ferent rates, so that one takes longer than another to evolve an idea, which is as valuable as, but not necessarily more so, than that more rapidly produced. To aim at rapidity in diagnosis for the sake of display is as foolish as to affect a Johnsonian ponderousness with the object of impressing the bystanders. Too great rapidity commonly leads to error from imperfect observation; too much consideration may destroy the value of an opinion by overloading it with contingencies.

In examining at the bedside and at the weekly examinations in the theatre, it is convenient to select the more advanced student who is shortly to be examined for a diploma as the stalking-horse by which to instruct the whole class. This teaching of clinical surgery is not, however, merely for purposes of examination, but for the business of life. The average medical practitioner may see but little surgery for years after he leaves the hospital, and then may suddenly be brought face to face with an urgent surgical case requiring careful investigation, acute diagnosis, and prompt and skilful treatment. If he fail to see surgical cases whilst a student, and to acquire some dexterity in their treatment, it will go hard with him in after-years, and he may unavailingly regret lost opportunities.

Treatment must follow, and not precede, diagnosis, and for every surgical injury or ailment there may be found more than one satisfactory method of treatment. The several surgeons of this and other hospitals may differ in their methods, but they are all guided by the same principles, and it is sometimes almost a matter of indifference how those principles are applied. Tradition has something to do with the adoption of particular methods in certain hospitals, and, if tradition mean success and not mere blind clinging to ancient precept, its teaching is to be respected. Experience is the best teacher, and experience can only come with time. Every practitioner must lay up for himself the store of self-made knowledge which will render his opinion valuable in after-life, and it is to assist those who are but practitioners *in embryo* in beginning this important work that the teaching here will be directed.

NOTE ON THE EXCISION OF TUMOURS OF THE PALATE AND FAUCES.

By DAVID FOULIS, M.D.,

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R. M., AGED 30, a moulder by trade, consulted me, at the Throat Dispensary in Dundas Street, for a tumour in the right side of the soft palate. He said it had been growing for two years, and that latterly it had begun to interfere with swallowing. It caused very little pain, and there was no cough. Caustics had been applied to the tumour, with the result of leaving its free surface irregularly cicatrised. For a considerable period he had been taking iodide of potassium, without, however, retarding the steady growth of the tumour. When he came to me (in January 1878), the mass was as large as a hen's egg, and it was firmly sessile in the right half of the soft palate, extending upwards and outwards, with a prolongation downwards into the right tonsil. The exact limits of the growth were difficult to define, but I feared that it might implicate the tissue round the internal carotid artery. The glands in the neck were not affected.

The patient was very anxious about the growth, so much so that he had abandoned his work in his mental depression. He readily consented to my proposal to excise the tumour, which I accordingly did on February 1st, 1878, in the Training Home for Nurses.

Anticipating that blood might flow into the trachea during the operation, I began by performing laryngotomy, tying in a cannula into the aperture in the crico-thyroid membrane. This permitted a piece of sponge to be pushed into the upper end of the larynx from the mouth, effectually plugging the larynx. I then cut the cheek open, from the right angle of the mouth to the right angle of the lower jaw, and secured the bleeding points. In the same line of incision, I next divided, with a small saw, the lower jawbone at the angle, and pulled the two rami apart for an inch or more. The right lingual nerve, being thus put on the stretch, was cut across; after which the tumour, which now lay freely exposed, was carefully dissected out. A large vessel at the lower end of the growth bled freely, but was at once secured. The raw surface was then mopped with solution of chloride of zinc, the sponge-plug was removed from the larynx, and the two rami of the jaw were brought together by two silver-wire sutures, placed in holes drilled in the bone for the purpose. The cheek was closely sewn up, then the tube was withdrawn from the aperture in the crico-thyroid membrane, and, lastly, about one-half of the incision over the larynx was sewn together, the other half being left open to allow the air to escape and to obviate emphysema.

On the morning after the operation, when the risk of vomiting was past, a wire-gauze splint was fitted round the chin and lower part of both cheeks, and fastened with tapes, which were tied over the head and behind the neck. This splint was made of wire-gauze (seventeen to the inch), moulded to the shape of the parts. The edges of the splint were made rounded and smooth by simply folding the wire-gauze on itself at the margin with a pair of forceps, any rough points being further masked by a drop of melted gutta-percha applied to them. No other dressing was used, the wire-gauze being smooth and soft enough not to irritate the skin, while it allowed of free ventilation of the surface, and was easily washed and cleaned by the nurse. Recovery took place rapidly. The temperature rose to 100.4 deg. on the second and third days, and after that time fell to and remained at the normal limit. For three weeks or so, the patient was fed with a feeding-bottle and thin oesophageal tube, in order to avoid unnecessary movement of the jaw. On March 16th, he went home, able to eat soft food, but still wearing the splint on the lower jaw.* A week later, he discarded the splint and returned to his work. The jaw is now (July) quite firm, and mastication and swallowing are perfect and painless.

