patient as long as the digestive processes continue to be in an unsatisfactory state.

The strong preparations of iron are best taken immediately after a meal. The tartrate and ammonio-citrate, especially when given with an alkali, have always seemed to me to act best when taken about an hour before food. The medium in which the dose of iron is prescribed is not a matter to be neglected. The bitter infusions—and of these the infusion of calumba is to be preferred—are usually ordered, and not only agree well, but no doubt add to the value of the remedy. It is important, however, to insist that the infusion be freshly made, for the concentrated infusions, diluted with water to the required strength, which are often made to do duty for the fresh preparations, are not desirable additions to the mixture. Moreover, they are frequently stale, and on that account not unlikely to upset the stomach. If this happen, the blame is at once referred to the metallic salt, and the patient is said to be “unable to digest iron.” In every case of such assumed incapacity it is well to dispense with the bitter, and order the perchloride drops to be taken well diluted with one of the aerated waters. The kind of water to be used is immaterial, for it is the gaseous constituent of the medium which gives its value to this method of administration. The aerated fluid not only renders the draught more agreeable to the patient, and less unwelcome to the stomach, but seems to invest it with the qualities of a natural ferruginous water so as very appreciably to enhance the efficacy of the remedy. In using this or any of the stronger preparations of iron it is important to insist upon thorough dilution. For an adult the dose should be taken in a full claret glass of soda or seltzer water three times a day immediately after food.

In addition to their tonic influence upon the system generally, certain of the chalybeate salts have special uses in their action upon particular organs. Thus the per-nitrate in small doses (mij to mij of the solution) is of value as a safe and efficient remedy for children in cases of convalescence from prolonged chronic diarrhoea. This ferric nitrate, indeed, seems to have a special invigorating effect upon all the mucous membranes, giving tone to relaxed tissue and reducing secretion. It has been used successfully for this purpose in cases of chronic bronchitis, menorrhagia, and leucorrhoea. For an adult the dose is 10 to 15 minims. It must be well diluted, preferably with one of the aerated waters.

The perchloride has a diuretic action which is taken advantage of in the treatment of albuminuria. It is especially useful towards the end of an attack of acute Bright's disease, when the albumen is slow to disappear from the urine. I prefer the form devised by the late Dr. Basham in which the perchloride drops are given with the acetate of ammonia, and a few drops of dilute acetic acid are added to prevent precipitation of the iron by the alkali. For an adult 20 minims of the perchloride tincture should be added to 1 fluid drachm of the liq. ammoniae acetatis and 10 drops of dilute acetic acid. This can be taken in 1 oz. of water three times a day after food, but I think the value of the draught is increased by a further dilution with double the quantity of an aerated water.

There is a special action of the perchloride which may be mentioned. In cases of erysipelas this preparation used to be regarded as a specific, and very exaggerated estimates of its value have been recorded. For an adult the dose recommended is 15 drops to be taken every two hours, beginning after the action of a brisk aperient. This treatment is no doubt useful in certain cases, but I have not found its beneficial effect to be “immediate and invariable,” as was claimed for it by an ardent advocate; indeed, in cases of infantile erysipelas, for which complaint this observer especially recommended it, the perchloride in the prescribed dose of 2 or 3 minims every two hours has appeared to me to be absolutely useless.

The sulphate of iron is a strong tonic, and in combination with sulphate of magnesia forms one of the stock mixtures in all hospital pharmacopoeias. In this form it is useful in pure anaemias when there is no digestive derangement. I have used the exsiccated sulphate largely in cases of children left weakly and anaemic after acute illness, and have found it well borne in fairly large doses—2, 3, and 5 grains. They take it well in glycerine directly after a meal. In ordering iron it is the usual practice to combine the drug with a sufficient

quantity of aperient. The object of the addition is to counteract any possible constipating effect of the astringent salt; but I think in most cases it is advisable to push the action of the aperient further than this, for there can be no doubt that judicious purgation enhances the value of the remedy. It is also beneficial in preventing retention of the iron and consequent colicky pains. It is wise in all cases during a course of iron to order a liberal dose of any saline aperient to be taken twice a week before breakfast. If this practice be followed, it will not be necessary to discontinue the use of iron for some days every few weeks, as used to be recommended.

