acid and work is produced by the digestion of farinaceous food; but since, as we have seen, the farinaceous food is excreted as sugar in the diabetic patient, and therefore does no work at all, the whole of the foregoing work must be done by the digestion of other kinds of food.

I have already shown that it follows from Lavoisier's experiments (confirmed in a remarkable manner by those of Regnault) that the work done by the combustion of carbon in the body is to the work done by the combustion of hydrogen in the proportion of 9068 to 3024, almost exactly 3 to 1; hence we have the work done by Owen Murphy, as a minimum in health,

Due to carbon	5.716 miles.
Due to hydrogen... ..	1.905 ,,
	<hr/>
	7.621 ,,

This result is somewhat in excess of the truth, for the same reason that the calculated *digestion coefficient* of proteine is in excess of that found by Frankland from experiment; for the combustion coefficients of carbon and hydrogen, in organic compounds, are slightly less than when free. If we are permitted to reduce 7.621 miles in the same proportion as in the digestion of proteine—viz., 48 to 43, we shall find—

Owen Murphy—minimum of work consists of
body weight lifted through 6.83 miles.

Let us now compare this minimum with the work actually performed by him when suffering from diabetes, by the digestion of flesh food and production of urea.

2. I have already shown that the work produced by the formation of 501.28 grs. of urea is 704 ft. tons, by calculation from the composition of proteine and urea. This result should be reduced in the proportion of 48375 to 43155, in order to obtain the work given by Professor Frankland's experiments. Making this reduction, we find that 500 grs. of urea correspond to 626.3 ft. tons of work, or 100 grs. urea to 125.26 ft. tons; or, in other words—

Every four grains of urea excreted correspond to five tons lifted through one foot.

Owen Murphy excreted, on an average, 1182 grs. of urea daily during nine weeks, which, by the foregoing rule, are equal to

$$1475 \text{ ft. tons} = \text{Murphy} \times x;$$

where x represents in miles the height through which the patient could be lifted by the work done per day; and is equal to

$$x = \frac{1475 \times 2240}{93.56 \times 5280} = 6.69 \text{ miles.}$$

This result is almost exactly equal to that already found as the minimum consistent with continued life, and explains in the most satisfactory manner the complete prostration of the patient, notwithstanding the consumption and digestion of more than double the usual quantity of flesh food.

In corroboration of the foregoing conclusion, I may mention that Murphy's temperature was found to be constantly 2° F. below that of other patients (chronic) placed in the same ward, and, in other respects, under similar conditions.

His unfavourable symptoms (so long as his powers of digestion were not impaired) were invariably alleviated by the free use of flesh food and fat, the latter being instinctively preferred by him; so much so that, during the delirium that preceded his death for twenty-four hours, he raved incessantly about "fat, roasted fat, which the angels of heaven were preparing for him."

I have studied many other cases of diabetes mellitus, and found similar results in all; but I feel it to be unnecessary to describe them, as one well-ascertained train of phenomena, carefully observed and recorded, is quite sufficient to establish the order of nature.

Conclusion.

I have now, Mr. President and gentlemen, to apologise for the length of time during which I have spoken, and to thank you for the patience with which you have listened to me. I am well aware how much I am indebted to your kindness, for I laboured under two serious disadvantages in addressing you: in the first place, I had undertaken a task beyond my strength; and, again, my address is made shortly after you had, like myself, been charmed and instructed by the luminous, learned, and eloquent oration of Professor Rolleston. I feel confident, however, that I possessed one advantage that he did not: I was a stranger in Oxford, and believed that my faults in matter and style would be leniently criticised. In this expectation, I am happy to say, I am not disappointed; and again I thank you for your kindness. Two other advantages I share with

him which have contributed to his address as much as to my own—a profound respect and reverence for all honest labourers in search of truth, whether they have preceded us by 20 years or by 2000 years; and an unwavering confidence and faith in the future that lies before the science of Medicine. We traverse a sea, mapped with imperfect charts, carrying with us a sure guide in our compass and stars; but we cannot afford to neglect a single rock or shoal, buoyed for us by the skill and care of those that have preceded us. Let us follow their example, and mark with conscientious care for our successors the dangers we ourselves discover and escape.