The cicatrix can be completely covered by the beard, and even in its present uncovered state it is not conspicuous. There is no sign of the reappearance of the growth (which proved to be a round-celled sarcoma) in the fauces. The uvula is, of course, drawn to the right side by the contraction of the internal scar. The incision in the cheek ran nearly

parallel to the lower branches of the facial nerve. A twig or two would appear to have been severed; for, just below the right angle of the mouth, a small triangular patch of skin, as large as a sixpence, has lost sensibility. A feeling of occasional itching in this little area is not relieved by rubbing or scratching it. The inferior dental nerve was cut, but seems to have recovered its function, for the sensation in the teeth is perfect. The patient notices, however, that toothache, which used to trouble him in a decayed right lower molar, has now ceased to be felt. The question as to the lingual nerve is interesting. The right half of the tongue is a trifle thinner than the left, and the patient says he feels it a little cold at times; but he declares that the sense of touch in the right half of the tongue is not impaired. The tongue is protruded in the middle line. On testing the tactile sensation with compass points, I find that, while the patient feels distinctly the impact of the points on the right side of the tongue, he cannot distinguish the sepa-

* The wounds in the cheek and neck had healed kindly. One of the stitches in the jaw-bone having become embedded deeply in the granulation-tissue, was left in; and three weeks later (three months after the operation), it was withdrawn through a tiny opening in the skin, which was formed at that time. The wire was quite white and polished, just as it was when put in; but where it was in contact with the bone it was slightly dull on the surface, as if eroded.

rate points so well as on the left side. When salt or sugar is placed on the two sides of the tongue, he observes that the sensation of taste is less acute on the right side. So little, however, is the patient incommoded by these various symptoms, that he denied their existence until minute examination proved them to be present. He has quite recovered his cheerfulness.

The result of the operation has satisfied me that the incision which I have employed is suitable for cases in which it is necessary to obtain free access to the parts at the back of the mouth, whether for ligature of a wounded carotid, or for the removal of a growth in the palate or back part of the upper or lower jaw, or fauces and tongue. The closure of the larynx in the manner described leaves the operator free to work in the enormous gap made by the incision; and hæmorrhage ceases to be so serious a complication as it otherwise is when a growth of any considerable bulk is being excised from the regions referred to.

October 1878. There has been no recurrence of the tumour; the patient is quite well and comfortable, and the scar is entirely concealed by the hair.

THE PURIFICATION OF WATER BY FILTRATION.

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THE subject which I have the honour to bring before you is one of the most interesting, and at the same time the most complex, on which I could address you. It is, indeed, surrounded with difficulties; and I am certain I need offer no apology for submitting for discussion a theme concerning which, I regret to say, there is much ignorance and misapprehension.

In dealing with my subject, my first object is to point out, in as plain language as possible, what is the nature of the substances we have to determine and eliminate if necessary, how this work may be accomplished, and what forces are expended in the process.

As you are all aware, pure water can only be found in the chemist's laboratory; absolutely pure water, containing only oxygen and hydrogen, it is almost impossible to produce. In the ordinary acceptance of the term, pure water does not require filtration; it should be free from suspended matter, and free from colour; water rendered impure by the admixture of fecal matters, or such substances as are known to be positively injurious, should be rejected at once. We need this process only when the water presents impurities the cause of which is suspected, but the consequences of using such uncertain. Now these latter are generally classed under the head of "organic matter"—a most comprehensive term, and which I maintain has been the cause of no small amount of confusion and clashing of opinions. And this brings me back to chemical contagia, a paper on which subject I had the honour of reading before this Association in Manchester last year.

In dealing with the complex quantity "organic matter", we are after all only adopting another phrase for contagium; for, unless this organic matter contains the spore or germ of a specific disease, it is at once conceded that it will not produce it; at least, such is the belief in the germ-theory of disease. It does not appear to me there has been, in connection with this subject, a proper study of the nature of the work a purifier has to perform. In endeavouring to eliminate specific germs, the special conditions under which they are produced must be considered, and these are evidently due to the intervention of something differing from those forces which we handle in our laboratories, as chemists. The chemical manifestations of the vital force in cellular organisms is lost sight of, and we appear to forget that many important conditions are developed by this vital force alone. It would perhaps be better to say that the change which takes place is due not so much to vital chemical force as to some special catalytic action exercised among the ultimate particles of the products originating in the nutritive processes of the organisms.

