disease "affects those who are of virile age, or, what oftener happens, those who are older and have been too much given to spirituous liquors, especially to brandy." The evil effect of alcohol is sometimes seen in persons who cannot be justly called intemperate, and a marked diminution of the tendency to bronchitis will sometimes occur in patients who become total abstainers after having been in the habit of drinking not more than a usual quantity of wine. The swollen, deeply red, and irritated soft palate of many hard drinkers probably affords a clue to the nature of alcoholic bronchitis.

Post-mortem examination of the bodies of persons past middle life reveals the fact that their chronic bronchitis is seldom unassociated with chronic nephritis, arterio-capillary sclerosis, chronic endocarditis or pericarditis or myocarditis, and atheroma of the aorta, not to speak of pulmonary emphysema—lesions which constitute an important part of the condition which we designate "old age."

That a tendency to chronic bronchitis and a tendency to gout concur in many patients is a frequent experience, and there can be no objection to our expressing this fact by calling the bronchitis gouty, provided the evidence of gout be sufficient. But I fear that gouty bronchitis is often talked about when the evidence of gout is small. Before the term "gouty" is predicated of any disease the reasons for the affirmation ought to be carefully examined. To define the word "gout" is not possible; the essential nature of gout we do not know. Doubtless there are satisfactory criteria or notes of gout, such as regular attacks in the hand or foot, tophi, and the discovery of uric acid in the blood. But medical men are often content with much lower probability than this when they pronounce a patient to be gouty, and I am far from saying that they are wrong. Howbeit the name of "gout" has been extended in meaning so as to include a vast number of diseases, but whether these speculations are as sound as they are ingenious, whether they are solid structures grounded on truth or no more than the phantoms of a lively imagination, I will not take upon myself to determine. Time will show. "*Medicina non ingenii humani partus est sed temporis filia.*"

PTHINOID BRONCHITIS.

There is a form of chronic bronchitis which bears a close resemblance to tuberculous pulmonary consumption; the disease is nothing but bronchitis, yet the symptoms are those of phthisis pulmonalis. The interest of this topic is mainly antiquarian for us, because it throws an important light upon the progress of pathology. Before the invention of auscultation the patients alluded to were necessarily believed to be suffering from pulmonary consumption, and, indeed, they were so suffering in the original sense of the phrase. For the epithet, "consumption" or "phthisis," related to the condition of the whole body, to the progressive emaciation in fact, while the word "pulmonary" indicated that the disease, whatever it was, which caused the emaciation, was seated in the lungs. This was the sense in which our eminent Fellow, Richard Morton, used the phrase in his admirable book entitled *Phthisiologia*. In the pthinoïd or consumptive form of bronchitis there is an abundant expectoration of purulent sputa. The early physicians knew of no source of pus but an ulcer, and hence they inferred that the lungs were ulcerated. The first man to discover that this was not the case was that singularly accurate observer Antony de Haen; but even after he had shown that the lungs, examined *post mortem*, were to all appearance sound, free from all ulceration, and yielding not a drop of pus on section, yet matters were not much advanced for practical medicine because the diagnosis could not be made during life. And here the subject stood until the time of Laennec. Perhaps you remember that Sir Thomas Watson confessed in his lectures that he once made this mistake, and pronounced a young woman to be in the last stage of consumption who soon afterwards made a rapid and complete recovery, he having omitted to auscultate her chest. Even auscultation does not always enable us to distinguish these cases with perfect certainty, but since Robert Koch's discovery of the tubercle bacillus we have a potent auxiliary to diagnosis in the microscopic examination of the sputa.

CONCLUSION.

In conclusion, we will revert to the results of our search into the causes of bronchitis. We found it to be highly

probable that most catarrhs are due to a specific infection, and they often depend upon contagion spreading from man to man. This doctrine has very important bearings upon medical practice. It leads us to believe that the means by which we may prevent catarrh are to be found in ventilation and cleanliness, if, indeed, ventilation be not a kind of cleanliness. Experience confirms this belief. When epidemic catarrh prevails, where do we find most of our patients? In those houses which are obviously the worst ventilated, even though they be the spacious houses of the rich. And where do our patients catch their catarrh? Either in houses of the kind which I have mentioned or in buildings where men most do congregate, especially in offices, shops, and churches. Large shops and stores, public museums and libraries, are ventilated as little as possible for fear of their contents being spoilt by smoke and dust. Many churches both in town and country are never properly aired for another reason—namely, because their architecture does not admit of it. Those "rich windows which exclude the light" do worse than this—they exclude fresh air. The revival of Gothic architecture has been, from the sanitary point of view, a great mistake. Our despised forefathers of the eighteenth century erected plain and simple buildings which could at least be well aired, well lighted, and kept warm and comfortable; nay, even the much-ridiculed churchwarden, with his brush and pail of white-wash, was a praiseworthy minister of health. Modern dwellings are no better than the churches. In the matter of domestic sanitation people have fixed their attention too exclusively upon the drainage and the water supply; light and air are not reckoned. Many of the large red-brick houses which have been built in great numbers at the West End of London and elsewhere during the last twenty-five years cannot be properly ventilated. The well of the staircase ought in every house to be a reservoir of pure air, and to have an independent supply from without. But in many houses the staircase cannot be ventilated except through the rooms, and, in fact, it never is ventilated. Nor are the rooms themselves much better off; their heavily mullioned windows are designed with small regard to the transmission of light and air. The subsidiary and merely ornamental arts, which do no more than please the eye, are studied to the neglect of that far greater art which promotes the happiness and welfare of the whole man—the art of preserving health.

THE GOULSTONIAN LECTURES

ON THE

PATHOLOGY OF THE THYROID GLAND.*

Delivered before the Royal College of Physicians of London.

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LECTURE II.

[ABSTRACT.]

RESULTS OF LOSS OF THYROID SECRETION IN THE YOUNG. In commencing his second lecture Dr. Murray referred to the effects the result of loss of thyroid secretion in the young, and quoted evidence to show that in young animals and children, in addition to other symptoms, there was arrest of development. If the arrest of development or destructive disease of the thyroid occurred early in life, symptoms of primary cretinism, which are the same in the sporadic as in the endemic form, soon began to appear.

As in myxœdema in the adult so in cretinism were found different degrees of severity. As the success of treatment depended so much upon an early start being made with it, he urged the importance of carefully considering the possibility of cretinism in all cases where some arrest of development was noticed early in life, they find various intermediate types between the extreme form of which he had given an example and ordinary myxœdema dependent upon the age at which

* The expenses of this research have been partly defrayed by a grant from the Scientific Grants Committee of the British Medical Association.

the disease first commenced. The older the child at the time of the onset the less marked the want of development, and the more nearly the disease resembles the adult type.

