During later years the habits of the people have changed, and the exegesis of life has also changed. Tinned, canned, and preserved articles of food have become almost a necessity, and, as if to assist in this change, tinned and bottled meats are so much used in dressing and decorating the windows that the man in the street would find a difficulty in distinguishing between a grocer's and a tinman's or an ironmonger's shop.

Mothers wilfully resort to the artificial feeding of their babies; condensed milk, possibly adulterated, being the favourite. As the child grows older, tinned meats become an integral part of his diet. We often find the housewife, either from ignorance or from sheer neglect, rushing to the shop just before the husband returns from his toils—tinned meat again. In many districts it has become a difficulty as how to dispose of the empty tins.

Professor Metchnikoff, in delivering the Harben Lectures in May this year on the Hygiene of the Tissues, said that "the future of medicine rests far more in hygiene than in therapeutics." This becomes apparent when we look back at the sanitary record of the last thirty years. The decrease of infectious and contagious diseases, of puerperal affections and of erysipelas, of tuberculous maladies, and of bronchitis and other chest affections—all this is mainly due to improved water supplies, better ventilation and cleanliness of our military barracks, factories, and workshops. This is still further strengthened when we bear in mind the fact that, notwithstanding all sanitary improvements, etc., infantile mortality is as high to-day as it was thirty years ago; when we consider that alimentary diseases are on the increase, when the enormous possibilities for the adulteration and poisoning of the food of the inhabitants is realized, and when the insidious and continuous deleterious action of food preservatives on the system is thoroughly understood.

What are the remedies?

(a) Reorganization of the Local Government Board in London on the lines suggested by the Council of the British Medical Association, or, better still, the creation of a new State department of public health at Westminster, and more research work supported from the public purse.

(b) Legislation. Several sections of the Public Health Act, 1875 and 1890, require amending. Increased powers of inspection are required. The Sale of Food and Drugs Act, 1875 and 1879, should be so amended as to embody the recommendations of the Departmental Committee on Food Preservatives. At present, before any conviction can take place, it must be proved that the preservative used is injurious to health. This is often difficult.

Briefly, the recommendations are the following:

1. The use of formaldehyde to be prohibited.
2. No more than 1 gr. to the pint or 1 gr. to the lb. of salicylic acid to be allowed, and its presence to be declared.
3. All preservatives and colouring matter in milk to be strictly prohibited.
4. That boric acid or with borax—not to exceed 0.25 per cent.—be the only preservative of cream, presence to be declared.
5. That no preservative other than boric acid or boric and borax—not exceeding 5 per cent.—be used with butter and margarine.
6. No chemical preservatives of any kind to be used in the food of invalids and of infants.
7. That the use of copper salts be prohibited.
8. Proper supervision by the Local Government Board of the use of preservatives and colouring matter in food.

The report of the Departmental Committee on Food Preservatives was published in 1901. So far nothing has been done to carry out the recommendations contained in it.

Now that a Supplementary Charter for the granting of medical degrees by the University of Wales has been settled upon, it becomes necessary that the University Colleges of Bangor and Aberystwyth should follow the excellent example of Cardiff in the teaching of subjects directly relating to public health. These subjects are not included in the ordinary medical curriculum of qualifying bodies to the extent they should be, and when we take into consideration the great increase in importance of hygiene and bacteriology in the science of medicine, we may well ask: To whom is this knowledge

of the greatest advantage—the general practitioner or the public health officer?

The College should be a centre for analytical and bacteriological work. The erection of a sanitary museum on the model of Parkes Museum in London should be provided for in the new university buildings about to be built. Here the teaching of sanitary science would receive a practical demonstration; all the appliances relating to ventilation, water supplies, drainage, heating, lighting, and, lastly, personal and domestic hygiene, including clothing, school fittings, food and their adulterations, could be made a means of education, not only to the student of medicine but to the hundreds of men and women that attend the university with the object of qualifying as teachers, both in elementary and secondary schools.

The knowledge of hygiene is almost as necessary for the elementary school teacher as it is to the medical man. At the last annual meeting of the National Union of Teachers it was stated that of the 160,457 elementary school teachers in the United Kingdom only 46.5 per cent. were certificated, and I am led to believe that of those certificated a small percentage only receive any special course of training in hygiene.

I am glad to find that cooking and hygiene have (under the new code) been made compulsory subjects in elementary schools.

It is by these means only that we may hope to educate the public of the importance of pure air, pure water, and wholesome food in their life-history.

