

5,922 children. "In spite of all the difficulties," he said, "admirable work is being done by the teachers, and its value is appreciated by those who are responsible for the medical care of the children."

The conference visited Oxford to see the Wingfield-Morris Orthopædic Hospital at Headington. Professor G. R. Girdlestone demonstrated the work of the hospital, and explained the advantages of the square ward system. The delegates lunched at Christ Church, where the Dean, the Very Rev. John Lowe, presided, and Lord Nuffield proposed a vote of thanks to the college authorities.

It will be realised that such a conference must result in inspiring those who attended it with renewed zeal in the promotion of work for the relief of suffering which appeals to all our hearts.

## PITFALLS OF URINE ANALYSIS.

### COMMON FALLACIES OF SOME SIMPLE TESTS.

By W. J. HATCHER.

The few simple chemical tests which constitute routine urinary examination are of such an elementary nature that the possibility of serious error is apt to be overlooked. Though the tests are certainly quite straightforward, lack of attention to essential detail or perhaps a lack of appreciation of their limitations may introduce serious errors. Examination of the physical properties, that is the colour, specific gravity, volume, etc., is quite valuable; it should, however, only be attempted on a 24-hour specimen. If a urinary preservative has been employed it should be remembered that many of the preservatives commonly used, formalin for example, are liable to cause false positive sugar reactions with Benedict's or Fehling's tests.

#### Albumin.

The boiling test for albumin is very largely used and generally it is both simple and satisfactory; considerable importance must, however, be attached to the reaction of the specimen. It is very necessary to test the reaction of the urine, both before and after the addition of acetic acid, while usually the addition of a single drop of 33 per cent. acetic acid will acidify all but the most alkaline of urines. It is nevertheless always desirable to make sure by actually testing the specimen again with litmus paper. Albumin may be missed in an alkaline urine, due to its not being coagulated during the boiling; alternatively if excess acid is added small amounts of protein (albumin) may be converted into a non-protein and thereby missed. The reaction of the specimen should be just acid to litmus, that is to say, should turn blue litmus papers a faint pink colour. The importance of the reaction of the specimen in albumin tests is by no means generally recognised and undoubtedly is the reason for many missed positive reactions.

Esbach's Quantitative method is very popular and is, in fact, almost universally employed in the Ward Test Room for the estimation of albumin in urine. It is, of course, well known that this method is not particularly accurate. If, however, reasonable attention is paid to necessary details the results are sufficiently accurate for most practical purposes. Insufficient attention is apt to be given to the question of the specific gravity of the specimen; when the specific gravity is about 1.010 it must always be diluted with water. Failure to do this inevitably causes an error, for even if the coagulated albumin does settle, it will not properly "pack" and an unduly high reading will result.

#### Sugar.

Mention has already been made of the fact that other substances besides glucose may bring about a reduction of

the copper reagents used in both Benedict's and Fehling's methods. It is also very important to keep to the proper amounts of both urine and reagent or a completely wrong idea of the amount present may be obtained. Obviously a slight excess of urine or a reduction in the amount of reagent may well turn a "trace" into a "loaded" result, a most serious misstatement and one which might grossly mislead the physician.

#### Bile.

Tests for the presence of both bile salts and pigments should always be carried out as it is possible for one to be present in the absence of the other, this feature is very apt to be ignored. Though Hay's Test with Flowers of Sulphur is widely used for the detection of bile salts it is a relatively crude technique and subject to several fallacies. Unfortunately, to date there has been no alternative method. The errors to which this method is subject may be minimised if close attention is paid to the following points:—

- (1) It must be remembered that other substances besides bile salts may lower the surface tension of urine and so give a false positive result.
- (2) The Flowers of Sulphur must be absolutely dry and the particles small and of uniform size.
- (3) A standard height should be employed for delivering the sulphur particles, the usual distance recommended is four inches above the specimen.
- (4) It is advisable to reflect a beam of light through the specimen, in this way the slightest fall can readily be seen.
- (5) In cases of doubt a control should be done with a normal urine.

#### Pus and Blood.

For the detection of pus there is no absolutely reliable chemical test and microscopical examination is the only satisfactory method of investigation.

All the chemical tests for blood in urine are quite reliable and in general very sensitive; it is as a matter of fact, their high degree of sensitiveness which is liable to cause trouble. Scrupulous cleanliness of all glassware used in the test must be insisted on, as the least trace of blood will produce a positive result. Incidentally it is helpful to remember that the presence of any number of red blood cells in a specimen of urine must also give a positive albumin test.

## THE PREVENTION OF TUBERCULOSIS AMONG STUDENTS.

Of late the authorities of several Universities have been much concerned over the frequency with which tuberculosis has attacked the students, particularly medical students. In Copenhagen, for example, it was found in 1933 that approximately 10 per cent. of the medical students entering for their final examinations were already tuberculous—if ever so slightly affected by that disease. In Paris also there has been a high rate of tuberculosis among the students, and during the last few years the authorities of the Sorbonne have devised a scheme for the systematic medical examination, free of charge, of all students who have recently matriculated. The "comb-out" thus effected has meant the discovery of many cases of tuberculosis in so early a stage that the prospects of successful treatment and complete recovery may be said to be excellent.

The measures adopted for discovering tuberculosis in students are remarkably similar in the different countries. First of all notices of free medical examinations are circulated and recently matriculated students are urged to take advantage of them. Then, at a given time and place, the students are examined by one or other of the tuberculin tests (Pirquet, Mantoux, etc.). The student who does not react to any of these tests, however big the dose of tuberculin, is regarded as free from tuberculosis. But the very fact

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