The chalybeate salts, when given with judgement, are remedies which we could ill spare, but the indiscriminate use of these preparations is to be deprecated. Iron must not be regarded as an infallible specific in every form of anaemia. The cases for which it is curative must be chosen with judgement, and every care must be taken to see that the digestion is in a condition to profit by the remedy. Any sign of irritability of stomach is to be taken as an indication that the stronger preparations are to be avoided, and even the milder salts—the tartrate and the ammonio-citrate—should be prescribed timidly, and only in conjunction with an alkali, such as citrate of potash or the aromatic spirits of ammonia, in a freshly-made bitter infusion. If the tongue be clean, or merely flabby and pale, showing indentations of the teeth at the sides, the stronger salts may be prescribed with confidence, and the dose may often be pushed with advantage if aperients are given from time to time as already recommended.

ON THE ANALOGY BETWEEN SPONTANEOUS RECOVERIES FROM CANCER AND THE SPECIFIC IMMUNITY INDUCED BY X RAY IRRADIATIONS OF THE LYMPHATIC GLANDS INVOLVED.*

By H. D. McCULLOCH, M.B., C.M. GLASG.

To the *Lancet* of January 26th, 1907, I contributed an article entitled, “Observations on the Induction of Auto-vaccination in Tuberculosis and other Chronic Glandular Infections by the X Rays as Revealed by the Opsonic Chart in the Former.” Since then I have had opportunities of continuing these observations and of confirming the opinions submitted in that article in regard to tuberculosis and its secondary infections. Moreover, I have applied the same method of treatment to the lymphatic glands which are involved in cancer and its secondary infections, but in these cases it was not possible to control the glandular irradiations by estimations of the opsonic index to the primary infection, as the micro-organism of cancer, if such there be, is not culturable.

The clinical symptoms of these cases were, however, sufficiently marked and progressive to be depended upon. It should be noted that the glands in these cases, which are usually remote from the site of the lesion, were alone exclusively irradiated, the rest of the body, including the lesion, being effectually screened from the influence of the rays.

By the kind permission of Mr. Neill MacGillycuddy, whose patients they were, I am able to submit the following details of four cases, the first of which was treated by me in the autumn of last year.

I.

The patient, aged 48 years, is a medical man actively engaged in private practice. He is married, and has a grown-up family. His general health is good, and he is of abstemious habits. He traced his throat trouble to an attack of influenza, which manifested itself by a profuse naso-pharyngeal catarrh in the winter of 1906-7, when he was obliged to take to his bed for a few days. He made a good recovery, and has been engaged continuously in a busy practice. He is a free, though not excessive, smoker.

At the end of the summer, 1907, he went away for a six weeks' holiday, when he motored about a good deal. During this period he felt an uneasiness in his throat, some pain in swallowing, fatigue of the vocal muscles in prolonged conversation, and an inability to phonate certain high notes. He is not a vocalist. There was also a constant “taste of blood” in the

* Read at the spring meeting of the Dorset and West Hants Branch.

mouth, and a peculiar persistent fetor. His gums were sound, as well as his teeth, and there was no evidence of gastric trouble. Late in October he consulted Mr. MacGillycuddy, who devotes himself specially to throat work, and who has a wide experience in this class of cases.

On laryngoscopic examination a deep wound or ulcer, with infiltrated, raised, and inverted edges, was seen to occupy a longitudinal position, about midway between the right arytenoid cartilage and its epiglottic base. It was quadrilateral, and in approximate dimensions, $\frac{3}{4}$ by $\frac{1}{2}$ in., and $\frac{1}{2}$ in. in depth.

The floor of the ulcer was a dark dull red, and there was absence of secretion or discharge from it.

The mucous membrane in the immediate vicinity was dry-looking, and the veins underlying it were turgid, though there was no inflammatory redness of the mucous membrane itself. A painful spot was found externally, corresponding to the site of the lesion, also two tender and enlarged lymphatic glands, one submental and the other below the thyroid—both on the right side.

There was no evidence of tuberculosis, syphilis, sepsis, or anaemia, and, bearing in mind the recent opinions of Sir Felix Semon and Dr. Jobson Horne, published in the *Journal of Laryngology*, November, 1907, we came to the conclusion that the case was one of early epithelioma.

In order to confirm this diagnosis a particle of the growth was required for microscopic examination. But this was refused. Although he is known to be a practitioner of more than average intelligence, he further scouted the idea of surgical interference of any kind.

As a *dernier ressort*, Mr. MacGillycuddy asked me whether I cared to examine and deal with the case by my method of lymphatic glandular irradiations, as the patient, though sceptical, had no objection to it. To this I gladly consented, and the method was adopted, with the following results:

A Crookes tube was used, enclosed in a Belot's shield, with a localizer, exposing an area of a sixpenny-piece over the enlarged gland.

The dose was 5 H units for fifteen minutes to each gland alternately every fourth day.

