At the end of twenty-four to twenty-six hours the cholera colonies have attained a delicate pink colour with a faint pink halo round them, while the other colonies still remain blue; also the colonies are of a good workable size to pick off and proceed with the serological tests.

After forty-eight hours, if the cholera colonies are in excess and the plate spread somewhat thickly, the medium itself becomes distinctly acid, and colonies other than those of cholera take on the pink tinge. However, the cholera colony even at this time can still be distinguished by the deeper red centre which the other colonies lack.

The only other organisms which are known to acidify starch are some of the diphtheroid group and some of the non-pathogenic water vibrios. These should not present any great difficulty, as Gram's stain on the one hand, and the serological test on the other, dispose of these organisms.

The following experiments have been carried out:

Experiment 1.—Ten cubic centimetres of broth were inoculated by emulsifying some faeces in it. To this was added a very small quantity of a culture of *V. cholerae*. The tube was well shaken, and 0.25 c.cm. of the broth transferred to a second tube of broth. Two drops of this broth were immediately plated on to the medium, the same rod being successively used for three plates. The first plate was too crowded to be of any use, but the second and third plates gave good discrete colonies, and on these plates the cholera colonies could be recognized in eighteen hours. Every colony on these plates was picked off, and all the pink colonies were proved to be cholera, whilst the blue colonies in every case proved otherwise.

Experiment 2.—The first broth tube from the previous experiment was kept at room temperature for two days. At the end of that time 0.25 c.cm. of this broth was added to 10 c.cm. of fresh broth, and a drop of this was immediately plated out as in the first experiment. The plates were rather too thickly spread to give good discrete colonies, but the cholera colonies could be easily detected. These colonies were again tested with cholera immune serum, and the differentiation proved correct.

Experiment 3.—This experiment was undertaken to see whether any of the normal water vibrios were capable of acidifying starch. The water was taken from a pond after heavy rain, and was taken straight to the laboratory. Some of the water was first enriched by incubating in peptone water for a few hours. One drop of this peptone water was then plated, and at the end of eighteen hours a few pinkish colonies were present. Some more of the water was plated direct, and in this case it took twenty-four hours before any pinkish colonies appeared. In both cases the pink colonies that were present were of a lighter shade than that which is produced by the cholera vibrio, and I do not think that they are very likely to be confounded with it. In addition, the red centre to the colony that is produced by the cholera vibrio in forty-eight hours was not present in these cases. This organism proved to be a normal vibrio of water.

Other Experiments.—The following organisms were also plated out: *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, coliform organisms, *B. dysenteriae* (Shiga and Flexner), *B. enteritidis* (Gaertner), streptococci, *V. Finkler Prior*, *V. metchnikovi*.

In no case did the above organisms acidify the medium, except in the case of the two vibrios, which produce a slight pink halo, but the colonies themselves, when viewed obliquely, do not become pink until a very much longer time has elapsed than that required to recognize the vibrio of cholera.

REFERENCE.

¹ Gordon, M. H.: Note on the ability of *V. cholerae asiaticae* to decompose starch, *Centralt. f. Bakt.*, 1 Abt., orig., Bd. 42, 1906.

NOTE ON THE VALUE OF HEXAMINE IN AURAL SUPPURATION AND IN MENINGITIS.

BY

DOUGLAS GUTHRIE, M.D., F.R.C.S.E.,

LIEUTENANT R.A.M.C.

HEXAMINE (urotropin) has come to be recognized as the most efficient of urinary antiseptics. Its action depends on the fact that it is for the most part excreted by the kidneys, and, in an acid urine, undergoes decomposition, liberating free formaldehyde.

Various experimenters have stated that after administration the drug may be recovered not only from the urine, but from the bile, pancreatic juice, saliva, milk, etc., from the synovial and cerebro-spinal fluids, and from nasal and aural discharges.

Crowe demonstrated that hexamine given by the mouth could be detected in the cerebro-spinal fluid withdrawn by lumbar puncture one hour later. He also asserted that

after the subdural inoculation of dogs and rabbits with streptococci the administration of hexamine appeared in many cases to avert the onset of meningitis, and, consequently, he advocated its routine use prior to operations on the brain or spinal cord. Barton followed up these observations by suggesting that the drug might prove useful in middle-ear suppuration, as he had been able to recover it from aural discharges.

It seems probable, however, that there are two sources of fallacy in the results and deductions of these workers. First, they employed Hehner's sulphuric acid test, which does not differentiate between the drug hexamine and its decomposition product formaldehyde. Secondly, hexamine is not split up, and hence can be of no antiseptic value in any but an acid medium. Ear discharges and normal cerebro-spinal fluid are alkaline.

In view of these considerations the following investigation was undertaken. The first fallacy was obviated by the use of the Rimini-Burnam reaction, whereby formaldehyde can be detected in urine in a dilution of 1 in 150,000.

Three solutions are required:

- (1) $\frac{1}{2}$ per cent. solution of phenylhydrazine hydrochlor.
- (2) 5 per cent. solution of sodium nitro-prusside.
- (3) Saturated solution of caustic soda.