RENEWAL OF THYROID SECRETION.

Dr. Murray then stated that when the supply of the secretion was renewed, metabolism was once more completed in a normal manner, and in cretins was so markedly reawakened that general growth again progressed even after it had been arrested for ten or twenty years. Schiff and Von Eiselsberg had shown that a portion of thyroid gland successfully transplanted into the subcutaneous tissues of a dog or cat could maintain a sufficient supply of secretion to avert the acute symptoms of athyroidism, and Mr. Victor Horsley made a great step in advance when he suggested that a similar procedure should be adopted in man. The procedure had been followed in certain cases by marked improvement, but unfortunately the grafted gland appeared not to be able to maintain an independent existence for long, and the symptoms returned. The excellence of the temporary results obtained, however, had led Dr. Murray to suggest that a simpler method of maintaining the necessary supply of thyroid secretion would be the continued internal administration of the secretion itself. With this view he had prepared a glycerine extract, and such an extract was now official in the *British Pharmacopœia*. At first he had administered the extract by hypodermic injection, but it was shown independently by Howitz, E. L. Fox, and Mackenzie that it was quite efficient when given by the mouth. The administration of thyroid extracts in animals deprived of their thyroid glands rendered it possible to distinguish between the symptoms due to loss of the parathyroid to those due to the loss of the thyroid. It seemed probable that the acute nervous symptoms in the monkey, such as the fibrillary twitchings, the spastic rigidity, and perhaps also the tremors and convulsions were largely due to loss of the parathyroid, while the subcutaneous swelling, dryness of skin, loss of hair, subnormal temperature, and changes in the blood were due to loss of the thyroid secretion. That conclusion received further support from the close resemblance of the latter symptoms to those of primary myxœdema in man, which they knew to be the result of disease of the thyroid gland, there being no evidence as yet to show that the parathyroids were affected in this disease. If that be the correct explanation, it was not surprising that these particular symptoms were not influenced by the thyroid extract.

TREATMENT OF MYXŒDEMA BY THYROID EXTRACT.

In primary and secondary myxœdema in man were seen the results of loss of thyroid secretion pure and simple, and consequently they were able to remove the symptoms entirely by giving a sufficient supply of the secretion.

The main objects of the treatment were to remove the symptoms by restoring normal metabolism as rapidly as possible without risk to the patient, and when that had been accomplished so to regulate the treatment as to continue the supply of thyroid secretion in sufficient quantity to maintain the normal rate of metabolism of the tissues generally. For that purpose the treatment was divided into two stages. During the first stage the tissues were gradually brought back to a normal condition. That might, according to the severity of the symptoms, require from one to three months. As soon as the symptoms had entirely disappeared, the first stage was completed. The condition of the atrophied thyroid gland was not influenced by the treatment, so that if the artificial supply of secretion was discontinued at that or any other time of the patient's life, all the symptoms of myxœdema would gradually return, as he had found by actual experience. Thus the second stage of the treatment of necessity lasts as long as the patient lives. It is therefore necessary to make the permanent daily dose as nearly as possible equivalent to the normal amount of secretion. If the dose fell below that, slight symptoms of myxœdema would reappear, and if it was excessive a condition of thyrotoxicity would be produced.

PREPARATIONS OF THYROID EXTRACTS.

Dr. Murray observed that in out-of-the-way places, and where expense was a consideration, the actual gland itself containing the secretion might be administered. One-eighth to one quarter of a lobe of the sheep's gland was a suitable

daily dose, one quarter being equivalent to about 10 minims of liquor thyroidei; it should be minced. It may be taken in glycerine or some other similar vehicle, and may be lightly cooked on the outside by frying or boiling. As a rule, however, it was better to employ one of the preparations of the thyroid gland. The liquor thyroidei was the most convenient preparation for general use, and in his experience the most efficient and uniform in strength. Not more than a sufficient supply for a fortnight should be obtained at one time, and the patient should measure out the dose and mix with a dessert-spoonful of water at the time of taking. The dry thyroid of the *Pharmacopœia* might be given as a powder, or made up into a pill or tablet. If the dried preparation became damp at all, it was liable to decompose and become unfit for use.

METHOD OF TREATMENT.

In advanced cases the first stage of the treatment must be carried out with great caution, especially if any symptoms of degeneration of the cardiac muscle, such as attacks of syncope, dyspnoea on exertion, feeble or irregular pulse, or weak heart-sounds were present. Under these circumstances the patient should be confined to bed at first, and only small doses of three to five minims of liquor thyroidei given each night. This dose, if well borne, might be gradually increased up to ten minims. If not confined to bed these patients are apt to make use of their returning vigour too soon, before the heart has had time to recover, and to adapt itself to the altered conditions brought about by the treatment.

At the present day, however, the greater number which require treatment were seen in the early stages before any cardiac symptoms developed. Such patients were able to go about, but unusual exertion should be avoided during the first stage of the treatment. The daily dose of ten minims of the extract might be given nightly, and increased at the end of a fortnight to fifteen minims if decided improvement had not already taken place. Undue acceleration of the pulse to 90 or 100, or rapid loss of weight were indications for reducing the dose.

Symptoms of gastro-intestinal catarrh were sometimes seen when a raw gland was used, but were seldom observed after a suitable preparation. When they arose the treatment should be stopped until they had passed away, and when the treatment was recommenced smaller doses should be given. When there was well-marked anæmia it was as well to give iron as well as thyroid extract, and for this purpose five grains of dried sulphate of iron in a pill two or three times daily were suitable.

The second stage of treatment began after all the symptoms of myxœdema had disappeared. During this stage, which lasted whilst the patient lived, he must continue to take a daily dose equivalent to the daily output of the gland before it became diseased. An occasional intermission of a week or so had little or no effect, but if it lasted three or four weeks the temperature fell one or two degrees, and the myxœdematous swelling of the face began again to develop. The most suitable dose during the second stage was, generally speaking, ten minims of the extract once a day, but if slight symptoms reappeared the permanent dose should be increased to twelve or fifteen minims. Though this had not been necessary in any of his own cases, in a few cases that dose had produced acceleration of the pulse, and the permanent dose had to be fixed at five or seven minims a day. In doubtful cases a dose of ten minims of thyroid extract should be given daily for three or four weeks, and if the symptoms steadily diminished it might be assumed that they were the result of thyroïdal disease.

RESULTS OF THE TREATMENT OF MYXŒDEMA.