In North Wales we are blessed with abundance of pure air, and of pure water Wales has more than enough. The great cities—Liverpool and Birmingham—have had their "gwala a'u gweddill" and now Birkenhead, the central slaughtering establishment of the kingdom, is also to be supplied with water from the Welsh hills. Let us hope that this may be of some assistance in the preparation and a guarantee as to the wholesomeness of our food, and that the community at large will benefit by it.

REFERENCES.

¹ Thresh and Porter. ² Registrar-General's Report, 1904. ³ Ibid.

THE DIRECT EXAMINATION OF OESOPHAGUS AND UPPER AIR PASSAGES.

By D. R. PATERSON, M.D.,

SURGEON TO THE EAR, NOSE AND THROAT DEPARTMENT, CARDIFF INFIRMARY.

THOUGH recent progress in the direct examination of the food and air passages has, to judge from the almost complete absence of literature, attracted little attention in this country, it is of some interest that one of the earliest attempts to solve the problem was made in England. As far back as 1868 Bevan described¹ an oesophagoscope made of a straight tube 4 in. long and $\frac{1}{4}$ in. diameter. Over the tube was a small mirror, the light being obtained from a candle or magnesium lamp. Bevan recommended it chiefly for the diagnosis of foreign bodies, strictures and malignant disease. The instrument does not seem, however, to have been taken up, as no record of its use is obtainable. In 1880 Mackenzie² introduced an oesophagoscope, which consisted of a skeleton tube constructed of two upright rods connected at intervals by rings one above the other. Being collapsible it was easy to introduce and expand *in situ*. Mackenzie made considerable use of it for removing tumours, etc., and to him belongs the credit of being the first to record the extraction of a foreign body (a piece of bone) by the direct method. It does not appear to have come into general employment, probably because in the following year (1881) much improved models were introduced by Mikulicz.

The improvements in oesophagoscopy later by v. Hacker and Rosenheim greatly extended its use, and the suitability of the instruments of the latter observer led Kirstein to apply the same principles to the inspection of the larynx. He first used an instrument like a Rosenheim's long straight oesophageal tube introduced over the epiglottis after cocaineization of the larynx. Later, this tube was introduced through a spatula, at first box-like, to be replaced subsequently by the "universal spatula," a long narrow instrument slightly bent forwards, with the

handle at right angles. Its end was inserted between the epiglottis and the base of the tongue, and by exerting pressure on the latter a good view of the whole interior of the larynx was obtained. Kirstein found that only a limited number of people could bear the pressure. In one fourth only of the adults could the whole larynx and trachea be seen, and in one to two fourths could it be carried out in a moderate degree only. On the other hand, Kirstein regarded the lower part of the trachea as a highly dangerous region, where the introduction of a stiff tube demanded the greatest care. It remained for Killian, when he removed a bone from the right bronchus through the upper air passages, to indicate the clinical importance of direct tracheoscopy with the tube, and the possibility of extracting foreign bodies from the deep bronchial passages. He demonstrated in 1897 that it was possible to pass tubes into the entrance of the main bronchi, and showed that these bronchi possessed a high degree of elasticity, are extensible, and may be displaced without ill effect. Through the tracheotomy wound he was able to introduce a tube past the bifurcation for 5 cm. into the right, and 4½ cm. into the left bronchus, to bring into view all the larger branches both right and left, and to see deep into the lower lobe branches and their ramifications. This he carried out equally well through the larynx and trachea, and named his method "direct bronchoscopy."

My own experience of Kirstein's method of "autoscopy," as he called it, dates from 1896, shortly after he published his first papers. One soon confirmed the truth of his statement that great difference as to tolerance existed among patients. Using his later models, when a patient was found who could stand the necessary pressure of the tongue, a direct view was obtained of the larynx and upper trachea which fully justified the enthusiastic description of Kirstein. The details of the larynx were seen close under the eye in a way which far excelled the laryngoscopic image, and the facility with which instruments might be used appealed strongly to the imagination. Unfortunately in practice its application was much limited. The majority of patients could not tolerate the necessary pressure, and the presence of a good set of upper teeth seriously interfered with the manipulation. The method consequently fell into disuse generally, and it was only on the introduction by Killian of the narrow tube-spatula that it has again become largely employed. The use of the tube form prevents the interference of the tongue with the spatula, a much smaller instrument is sufficient for the purpose, and the patient is much less inconvenienced; though it possesses the disadvantage of giving a more curtailed view, it is much more easily tolerated, and a larger number of patients are brought within its scope. Though the tube-spatula is a return to an instrument which in principle was used by Kirstein in his early trials, the direct method owes to the untiring labour of Killian much of the improvement in detail and the now widespread recognition of its great value.