Assembled as we are within the walls of the University of Oxford, the centre and heart of all that is intellectual and religious in the life of England—a University that borrows its accurate logic, as well as its refined ethics, from the lips of Aristotle; that reverences Euclid as the fountain and source of its elegant geometry; and sits at the feet of Homer, Pindar, and Eschylus, to learn its poetry,—we need not fear that Hippocrates and Galen will ever want admirers and students; but the Oxford of to-day has taught us, what many did not anticipate, that she is equally ready and skilful, as she has proved herself to be in cultivating literature, to devote her vast intellectual energies to the encouragement and development of the natural sciences, based upon the solid and only permanent foundation of mathematical research. The efforts made within the last few years by Oxford to encourage within her walls the mathematical and natural sciences have won for her the respect, and warmed towards her the hearts, of all that search for truth in the study of nature. Our brothers in Oxford, like the Athenians at Syracuse, have gone on board the fleet, while we watch them from the shore, sympathising in the sea fight: as they win, we shout; when they fail, we weep.

Long may the union of the far distant but never to be forgotten past with the living present, that now exists in Oxford, continue. No science, no profession, can benefit so much by it as that of Medicine.

A BRIEF INQUIRY INTO THE CAUSES, IMMEDIATE AND REMOTE, OF DIFFICULT DENTITION, AND ITS TREATMENT.

By J. H. JAMES, F.R.C.S., &c.

AMONGST the various conditions which affect the mortality of our species there are few which exceed in importance that of dentition. The lowest statements of its amount are very considerable, and if to these are added those which occur from the febrile diseases of infancy, falling upon those who are undergoing the process, the total is large indeed. Furthermore it ought to be considered that while all other conditions which engage the attention of medical practitioners are only occasional, dentition is the lot of all who have passed the first few months of infancy. These being the facts, it might be suppose, *a priori*, that the subject would have engaged the attention of the profession in an especial manner; but although the works which are intended to deal with infantile diseases show no want of this, yet, as regards the interest it has engaged, it falls very far short of others of much less real importance. The reason is obvious: dentition, like many other things, is too common to be specially regarded. I should not, however, have intruded any observations of my own, but for two reasons. One is, that the treatment by lancing appears to be getting into disrepute, for no sufficient reason as far as I can see; and secondly, that authors, even of the highest authority, differ as to the mode in which it should be practised. A few instances will suffice to prove that it is so. Dr. Copland* and Dr. West† (whose abilities entitle them to every respect) lance the gums in difficult dentition in a very modified degree, their object appearing to be simply the relief afforded by taking blood, and avoiding, rather than seeking, the division of the capsule; while Underwood,‡ Sir J. Clark,§ and Dr. Joy,|| all insist upon the necessity of relieving the tension as well as taking blood. The question, as far as I can judge, is decidedly in favour of the latter practice, and although I cannot boast of

* Dictionary of Practical Medicine, vol. i., page 505.

† West on Diseases of Infancy and Childhood, p. 523.

‡ Underwood on Diseases of Children, vol. i., p. 213.

§ Sir J. Clark on Diseases of Children, p. 71.

|| Encyclopædia of Medicine, vol. i., p. 519.

the experience which these authors have had at their command, yet nearly fifty years' observation has enabled me to judge what the results have been in a very considerable number of cases; and although numerically inferior, yet as I had an opportunity of watching most of them during the whole period of dentition, and was much interested in their well-doing, I may perhaps be considered as not speaking on the subject without some warrant.

Why is dentition ever difficult? Perhaps I may be allowed to make a few remarks upon the subject, commencing with normal dentition. The nascent tooth, with its capsule, is extremely vascular and sensitive, if we may judge from the supply of vessels and nerves. When it is completed, the crown becomes coated with enamel, which has neither vessels nor nerves—in point of fact, is not itself living matter, though connected with it, and, like all other matters devoid of life while contained within the body, a disposition to be discharged obtains, until the enameled crown has escaped through the gum, the process being accelerated by the elongation of the roots, to which indeed it has been wholly ascribed; whereas, in point of fact, the softening and absorption of the living tissues to give it exit is precisely similar to what is occasioned by other dead matters; and so little is the disturbance that the tooth sometimes appears without any indication of pain. This is normal dentition.

What are the causes of dentition being otherwise than normal—in other words, what are the causes of difficult dentition? The first is local and general plethora and congestion, often promoted by too full diet, or too much heat about the head. This appears to have been considered as an especial cause; but in many cases it may be doubted whether it is not rather an effect than a cause, for a free lancing will often give effectual relief.

The second is the occurrence during dentition of any of the febrile diseases of childhood, which, falling upon the subject while dentition is going on, induces an inflammatory action and its consequences, to be hereafter stated.