When the treatment of a well-marked case of myxœdema was carried out on the lines just indicated, very definite and interesting results were soon obtained. One of the earliest signs of improvement was in the return of the temperature to the normal level. This was illustrated by the chart shown, by which it would be seen that the temperature before treatment ranged from 95° to 96° F., whereas during the second, third, and fourth weeks of treatment it varied between 96° and 98°. As the temperature rises to normal the former sensitiveness to cold was lost, and the frequency of the pulse was increased. The most striking changes were those which took

place in the skin with its appendages and in the subcutaneous tissues. The myxœdematous swelling gradually disappeared from all parts of the body, so that the face and hands once more assumed their natural appearance, and the free movement of the limbs, which had been considerably hampered by the swelling, was regained. The reduction of the swelling was accompanied by a loss of weight, which might amount to as much as two or even four stones. The skin, which, as a result of the removal of the swelling, may for a time remain loose and wrinkled, became warm and moist owing to a renewal of the secretory activity of the sebaceous and sweat glands. Not infrequently there was some desquamation which might occur in fine scales or in large flakes from the palms of the hands and soles of the feet, as observed by Byrom Bramwell.¹ The hair follicles resumed their proper function, so that even where there had been complete baldness a good growth of hair was developed in the course of six or twelve months. Considerable changes are thus produced in the appearance of the patient.

In addition to these very obvious signs of improvement, the feeling of lassitude passed away and normal muscular strength and activity were regained. As a result of this, those who before treatment could barely walk a mile were enabled to walk long distances, climb mountains, and undertake various other forms of exercise. Mental processes became more active, the memory improved, and the hallucinations disappeared. In some cases in which actual insanity had occurred it also had been cured. If albuminuria without actual renal disease had been present it disappeared, while the amount of urine was increased. The observations of Ord and White² showed that the total amount of nitrogen eliminated was increased, and that the increase was almost entirely due to the increase of urea in the urine. At first the amount of urea excreted might not only equal but actually exceed the normal average quantity. The number of red corpuscles in the blood was increased. In patients who had not reached the menopause menstruation returned, and took place regularly, even where there had been amenorrhœa for several years. In fact, the myxœdema was entirely cured, though the fibrosis of the thyroid gland remained unaffected by the treatment.

TREATMENT OF CRETINISM.

Dr. Murray dwelt on the importance of carefully considering the possibility of the presence of disease or lack of development of the thyroid gland in every case of arrest or delay of development in children. In all such cases it was important to look for slight signs of cretinism. The importance of early diagnosis in such cases lay in the fact that the earlier the treatment was commenced the better prospect there was of normal development of the central nervous system. Experience had already shown that in cretinism of some years' duration rapid as the improvement in the physical condition may be, the intellectual development was much slower, so that when treatment was commenced late it was doubtful if the latter would ever advance nearly as far as when treatment was started early. If any doubt existed as to the diagnosis, it was a good plan to carry out the treatment for one or even two months. If no distinct improvement took place the want of development was not due to cretinism, for in other forms of arrested growth the treatment had comparatively little effect, though it is worthy of trial. The treatment of early cretinism should be carried out on the same lines as the treatment of myxœdema in the adult.

In the treatment of cretinism which had lasted for some years they had a much more difficult task to perform, but very good results could be obtained. Even where the disease had already lasted ten or twelve years, provided the patient was not more than 18 or 20 years old, a remarkable amount of growth could still take place. In those cases 3 to 5 minims of thyroid extract might be given at the commencement, and increased according to the progress observed. Even in cases in which the symptoms had lasted for twenty or twenty-five years some growth and marked improvement in all the symptoms took place. In cases of long duration attacks of syncope were not uncommon. In such the earlier part of the treatment was more safely accomplished by keeping the patient in bed, and giving small doses of 1 or 2 minims only at first.

RESULTS OF THE TREATMENT OF CRETINISM.

When the necessary stimulus to the normal metabolism of growth was thus supplied to a cretin in the early stages of the disease the symptoms soon disappeared. The swelling gradually diminished in all parts of the body; the tongue, lips, and nose diminished in size, so that the appearance became natural; the skin became soft and moist and the temperature rose to normal. Growth, which at this early stage would only have been partially arrested, started afresh. If the treatment was continuously carried on in such a case from the earliest time at which the disease was recognisable, there seemed no reason to doubt that ultimately the child would grow up into a fully-developed, healthy adult, who, however, would, of course, at any time develop symptoms of myxœdema if his supply of the extract was discontinued. The amount of improvement which might take place in very advanced cases was well illustrated by the course of the case shown in the photograph.

In this case the symptoms had been present for some twenty-seven years before treatment was commenced. The dose was at first 1 drop a day, gradually increased, till now she takes 15 drops, equal to about 12 minims of thyroid extract daily. At the commencement of the treatment growth had been arrested apparently for many years, as she only measured 34½ inches in height. She now measures 38½ inches, having grown 4 inches in three years and a-half. The hair was much less coarse than it used to be, and the scalp was white and smooth. The swelling had

Fig. 2.—G., aged 28, June, 1895, height 34½ inches.

greatly diminished, so that the nose, cheeks, and lips were much smaller than they were, and the whole expression was much more bright and intelligent. The mouth was kept closed, and the tongue had become normal in size and no longer protruded between the lips. The condition of the teeth did not seem to have improved, except that she could now chew nuts, which she was unable to do before. The elastic pads have disappeared from the supraclavicular regions. A most remarkable development of the mammary glands, which before treatment were entirely undeveloped, had taken place. This was all shown in a recent photograph (Fig. 9), in which it would be seen that the nipples and breasts were now very well developed. Some pubic hairs have grown, and menstruation, which had only occurred very scantily on a few occasions, was now regular and abundant. The abdomen was not so prominent, and the umbilicus was retracted. There was still well-marked lordosis. The skin was much less dry, and perspired freely when she was walk-

ing. She was much more energetic, and the muscular strength had increased, so that she could now walk two miles. The temperature had long been normal. She was distinctly more intelligent, the vocabulary had increased, she could recognise people and animals, and could make her wants perfectly understood. She was unable, however, to frame a sentence, and used only single words, or at most two or three together. She was careful and cleanly in her habits.

Fig. 9.—G., February, 1897, height 38½ inches.

This case was a good example of the amount of improvement of which even the worst cases were capable. Greater improvement still had been obtained in cases of some years' duration which were still under 20 years of age. Thus in Dr. John Thomson's case, aged 18 years and 8 months, 33½ inches in height, there was an increase in the height of 4½ inches in twelve months. In Dr. Byron Bramwell's case, aged 16 years and 4 months, 29½ inches high, growth was at the rate of 6½ inches in six months.

