other fluid material is concerned, the method as ordinarily employed (1919¹) is satisfactory, since solution is effected in a comparatively short time and the tubercle bacilli are not damaged; but, in the case of tissues, prolonged exposure to the reagent may be necessary before the material becomes sufficiently fluid to allow of its being centrifugalized, and in these circumstances the growth of tubercle bacilli, as well as that of less resistant organisms, may be inhibited. In the methods here described the tissue material is reduced to a very fine state of division by mechanical means, and a very short exposure to the antiformin serves to destroy bacterial contamination.

Process.

The tissue to be investigated is cut up into small pieces with scissors, and is thoroughly rubbed up in a mortar with a small amount of dry sterile quartz sand. The rubbing up is continued till the fibrous tissue is disintegrated as far as possible, and the material forms a slightly moist, crumbling mass. The contents of the mortar are then washed into a wide test tube with 15 to 20 c.cm. of sterile saline solution. The sand is allowed to sediment for a few minutes; as it falls, it carries down with it any coarser particles of tissue which remain. The supernatant fine suspension is then pipetted off, and thoroughly mixed with an equal volume of 15 per cent. antiformin. After five minutes, during which it should be stirred continuously, the mixture is centrifugalized at high speed for a few minutes, and the supernatant fluid is discarded. The sediment is shaken up with sterile saline solution and again centrifugalized. The shaking up of the sediment with sterile saline solution and centrifugalizing are carried out three times in all, so that no trace of antiformin remains. The sediment resulting from the final centrifugalizing is used for making cultures, or, after emulsifying with a convenient amount of sterile saline solution, is injected into a suitable animal. It may be mentioned at this point that in none of a large number of films made from the sediment obtained by this procedure was any evidence found that the bacilli tended to be broken up. It is certain that their vitality cannot be seriously diminished as in some cases growth was obtained although the tubercle bacilli were present in such small numbers that none could be demonstrated in films. Further, in many instances, control cultures on agar were put up at the same time as the egg medium cultures. These invariably remained sterile.

Preparation of Medium.

The medium used is simple to prepare and is a modification of Dorset's medium (1919²), in which the contents of eggs are mixed with a tryptic digest of horse heart instead of with water. Various digests were tried, including horse heart digested for varying periods, Cole and Onslow's casein digest (1916³), and a tryptic digest of gliadine. All the media containing a protein digest were found to yield a more rapid and abundant growth than the original Dorset medium, but the product which so far has given the most satisfactory result is that obtained by digesting horse heart with trypsin for a period of three weeks.

Preparation of Horse Heart Digest.

Take:

Horse heart, freed from fibrous tissue and fat as far as possible, and minced	...	500 grams.
Water	...	1,000 c.cm.

1. Render faintly alkaline to litmus, using 20 per cent. sodium hydrate, and heat slowly to 80° C.
2. Cool to 40° C. and add 1 per cent. liquor trypsin co. (Allen and Hanbury) and 30-40 c.cm. chloroform. Shake well and cork with a loose stopper.
3. Incubate at 37° C. for ten days, shaking daily.
4. Add a further 1 per cent. liquor trypsin co. and leave in incubator for another ten days without shaking.
5. Render slightly acid to litmus with glacial acetic acid and boil for fifteen minutes.
6. Leave overnight in ice chest and decant off clear fluid, or filter through Chardin paper.
7. Adjust reaction to 1.2 per cent. acid to phenolphthalein; autoclave at 118° C. for twenty minutes; cool and filter; sterilize.

It is important to test the reaction of the digest at intervals during the period of incubation, as it tends to become acid, and, should this occur, a further addition of alkali must be made till it is again just alkaline to litmus.

The contents of several fresh eggs are well beaten up, and the above digest is added in the proportion of one part to three parts of the beaten eggs and thoroughly mixed. The mixture

is filtered through muslin to remove air bells and filled into tubes which are heated in the sloped position at 70° C. till complete solidification has occurred. The medium is then sterilized high up in the Koch sterilizer (to avoid bubbling) for twenty minutes on each of three succeeding days. Prepared in this way the medium forms a smooth slope, free from air bells, of a pale yellow colour. Glycerin is added to the medium before solidifying, when desired.

An important point to be observed in the preparation of Dorset's medium or of this modification is that the eggs used must be as fresh as possible. Commercial "fresh" eggs are often quite unsuitable, and the more nearly the eggs approximate to "new-laid" the better are the results likely to be. Whatever the component of new-laid eggs may be which renders their use in the preparation of media more favourable to the growth of tubercle bacilli, it not only resists the heating incident to sterilization, but is actually rendered more stable by it, since media prepared from fresh eggs retain their growth-producing properties for many weeks at least, whilst these properties are lost in a few days if the eggs are kept before being made into medium.