A small quantity of the fluid to be examined is placed in a test tube, and three or four drops of each of solutions 1 and 2 are added, then a few drops of solution 3 are poured down the side of the tube. A dark green colour indicates the presence of formaldehyde. Should the test prove negative, it is repeated with a fresh sample of the fluid which has been boiled with a few drops of sulphuric acid, when a positive result will show that hexamine was present.

As regards the second possible source of error, it was thought that if hexamine actually appeared in aural discharges its decomposition and consequently its antiseptic action could be favoured by the introduction of weak acids into the ear, just as intranasal lupus is treated by giving iodides by the mouth and applying hydrogen peroxide locally. It is known that in meningitis the reaction of cerebro-spinal fluid changes from alkaline to acid, a change which would appear to favour the action of hexamine.

Four untreated cases of suppurative otitis media were investigated, all the patients being children attending the ear and throat department of the Royal Hospital for Sick Children, Edinburgh. Local treatment was stopped. The hexamine was given by the mouth and in dilute solution. The fluids examined were: (1) Washings obtained by syringing the ear with a few cubic centimetres of distilled water, and (2) the urine.

CASE I.—H. H. Chronic otitis media dating from attack of scarlet fever a year ago. Large perforation. Much fetid pus. After 10 grains of hexamine, thrice daily for a week, the urine contained formaldehyde, the ear washings no formaldehyde and no hexamine. The dose was increased to 20 grains thrice daily, but had to be stopped in four days on account of pain on micturition and enuresis nocturna. Formaldehyde was present in quantity in urine, but no formaldehyde or hexamine in the ear washings.

CASE II.—L. B. Chronic otitis following measles two years ago. Membranes totally destroyed. Curdy fetid discharge. Ten grains of hexamine was given thrice a day for a week. The urine was then found to contain hexamine, but no formaldehyde; its reaction was neutral. The ear discharge showed neither hexamine nor formaldehyde. After 20 grains of hexamine thrice a day for a second week the results were exactly similar.

CASE III.—C. P. Chronic otitis for eighteen months. Small perforation. Profuse discharge. At the end of the first week, 10 grains of hexamine thrice daily, the urine contained formaldehyde. No hexamine or formaldehyde in aural discharge. At the end of second week (20 grains) these results were unaltered, but the patient had frequency of micturition.

CASE IV.—J. G. Discharge from right ear for three months. Small central perforation. Much muco-pus. Formaldehyde present in urine, but neither hexamine nor formaldehyde in the ear washings. Increase of the dose did not alter results.

It will be seen that hexamine or formaldehyde appeared in the urine in all cases, but in no case could either substance be detected in the aural discharge. The drug was given in fairly large doses, and symptoms of intolerance appeared in two of the cases.

With regard to the cerebro-spinal fluid, results appear to point to a similar conclusion, namely, that hexamine either does not make its way into this fluid at all or appears in such small quantity as to be of no therapeutic value. Intradural injections of hexamine may conceivably have some effect on the meninges near the site of injection,

but oral administration is useless. Two cases may be cited in support of this view.

1. E. M., suffering from pneumococcal meningitis, was given 30 grains of hexamine one hour before lumbar puncture. The cerebro-spinal fluid was turbid, reaction neutral; it contained no hexamine or formaldehyde. (Rimini-Burnam test.)

2. D. H., suffering from meningococcal meningitis, was given 50 grains of hexamine. Lumbar puncture one hour later. Cerebro-spinal fluid turbid, acid reaction; it contained neither hexamine nor formaldehyde.

In reading reports of cranial and spinal injuries sustained during the present war one frequently encounters the statement that "hexamine was given," but an opinion is seldom expressed as to the value of such treatment. The matter can be settled only by further investigations along the lines indicated above.

I am indebted to Dr. John Thomson and to Dr. W. G. Porter for their permission to record the cases.

BIBLIOGRAPHY.

- S. J. Crowe: Urotropin in the Treatment of Systemic Infections. *Johns Hopkins Hospital Bulletin*, September, 1912.
S. J. Crowe: On the Excretion of Urotropin in the Cerebro-spinal Fluid, and its Therapeutic Value. *Johns Hopkins Hospital Bulletin*, April, 1909.
Barton: The Elimination of Urotropin by the Mucous Membrane of the Middle Ear. *Journ. Amer. Med. Assoc.*, liv, 1910.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CERTAIN BODIES FOUND IN THE URINE IN CASES OF TRENCH NEPHRITIS.

In the centrifuged deposit of the urines of twenty-five cases of trench nephritis treated at this hospital peculiar and distinctive bodies were discovered by our laboratory assistant, Mr. Mann. These bodies had the following characters:

The most striking consisted of three circular cells arranged somewhat in the form of a pair of spectacles. They were of a greenish or greenish-yellow colour. The individual cells measured about 26μ in diameter, but the combined three when joined together measured only 60μ in their greatest diameter, as they were superimposed or overlapped. The general outline was constant; in other words, each retained its original position. The contents were granular, with at times a nucleus circular in outline situated slightly out of the centre of the cell.