The intellectual development was always much slower than the bodily growth and general improvement in all other respects. The shorter the duration of symptoms had been at the commencement of the treatment the more rapid the improvement in the mental condition, and Dr. Murray thought it was only in cases in which the treatment was started early that they could expect normal intellectual development to take place. In cases of some duration it was important that a special education should be carried on at the same time as the treatment in order that the patient might be able to make the most of his renewed cerebral activity.

LECTURE III.

COMPENSATORY HYPERTROPHY.

THE whole question of compensation and compensatory hypertrophy of organs in disease is of such great interest and practical importance that any facts which tend to throw light on the conditions under which they are developed are of value. In health we can by specially-arranged exercises bring into operation the pathological law that any muscle contracting intermittingly against an increased resistance

which it can overcome undergoes hypertrophy, and thus induce hypertrophy of the biceps or any other muscle. In some diseases our chief object is to favour and encourage compensating hypertrophy by every means in our power. In valvular disease of the heart adequate compensation in the form of "work hypertrophy" is of prime importance, the object of our treatment being to encourage and maintain its proper development, and, as long as possible, ward off the disastrous effects of its failure. All hollow muscular organs develop compensatory muscular hypertrophy, when their work is increased by some abnormal resistance to the expulsion of their contents, which can by an extra effort be overcome. Other tissues also can undergo similar changes, an example of which is given by the condition of the blood in cyanosis. It has been shown by Toenissen, Gibson,⁵ and others that in the intense cyanosis of congenital heart disease the hæmoglobin is increased in amount, and the red and white corpuscles are increased in number. The hæmoglobin may be increased up to 120 or 160 per cent of the normal amount, the red corpuscles up to 9,000,000, about double the normal number, and the white to 16,000 in each cubic millimetre of the blood. These changes may fairly be regarded as indicating a compensatory hypertrophy of the blood which enables it to carry more oxygen in face of the adverse conditions under which the circulation is carried on. Marie regards a similar increase in the number of the red corpuscles which occurs in those who live at high altitudes as a similar compensation.

The glandular organs of the body have also remarkable powers of development under the influence of appropriate stimuli—as, for example, the development of the mammary glands during pregnancy. Both secretory and excretory glands can undergo compensatory hypertrophy when a portion of the gland has been disabled by disease or design in such a manner as to throw an increased amount of work upon the remainder. The stimulus of working at higher pressure than normal here, as in the heart, leads to the development of a compensatory hypertrophy—such, for example, as is seen in one kidney after the removal or destruction by disease of the other.

It is important in all cases to ascertain the minute structure of organs which have thus developed a compensatory hypertrophy, for it is not necessarily a simple hyperplasia or exact reproduction of the normal structure.

In the kidney Lazarus-Barlow⁶ states that there is hyperplasia of the cells and hypertrophy of the glomeruli, and quotes Eckhardt's statement that, if the hypertrophy is the result of congenital absence of one kidney, there is both hypertrophy and hyperplasia of both glomeruli and tubes; if the other kidney is destroyed or removed later in life, there is hypertrophy without hyperplasia of either glomeruli or tubes.

Owing to the special anatomical position and physiological properties of the thyroid gland it affords unusual facilities for observing some of the phenomena of compensatory hypertrophy. It is now a well-known fact, owing to the work of Horsley,⁷ Halsted,⁸ and Edmunds,⁹ that when a portion of the gland is removed the remainder undergoes compensatory changes, in virtue of which it is enabled to supply enough secretion to prevent the appearance of the symptoms of athyroidism. The portion removed at one time may be one-half or even three-quarters of the whole gland, and Halsted has shown in the dog that successive portions, if removed on three or four separate occasions, may be excised until only one-eighth, or even one-sixteenth, of the original gland is left without symptoms of athyroidism being developed. Although these changes are accompanied by an increase in size, the hypertrophied remainder does not attain the size of the original gland, so that, weight for weight, it has to do more work than the original glandular tissue. Under these circumstances it is not so surprising that the structure of a piece of the gland which has undergone compensatory hypertrophy should differ somewhat from that of the normal gland. When sufficient hypertrophy has developed to supply as much secretion as is necessary, we do not find a simple hyperplasia of the original glandular tissue, but considerable change in the structure throughout. The alveoli, instead of being nearly circular, become irregular in outline. This change is due to the folding of the wall, which projects at different points into the lumen of the alveolus. In advanced hypertrophy the lumen may appear to be star shaped, or it may be almost obliterated by neighbouring folds of epithelium

coming into contact. The appearance in places may thus closely resemble that of a racemose gland. The epithelial cells themselves are also altered. They are considerably increased in size, the ordinary low cubical epithelial cells being converted into tall columnar cells. The result of these two changes is that in equal areas the secretory cells are greatly increased both in numbers and size in the hypertrophied, as compared with the normal, gland. The colloid lying in the gland is diminished in amount, and appears to be more watery in consistence than normal. This change in consistence cannot, however, be accompanied by any deficiency in the active ingredients of the secretion, as it is able to prevent the onset of any symptoms of athyroidism. The appearances just described are evidently those of glandular tissue working at high pressure, and just able to supply the necessary amount of secretion without storing any in reserve in the alveoli as is usual in the normal gland.

In illustration of these changes I may refer to an experiment in which I removed the whole of the left lobe and the greater part of the right from a rhesus monkey. After the operation there was slight hebetude and harshness of the voice. No other symptoms developed, although the animal was kept under observation for fourteen months, and then was killed as it had contracted general tuberculosis. A piece of glandular tissue which had developed from the small portion of the right lobe left at the operation was found weighing 0.42 gram. Fig. 10 (p. 655) shows the changes in structure which had taken place. The folding of the epithelium giving a larger secretory surface is clearly seen, and in some of the smaller alveoli near the centre the consequent irregular shape of the lumen is evident. The epithelial cells have become columnar in type, while the colloid is scanty, and seems to be watery in consistence.

The remarkable results which have been shown by Dr. Rose Bradford to follow the excision of a portion of the kidney, and which were so well described by him in his Goulstonian Lectures last year, raise the question as to whether these changes in the structure of the thyroid are due entirely to the want of that body acting as a stimulus to the compensatory growth of the gland, or whether they are in any way due to some other local or general effect of the operation itself. If the compensating growth of the one lobe takes place simply in response to a call for more secretion to make good the loss of the other lobe, no hypertrophy should take place if this want is fully supplied from other sources. This point may be tested by removing one lobe of the gland and giving thyroid secretion continuously for some time, and then removing the other lobe for examination. If no changes indicating compensatory hypertrophy are found in the second lobe, it goes far to show that the hypertrophy develops simply as the result of an insufficient amount of thyroid secretion being present in the blood.