DIRECT EXAMINATION OF THE OESOPHAGUS (OESOPHAGOSCOPY).

For this purpose Rosenheim's tubes are the most convenient. They are rigid, thin, and slightly thickened at the end to avoid injury to the mucous membrane. The gullet is not of the same calibre throughout, being affected at several points by adjacent structures. Perhaps the most important from the point of view of examination is the cricoid narrowing at the lower border of that cartilage. There the gullet is flattened from before backwards, and sometimes presents difficulty to the introduction of the tube. The narrower the tube the more readily is it introduced and the more easily borne. Tubes of a calibre of 9 to 11 mm. are those generally employed. In children 5 mm. may be used, but, of course, with a narrower tube a more restricted view is obtained. In adults the calibre may be increased to 15 mm., and in special cases—as, for example, when examining the lower segment just above the cardiac end—I have used them as large as 20 mm. without difficulty, and with the advantage of a much larger field. For illumination the Kirstein electric forehead lamp is admirably adapted. The use of a local anaesthetic such as cocaine is necessary. A 10 per cent. solution brushed over the soft palate, pharynx, epiglottis, pyriform sinus, and entrance to oesophagus will suffice to render the parts

insensitive. In some anxious patients a small dose of morphine hypodermically will serve to quieten, and in a few a general anaesthetic may be required.

The position of the patient is of some importance. The sitting posture is well adapted for most short procedures, and the one I generally adopt. The patient sits on a low stool, with the head hyper-extended and steadied behind by an assistant. As the examination is often undertaken where obstruction of the oesophagus exists, the presence of a quantity of mucus is a serious drawback, as it interferes with the view. In that event, as well as when the procedure is likely to be prolonged, the recumbent position is better. The dorsal position, with the head hanging over the table, so that all saliva drains into the pharynx, is adopted by many operators; others prefer the patient on the side (Mikulicz), when the mucus escapes by the mouth. In introducing the tube a gum elastic bougie of a calibre which fills the tube exactly is used as pilot. Moistened with liquid paraffin, the tube is passed over the tongue, the flexible end of the bougie guiding it down the posterior wall of the pharynx until it comes to the entrance to the gullet, into which it usually follows the pilot. Sometimes the passage through the upper narrower part constitutes a difficulty. It is helped by making the patient breathe deeply or swallow, when the tube may be slipped through, or a smaller bore tube may be tried. In any case no force should be used. Once in the oesophagus, the bougie is withdrawn, and the further progress of the tube can be controlled by the eye. With the smaller bore tube I never make use of a pilot, as guiding by the eye is more precise, and the entrance can be inspected at the same time. With the tube in the oesophagus difficulty with mucus may be again encountered, and here Killian's saliva suction pump does good service, though in dilatation with food contents it may get blocked. When the amount of fluid is large, tilting up the foot of the table may empty it, and I have found irrigation very helpful.

In setting forth the conditions in which direct examination is of especial value, I do not propose to do more than refer briefly to a few illustrative cases selected from material which has come under my own care. Cases in which difficulty of swallowing is the most prominent symptom are most frequent. Where this is of the so-called functional character, occurring chiefly in women, and associated often with atrophic catarrh of the upper pharynx, the history is generally a guide, but in certain cases a definite diagnosis is possible only by direct examination. In one patient, a woman, aged 40, who suffered for eighteen months from constant pain in the throat, difficulty in swallowing and loss of flesh, and in whom malignant disease had been suspected, the oesophagoscope revealed nothing in the nature of a stricture or growth, and the passage of the tube was followed by improvement. In another, a woman of 60, who had a varying amount of difficulty in swallowing for three or four years, which had latterly become somewhat more constant, nothing was revealed by the laryngoscope. The oesophageal tube showed, however, at the cricoid an ulcer with thickened edges, which subsequently infiltrated the cricoid plate and involved the larynx. A third patient, a man, aged 69, had trouble in swallowing referred to the neck, usually followed by pain in the epigastrium. From other symptoms present an aortic aneurysm was suspected, but a tube of 11 mm. diameter was carefully passed without difficulty down a normal oesophagus until the cardiac end was reached, when a growth was discovered. A smaller-sized tube was passed through with good results, as the patient entirely lost his pain and was able to swallow much better for a time. It is an easy matter to remove part of a growth for examination, and when this is in the upper part of the gullet I find the straight laryngeal forceps very suitable for the purpose.

