

however has not been previously described as far as I am aware. In routine examination of some thousand specimens of urine from both sexes, I had never encountered this parasite until recently, but have lately encountered urinary infection in four individuals, three of them males. These cases were as follows:—

Case 1.—B. C. S., Hindu male, aged 62 years. On March 16th, 1924, the urine gave a specific gravity of 1010; reaction slightly acid; a trace of albumin present; no sugar. Microscopic examination of the deposit shewed a few pus cells and numerous and actively motile *Trichomonas*. On the 21st April, 1924, the urine was neutral in reaction; neither albumin nor sugar was present, and neither pus cells nor *Trichomonas* could be found.

Case 2.—S. B., Mahomedan male, aged 50 years. On the 24th May 1924, the urine had a specific gravity of 1005 and an acid reaction; shewed no albumin or sugar; and on microscopic examination a few pus cells and *Trichomonas*. On the 13th July 1924 the reaction was neutral; and neither pus cells nor *Trichomonas* were found.

Case 3.—N. M., Hindu female, aged 19 years. On the 8th November 1924, the urine had a specific gravity of 1010 and acid reaction; shewed no albumin or sugar, but many *Trichomonas* on microscopic examination of the deposit.

Case 4.—S. C., Hindu male, aged 40 years. On the 20th January 1925, the urine had a specific gravity of 1008 and acid reaction; shewed no sugar or albumin; but on microscopic examination some pus cells and numerous *Trichomonas*.

All the samples of urine were collected in clean glass urinals by myself, so no question of faecal contamination can arise. It is interesting to note that in two instances where a second examination was carried out, the infection had spontaneously cleared up within a short time, without any treatment, and that the pus cells present at the first examination when *Trichomonas* was present, were absent at the second examination when it was absent. It would appear that *Trichomonas* may cause a mild urethritis, attended with smarting and burning on micturition, or the discharge of pus per urethram, but that this urethritis cures itself on the disappearance of the *Trichomonas*.

ON THE TECHNIQUE AND SIGNIFICANCE OF THE ROSINDOLE REACTION, APPLIED TO URINE.

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THE derivatives of tryptophane, which are known to be formed by putrefactive bacteria in the intestinal canal, are indole-propionic acid, indole-acetic acid, indole and skatole. Small quantities of indole are absorbed and undergo

further oxidation to indoxyl, which is excreted in the urine combined with sulphuric acid (indican) and glycuronic acid. The formation of indican is thought to be one of the many functions of the liver, and the quantity present in the urine is regarded as an index of the degree of intestinal stasis. It is probable that other derivatives are also absorbed from the alimentary canal. Putrid purulent conditions are sometimes accompanied by an increase in urinary indican, and this observation has been cited as evidence that endogenous formation may occur.

The purpose of the present paper is to point out that products of tryptophane, other than indican, are frequently present in urine and that variation in the excretion of these products appears to have some correlation with certain pathological conditions.

Since indole production has been regarded as a determinative characteristic in bacteriology, considerable research has been carried out on the indoles and their colour reactions. Ehrlich's rosindole test has been found delicate, but is also given by tryptophane and many of its derivatives, though confusion is unlikely to occur with skatole as a blue violet tint is produced instead of the usual rose colour.

It has been suggested that the rosindole reaction could be rendered more specific by its application to a distillate, as tryptophane and indole-acetic acid are non-volatile in steam, while indole and skatole are known to be readily volatile. Working along these lines Goré¹ devised the ingenious cotton wool plug (C. W. P.) test for indole, which was shown by Malone and Goré² to give positive results with an indole dilution of one part in two million.