To test this point the right lobe and parathyroid were removed from a male bonnet monkey. For the next three weeks 12 minims of thyroid extract were given in the course of each week. Then, as the animal became rather emaciated, the quantity was reduced to half this amount for the next five weeks. Slight myxœdematous symptoms then appeared, but diminished on increasing the dose to 24 minims in the week; this was continued for two and a-half weeks, when the animal died from dysentery. The left lobe was found to be pale in colour, and only weighed 0.03 gram. No parathyroid was found attached to it. Microscopical sections showed no signs of compensatory hypertrophy even in its earliest stages.

In another experiment the right lobe and parathyroid were removed, and 1 minim per diem of thyroid extract was given by the mouth for sixteen weeks, and then the left lobe and parathyroid were removed. The right lobe with the parathyroid which was removed first weighed 0.3 gram, and was found to be abnormal in structure to start with, as it resembled a hypertrophied gland in structure.

Similar appearances were found by Halsted in the thyroid gland of several healthy dogs. The occasional occurrence of such changes in apparently healthy animals is at present difficult to explain. The interesting point in this case is that after the prolonged interval of sixteen weeks, during which the extract was given, the left lobe was found to be paler in colour, and weighed 0.25 gram. The microscopical structure was normal, and showed no signs of commencing compensatory hypertrophy. If this lobe was originally in the same condition as the right the treatment seems to have restored it to a normal condition, and if not it any rate showed no signs of compensating hypertrophy. As far as they go these experiments tend to show that if the proper amount of secretion is

supplied after removal of one lobe compensating changes do not take place in the other.

In connection with this part of the subject I have tried the effect of prolonged administration of thyroid extract upon the healthy thyroid gland. It is well known that parenchymatous goitres often decrease in size when treated by thyroid extract. One explanation of this result is that a partial atrophy from disuse is established when the full amount of secretion is supplied from an external source. Two experiments have been made to ascertain if any atrophic changes could be induced in the healthy thyroid gland by supplying secretion ready made as it were and so doing away with the normal stimulus to secretion. The thymus atrophies after the first year of life from disuse, and the thyroid does so itself in old age, possibly for the same reason.

A small bonnet monkey was given 1 minim of thyroid extract per diem by the mouth for forty-four days, and then 3 minims for thirty-one days. The thyroid gland was then removed. It looked small and pale in colour, and with the two parathyroids weighed 0.11 gram. The microscopical appearance of the gland was normal, the epithelial cells and their nuclei being stained as usual, and the alveoli were well filled with secretion. In another similar experiment a male bonnet monkey was given 1 minim of thyroid extract for forty-four days, and 3 minims daily for forty-two days. The thyroid gland was then removed, and, with the parathyroids, weighed 0.14 gram. The nuclei were well stained, and the alveoli were well filled with secretion. There was rather more fibrous tissue in the interalveolar space than is generally seen in the normal gland, but not a sufficiently well-marked increase to amount to a pathological change. The glands were certainly pale in colour and light in weight, and appeared to have undergone some diminution in size, but no evidence of atrophic changes was found in the microscopical specimens. Possibly if larger doses had been given for a longer period, some more definite change in the structure of the gland might have been found.

GOÏTRE.

The pathology of goitre is a subject of much importance, for the disease is still endemic in this country in the valleys which drain the Pennine range of hills east and west from the Border as far south as the Peak in Derbyshire. Time will not permit me to discuss the question of the origin of endemic and sporadic goitre, but I wish to draw attention to the interesting effects which have followed the treatment of simple parenchymatous goitre by thyroid extract. At first sight such treatment may seem somewhat superfluous, but experience has shown, and to that of others I can add my own, that this method of treatment frequently leads to a notable diminution in the size of the goitre. Adenomata, cystic adenomata, and other new growths are not influenced by the treatment, though the parenchymatous enlargement which often accompanies them may be diminished.

In the treatment of goitre it is advisable to begin with 10 minims of liquor thyroidei each night; in the course of a few days, if the pulse is not accelerated beyond 90 or 100, this dose may be given twice, and at the end of a week thrice daily. If well borne, the dose may be still further increased. The treatment should be continued for three or four weeks to give it a fair trial, and longer if the goitre continues to decrease in size. In several cases in which the general enlargement of the gland has been sufficient to cause dyspnoea by compressing the trachea, so that an operation had to be considered, the gland has been reduced to two thirds, or even one half, of its former size, and all the symptoms of pressure removed, and with them the necessity for an operation.

The beneficial effects of this treatment may be due to the iodine which is present in combination with a proteid in thyroid extract, for iodine has long been used with good results in the treatment of goitre. We have seen that the healthy thyroid of the monkey showed some signs of diminution in size under the same treatment, and I would suggest that the decrease in size in goitre may be due to part of the enlarged gland passing into a resting condition, and consequent diminution in size if there is not an actual disuse atrophy as a result of the treatment.

EXOPTHALMIC GOÏTRE.

Exophthalmic goitre, with its many varying phrases, is a disease of great interest from several points of view. The various clinical types in which it comes before us, and the great difficulties in treatment it often presents renders a true solution of the problem of its pathology of the greatest importance.

The circulatory and nervous systems have each in turn been considered to be at fault, and it is only recently that attention has been drawn to the important part which is

played by the thyroid gland in the pathology of the disease. The central and sympathetic nervous systems have been carefully examined in a considerable number of cases; in some they have been found quite normal, in others various lesions have been described, but these have varied in different cases, and on the whole appear to be rather secondary than primary in origin. I shall not describe the various lesions which have been found, as I have already elsewhere¹⁰ discussed their relative importance. The lesions found in the thyroid gland are far more constant in character than any yet described in the nervous system, and it is the most obviously diseased organ to be found in a case of exophthalmic goitre.

In nearly all cases of exophthalmic goitre there is a palpable enlargement of the thyroid gland. On looking through my casebooks I find notes on 70 cases of exophthalmic goitre which I have seen during the last nine years in the North of England, where the disease is not uncommon. Of these 8 were men and 62 women. All the 8 men had enlargement of the thyroid; of the 62 women all except 3 had enlarged thyroid glands. Taking both sexes together, we find that only 4.3 per cent. of these cases had no goitre. It has been shown by Maude that in some cases enlargement of the gland may be present at one time and not at another, so that even in these 3 cases, which were only seen a few times, there may have been some enlargement at some other time during the course of the disease which had escaped observation. In any case, in 95 per cent. of my cases, there was either enlargement of the gland at the time the case was seen, or there was a distinct history of enlargement at an earlier stage.

