often remove the sugar from the urine when the ordinary rigid diabetic diet has been unsuccessful, and this is its great value.

2. The results are often prompt, the urine being free from sugar after two or three days.

3. After a period of treatment with casein and cream the patient is often able to take ordinary diabetic diet, or even a less rigid diet, without the appearance of sugar in the urine, whilst previous to the casein treatment the most rigid diabetic diet did not remove the sugar from the urine.

4. Though the sugar will return in the urine in course of time in most cases after the patient's diet has been relaxed, still I am inclined to think that the return is much less rapid than when the sugar has been removed from the urine by an ordinary rigid diabetic diet.

5. The casein method is not expensive and is easily carried out.

6. In most cases of the very severe forms of diabetes in which the urine contains much diacetic acid the casein treatment is of little value, and sometimes may be very unsuitable; still in certain cases it is of much service, and may remove the diacetic acid and even the sugar from the urine for a short time, and on returning to a less rigid diet the sugar excretion may be very small for a long time and the diacetic acid may not return for a long period. Of course, such cases form only a minority of the cases of this class.

Unfavourable Results and Dangers.

I have hesitated to publish this article for some time owing to the bad results obtained in a small percentage of the cases. The treatment requires to be very carefully watched and the patient seen daily and the urine tested daily during the casein treatment. Though I have never

had any serious bad results, it is necessary to discontinue the treatment promptly, in a small percentage of the cases, owing to the onset of the symptoms which I shall now mention.

From experience I do not now place a patient on the casein treatment unless I can see him daily for a week, or unless I can be daily informed of his condition by his medical attendant and have the urine sent to me daily.

I have met with unfavourable symptoms in about 20 per cent. of cases. A feeling of great weakness and exhaustion occurs in a few, and it is then desirable to discontinue the treatment on this account. Others become mentally depressed and irritable at what they consider a harsh treatment, and will not continue it. In a few it produces dyspepsia, or diarrhoea, or constipation. But in the majority of cases it can be followed quite easily and without unfavourable symptoms. When it cannot be taken the diet of cream, eggs, custard, beef-tea, already described, may be recommended.

Patients who are fond of the pleasures of the table and like nice foods will probably regard the casein treatment as monotonous, or as one of my patients expressed it, "not interesting." But many take it readily and without any dislike, and are delighted at the results as regards the sugar excretion.

In the casein treatment just described—

1. The amount of carbohydrates in the food is reduced to the minimum;
2. The total quantity of food is reduced to a very small amount;
3. The food is given in small quantities at frequent intervals—every two hours.

I am inclined to believe that the last two points are of much importance in the success of the treatment.

(Knowing the great pressure on the space in the BRITISH MEDICAL JOURNAL I have not added descriptions of cases. Such detailed accounts I hope to publish later in the *Medical Chronicle*.)

THE EARLY ADMINISTRATION OF VACCINE IN PNEUMONIA.*

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In the treatment of acute lobar pneumonia vaccines have been used, mainly as a last resort, in cases which were not doing well under other treatment. Some physicians advise that a vaccine should be prepared from the sputum early in an attack, to be used in the event of continued severity or relapse of symptoms, and in cases of slow resolution. This attitude is illogical. If a vaccine is of service at all, it should be used as soon as possible, in order to limit the intensity of the infection and prevent the occurrence of grave symptoms. A vaccine can give little or no assistance when the infection has been allowed to go on uncontrolled to the point of cardiac and nervous exhaustion. That they have principally been used late in the disease, and then usually in quite inadequate doses, is the reason that their value is not the subject of agreement. My own practice is to give a vaccine as early as possible after the onset of symptoms. The object of this paper is to give the results obtained in a number of cases which were injected not later than the third day of the disease.