The second form met with was a circular granular body having all the characters of the laterally-placed bodies above described. This measured exactly the same as the individual cells described above. No doubt this was a free form.

The third form was an irregularly granular body with an indistinct outline, and probably this represents a degenerated form of the second form or the central cell of the first. From the second form distinct pseudopodic projections were seen.

In order to eliminate accidental contamination catheter specimens were taken in sterilized flasks from some of the patients.

A number of urines from other diseases were centrifuged and examined but no similar cells were found.

We are indebted to Dr. Coles of Bournemouth for much assistance.

Mont Dore Military Hospital,
Bournemouth.

A. R. FRIEL,
J. DRUMMOND,
Captains S.A.M.C.

THE VALUE OF A MILK DIET PRIOR TO THE USE OF KHARSIVAN OR SALVARSAN.

The following figures show, I think, that if a person to whom salvarsan or kharsivan is to be given is put on a milk diet for a period of twenty-four hours prior to the operation, the toxic effects of the drug are reduced to a minimum, and the patient suffers little or no discomfort.

Prior to the routine use of milk in all these cases, the majority of the venereal patients in the Union Hospital, Gateshead, were on an ordinary diet unless they were so ill that they could not take it, when, as a general rule, their diet consisted solely of milk.

My attention was drawn to the possible value of this diet one day when I saw five patients to whom salvarsan had been given the previous day. Of the five, two who had

had milk only had no toxic effects whatever, whilst the other three, who were on ordinary diet, were really ill. The same thing occurred in the case of four women shortly afterwards. Two on milk were very comfortable, while the other two, on ordinary diet, had vomiting and diarrhoea. We then tried the effect of milk in all cases, and the results in the first 100 injections are given below. The procedure was to give four pints of milk only for twenty-four hours prior to the injection and an ordinary diet afterwards. In some cases patients had a full dinner a few minutes after the injection with no ill effects.

The usual toxic results that we had previously met with were (1) persistent headache; (2) vomiting; (3) diarrhoea; (4) rigors; (5) albuminuria. Of the patients on milk diet, in 77 there were no toxic effects; of the remaining 23 all had headache and 19 of them vomited—1 six times, 2 four times, 6 three times, 8 twice, and 2 once. Of those who vomited, 9 had diarrhoea also, and so had 3 of the remaining 4; 1 patient had albuminuria; there were no rigors.

Prior to the use of the milk one might say that every patient complained of headache to a greater or less extent, whilst the same might be said of vomiting.

LIONEL L. WESTROPE, M.D.,
Medical Officer.

Union Hospital, Gateshead-on-Tyne.

THE PREVENTION OF GALL STONES.

WHEN a sufferer from the agonizing attacks of gall stones asks his medical adviser what he can do to prevent other attacks, he usually receives the conventional answer that he must diet himself, take active exercise, and a course of alterative medicine, such as sodium phosphate. I believe these methods are quite useless. Stone in the gall bladder is, like stone in the urinary bladder, caused by the bladder not being completely emptied each day, and the unexpelled residue decomposes and precipitates the solid matter of which the stone is composed.

It is common knowledge that the best way to prevent urinary stone is to make sure that the bladder is completely emptied daily, and if necessary the patient must use a catheter for that purpose. To prevent gall stones from forming it is just as essential to empty the gall bladder completely each day. The method is to make pressure over the gall bladder in the early morning, before breakfast, with the round end of a dumb-bell weighing 12 lb. The gall bladder is usually full in the early morning, and, with gentle pressure at first, the contents can be heard escaping with a characteristic gurgle, and by increasing the pressure and a sort of rolling movement from the fundus towards the neck, the whole of the contents are pressed out. It is as well to keep to the right of the abdominal middle line and to avoid pressing on the aorta, as such pressure constantly repeated might do harm.

I feel almost inclined to rename the gall bladder the "castor-oil gland," for the expression of the gall bladder mucus is always followed within half an hour by an action as grateful as would be produced by half an ounce of the oil. At the commencement of this method there may be in the gall bladder lumps of thickened mucus or concretions, and there would then be some discomfort as they passed along the duct, but in a few days, when this debris has been cleared out, the patient, who may have long suffered from agonizing attacks of gall stones for years, will begin to experience peace in his epigastrium.

Any one may easily learn to practise this method on himself, but it should never be used during the course of an attack; then a rubber hot water bag and morphine are the best treatment.

Sunderland.

THOS. A. WATSON, M.B., C.M.

MR. ALFRED GRACE, M.R.C.S., L.S.A., of Chipping Sodbury, Gloucestershire, brother of W. G. Grace the famous cricketer, left estate valued at, £2,134 gross, with net personalty £1,089.

STATISTICS collected by the American National Association for the Study and Prevention of Tuberculosis show that there are now nearly 3,000 agencies engaged in the fight against tuberculosis in the United States. The list includes 557 sanatoriums and hospitals, 158 tuberculosis boarding houses, 90 hospitals for the insane, 35 penal institutions making special provision for tuberculosis, 455 dispensaries, 310 open-air schools, and 1,324 anti-tuberculosis associations and committees.