The enlargement of the thyroid gland in exophthalmic goitre is as a rule uniform. In cases of long duration it may be irregular in shape and consistence owing to the development of fibrosis leading to the formation of irregular strands and masses of hard fibrous tissue in some parts of the gland. The veins on the surface are large and their walls are thin. In well-developed cases the goitre is very vascular, and the arteries are dilated and tortuous, indicating that there was a liberal supply of blood during life. On section the cut surface presents a uniform appearance; it is lighter in colour and exudes less colloid than a normal gland.

The microscopical appearances have been very clearly described by Greenfield,¹¹ Stewart and Gibson,¹² Edmunds,¹³ and Abram.¹⁴ The general appearance is that of a gland in a state of great secretory activity, and has been aptly compared by Greenfield to that of the mammary gland during lactation. The number of alveoli is not only increased by the total increase in size of the gland, but in equal areas more alveoli are seen than in the normal gland. In many places the lumen of the alveolus is irregular in outline owing to the folds of the alveolar wall covered with epithelium projecting into it, so that, even when the gland is but slightly enlarged, there is a marked increase in the amount of the secretory epithelium. The lumen of the alveolus is in consequence diminished in size, in some cases to a considerable extent. The actively secreting part of the gland is thus increased at the expense of the storage room, which is so ample in the normal gland. The epithelium which lines the alveoli and covers these folds is changed in type, for the cells, instead of being flat or cubical, are tall and columnar. There is less secretion to be seen lying in the alveoli than in health. This diminution in quantity is partly due to the decrease in the amount of storage room. In addition to this, however, the alveoli are only partially filled, an appearance which suggests that there is a more rapid removal of the secretion from the gland than in health. The colloid is also more watery in consistence and it stains less deeply than normal. Eosin does not stain it at all, and Renant considers that it resembles foetal colloid more nearly than that found in the healthy adult.

These changes are well shown in two specimens from cases which have been under my care. The section shown in Fig. 11 (p. 655) was taken from the right lobe of the thyroid gland of a married woman, aged 32, who had suffered from attacks of palpitation for several years. There had been enlargement of the thyroid gland for a year, exophthalmos for nine months, and progressive emaciation for eight months. The pulse varied from 120 to 140. As medical treatment failed to arrest the progress of the disease, the right lobe of the gland was

removed by Mr. F. Page. Unfortunately the patient died suddenly an hour after the operation. This specimen shows the general appearance of the gland under a low power, the plication of the alveolar wall, and the diminution in the amount of secretion in the alveoli. Fig. 12 and Fig. 13 (p. 655), which were also photographed by Dr. R. A. Bolam, were taken from sections prepared by my research clerk, Mr. J. Muirhead.

The specimen shown in Fig. 12 was taken from a man, aged 30, who had suffered from acute exophthalmic goitre for some four or five months. There had been goitre, great nervousness, exophthalmos with retraction of the upper eyelids and von Graefe's sign, frequent pulse, rapid respiration, emaciation, sweating, and diarrhoea. In addition he had an attack of appendicitis, followed by the formation of a small abscess, which contributed to the early fatal termination.

This specimen shows an aveolus under a high power in which the changes described are well marked. There are several deep folds in the wall, the columnar type of the epithelium is clearly seen, and only a small amount of lightly stained secretion is lying in the irregularly shaped lumen.

From the above description and illustrations it will be seen that the structure of the gland in exophthalmic goitre resembles that in compensatory hypertrophy in a remarkable manner. In both there is the increase in the secreting structures as shown by the plication of the alveolar wall, in both the epithelium is changed from a cubical into a columnar type, while the secretion stored in the alveoli is less in quantity and more watery in consistence. We know that the changes in compensatory hypertrophy are an indication of increased activity, so that it is fair to infer that the changes found in exophthalmic goitre show that hypersecretion is going on. For additional reasons which we shall now consider the most rational explanation of the complex symptoms of this disease appears to be that they are due to an excessive formation and absorption of the secretion of the thyroid gland, which may or may not be altered in composition, and to the constant presence of this excess in the blood, and to its action upon the metabolism of the tissues generally, but more especially of the nerve centres in the medulla.

According to this view exophthalmic goitre is the opposite condition to myxoedema, the former being the result of excess as the latter undoubtedly is of lack of thyroid secretion in the blood. This is supported by the strong contrast which is presented by the symptoms of the two diseases, a contrast which is nearly as marked as that between the small fibrous and atrophied gland of myxoedema and the enlarged hypertrophied gland of exophthalmic goitre. Associated with the former we have increase of weight, stolidity, subnormal temperature, dryness of the skin due to diminution of cutaneous secretion, with increase of electrical resistance and slowing of the pulse, while with the latter we find emaciation, nervousness, normal or raised temperature, moist skin due to increase of secretion, with diminished electrical resistance and acceleration of the pulse. We may conveniently express the relationship of myxoedema to exophthalmic goitre in their various degree of severity in the following diagrammatic manner. If we take 100 as representing the normal amount of thyroid secretion in health, then 75 per cent. is probably about the amount of secretion formed in those cases of early thyroidal fibrosis with slight myxoedema to which I have already alluded. If half the glandular tissue is destroyed and only 50 per cent. of secretion is formed, the symptoms will be moderate. If 25 per cent. the symptoms will be well marked, and if none at all is found they will be severe. In the reverse way, in exophthalmic goitre 125 per cent. of secretion would be present in a slight case, 150 per cent. in a moderate one, 175 per cent. in a well-marked one, and 200 per cent. in a severe case.

Percentage of Thyroid Secretion in the Blood.	Degree of Severity of the Symptoms.
200	Severe exophthalmic goitre.
175	Well-marked exophthalmic goitre.
150	Moderate goitre.
125	Slight goitre.
100	Health.
75	Slight myxoedema.
50	Moderate myxoedema.
25	Well-marked myxoedema.
0	Severe myxoedema.

In myxœdema these percentages are in all probability approximately correct. In exophthalmic goitre, however, we have no means of ascertaining how much secretion is actually formed. It may amount to much more than double the normal quantity in a severe case, so that these percentages are purely relative, and must not be taken to indicate the actual amount of secretion present in the blood.

Fig. 10.—Compensatory hypertrophy of thyroid gland of monkey showing plication of alveolar wall, columnar epithelium, and scanty secretion in alveoli. Low power.