Thirdly, an opposite condition, partaking more of the character of cachexia, where the child is naturally unhealthy from parentage, or is rendered so by bad nursing or feeding, or by unhealthy air. These, probably, are the most frequent causes; and the explanation I would offer is this: that whereas the extremity of the tooth is absolutely dead matter, it follows the ordinary laws of the economy as stated under normal dentition; but whereas foreign bodies in healthy people only produce a moderate degree of irritation, in the unhealthy this proceeds to the extent of active inflammation. So in dentition, the pressure of the extremity of the tooth upon the capsule excites an amount of inflammation, where the condition is unhealthy, which causes thickening and tension both of it and the gum, and reacts on the vascular and sensitive parts of the tooth within as well as of its capsule; and the various formidable symptoms which arise during dentition are the result of the influence produced on the whole system, whether it be called sympathy, or reflex action, or anything else. The local conditions now very much resemble that which is produced in other parts of the body by the tension of unyielding membranous structures upon vascular and sensitive parts contained within them, the ill effects of such tension being but too well known. There are two points which here require elucidation. First, how is it that a cachectic state of the child should be a cause of such serious inflammation? Secondly, what treatment may be deduced from this explanation? Now it will hardly be questioned that, where a person is healthy, the irritation produced by any foreign body will be of a moderate kind as compared with that which is occasioned in those who labour under an unhealthy condition. Thus a splinter or a thorn may produce but little inconvenience in one person, and even fatal inflammation in another. This I propose as a reasonable explanation of the phenomena; and we are not without proofs that it is so, for a child who has had difficult dentition, under the disadvantages of a bad wet-nurse or an unhealthy situation, will, if the wet-nurse or the situation be changed, go through its subsequent dentitions with little comparative difficulty. That this is a fact is pretty generally admitted; and the explanation of the fact is, I would submit, that the same local cause of irritation, acting upon a healthy instead of an unhealthy subject, produces the remarkable difference.*

The principles of treatment may be deduced from this view of the pathology of the case. The imprisoned tooth in difficult dentition is very much in the condition of any other part of

the body where vascular and sensitive parts are bound down by unyielding coverings—say paronychia, thecal and fascial inflammations. In these, although the removal of blood from the part is undoubtedly useful, yet it does not supersede the more effectual plan of free incisions, removing the tension. Fair analogy would point out that similar treatment in difficult dentition is the best. It is the treatment supported by Underwood, Clark, and Joy, and which I have myself always found remarkably successful.

Everyone has observed the eagerness with which children during dentition bite upon hard substances. This has been supposed to give relief to the itching or irritation of the gums; but it is certain that it must have another effect—namely, that the edges of the incisors and the sharp points and tubercles of the other teeth, by pressing upon the capsule, effect from within their division, or assist at least to do so; and it is worthy of remark that, in common parlance, the child is said to be *cutting* its teeth. This may be held to be an argument in favour of the operation which facilitates it.

A question very naturally arises as to there being any reasonable grounds for supposing that such complete division can be a cause of injury, and what. It has been said that if the incisions in the gums unite, the cicatrices offer an increased resistance to the passage of the tooth. But this argument is disposed of by the well-known fact that new-formed parts more readily give way than original structure. Has any other objection been offered to the practice of lancing the gums in difficult dentition? I will put out of the question any injury which can be done to the enamel. Those who have suffered from instruments in the hands of a dentist will not attach much importance to what the edge of a gum lancet will do. Is there any damage inflicted on the parts beneath the surface which are not seen? I should say, on the contrary, that the relief of tension on the surface is communicated to the capsule below, and a relief afforded to the inflammatory processes there; and if this be so, the organisation of the tooth is much more likely to be benefited than injured by the proceeding; and although difficult dentition may lead to future decay both of the first and second set (with which the first is so closely connected), I would submit it is from the damage done by the inflammatory processes, and not by the lancet which relieves them.

It will be remembered that I am speaking only of difficult dentition; for to meddle with a tooth which is only progressing in a normal way would be worse than useless, since in such cases a wound of the capsule would have the same ill effect that lancing a phlegmon prematurely has—it would obstruct, instead of advance, the progress of that tooth. But who would confound the pale, flabby surface of the gum in such cases, with the swollen, red, and tense condition of the parts in difficult dentition? I am not aware that any other objection has been or is likely to be urged against deep lancing.