After the third irradiation—that is, on the thirteenth day—a laryngoscopic examination of the lesion was again made. It was found not merely to have been arrested, but healing was well advanced. What remained of the growth was part of the inner longitudinal margin. This was represented by two minute pustules adjoining one another, like those seen in varicella. The adjacent mucous membrane was more moist-looking.

The laryngoscopic examination after the sixth irradiation showed no trace of the growth or pustules, but an area of about 1 in. square, corresponding to the site of the lesion, was denuded of epithelium, though bathed in moist secretion. As this symptom was accompanied by a general sense of soreness in the fauces just previous to irradiation I was somewhat disappointed. I had endeavoured to restrict smoking, but found this restriction had not been observed. I now suggested the necessity of stimulating leucocytosis by resorting to the orthocoumarate of sodium; but before this preparation could be obtained the desired result was attained by a steady continuance of the irradiations.

Laryngoscopic examination after the eighth irradiation showed the epithelium to be completely restored and the secretion of mucus to be normal in quality and quantity. The subsidence of the other persistent symptoms took place in the following order:

Local anaesthesia, which was likened by the patient to an application of cocaine, during each radiation, and this relief was maintained for four days after irradiation without producing any by-effects. The foul odour and taste of blood disappeared on the third day after the first irradiation.

There was no pain in swallowing after the second irradiation. There was no fatigue of the vocal muscles after the fourth irradiation. The return of mucous secretion after the eighth irradiation was remarked by the patient as removing all sense of discomfort. He now found, for the first time after some months, that he could phonate high notes with ease. Two or three subsequent irradiations at longer intervals (a fortnight) were, however, applied to remove all remaining tenderness in the glands till they ceased to be palpable. Seven months have elapsed without any sign of recrudescence. He can sing and uses his voice with perfect freedom.

Having regard to the fact that no microscopic examination of the growth had been made, and that the ravages of the disease were extremely limited and circumscribed, we were not quite satisfied with our proofs, such as they were, till three more advanced cases of laryngeal cancer came to be treated by precisely the same method. These were dealt with by Mr. MacGillycuddy himself, and I am indebted to him for the following report:

II.

A. B., a male aged 74 years, is a moderate smoker, temperate habits. Has suffered much from articular rheumatism and gout, but has led an active, successful business life. First seen in December, 1907, for difficulty of swallowing and change of voice, which had gradually grown hoarse. On examination, a large growth was seen, apparently springing from the aryteno-epiglottic fold on the left side and obscuring the left vocal cord; it extended halfway across the larynx. There was some diffi-

culty in swallowing and pronounced fetor of breath. The voice was hoarse and nasal in quality. Occasional hæmorrhage of a bright colour was said to follow upon coughing. Paresis of left side of the soft palate, constant cough and glairy mucus, which when first seen was most offensive. All evidence of syphilis, tuberculosis, or primary sepsis was negative. The sputum was examined for tubercle bacilli, with negative results. An enlarged submental lymphatic gland, the size of a walnut, was very tender, which on being touched provoked a paroxysm of coughing. In view of the extensive nature of the growth and the advanced age of the patient, the case was considered inoperable, and x-ray irradiations of the lymphatic gland was suggested as the remedy. Irradiations over the affected gland were applied on fourteen occasions, for fifteen minutes' duration each time, at 1 milliamperé. The patient was also given 20 grains of the cinamate of sodium and 10 grains of the orthocoumarate of sodium daily, with a view to stimulating leucopoiesis. The results were that the fetor entirely disappeared and the enlarged gland decreased. The cough formerly evoked by touching the gland disappeared, though that produced by the act of swallowing has continued. Swallowing has grown slightly worse for solids, but he can take fluids easily. This latter symptom has followed upon an intercurrent attack of influenza, from which apparently he made a good recovery. The paresis of the soft palate is hardly noticeable, but the tongue has become slightly affected on the left side, and looks puckered. It is protruded with some difficulty. The larynx is much improved, the growth on the left side has shrunk, and the interior of the larynx can now be viewed. There is still considerable infiltration of the aryteno-epiglottic fold, and the ventricular band and cord cannot be differentiated. Cough is much less, and there is a remarkable improvement in his general health.

An oesophageal tube has not been passed, for the reason that little good could be achieved by the procedure, and the idea has been to conserve the patient from all possible worry as to his condition; also to give as fair a chance as possible to the new plan of treatment by glandular irradiation, with the object of setting free antibodies from the lymph system. There was no chance of confirming the diagnosis by the microscope, for the same reason as in the first case. But the clinical features in this, as in the former case, are so very marked that there can be little doubt that it was a case of malignant disease.