Another interesting point in the relationship between the two diseases is the repeatedly-observed fact that recovery from exophthalmic goitre may be followed by myxœdema, while, as far as I am aware, exophthalmic goitre has never been observed to develop in a patient already suffering from

Fig. 11.—Thyroid gland in exophthalmic goitre showing plication of alveolar wall and scanty secretion in alveoli. Low power.

myxœdema. In some cases the symptoms of exophthalmic goitre diminish as those of myxœdema develop, in others there is an interval of good health between the disappearance of the exophthalmic goitre and the onset of the myxœdema. In a case recorded by Baldwin,¹⁵ exophthalmic goitre developed in 1887 and recovery took place the following year. Two years after, in 1890, myxœdema developed which three years later was successfully dealt with by the thyroid treatment. In a

similar case recorded by Joffroy and Achard, and quoted by Moebius,¹⁶ the exophthalmic goitre existed for twenty-three years and then subsided, to be followed by myxœdema.

After death the nervous system was found to be quite normal, and the thyroid gland in an advanced stage of atrophy. It thus seems evident that the development of thyroidal fibrosis in exophthalmic goitre, by lessening the over-activity of the gland, leads to a subsidence of the symptoms,

Fig. 12.—Thyroid gland in exophthalmic goitre showing plication of alveolar wall, columnar epithelium, and scanty secretion in alveoli. High power.

which, if the fibrosis and atrophy progress far enough, are replaced by those of myxœdema. Fig. 13 shows a section of the gland from an old-standing case of exophthalmic goitre.

In this the alveoli are much diminished in number, and between them there is a large amount of young cellular fibrous

Fig. 13.—Exophthalmic goitre of long duration showing few alveoli and much young cellular fibrous tissue.

tissue. No symptoms of myxœdema were present at the time this patient died, but it is evident that if the fibrosis had advanced much further symptoms of myxœdema would have developed. While these changes are taking place in the gland, the symptoms may pass from those of severe exophthalmic goitre through all the stages mentioned in the table to those of severe myxœdema.

One or two cases have been recorded in which the symptoms of myxœdema are said to have coexisted with those of exophthalmic goitre. The reasons for asserting the coexistence of the two diseases in these cases seem to be rather slender, and to be largely founded on the presence of an irregular brawny swelling together with the symptoms of exophthalmic goitre. I have occasionally seen a firm subcutaneous swelling in some parts of the body in exophthalmic goitre, but it certainly was not myxœdematous. It is important to have such cases carefully reported, so that more information may be obtained on this point. The persistence for a time of a few symptoms of exophthalmic goitre in a case of long duration which was passing into myxœdema is not unlikely, for the effects of the long-continued action of an excess of secretion on the nerve centres in the medulla, may easily remain for a time even after the thyroid had begun to atrophy, just as the effects of the action of lead or the toxins of diphtheria on the nervous system persist long after they have ceased to act.

The physiological effects of thyroid secretion in large doses are of special interest in this connection. Exophthalmic goitre, though rare in the lower animals, has been observed in the horse, the cow, and the dog, so that if the right cause is brought into operation there should be no great difficulty in producing the disease in one of these animals. As we are ignorant of the causes of the change in structure and activity of the thyroid gland in exophthalmic goitre, attempts can only be made to reproduce the symptoms we believe to be secondary to the excessive activity of the thyroid. This can be done either by grafting an excess of thyroid gland tissue into an animal, or more certainly by feeding it with large quantities of thyroid secretion, or by injecting it beneath the skin. Ballet and Enriquez,¹⁷ by feeding dogs with the thyroid glands of sheep, produced distinctive symptoms in 3 out of 6 cases. These symptoms were elevation of temperature, tachycardia, tremors, conjunctivitis, emaciation, and in one animal quite distinct exophthalmos.

Still more important are the results which have been observed and follow large doses of thyroid extract in man. A condition of thyroidism seems to be more easily produced in those who have recovered from myxœdema than in those who have normal thyroid glands. It may develop rapidly if large doses are given, or more slowly if smaller, but still excessive doses are given for a long period. The earliest and most common symptom is increased frequency of the pulse. The patient complains of palpitation, and the heart beats violently 100, 120, or 130 times a minute. A fine tremor of the hands is often present, and the skin is flushed and moist. If the large doses are continued for some time emaciation also takes place.

In addition to these symptoms, elevation of temperature, restlessness, loss of sleep, polyuria, albuminuria, glycosuria, partial paraplegia, sensation of heat, and diarrhoea, all of which are occasional symptoms of exophthalmic goitre, have been recorded. In one remarkable case Bécère¹⁸ observed exophthalmos and rapid respiration in addition to other symptoms among those already mentioned in a woman who had suffered from myxœdema, and had taken 92 grams of thyroid gland in eleven days.

Some remarkable toxic symptoms have been observed in some cases by Horsley and Rodocanachi,¹⁹ Paul,²⁰ and other surgeons, to follow partial removal of the enlarged thyroid gland. The most common symptoms which have been observed are fever, great frequency of the pulse (amounting to 150 or even 180 beats in the minute), rapid respiration, and great restlessness. In some of the cases the termination has been fatal at the end of a few days. As far I am aware, such symptoms have not been observed after a total thyroidectomy, so that they are not a result of the operation itself. The symptoms have occurred in cases of exophthalmic or soft parenchymatous goitre after removal of one lobe of the enlarged gland, and especially when it had been much handled or squeezed during the operation. In several cases a profuse flow of thyroid secretion has been observed to take place after the operation from the divided isthmus into the wound. The symptoms are similar to those in acute cases of exophthalmic goitre, and in thyroidism artificially produced in the manner already described, and are evidently due to absorption from the wound of thyroid secretion poured out from the cut surface of the gland, or a large quantity of it being squeezed during the operation into the lymphatics, and so into the blood stream.

This absorption of the secretion is a source of real danger in operations for goitre, and especially in cases of exophthalmic goitre. If, however, the gland be handled as little as possible during the operation, the cut surface is scaled by the cautery, and a free exit is provided for any secretion which may find its way into the wound, such symptoms will in all probability but seldom arise.

It is now well known that thyroid extract has a bad effect on patients with exophthalmic goitre. Under its influence the pulse becomes more frequent and the other symptoms are increased. In some instances where other treatment had been followed by a marked improvement the administration of thyroid extract has been followed by a relapse into the former condition. In my opinion it should never be given in exophthalmic goitre, as it is only adding fuel to the fire.

The results of surgical treatment of exophthalmic goitre, undertaken with the object of reducing the amount of secreting tissue by removal of one lobe, or of inducing atrophy by ligature of some of the arteries which supply the gland, are of great interest. Unfortunately the operation itself, though sound in principle, is at present by no means free from risk. The steady improvement, however, which has resulted in many cases in which it has been successfully performed affords still further evidence that the symptoms of exophthalmic goitre are due to the over-activity of the thyroid gland.