On this medium growth, both in primary cultures and in subcultures, is rapid, being visible, as a rule, in less than a week, sometimes in four days, and copious in less than three weeks. Bovine types of bacilli are markedly inhibited by the presence of glycerin in the medium, as occurs in Dorset's medium prepared in the ordinary way. The differences between the cultural characteristics of the human and bovine strains are very well brought out, the human type producing a copious, heaped up, dry and wrinkled growth, often with a slight brownish tint; the bovine a growth which is flatter, fairly smooth, and with a distinctly slimy appearance. So far, direct cultures of tuberculous material from twenty-five cases have been made on this medium, and in twenty-four of these growth has been obtained. The remaining case was one of tuberculous meningitis in which only one tubercle bacillus could be found in films from the sediment obtained on centrifugalizing a large amount of cerebro-spinal fluid.

SUMMARY.

1. The disintegration of tuberculous tissue and the destruction of contaminating bacteria by antiformin can be greatly facilitated by a preliminary trituration of the tissue with quartz sand.
2. This procedure appears to exercise no deleterious effect on the bodies of the bacilli or on their vitality.
3. The growth of tubercle bacilli on egg media of the Dorset type is enhanced when the media are prepared with a twenty-one day tryptic digest of horse heart instead of with water.
4. Egg media intended for the growth of tubercle bacilli should be prepared from eggs which are as nearly as possible new-laid.
5. The addition of glycerin to such media inhibits the growth of bovine strains, and the other cultural characteristics of bovine and human strains are well defined.

NOTE.—Further experiments with these and other digests are being carried out with a view to the preparation of fluid media; and also, by the use of more delicate indicators, for the determination of the optimum reaction of the various components.

REFERENCES.

- ¹ Muir, R., and Ritchie, J.: *Manual of Bacteriology*, 1919, seventh edition, p. 297.
- ² Ibid., p. 46.
- ³ Cole, S. W., and Onslow, H.: *Lancet*, 1916, ii, p. 9.

NASAL DRILL: AN INVESTIGATION OF ITS VALUE IN THE TREATMENT OF ADENOIDS.

BY

GERTRUDE H. HICKLING, M.D., D.P.H., B.Sc.

IN the *Lancet* of August 24th, 1918, and in several later issues, some remarkable results were published of the effect on adenoids of systematic nasal drill, as conducted by Mrs. Handcock. At that time, owing to the depletion of staff at the various hospitals, numbers of cases of adenoids waited month after month for operation. Thus the moment seemed opportune to ascertain whether the troublesome symptoms of these children could be alleviated by means other than surgical. I therefore went up to London and Mrs. Handcock kindly demonstrated the method to me.

Subsequently a class conducted on similar lines was held weekly for six months at the out-patient department of the Manchester Children's Hospital. For test purposes various types of cases were sent to the class. An average of twenty children attended, ranging in age from $3\frac{1}{2}$ years to 14 years. The parents were present at the drill, and by their regular attendance showed their interest in the proceedings.

Method.

The children stand in rows with as much space as possible between each individual in a room with widely opened windows. Each child is given a piece of soft paper to serve as a handkerchief. Then at the word of command:

One : All stand erect (chest out, shoulders back, etc.).

Two : Hold paper ready (spread out in the left hand beneath the nostrils).

Three : Grasp the top of the nose (between the eyes, with the right thumb and forefinger, the elbow being raised to shoulder level) leaving the nostrils open.

Four : Blow down the nose (bowing the head forward and down and at the same time depressing the right elbow to the waist line, the top of the nose still being held).

Five : Breathe in.

Exercises three, four, and five are then repeated in a rhythmic manner about ten times, the action somewhat resembling that of a pump. After this each nostril is "pumped" separately in the same way, each side being held closed in turn. The soiled paper, which catches the discharge as it flows unimpeded from the uncompressed nostrils, is now burned and replaced.

The nose and its accessory sinuses having been to some extent cleared by this preliminary pumping, irrigation of the nasal cavity from above down is now obtained by means of a free flow of lymph induced by sneezing, thus: A mild, non-irritating nostril snuff is handed round. Mrs. Handcock's powder was used at first; afterwards a similar preparation made by the hospital dispenser, Mr. Teesdale, containing menthol and a soap basis. Each child takes a pinch of the powder, and lightly flicks the septum just within the nostrils. The powder is not sniffed up. This feeble stimulation is sufficient in the majority of cases to induce a sneeze. Immediately after sneezing "nose pumping" is resumed. Sneezing and pumping may then be repeated until discharge from the nostril ceases or becomes scanty. Lastly, nose breathing exercises are performed, the nostrils being used alternately and together.

The importance of nose breathing and of regular daily nose "toilet" is constantly emphasized, and powder is provided for the drill to be carried out at home.

Results.

General.—Improvement in the physique of the class was soon noticeable; the carriage is better, chests are fuller and shoulders less curved, mouths gape less, and there are fewer cases of sniffing and running noses. Mothers report greater freedom from colds, less restless sleep, and cessation of snoring. Speech is clearer and hearing more acute. One child got through the winter without having his "annual" February attack of bronchitis. No member of the class contracted influenza during either of the two epidemics, although in some cases other persons in the household had the disease. Improvement of appetite and of digestion and a gain in weight coincided in several instances with the disappearance of the nasopharyngeal discharge. One case of relapse after operation is now free from symptoms.