The arrest of the oesophageal obstruction and paralysis, which was advancing so rapidly when this patient was first seen, nearly seven months ago, was such, that in consultation with his medical attendant, he was only given six weeks' time before it would be necessary to consider the advisability of a gastrostomy, or to let him die.

III.

A. C., a clergyman, aged 64 years, is a heavy smoker. Has had a delicate throat for some years, and four years ago was treated for pachydermia laryngis, which subsided in some two months, under iodides and partial rest.

In September last, he returned with very much the same condition, and a complaint that his voice gave out suddenly when preaching. On these occasions his voice went off into a high falsetto note, which he had no power to control. The iodides were repeated, and he was requested to come up for examination six weeks later. On this examination there was little if any improvement, and his condition was doubtful. On seeing him some weeks later it was found that he had developed a distinct minute sessile papilloma, on the middle third of his left vocal cord. It was impossible from its small size and position to obtain a portion for microscopical examination, so after watching him for a week or so, it was decided that the case was one of epithelioma. This opinion was confirmed on consultation. But as an operation was very strongly objected to, he was put upon similar treatment to the former patient. The physical condition at this time, December, 1907, was as follows: A minute sessile tumour, in middle third of left cord. Infiltration and thickening of ventricular band, decreased mobility of left cord. The entire area of the left side of the larynx was a bright red, voice harsh, and changed in quality, no difficulty in swallowing, no detectable lymphatic glands.

The irradiations were applied to the region of the anterior cervical glands for fifteen minutes—at 1 milliamperé on twelve occasions. The cinamate and orthocoumarate of sodium in fifteen-grain doses daily were given. Six weeks after commencing the treatment he presents the following condition: All pain is absent, his voice is improved in quality, and does not break or trouble him during his duties. The tumour on the cord has changed its position somewhat, and has advanced nearer to the free border of the cord, which is thickened, but it is more movable, and the turgescence of the ventricular band is less.

The patient feels much improved, and expressed a feeling of general well-being, and he is beginning to kick against further treatment. Though the disease is arrested, or seems to be so, in this case it has not improved with any approach to the rapidity and satisfaction

of the two former cases. He is now, five months* since beginning of treatment, practically quite well. The right cord is free from growth and is mobile, with no turgescence of the ventricular band.

IV.

A. D. The patient is a marine consulting engineer, aged 64 years. He is a smoker but is temperate in his habits. This case is interesting, and worth including with the above, as it also was a direct sequel to influenza, and had been regarded for some weeks as a simple adenitis.

The case is therefore a very recent one, and has only had a few irradiations. Up to five months ago—that is, the beginning of January last—he was quite well, and in his usual good health when he contracted influenza. From this he recovered, but in a fortnight had a relapse after undue exposure. Immediately following, and practically coterminous with it, he had some enlargement of the anterior cervical glands of the left side of the neck, which has continued to the present time. There is a little discomfort in swallowing, and the voice is a little changed in character, but neither of these symptoms amounted to very much. His physical condition on March 17th was as follows:—On the left side of the larynx, springing from the aryteno-epiglottic fold, and including the arytenoid cartilage, was a medium-sized, mulberry-like growth. This occupied the whole side of the larynx between the arytenoid and epiglottis. There was no fetor of breath, hæmorrhage, or discharge. The left vocal cord could not be seen. The expectoration was examined for tubercle bacilli, with negative results. The glands were tender and rather hard, but not at all stony.

Precisely the same treatment was adopted as in the former cases, but so far he has only had a few irradiations, with the following results:

Condition of Larynx.—The mulberry-like growth has entirely disappeared, bringing into view the cord on the left side. There is, however, some infiltration, extending from the arytenoid cartilage, along the aryteno-epiglottic fold, for three parts of its way upwards, assuming the appearance of an oval swelling. There is some pain in swallowing for the first time, and previous to the irradiation pain was experienced, radiating from the region of the epiglottis to the mastoid, in the course of the great occipital nerve. The patient expressed a sense of general well-being, and to all appearance was soon much improved. Three weeks ago there was no pain in swallowing; a small ulcer was seen behind the right arytenoid eminence, slight secretion and no fetor, with signs of retrogression of the lesion.

Apropos of the above method, the following abstract from the *Epitome of Current Medical Literature in the BRITISH MEDICAL JOURNAL*, February 16th, 1907, paragraph 89, is interesting:

The x-ray Treatment of Syphilitic Adenitis.—M. Nencioni and A. Paoli (*Lo Sperimentale*, 1906, lx, 882) have treated 37 cases of glandular enlargement due to Hunterian chancre with the x rays. The subacute cases (14) recovered a little faster, and had less pain than similar cases not treated by the x rays. The chronic cases (16) obtained great benefit from the treatment; they were relieved of all pain, the glands diminished rapidly in size, and the glands which had been opened by the surgeon healed up with great speed. The acute cases (7) also benefited considerably by the x-ray treatment. The authors conclude that the treatment is of considerable value, and in particular accelerates the healing of indolent wounds and ulcers.