Extraction of Foreign Bodies.

It is perhaps in the extraction of foreign bodies that oesophagoscopy shows its great advantages. Where the body is impacted the choice lies between it and oesophagotomy, an operation attended with a high mortality. The following cases which have come under my care illustrate the usefulness of the method.

(a) A boy, aged 13 years, swallowed a fishhook which he had been holding in his mouth, and was admitted into hospital with the loop of gut protruding from the mouth. Measured

from another specimen the gut was 9 in. in length, and a radiograph showed the hook in the gullet opposite the body of the fifth dorsal vertebra. Under chloroform, a tube was passed over the gut into the oesophagus under control of the eye and carefully pushed down until the hook was reached. It was seen fixed in the oesophageal wall, the point being firmly imbedded beyond the barb. To effect its removal I threaded the gut through the tubular end of a saliva suction pump and pushed it down on to the hook. Its bulbous termination fitted into the concavity and guarded the point and barb. When the gut was now made taut complete control was obtained over the hook, which was readily detached and removed. The boy recovered completely (Fig. 1).

(b) A woman, about 36 years of age, swallowed during sleep a tooth-plate, and was admitted into hospital shortly after. Fortunately nothing was done to dislodge it. The plate carried four teeth and two sharp metal clasps for fastening. A skiagraph showed the plate in the oesophagus opposite the suprasternal notch. Under an anaesthetic the oesophagoscope was passed, the plate discovered, and its relative position determined. The edge was then laid hold of with straight laryngeal forceps and the body carefully drawn up. As it was too large to pass through the tube they were withdrawn together and extraction successfully accomplished (Fig. 2).

(c) A child, aged 4, swallowed a large brass button, plano-convex in shape such as worn on a seaman's overcoat. Difficulty in swallowing was present. Under an anaesthetic with the oesophagoscope the button was found in the gullet just within the chest. It was extracted with the straight laryngeal forceps (Fig. 3).

Fig. 1.—Fishhook from oesophagus. Fig. 2.—Toothplate from oesophagus. Fig. 3.—Brass button from oesophagus. Fig. 4.—Halfpenny from oesophagus. Fig. 5.—Safety-pin from larynx. Fig. 6.—Collar-stud from larynx. Fig. 7.—Stay eyelet from trachea.

(d) A child, aged 3, swallowed a halfpenny which was detected by x rays behind the cricoid. An attempt with a coin-catcher failed to dislodge it and the child was admitted to hospital. The coin was readily seen through the oesophagoscope and extracted without difficulty (Fig. 4). Several other cases of coins in the oesophagus of children have come under my notice—one had remained for ten days—and their removal was effected with great ease by means of the tube.

It is not unusual for a patient who has swallowed a small pointed body to complain of symptoms which make it difficult to say whether it is still in the oesophagus or has merely caused some lesion of the mucous membrane. A case in point is that of a gentleman who swallowed a small piece of bone when eating game. Pain was immediately felt in the lower part of the throat and a probang was passed by his medical attendant which appeared to displace something. As pain persisted for a time afterwards I examined with the oesophageal tube and found a linear abrasion of the mucous membrane in the cricoid region evidently caused by the passage downwards of the sharp body, no trace of which could be found. The discomfort eventually disappeared.

As an example of a foreign body impacted in strictured oesophagus, the following case is very instructive from several points of view:

A lad of 17, who had "a small swallow" for years and was careful to masticate his food well, had whilst at dinner a piece of beef stick in his throat, and was totally unable to swallow. A bougie and coin-catcher were used,

apparently with some force but without success, in clearing the passage. On admission to hospital next day the patient was very ill. The neck was swollen and emphysematous crackling was felt on the left side. On examination under an anaesthetic, the entrance of the oesophagus and left pyriform sinus were seen to be much swollen and oedematous, the mucous membrane standing out in dusky folds. By means of an oesophageal tube that region was carefully examined, and one of small calibre passed down, when a piece of beef was found impacted just behind the cricoid plate. This was removed, and a narrowing of the gullet made out just below it. The patient was now able to swallow fluids, and though very ill for some days he eventually made a good recovery. Difficulty in swallowing large solids remained, due to the oesophageal narrowing, which had probably existed for some years.

This case illustrates the danger of employing the probang even in cases where the body is known to be soft. A previous history of difficulty of swallowing should always be inquired for, and, if obtained, no attempt to use bougie or probang with any degree of force should be made.