In a recent communication to the Medical Research Section of the Indian Science Congress, Goré³ suggested that the application of the cotton wool plug test to urine would serve to indicate the presence of indican, but based this conclusion on the parallel results obtained with his test and the Obermeyer test for indican on ten specimens only. For the convenience of readers Goré's technique of the cotton wool plug test for urine is given below:—

"Put 2 c.c. of urine into a small test tube (5 ins. by $\frac{3}{4}$ in.) and fit it with a plug made of white absorbent cotton wool. Remove the plug, moisten its under-surface with a drop or two, first of potassium persulphate solution (potassium persulphate 1 grm.; distilled water 100 c.c.) and then of p. dimethyl-amino-benzaldehyde solution (p. dimethyl-amino-benzaldehyde 1 grm.; absolute alcohol 95 c.c.; concentrated hydrochloric acid 20 c.c.), and replace it. Bring the urine to the boil by intermittent heating in a low flame, and if the urine contains indican, half a minute or a minute's further such boiling imparts a pink colour to the moistened under-surface of the plug. In the case of a negative result, i.e., absence of indican, no pink colour is seen on the cotton wool."

If Goré's test can be applied for urinary indican, either indican must be volatile and capable of giving the rosindole reaction, or variations in the excretion of indican must be accompanied by similar variations in the excretion of a volatile rosindole-positive substance. That indican is non-volatile was demonstrated by the writers in the following experiment:—

400 c.cms. of pooled urine which gave positive results with both the cotton wool plug and the Obermeyer tests were slowly distilled until 200 c.cms. were obtained. Both distillate and residue were made up to the original volume with distilled water so that the volatile and non-volatile constituents respectively were in the same concentration as in the original urine. The diluted distillate gave the cotton wool plug reaction to the same degree as the original urine but was negative to the Obermeyer test, while the diluted residue did not give the cotton wool plug reaction but the Obermeyer test was positive as in the original urine. The cotton wool plug reaction, therefore, cannot be given by indican.

In order to determine if the excretion of a volatile rosindole-positive substance was paralleled by the excretion of indican we have carried out a series of upwards of 250 rosindole tests by the modified technique described below which will be referred to as the R. I. test. Each urine was also tested with Obermeyer's reagent for indican. The specimens were obtained from Chinese and Tamil patients in the admission ward of the District Hospital, Kuala Lumpur, and we desire to acknowledge our indebtedness to Dr. E. A. O. Travers for the clinical material.

A graphical comparison between the results of the two tests is shown in Chart I, from which it is seen that no relationship exists between the excretion of indican and the volatile rosindole positive substance.

CHART I.

100%	NEGATIVE	NEGATIVE
		TRACE
		POSITIVE
80	TRACE	NEGATIVE
		TRACE
		POSITIVE
60	POSITIVE	NEGATIVE
		TRACE
		POSITIVE
40	POSITIVE	NEGATIVE
		TRACE
		POSITIVE
20	POSITIVE	NEGATIVE
		TRACE
		POSITIVE
0		
	P. d.-m. benzaldehyde (R. I.) Test.	Obermeyer's Test.

A graphical comparison of the results from the R. I. and Obermeyer Tests.

What, then, is the substance present in a large percentage of urines which gives a positive R. I. test? To isolate it, a large quantity of pooled urine was distilled and the distillate thoroughly extracted with neutral ether, which was allowed to evaporate at room temperature, leaving a fine film at the bottom of the flask. The extracted distillate no longer gave a positive R. I. reaction, and the ether-soluble residue was found to contain indole though it is possible that traces of other volatile, ether-soluble, rosindole-positive substances were also present.

A simplified technique for the urinary rosindole test.

In carrying out our series the cotton wool plug was found to be inconvenient, and it was early superseded by a diaphragm of filter paper over the mouth of the test tube, held in position by an indiarubber ring. Three drops of the persulphate solution were placed on the diaphragm followed by three drops of the p. dimethyl-amino-benzaldehyde solution, delivered by a small pipette. This modification has the advantage that the result can be read directly by viewing the upper surface of the diaphragm. Intermitent boiling over an open flame was tedious and liable to give varying results. We therefore employed a water bath and all tubes were placed in boiling water for seven minutes before reading. The rose colour tends to fade after removal of the tubes from the bath, so that readings should be made immediately after removal.

We found that the test could be rendered quantitative as the gradations of the rose colour obtained approximate very nearly to the shades produced by dipping filter papers in very weak solutions of neutral red. The neutral red papers are standardised by matching the tints obtained by applying the test to known indol solutions, and are then compared with the colours given by the urine under test. The disadvantage of this method is the tendency of neutral red to fade, which necessitates re-standardisation from time to time.