Drs. Lawrence and Crane of the United States have recently published independent articles on x-ray irradiations controlled by opsonic estimations which lend support to my views on this subject.

In the *BRITISH MEDICAL JOURNAL* of July 20th, 1907, a suggestive article is to be found, entitled "A Case that seems to Suggest a Clue to the Possible Solution of the Cancer Problem." In this, as well as in several cases recorded in England, in Europe, and in America of spontaneous recoveries from cancer in man, one conspicuous feature that seems not to have been sufficiently appreciated has been the invariable extensive lymphatic glandular involvement—a fact, indeed, which has led to the decision that the cases were inoperable. Such was the condition in the case I have just referred to, and although at this stage x-ray treatment seems to have been ultimately employed, the irradiations were seemingly directed to the lesion in the breast, and not to the glands in the axilla or those in the pulmonary region. After her return home in a moribund condition she had an attack of pleurisy with extensive effusion, following upon which there was a period of enforced starvation. Consequently a resolution of the neoplastic encapsulating tissues enveloping the glands took place. It is well known that during hibernation in animals and in starvation those tissues which are of rudimentary

* The period of freedom from recurrence is now, one year in the first case, ten months in the third, and nine months in the second and fourth cases.

organization are first drawn upon for the needs of the organism.

Fasting for from two to three weeks is commonly enforced by the Arabian Hakims, who practise the old Greek or Yunani system of medicine at the present day, and, like venesection of old, it doubtless has its advantages when judiciously applied.

We know that the iodides produce a resolution of such tissues and the therapeutic action of the x rays is very similar, but with this difference, that in the case of the former, months of medication are necessary, and in the latter it is a matter of hours, judiciously extended over a few weeks.

Trypsin, amylase, and papain are proteolytic enzymes and act similarly as solvents. The antigens elaborated within the deep lymphatic and lymphoid structures, being of a colloid nature, cannot be diffused, until the impervious encapsulating tissues are opportunely resolved.

In the light of recent clinical knowledge it seems to me that the time has now come when, in the diseases which involve the production of an immunizing agent, we may safely adopt as a working hypothesis that of the implication in these tissues of a microbic causation.

It is highly probable that in the great majority of such diseases the lymphatic involvement is, in its early stages, physiological and not pathological, therefore not manifested to our senses either subjectively or objectively. A microbic attack necessarily involves the initiation of the formative process of an immunizing agent, this process being completely carried out in those cases in which a certain adequate dose of the infection is successfully repelled.

Hitherto, lymphatic glandular involvement in the infectious processes in the animal body has been looked upon most unfavourably both by the physician and the surgeon, as "a spreading of the disease into the most vulnerable parts of the system," and not as an *extended response of the body in the mechanism of bodily defence*.

These glands which are usually conspicuous in the neck and armpits are therefore cut out as completely as possible; it is said, "to prevent further spread," or "recurrence" of the malady. It should, however, be noted that there is this serious inconsistency in what has been called the "radical operation" in cancer, that these glands are usually left undisturbed, when they are not easily accessible to the fingers, as in operations for cancer in the abdominal organs. The fact that these glands have been estimated to number from 800 to 900 in the human subject, and that they exist for the purposes of a most important function, seems to have been entirely overlooked.

Professor Goldmann, in a paper read before the Royal Society of Medicine in November last, stated that the results obtained by the German surgeons who now operated in cancer without extirpating the involved lymphatic glands were no worse than those obtained by other German surgeons who insisted on their complete removal; . . . and thereby hangs a tale.

THE FUTURE OF THE AILING POOR-LAW CHILD.

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DURING the past decade real progress has been made in the treatment of two classes of Poor-law children—first, the normal and healthy children; and, secondly, the children who are acutely ill. But there is a third class which, on account of various administrative difficulties, has not obtained the treatment which is urgently needed for it. This class is made up of children who are weak and ailing, who are neither in a fit state of health to be classed for treatment with the normal child, nor ill enough to require the constant medical attention needed for the acutely ill.

The advance which has been made in dealing with the healthy child is one of the brightest features in the progress of Poor-law administration. The number of such children remaining in the unsuitable environment of the workhouse is gradually decreasing, the horrible barrack-