Local.—With the exception of a diminution, amounting in some cases to an actual cessation of the nasopharyngeal discharge, very little local change was observed in the throats—that is, the relief of symptoms is out of all proportion to the visible improvement in the local condition. Certainly in some cases slight shrinkage seemed to have occurred, but in no case could it be said that the growths had disappeared. This result is disappointing, in view of the cases recorded in the *Lancet* referred to above.

Nevertheless the experiment would seem to show that:

1. Cases where operation is inadvisable on general grounds may be relieved of their main symptoms by this method of nose drill.
2. Some cases of chronic nasopharyngeal discharge attributed to the presence of adenoids can be cured without operation.
3. Operation may be avoided, that is, rendered unnecessary in cases of slight adenoids.
4. Daily nasal drill lessens the chance of contracting infections.

Two special fields of usefulness of the drill suggest themselves in addition.

Post-operative.—To keep the nasal passages clear and so avoid recurrence.

Preventive.—The introduction of nose drill into the daily routine of nursery schools and infant schools should do much to bring about a decrease in adenoid case incidence

and do away with the majority of those cases of sniffing, sore-nosed children to be seen by the dozen at any medical inspection of school children.

In conclusion I should like to take this opportunity of thanking the hospital staff for permitting and assisting the experiment, more especially Dr. Lapage, at whose out-patient clinic the class was held, and who, on his return from service overseas, allowed me to continue the class, and Dr. Arnold Jones, aural surgeon to the hospital.

Note by C. P. LAPAGE, M.D., M.R.C.P.

On my return I found that Dr. Hickling, who had been conducting my out-patient department during my absence, had instituted a nasal drill class. I asked her to continue to hold the class in order to finish the experiment. From personal inquiry I can support all that Dr. Hickling has said about the progress and relief of symptoms in those cases who had not markedly enlarged tonsils and adenoids. The results certainly justify the continuation of this class, and I intend to hold a further trial, and if successful, to make the class part of my out-patient practice for a certain selected class of case.

One does not for a moment wish to give the impression that cases of hypertrophied tonsils and adenoids of any size can be cured without operation, because no amount of drill can remove tissues which are hypertrophied; but some cases are inflamed and swollen rather than hypertrophied, and in such there is no doubt that methods making for removal of stagnation and chronic inflammation are a very important factor in treatment. It is quite possible for reduction of inflammation to cause, shrinking sufficient to relieve symptoms in mild cases. It is not an unknown experience to find that in cases in which operation has been decided upon but which have had for some reason or other to wait for a little time for that operation, the tonsils and adenoids have shrunk so much in the interval that operation has become unnecessary.

I hold that the majority of cases of tonsils and adenoids are due to infection, which becomes chronic and leads to obstruction, first by inflammation and swelling and then by ultimate hypertrophy of the lymphatic tissues. Under modern conditions children are more exposed to infection than formerly, because they have so many more opportunities for such infection. Gatherings of children indoors, as at school and places of amusement, or in badly ventilated chambers such as trams and railway carriages, are specially fertile sources of infection. Other causes, such as debilitating factors acting on the general health and vitality, also play an important part, probably because they lead to lowered general resistance to infection. Again, irritating atmospheric conditions and any unhygienic state of the mouth have an effect, the former being especially shown by those cases who suffer from chronic catarrh and frequent colds in town atmospheres but do well in country air or at the seaside. Whatever the cause, there is no doubt that there is a very large number of cases of inflamed and enlarged tonsils and adenoids at an out-patient department who have troublesome symptoms and yet are not sufficiently bad to need operation, either because the enlargement is intermittent or because it is slight.

As a summary one can say that in cases with much hypertrophy the local results are, as can only be expected, poor, but in cases with inflammation and little hypertrophy the relief of symptoms such as headache, restless sleeping, and liability to colds, is marked. Nasal drill is therefore of great value for such cases, and it should also be of value as a post-operative measure. It is of value over and above the physical exercises employed, because the improvement in the nasopharyngeal symptoms was far greater than could have been accounted for by the mild physical exercises which were used as an adjunct to the nasal drill. For cases which are hypertrophic and not largely inflammatory, and which are therefore sent for operation, nasal drill may be useful as a post-operative measure. The best methods of conducting nasal drill and the period of time over which such exercises should be continued can only be determined by experiment.

SIR GEORGE FRAMPTON'S monument to Nurse Cavell has been placed in position at the point where Charing Cross Road meets St. Martin's Lane. The crowning figure on its lofty pedestal will look down on Trafalgar Square. Among the monuments of London it will be remarkable for its dignity and the originality of its conception.

MESSRS. CHAS. J. SAWYER, Ltd. (23, New Oxford Street, London), have issued a catalogue of works on medicine, surgery, anatomy, etc., from the sixteenth century to the nineteenth, with a selection of engraved portraits of medical men. The prices of both strike us as moderate.