With regard to the diagnosis of foreign bodies, it may be laid down that the most certain method is oesophagoscopy. When the body is of metallic nature which gives a distinct shadow, radiography is helpful in determining its size and general situation, but precise information of its relations can only be obtained by means of the oesophageal tube. When the body is soft or small, giving no definite shadow, such as a spicule of bone, this instrument is indispensable, for by it alone a careful search is possible without risk. The probang or coin-catcher often fail to detach small bodies, and where these are sharp, serious injury may result. Even in the case of comparatively harmless bodies, such as coins, perforation of the oesophagus and death have resulted from attempts at dislodgement in this way. Blind attempts at extraction are not without danger, and, even when controlled by the fluorescent screen, injury to the mucous membrane has been inflicted. It is surely more in accord with surgical principles to view the foreign body *in situ*, and so define its relations to the surrounding oesophagus.

Oesophagoscopy is the safest and most certain method in the extraction of foreign bodies, and all other methods by bougie or coin-catcher, or by pushing the body into the stomach, should be avoided. The cases above detailed afford evidence of this. If undertaken at the earliest possible moment and before attempts by other means have complicated matters, the operation is perfectly safe and rarely fails. V. Hacker records a series of 38 consecutive cases of foreign bodies extracted by oesophagoscopy without harm to the patient.³ It has been urged that such cases may be dealt with by oesophagotomy, and even for impacted coins in children this serious operation has been carried out several times by Sebileau.⁴ As the most favourable statistics of oesophagotomy give a mortality of 20 per cent., all observers who have had experience of oesophagoscopy will agree that it is more suitable and certainly less dangerous. Of course, in certain conditions, the operation of oesophagotomy may be necessary. Where the foreign body is large and irregular, or has been impacted a long time, or has set up inflammatory trouble, it may be advisable to open the gullet, and, where gentle manipulation through the oesophageal tube has failed to move it, this should be done without delay, if the body lie within reach in the upper two-thirds.

To sum up, oesophagoscopy is the most certain method in the diagnosis and extraction of foreign bodies, and should be adopted as early as possible. Other methods, such as the use of bougies, coin-catchers, etc., should be avoided as not without danger, and under no circumstances used where a sharp body or the existence of a stricture below the body is suspected.

DIRECT LARYNGOSCOPY AND TRACHEOSCOPY.

In examining the larynx Kirstein's direct method is employed. With the tube spatula, the end of which has a fish-tail shape, a certain amount of pressure on the base of the tongue is necessary, and when that is well borne the results obtained are excellent. I generally use the model devised by Killian, and find it in every way satisfactory. For an ordinary examination in an adult, Kirstein's electric lamp throws the light well into the tube, which can be guided by the sense of sight as it passes downwards. It is necessary to cocaineize the base of the tongue, soft palate, posterior surface of the epiglottis, and the interior of the larynx with a 10 per cent.

solution of cocaine containing a few drops of adrenalin added. The patient is seated on a low stool, with the head supported by an assistant, and told to breathe regularly and avoid straining. The spatula is then warmed and introduced through the open mouth under control of the eye, guided by the forefinger. It is passed over the epiglottis and then downwards, or it may be passed round that structure to one side or the other, and the handle tilted up so as to bring the point over the entrance of the larynx. A good view may be obtained of the interior, and if it is desired to examine the trachea a narrow tube may be used and gently pushed down as far as the cords. If the patient is now told to breathe deeply it may be passed through the glottis. The interior of the trachea may then be cocaineized—a 10 per cent. solution being quite sufficient, as the mucous membrane is not very sensitive unless a catarrhal state is present. The tube may now be gently pushed as far as the bifurcation. For the tracheal examination a narrow tube, 9 mm. diameter in adults and 5 to 7 mm. in children, may be introduced by itself or through the tube-spatula, the latter greatly facilitating the procedure. The spatula is constructed in two halves so that it can be detached and removed after the tracheal tube has passed the glottis. In children it is usually necessary to administer a general anaesthetic, and the examination is done with the head hanging over the table. In adults, when operative measures are to be carried out, this position is certainly the most convenient and the one to be adopted. I have found the tube-spatula serviceable in operating on the epiglottis, and preferable to the indirect method, as illustrated by the following case:

A woman, aged 56, complained for two months of burning in the throat and slight discomfort in swallowing. There was some thickening of the epiglottis, which was superficially ulcerated at one point. A small piece excised through the tube-spatula showed it to be epithelioma. She was now put under a general anaesthetic, and by means of Hartmann's conchotome the disease was cut away freely, and nothing but the stump of the epiglottis left. There was no difficulty with haemorrhage, and the parts healed rapidly.