Before quitting the subject, I may be permitted to say a few words on disproportion—a matter which seems hardly to have received sufficient attention. Children inherit the teeth and jaws of their parents, and it may be that these do not coincide. Large teeth may occur in small jaws, the result of which will be crowding of the nascent teeth into too small a space; and although this process cannot be watched before the teeth are out, its effects may be seen subsequently in the crowded and irregular position of the teeth both in the first and second set, and those who have experienced the distress occasioned by crowding in the case of the last molars can easily form a judgment of what crowding must be in a child. Thus parentage may operate in two ways: firstly, by transmitting that ill-health which is frequently a remote cause of difficult dentition; and secondly, by propagating disproportion between the teeth and the jaws. If anyone doubts the probability of such conditions, let him only compare the noble set of teeth and ample jaws of the African savage with those which are too often exhibited by the races deteriorated by civilisation (from which, however, the healthy rural population is comparatively exempt).

It would extend this memoir far beyond the limits I propose if I were to go into any details of those disorders which are allowed to be the frequent result of difficult dentition. But I may remark that they are of two kinds—one, which evidently relieves the morbid condition, and probably prevents more serious consequences, such as insalivation, cutaneous eruptions, and mild diarrhoea; the second, severe affections of the alimentary and formidable derangements of the cerebral and nervous system, or of the respiratory organs. It is in the second class of disorders that I have found efficient lancing of the gums so beneficial.

* This affords a strong proof that an asthenic state disposes to the production of the inflammation, while the same treatment may serve just as in inflammation from a sthenic condition.

Much depends upon the *effective manner* in which this little operation is performed; for, as the old maxim has it, "heavy weights hang upon small wires." If we do not completely secure the head of the child, we may be baffled in our endeavours to carry out our measures effectually. The woman who holds the child (it had better not be the wet-nurse), seated on a low chair, lays it across her lap, so that the head may come between the knees of the operator, seated a little higher, so that it can be held as if in a vice; he will then have the jaws at his complete command, may examine them as to the necessity of interference, and if necessary lance them effectually. The incisors require a single, the remaining teeth, including the cuspidali, crucial incisions. This plan will occasion much less distress to the parent than a struggle to fix the head in any other way.

I have only now to add that I have confined my observations to the subject of lancing the gums in difficult dentition, the other modes of treatment required having been fully and ably stated by the best authorities.

Exeter, August, 1868.

CASE OF GUNSHOT WOUND OF THE LEFT HIP TREATED ON THE ANTISEPTIC PRINCIPLE; RECOVERY.

By PEARSON R. CRESSWELL, Esq., M.R.C.S.,

CHIEF SURGEON TO THE DOWLAIS IRON WORKS,
MERTHYR TYDFIL.

THE use of carbolic acid in the treatment of wounds and compound fractures has created quite a revolution in the surgical practice at the Dowlais Iron Works (and to give an idea of the extent of that practice, I may say that there are upwards of 8500 persons actually employed in the works); for during the last twelve months I have used it extensively in the treatment of the varied injuries that are of constant occurrence, and, I think I may say, in every instance with marked success. Formerly, in severe cases of compound fracture, amputation was the rule; latterly, it has been the exception.

At some future time I hope to send a summary of the more important cases of compound fracture treated on the antiseptic plan; but now I give the details of a successful and very interesting case of compound and comminuted fracture of the neck and trochanteric portion of the left femur, in which there has been perfect bony union, and that without a trace of suppuration.

On the 13th of April last, at 1 P.M., I was called to see Jonadab T—, aged twenty-three, a boiler-maker by trade, who had just been shot at the rifle-range, where he was engaged performing the duties of a marker. He stated that he had run out of the mantelet, was standing in a slightly stooping position in front of the target, looking for the mark of the last shot, which was somewhere about the bull's-eye, when he felt a sharp smack on his left buttock, and immediately fell to the ground. The patient was placed on a door on his right side, and removed home at once. The ball that struck him was from a regulation cartridge discharged from a long Enfield rifle at a distance of 600 yards.