It is a fact of considerable interest that along with the enlargement of the thyroid gland in exophthalmic goitre other ductless glands may be increased in size. The thymus gland is very often enlarged; in all the cases recently examined at St. Thomas's Hospital Dr. H. Mackenzie²¹ has found the thymus persistent and enlarged, the microscopical structure being normal. Exophthalmic goitre and acromegaly are sometimes found to occur together. I have recorded two examples of this and collected records of three others.²² In acromegaly the pituitary gland is enlarged, and the enlargement seems to be analogous to that of the thyroid in exophthalmic goitre, so that we have the remarkable fact that all these three ductless glands may be simultaneously enlarged. We know no explanation of this, but it suggests that possibly some common factor may be the cause of the enlargement. That some association exists between the thyroid and pituitary glands is further shown by the enlargement which takes place in the latter when the former is removed or disabled by disease.

These facts all indicate that in the treatment of exophthalmic goitre attention should be directed to the thyroid gland. Time will not permit me to discuss the question of operative treatment, but there can be little doubt that removal of part of the enlarged gland is a rational method of treatment, and when the risks of the operation are diminished it should be more frequently employed in severe cases in which medical treatment has failed to do good. Of medical treatment much has been written. In my own cases inunction of red iodide of mercury ointment over the goitre and belladonna given in large doses internally, so as to check the hypersecretion of the gland, have proved most serviceable. If the palpitation is excessive, convallaria has proved more useful than any other member of the same group of drugs. If there is great nervousness the bromides have done good. In only one case have I seen decidedly good effects from taking thymus. In this case 3 tablets of dried thymus were taken each day for nine months, for the last six and a-half of which the red iodide of mercury was used as well. As a result of this treatment the pulse-rate, which varied from 132 and 148, fell to 84, the thyroid gland, which had been considerably enlarged, returned to its normal size, the tremor became much less, and the exophthalmos was diminished.

In conclusion, Mr. President and gentlemen, allow me to thank you for the kind help you have given me by your attention in my endeavour to place before you some of the facts which help to explain the function of the thyroid gland and the practical uses to which such knowledge can be put in the treatment of disease, and I trust that the wishes of the founder of this lectureship have thus been carried out in the spirit, if not in the actual letter, of his bequest.

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THE ARRIS AND GALE LECTURES ON THE ANATOMY AND SURGERY OF THE PERITONEAL FOSSÆ.

Delivered at the Royal College of Surgeons of England,

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LECTURE III.—THE INTERSIGMOID FOSSA: INTER- SIGMOID HERNIA: HERNIA INTO THE FORAMEN OF WINSLOW.

THE INTERSIGMOID FOSSA.

THE first mention of this fossa is made by Hensing in the year 1742 in a Giessen dissertation. No subsequent reference to it is found until 1843. In this year Roser speaks of having seen the fossa very clearly defined on two occasions. In 1857 Engel describes a canal having a length of 3 cm. in infants, extending along the inner border of the left psoas muscle to the level of the bifurcation of the aorta, and in exceptional cases as far up as the pancreas. Treitz in 1857, Gruber in 1859, and Treves in his Hunterian Lectures, give good descriptions of the fossa. The latter author says: "The perfect fossa was met with in 52 per cent. of all the subjects. But if distinct funnel-shaped depression be added to the examples of the true fossa, then the percentage reaches 65. Jonnesco in 1890, and Brösike in 1892, gives accurate accounts of the fossa.

On drawing the sigmoid or omega loop upwards, the left or underlayer of the sigmoid meso-colon is exposed. On this surface can be seen the entrance to the intersigmoid fossa at the line of insertion of the meso-colon (Fig. 20). The fossa

Fig. 20.—Formation of the intersigmoid fossa.

is present in rather over 70 per cent. of bodies examined. Its frequency depends, however, chiefly upon the ages of the subjects. In the fetus of later months and in infants it is invariable. Its frequency becomes less with increasing years. As Treitz showed many years ago, in the aged there are never lacking signs of adhesion, crimping and thickening in the

Fig. 21.—The intersigmoid fossa.

sigmoid meso-colon. Processes of this kind tend to obliterate the fossa, so that in subjects over 50 years of age the pouch is not infrequently wanting. The opening of the fossa is situated in the line of attachment of the sigmoid meso-colon at a point which is near the inner margin of the psoas. It lies over the common iliac artery close to, or in front of, its bifurcation.

The orifice is generally round or oval, and is bounded in front by a fairly well-defined sharp edge of peritoneum. In this edge, or very close to it, may be seen the sigmoid vessels. This orifice leads to the intersigmoid fossa, which lies behind the sigmoid mesocolon and in front of the parietal peritoneum. The posterior wall of the fossa is adherent to the common iliac artery, and through the transparent wall can be seen the ureter as it crosses the vessel. The apex of the fossa extends upwards for a distance that varies very considerably. Sometimes there is merely a dimple representing the fossa; in other cases the depth may be 2 or 3 inches, or even more. I have on several occasions seen the fossa extend beyond the middle of the kidney, and this is usually the case in the fetus. Engel, Brösike, and Rogie describe the pouch as extending as far up as the body of the pancreas. Most frequently the fossa in the adult is of the shape and size of an abbreviated glove finger for an average middle finger.

GENESIS OF THE FOSSA.

Several explanations have been suggested by Treitz, Luschka, Waldeyer, Treves, and others which I believe to be incorrect. It was first shown by Toldt that the disappearance of the mesentery of the descending colon was due to a process of "physiological adhesion" taking place between the left (or posterior) layer of the mesocolon and the parietal peritoneum (Fig. 20). This agglutination begins above, close to the splenic flexure, and spreads gradually downwards. Over the kidney, owing to the projection of this organ, the fusion is earlier and more complete. Along the inner edge of the kidney is a groove, and here, therefore, the opposing surfaces do not so readily come into contact, and adhesion is delayed. At the lower part of the groove union is never complete, and the gap that results is the intersigmoid fossa. On examining a fetus of the seventh month, or a little younger, the descending mesocolon is obliterated. On pulling, even gently, on the colon, however, it will be found to strip up quite readily from the parietal peritoneum, until the primitive mesocolon is reproduced.

HERNIA INTO THE INTERSIGMOID FOSSA.

Treitz refers to two cases of intersigmoid hernia, one recorded by De Haen, and the other by Lawrence. The description and figures given by De Haen negative his case unconditionally. Lawrence in the fifth edition of his work says that hernia may occur in the mesentery of the sigmoid, but gives no case. A case which has been generally accepted is