In my former paper, in discussing the spore-theory of disease, I endeavoured to show we had at least two things to consider: A. The organisms themselves; and B. The morbid products of their nutritive processes; and more recent observations have led me to think that this latter is by far the greater enemy of the two with which we have to contend. We know, for example, that cane-sugar, before it undergoes alcoholic fermentation, is hydrated, and thus split up, as occurs if acids are added, into two opposite glucoses: the ordinary glucose or grape-sugar, which causes the plane of polarisation to turn to the right, and lævulose or uncrystallisable sugar. This change was at first thought

to be due to the acid, but M. Berthelot showed that the active agent is a soluble, neutral, nitrogenous principle, *excreted* by the ferment, to which we can attribute no organisation, but which is directly derived from a living organism possessing the remarkable power of altering cane-sugar in a few moments, possibly by catalytic action, as no change appears to happen to itself.

We have here, then, two principles; viz., the cell itself, and the excreted product; and to this latter the force is due. Now, without such an exposition, it might be thought the force originally existed in the cell or organism, which would absorb all attention and divert it from the recognition of the ultimate source of disease or contagium, properly so called. The soluble ferments are derived directly from the living organisms in the midst of which they originate, nor can their specific character be transmitted to any artificial organic substance. I quote, as all important, the results of M. Bert's experiments, which prove that the action of chemical agents on soluble ferments is not quite to be compared with that exerted on organic ferments, for compressed oxygen destroys the organic ferments, while soluble ferments are not modified in their activity by it.

Again, every germ immersed in a liquid medium would attract to itself whatever may happen to be held in solution suitable for its nutrition; and this again, in due time, is broken down and cast off as effete matter, in which, after changes may take place. We have, then, in the generic term "organic matter" the following distinct products: A. The spore, or germ, or organism; B. The dissolved organic matter, ready to decompose and eliminate gaseous impurities, forming the pabulum of A; C. The morbid material resulting from its nutrition; D. Further morbid matter, originating probably by catalytic action in C. If, then, C and D are the real morbid matter, may they not be sometimes administered without A? We might then have cases (of enteric fever, say), giving all the symptoms, but without power of transmission; the subjective result to the patient might be the same, but the objective result with reference to other persons would be different. Again, perhaps a severe and a mild case might differ in this way: a severe case has A as well as B and C; in addition to the direct action of B and C, there may be progressive production of fresh B and C by the agency of A; A may also multiply itself, and thus the case would become objectively dangerous. A mild case, again, might suffer only from the direct effects of B or C, but the absence of A would make the manufacture of a further dose impossible, the case would also be objectively harmless from the absence of A. In this way some anomalies may be explained. This theory will account for Arnold Hillier's failure to discover any organisms and to attribute to chemical results changes which up to the present were only produced by living organisms. Arnold Hillier, it will be remembered, has recently extracted an albuminous body from putrid meat, in which he failed to discover any germ, but after the ordinary period of incubation, the rabbit into whose veins he had injected the extract died of intense blood-poisoning. At the same time, it must not be forgotten that the highest power of the microscope would fail to detect the gonidia of even the smaller algæ should their refractive index only equal that of water.

But organic matter is not confined exclusively to the animal world; we have vegetable organisms also to deal with. As a fact, no natural water—whether lake or river—is free from vegetable growth; microscopic examination reveals to us animal and vegetable life in abundance—rotifera and infusoria, oscillatoriaceæ and desmidiaceæ, the amber-tinted diatomaceæ, and mineral matters of various hue. Nor is it desirable that water should be altogether bereft of life. Some of the most impure waters I have ever analysed showed no trace of animal or vegetable life. It would seem as if the impurities were fatal, even to vegetable existence. Algæ alive and fresh, exhibiting a rich colour, are an evidence, I think, of wholesome water. It is only when these organisms undergo decay, which, as a rule, mostly takes place in the service-pipes in large towns, that it becomes unsuited for use. Light and high temperature appear to be the two great agents necessary for the development and growth of these algæ; and be it remembered, ordinary filtration through sand will not remove the spore or germ of plants; so that, under favourable conditions, filtered water, if kept, may be again liable to vegetable growth.

In the time placed at my disposal, I am unable to do more than briefly consider the organic impurities in water; and as these are by far the most important, I shall discuss filtration solely in reference to them, and dismiss from my paper all effect produced on mineral matters or on metals. These I hope to treat of at some future time. To repeat, organic matter may be suspended or dissolved. Filtration, in its simplest form, is only a mechanical process. It arrests the suspended particles which are in the liquid, and allows this latter to pass through. We have frequent examples of this in the large filter beds constructed by public companies, which are generally made of sand and gravel in