Pneumonia is primarily a septicaemia, and it may prove fatal in this stage before there is any localization in the lungs. In laboratory animals injected with pneumococci septicaemia is the rule, unless they are immunized or the injected organisms are of low virulence. Man has a greater resistance than animals, and local lesions usually follow the septicaemia. The consolidation of the lungs must be regarded as a defensive process, an attempt to localize the infection. It is not true bacteriologically that infections attack the place of least resistance. They attack the place of greatest resistance. A fortress city suffers more than an open, undefended town. The chief defence against the pneumococcus is phagocytic,

and the lungs contain a larger number of leucocytes than any other organ, except the marrow, which is their birth-place, and the spleen, which is their grave. The emigration of leucocytes and the clotting of the fibrinous exudate in the alveoli prevent the spread of the germs but at the same time impede the access of antibodies from the blood. During the stage of firm consolidation little can be expected from vaccine treatment so far as the affected parts of the lungs are concerned; but inasmuch as other parts of the lungs are still patent the raising of the antibody content of the blood will be of some value. Further, by accumulating antibodies in the blood, we make them available for the time when unorganized ferments have liquefied the fibrin sufficiently for fluids to enter. But when vaccines are given late in the disease an increase of antibodies can have no effect upon the damage already done, and the patient may die of heart failure or nervous exhaustion. Elsewhere¹ I have shown the good results which can be obtained from using appropriate vaccines in septicaemia caused by the *streptococcus*, *staphylococcus*, *gonococcus*, or *Bacillus coli*. In spite of the pessimistic conclusion of Dr. Samuel West at a recent discussion that "in the acute general infections vaccine treatment offers but little prospect of benefit," I regard, after much experience of this class of case, the septicaemias as one of the best fields for the skilled employment of vaccines, and the septicaemic stage of pneumonia is no exception.

All the cases of pneumonia described here have been treated with a stock vaccine made from a highly virulent strain of pneumococci. The diagnosis was made at first on clinical grounds and confirmed later by bacteriological examination and the progress of the case. The number of cases is small, as a physician does not get many opportunities, either in private consultations or in hospital, of seeing cases of pneumonia in their early stages. By far the majority of the cases which I have treated with vaccine were first seen on the fourth or later days. These are excluded from the scope of this article. Six cases received their first injection within twenty-four hours from the onset of symptoms, three were injected during the second day, and six during the third day.

Cases Injected within Twenty-four Hours of the Onset of Symptoms.

CASE I.

A lady, aged 25, at 1 a.m. on May 26th, 1913, had a severe rigor with vomiting. This was followed by pain in the left side

of the chest and a frequent restrained cough. She was seen by her doctor, who was a relative, at 3 a.m., and by myself in consultation at 11 a.m. The temperature was then 103°, pulse 120, respirations 38. She had the typical symptoms and appearance of pneumonia—hot dry skin, shallow breathing, grunting expiration, pain in the side. There were subdued breath sounds at the base of the left lung with a few fine crepitations. Sputum was already rusty; 25 million pneumococci were injected at once. This was followed by a fall of temperature, which reached normal during the following night. The respirations

Case I.—Female, aged 25. Injected ten hours after onset.

and pulse-rate fell with the temperature. Slight fluctuations of temperature occurred for three days, but after a second injection on the fourth day the temperature remained normal. In spite of the absence of symptoms there was well marked consolidation in the lower lobe of the left lung and a small patch in the right. The sputum contained large numbers of pneumococci. The lung rapidly cleared, and the patient was allowed out of bed in a week from the onset.

CASE II.

A man, aged 45. Several attacks of bronchitis during the previous year. A sharp rigor occurred on the evening of January 11th, 1914. Temperature rose to 105°, with a pulse-rate of 128 and respirations 38. When seen by me exactly twenty-four hours later he was somewhat cyanosed, his pulse was soft, and there was a mitral systolic murmur. Sputum was rusty. At both bases the breath sounds were subdued, with fine crepitations. Scattered rhonchi in both lungs. Herpes on lips. Considerable pain in right lower axillary region. The outlook seemed bad, and it was feared that his heart would not stand the strain. Twenty-five million pneumococci were injected. The temperature fell to 100° next morning, and, after a rise to

* The substance of this paper was given as a post-graduate lecture at the General Hospital, Birmingham, on April 28th, 1914.