For examination of the posterior laryngeal wall the direct method is excellent. It gives a much better view of the inter-arytenoid region than the mirror, and curettage can be carried out directly and more satisfactorily. When there is great swelling of the arytenoids a short tube will permit an inspection which is often impossible with the laryngoscope.

In the removal of laryngeal tumours the direct method is of great value, and this is especially the case in the papillomata of children. For this purpose the little patient is put under chloroform in the dorsal position, the parts cocaineized, and the end of the fishtail tube-spatula placed between the base of the tongue and the epiglottis. By suitable pressure the epiglottis is tilted up, and the interior of the larynx brought into view. I employ a straight forceps with a small beak to remove the growths, and this can be done rapidly, blood giving little or no trouble, as it drains into the dependent pharynx. A number of cases so dealt with have given excellent results, as a more complete clearance was possible, the anterior commissure and subglottic space being brought within reach.

Direct tracheoscopy has similar advantages, bringing the whole length of the windpipe under observation. I have used it perhaps most frequently in estimating the effect of pressure on the trachea from without in enlargements of the thyroid. For the surgeon, it is important to know the extent of and point at which pressure takes place, and whether it is present on one or both sides. Compression by aneurysms may be detected, and the discovery of a pulsating swelling just above the bifurcation clears up the diagnosis in an obscure case. In a boy now under treatment, a gradually increasing stridor was seen to be due to stenosis of the trachea opposite the suprasternal notch, and in a child who had left off wearing a tracheotomy tube some time before the serious difficulty of breathing was found to be caused by a large granulation on the site of the old tracheal wound, almost blocking the lumen. Removal by the straight forceps put matters right.

Examination of the trachea may be carried out through a tracheotomy wound—direct lower tracheoscopy. In the case of stenosis just mentioned, tracheotomy was per-

formed for increasing dyspnoea, and a long catheter inserted. The opening facilitated the employment of a short tube of 7 mm. diameter, through which granulation tissue was removed, with great relief to the breathing.

For the removal of foreign bodies direct laryngo-tracheoscopy is of especial value. The following cases illustrate its use:

(a) An infant 9 months old was brought to hospital with the history of having swallowed a safety-pin six weeks before. The mother stated that the child showed no sign of inconvenience until a few days before advice was sought, when a slight fullness was noticed on the right side of the throat. The child looked well nourished, was placid, and nothing appeared amiss. Chloroform having been administered and the tube-spatula passed, I came at once upon a foreign body. It was an open safety-pin, the point lying inside the larynx, the protector fixed in the right pyriform sinus, and the hinge close to the right border of the epiglottis. It was somewhat firmly fixed, but by means of the straight laryngeal forceps it was loosened and extracted. It measured in length $1\frac{1}{2}$ in. (Fig. 5).

(b) A child 12 months old was admitted to hospital with difficulty of breathing and well-marked stridor. The history was that three months previously, whilst playing with a metal collar-stud, the child had a coughing fit and the stud could not be found. Nothing unusual, however, was noticed about the child, except a crowing noise made in sleep. Two months later difficulty of breathing set in which increased in degree. A skiagraph showed the stud fixed in the larynx in an oblique position with its head anteriorly. This I confirmed on direct examination, and made out as well considerable oedema of the entrance of the larynx. The foreign body was readily seized by the head, but it required firm traction to free it from the oedematous tissue around. The breathing was at once relieved and in ten days' time all trace of stridor had disappeared. The absence of interference with respiration at first, was no doubt due to the situation of the stud which kept the larynx open, and it was the gradual onset of oedema which led to the block (Fig. 6).

(c) A girl, aged 8, came to hospital with laryngeal obstruction of a week's duration. She was not hoarse, and, with the laryngeal mirror, a glimpse was got of a body, situated below the glottis. As the difficulty of breathing was said to have come on after teeth extraction, a broken tooth was suspected and a skiagraph strongly supported this. After admission the breathing suddenly became worse, and it having been ascertained that the foreign body had become displaced somewhat downwards and dyspnoea being very urgent, a low tracheotomy was done. The pharynx and larynx being now cocaineized, a good view of the body was obtained through Killian's tracheoscope, and I had no difficulty in extracting it with the straight laryngeal forceps, when it proved to be, not a tooth, but a stay-eyelid somewhat crumpled and covered with calcareous incrustation. The child admitted that she had played with it some time before, but had no recollection of swallowing it (Fig. 7).