On examination, I found a small rent in the seat of his trousers, and, corresponding to this, a penetrating wound of the left buttock, immediately behind the great trochanter. The trousers being removed, I perceived, at about half an inch below Poupart's ligament, and a quarter of an inch external to the femoral artery (left), a prominent swelling caused by the ball, which had lodged, and could easily be felt lying underneath the uninjured integument; the femur was fractured, the limb shortened, and in the position of a dislocation on the dorsum ilii. I proceeded to remove the foreign body, and for that purpose placed the patient on his back, with the injured limb supported by a pillow placed under his knee, when I found that the ball had receded from the surface, and could nowhere be felt. However, on placing him again on his right side, I detected it in its old place, and at once made an incision through the skin over the tumour about two inches in length, and parallel with the artery, and easily extracted the ball with the aid of a small scoop. Hæmorrhage, which was rather free at first, soon ceased. On passing my finger into the anterior wound, I found the neck and trochanteric portion of the femur

much comminuted, and removed several large pieces of loose bone; but many small fragments, lying deep and difficult to get at, were left. The wounds were closed with lint and strapping, and a long interrupted Liston splint placed on the limb. As the patient was suffering severely from shock, warm brandy-and-water was ordered, which he took reluctantly, saying that he had been a total abstainer all his life. At 8 P.M. I removed the lint and strapping, and mopped out the wounds with carbolic acid, squeezing it well into the interstices. A piece of lint, soaked in a mixture of carbolic acid and boiled linseed oil, in the proportion of one part of acid to four of oil, was then placed over both wounds, and over this a layer of antiseptic putty, and the whole covered in with lead-foil, and secured by a spica bandage. Pulse 100; skin warm; temperature of injured limb natural. To have one grain of opium powder immediately.

April 14th.—12 A.M.: Has passed a good night; no pain in the limb; no hæmorrhage; bandage stained with bloody serum; skin cool; tongue moist; pulse 100; has passed no urine; catheter introduced, and about a pint of urine drawn off. Antiseptic putty reapplied, great care being taken not to disturb the piece of lint first placed over the wound.—11 P.M.: Has no pain, but feels restless; has passed no urine since the introduction of the catheter this morning; pulse 108. Urine drawn off. To take twenty minims of tincture of opium immediately.

15th.—12 A.M.: Slept well last night; countenance placid; skin cool; tongue moist and clean; pulse 100; retention of urine still continues. Introduce catheter. Renew antiseptic putty. Sero-sanguinolent discharge very trifling.—11.45 P.M.: Expression of countenance rather anxious; skin hot; marked abdominal tenderness; pulse 100. Introduce catheter. To take twenty minims of tincture of opium immediately.

16th.—1 P.M.: Feels pretty well this morning; slept well after the draught; no pain in the limb, and but slight tenderness over the abdomen; pulse 96. Urine drawn off. Renew the putty dressing. No discharge of any kind whatever.—11.45 P.M.: Feels comfortable. Urine drawn off. Wishes for his draught. Opium as before.

17th.—1 P.M.: Feels quite well, with the exception of being unable to pass his urine. Renew putty dressing. No discharge.—11.45 P.M.: Introduce catheter, and repeat opium.

18th.—Has passed, as usual, a good night, and feels well this morning. His appetite, which has been hitherto very good, has failed him to-day. Bowels have not been moved since the accident. Introduce catheter; renew putty. An ounce of castor oil to be taken to-morrow morning.—11 P.M.: Introduce catheter, and repeat opium.

19th.—11 A.M.: He took the castor oil early this morning; it has not operated yet, and it has made him feel very squeamish. Urine drawn off. Renew the putty dressing. No discharge. The dose of castor oil to be repeated.—10.15 P.M.: Bowels have acted freely, and he has passed urine. Feels comfortable, and thinks he will be able to sleep without the draught.

20th.—Has passed a good night; appetite good; thirst moderate; skin cool; passes urine well; in fact, his general health is as good as ever; no pain in the limb; not a sign of discharge. Reapply the antiseptic paste.

May 3rd.—Antiseptic putty has been daily renewed. Health very good; no pain in the limb; no discharge; he wants to get up.

6th.—Feels quite well; no pain in the limb; antiseptic putty has not been changed since last report; not a stain on the bandages.

29th.—Removed splint and dressings, together with the original antiseptic rag, when I found over the sites of the wounds two perfectly smooth cicatrices. The limb on being measured was an inch and a quarter shorter than its fellow. Placed the limb in a gum-and-chalk bandage, and fixed a piece of Hides' patent leather-felt splint around the pelvis and hip. To get up to-morrow.

July 3rd.—Since last report has been up and walking about with the aid of crutches, frequently showing himself at the surgery. To-day I removed the bandage. Bony union perfect. A great deal of thickening about the hip. Limb an inch and a quarter shorter than the other. Foot everted. Stiffness about the hip-joint.

24th.—Presented himself at the surgery previous to going to the country. He still walks with a crutch, but can bear the weight of his body on the injured limb for a short time; but when continued he feels a slight aching pain in the groin. Free movement at the hip-joint.

Dowlais Surgery, July 25th, 1868.