Correlation between the results of the rosindole test and clinical diagnosis.

The readings of the R. I. and indican tests in various diseases are shown in Table I, from which all "trace" readings have been omitted. The results indicate possible clinical applications of the R. I. test, though the number of cases in each group is too small for the drawing of any definite conclusion.

In the respiratory diseases (25 cases)—pneumonia, influenza and tuberculosis—there is a slight increase in the percentage of R. I.-positive cases, and it is noteworthy that all the cases of tuberculosis, including seven pulmonary and two bone infections, gave positive R. I. tests, while only in three cases was a positive indican result obtained.

The nephritic cases (16) included sub-acute nephritis and two cases of chronic interstitial

nephritis. The results in this group are of interest because the percentage of R. I.-positive cases is considerably decreased, but the indican results show little variation from the average over the series. Possibly the nephritic kidney is unable to excrete the R. I.-positive substance as readily as the normal kidney.

The liver insufficiency cases (7)—cirrhosis and abscess—show a largely increased percentage

(1) Whether sodium iodide orally was beneficial in cases of goitre.

(2) Whether iodine is essential for the good functioning of the thyroid gland.

(3) Whether the oral administration of sodium iodide could prevent the disease.

He suggested that it might be advisable if the drug was administered intravenously, pointing out further that no possible harm could be done

TABLE I.

Showing the results of the R. I. and Obermeyer Tests in various Diseases.

	All Cases	Malaria.	Respiratory Diseases.	Nephritis.	Alimentary Diseases (Dyspepsia, "Indigestion" and Constipation).	Liver Diseases (Cirrhosis and Abscess).	Sepsis (Ulcers, Abscess, Cellulitis, etc.).	Syphilis.
No. of Cases	265	98	25	16	21	7	16	19
Indole + (R. I. Test)	52%	49%	56%	31%	67%	71%	50%	58%
Indole - (R. I. Test)	16%	18%	12%	38%	0%	0%	6%	16%
Indican + (Obermeyer Test)	38%	36%	32%	44%	38%	29%	44%	47%
Indican - (Obermeyer Test)	42%	43%	40%	44%	24%	43%	38%	42%

of positive cases while the indican positive percentage is slightly decreased; a result which is not at variance with the theory that the formation of indican from indole occurs in the liver.

The results obtained in other diseases require little comment.

Summary.

A technique for the application of the rosindole test to urine is described.

A positive result does not indicate the presence of indican in the urine.

The percentage of positive cases is decreased in nephritic cases and increased in liver insufficiency cases.

REFERENCES.

¹ Goré, S. N. *Indian Jl. Med. Research*, 1920, VIII, 3, p. 505.

² Malone, R. H. and Goré, S. N. *Ibid.*, p. 490.

³ Goré, S. N. *Indian Med. Gazette*, 1924, LIX, p. 393.

INTRAVENOUS INJECTIONS OF SODIUM IODIDE IN THE TREATMENT OF GOITRE.

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THE junior writer first broached the subject of intravenous injections of sodium iodide for the treatment of goitre with a view to testing:—

if no benefit was obtained, the drug being alkaline and non-poisonous. Accordingly we agreed to test the treatment, for which purpose the senior writer visited one of the villages close to Falam, and selected two cases (Nos. 4 and 5) of goitre, about the size of an orange each. On his return he found two other cases had applied for treatment for goitre (Nos. 2 and 3); these were old-standing cases and very much larger than Nos. 4 and 5.

Of the two sets, Nos. 3 and 4 were selected for intravenous treatment for the following reasons:—

Case 3.—The woman was normally developed and the goitre was not circumscribed and hard, whereas in case 2 the woman was partially a cretin and mentally affected to a certain degree.

Case 4.—The boy being older than case 5, we expected that the veins would be easier to deal with. Otherwise there was not very much to choose between the two goitres.

All the cases will be discussed in turn, and it is hoped that in a short time we will be able to add a long list to this short one. Our reasons for publishing our results so early are two-fold:—

(1) To enable other workers to take up the experiments.

(2) To try and get the drug in as pure a form as possible, also in a more portable form than the powder at present in use.

The drug has been administered intravenously without any previous preparation, though the