The direct examination of the lower air passages, or bronchoscopy, brings into view the bronchi and their ramifications. It may be carried out through the tracheotomy wound where that exists—lower direct bronchoscopy—or through the larynx, upper direct bronchoscopy. The latter method is always chosen unless tracheotomy has already been performed. The preliminaries are the same as in tracheoscopy. If the patient possesses good self-control, the sitting posture may be adopted, but for most, and especially if manipulative procedures are contemplated, the recumbent posture, with the head hanging over the end of the table, is more suitable. Longer tubes are necessary, 30 cm. to 35 cm. in adults, and 15 cm. to 25 cm. in children. The passage of the tube into the larynx and trachea is facilitated by the tube-spatula through which it is passed. The interior of the trachea and bronchi are cocaineized, and the tube pushed gently down past the bifurcation. The right bronchus being more in a line with the trachea is easily explored into the base of the lung. To enter the left slight pressure may be necessary, which is perfectly safe, as the wall of the passage is elastic and extensible. Divisions of the bronchi to the second or third degree may be investigated. This method has made possible the removal of foreign bodies which have been aspirated into the bronchi, and the series of successful extractions recorded by Killian testify to its brilliant results. In cases where a foreign body is suspected, the bronchoscope is of great value in settling the question.

A child aged $2\frac{1}{2}$ was sent to hospital by its medical attendant with the history that a week before it had a severe suffocative attack, thought to be due to something it had swallowed. On three subsequent occasions it had slighter attacks of dyspnoea. On examination the breath sounds on the right side were not so marked as on the left. Under chloroform I examined the upper passages, and then passed a tube of 6 mm. diameter into the right bronchus, and well into the lower lobe. Beyond

some increase in secretion, nothing was detected. The left bronchus was similarly explored with a like result. The child was kept under observation for some time, but there was no recurrence of the attacks.

It has been pointed out by Killian that bronchoscopy may be of service in localizing pulmonary cavities—a matter of great importance in the surgery of the lung. From the point of view of diagnosis the following case is of some interest:

A girl, aged 8, was admitted to the medical wards suffering from purulent expectoration of six months' standing. The pus was ejected in considerable amount, generally once a day in the morning, and had the appearance of coming from a lung cavity. The physical signs were indefinite, being chiefly loud rhonchi over both bases. With a view to ascertain the source of the pus a bronchoscopic examination was made, the child being under chloroform. The right bronchus was explored into the base of the lung and the openings of the branches from the middle and upper lobes noted. They contained, however, only a small quantity of stringy mucus. On inserting the tube into the left bronchus a quantity of pus was ejected through it with some force. After careful mopping, most of the pus appeared to come from a branch of the bronchus serving the middle of the lung. Ten days later another examination was made, the tube on this occasion being passed at once into the left bronchus and with the same result, a large quantity of pus coming out of the same bronchial branch. The child suffered no ill effect from the examinations, and was about on the second day. As the general condition was improving under medical treatment this was continued.

In such a case it would be possible to pass a probe into the branch and have a skiagraph of it taken *in situ*, so as to facilitate localization; or bismuth might be insufflated into the cavity and a skiagraph made for the same purpose. In the event of surgical procedures, for example, pneumotomy, the presence of the probe would enable the surgeon to locate the cavity, often a matter of great difficulty in a partially-collapsed lung.

From the evidence that has been produced it appears to me abundantly clear that direct examination of the air passages is a method of the greatest utility. It is especially welcome in the treatment of that group of cases which has always been so difficult and has yielded not a few tragedies, namely, foreign bodies in the air passages, and it is earnestly to be hoped that the time has now come when workers in this country will recognize its enormous advantages.

REFERENCES.

- ¹ *Lancet*, 1868, i, p. 470. ² *Diseases of Throat and Nose*, vol. ii, p. 15. ³ *Deut. med. Woch.*, No. 39, 1904. ⁴ *Annales des Malad. de l'Oreille*.

HUMAN AND BOVINE TUBERCULOSIS.

THE DANGER OF INFECTED MILK.

By NATHAN RAW, M.D., M.R.C.P.LOND., F.R.S.EDIN.,

PHYSICIAN, MILL ROAD INFIRMARY, LIVERPOOL; BRITISH MEMBER OF THE INTERNATIONAL COMMITTEE FOR THE PREVENTION OF CONSUMPTION.

IN the *BRITISH MEDICAL JOURNAL* of 1903, 1904, and 1905, I have had the pleasure of expressing my views as to the part played by tuberculous cattle in the spread of tuberculosis amongst humans, more especially in children. The intricate and difficult problem as to the exact relationship between human and bovine tuberculosis is still unsolved, because the actual test—namely, the experimental test of inoculating humans is inapplicable, and always will be. Hence we must work by roundabout methods, making clinical observation our basis, and relying on inferences from analogy, pathological research, and minute and careful comparisons between the bacilli of various origins for our ultimate conclusions.

I would like to follow the lines of my original paper of 1903, since I have no reason to modify the view then set forth—namely, that human and bovine bacilli are divisible into two distinct types of a common species:

1. *Typus humanus*.
2. *Typus bovinus*.

Long-continued residence in a particular host has resulted in the bacilli assuming characteristics which serve to distinguish it from others, and the fact that tubercle bacilli have lived for thousands of years in human lungs would be ample evidence for assuming a difference between bacilli which had lived for centuries in cattle.

To what extent infectious agents are restricted in their activities is shown by the fact that only *one* of the infectious

diseases in man—the bubonic plague—is shared by one of the lower animals—the rat. The plague is known to spread freely from rat to rat, from rat to man, and less freely from man to man, so that some are inclined to the view that plague is primarily a rat disease.

There are other infections which may be transmitted from animals to man, but only under exceptional circumstances (Smith).

Another fact of the most profound importance in studying this problem is that for centuries man has been accustomed to feed upon cattle and their products (milk, butter, cheese, etc.), and in this way the human body has become tolerant to bovine tubercle bacilli.

Whilst I firmly believe that human and bovine bacilli are different types of parasites, yet I am convinced that bovine bacilli are freely communicable to humans and are the cause of a large amount of tuberculosis in children.

Koch holds that human and bovine tuberculosis are separate and distinct diseases, and that bovine tuberculosis if conveyed to man cannot set up generalized human tuberculosis.

Koch, in addition, believes that phthisis is conveyed from one person to another by direct infection, especially from contact with an advanced case of the disease, and that this is by far the commonest cause of the spread of the disease. Von Behring, on the other hand, holds diametrically opposite views. He says that human and bovine tuberculosis are the same disease, and that nearly all tuberculosis is the result of infection during infancy by means of infected milk, and that direct infection from person to person is not proved. I venture to submit that the truth will be found between these opinions, and, whilst I firmly believe that human and bovine bacilli are distinct varieties of an original species, yet they are sufficiently distinct to produce different and characteristic lesions in the human body; and I am also convinced that bovine bacilli give rise to a large amount of tubercle in the child through infected milk.

During the last three years I have made a very large number of pure cultures of tubercle bacilli from various sources—human, bovine, and avian. My original cultures were obtained from Berlin, Copenhagen, and Lille through the kindness of Professors Koch, Bang, and Calmette. Three cultures were obtained from each laboratory, and, after growing a very large number, one is bound to admit distinctive cultural differences on the same medium between human and bovine bacilli. All are agreed on the distinctive characteristics of avian bacilli.

So much, then, for the bacteriological side, which has received important support from the Imperial German Commission appointed to investigate the question of the relationship between human and bovine tuberculosis. They have reported entirely in favour of their being distinct varieties, and out of 23 cases of tuberculosis from human sources examined they found 6 to be of bovine origin, and all from children.

From the clinical and pathological side, my contention is considerably strengthened, and for this purpose I have examined over 4,000 cases of tuberculosis which have been under my care during the last nine years, a large number of which were children. In addition I have made over 1,600 *post-mortem* examinations on tuberculous cases, and most of them have been examined minutely.

Leaving for a moment the difficult question of modes of infection, I have come to the conclusion that man is attacked by two distinct varieties of tubercle, one conveyed by infection from person to person, the other received into the body through tuberculous milk and dairy produce. After examining some thousands of cases of phthisis one cannot but be impressed with the fact that the tuberculous process is confined strictly to the lungs and intestines in a very large percentage of cases—in fact, it is rare to see enlarged lymphatic glands, tuberculous joints, lupus, or peritonitis associated with true phthisis pulmonalis.

As a primary disease, phthisis seems to originate in the lungs as a result of inhalation of infected tuberculous matter, and secondarily to cause tuberculous ulceration of the intestine by swallowed sputum.

Other forms of tuberculosis, such as enlarged lymphatic glands in the neck, tuberculous peritonitis, tuberculous joints, and probably tuberculous meningitis and lupus, are most likely caused by bovine bacilli being absorbed through the digestive tract in milk and other food, such as butter, buttermilk, cheese, sausage, etc. Enlarged glands in the