Chemical Analysis.

The viscera of the deceased, and a small quantity of urine found in his bladder were forwarded to me for chemical analysis, and I detected cocaine in both. I could detect no other poison in the viscera. The dose taken by the deceased could not be ascertained.

CASE II.

K., a Hindu female, aged about 28 years, a woman of the town, was in the habit of taking cocaine. She left home at about 1.30 a.m. on August 29th, 1912, and returned at 6.30 a.m. a few hours later. She was seen to be staggering while washing her mouth at a hydrant hard by. Very soon afterwards she lay down, became unconscious, and in a few minutes she died.

Post-mortem Appearances.

Body fairly nourished; rigor mortis present; pupils slightly contracted; there were no marks of violence on the body. The brain and its membranes, the liver, the spleen, the kidneys, the ovaries, the bladder, and the mucous membrane of the stomach were found congested. The right heart was dilated, and contained dark fluid blood. The stomach contained about 3 oz. of recently taken vegetable food without special odour.

Chemical Analysis.

The viscera in the case were sent to me for chemical analysis, and I detected a marked quantity of cocaine in them. I detected no other poison in the viscera. Neither the dose taken nor the fatal period could be ascertained in this case.

CASE III.

M. K., a Hindu female, aged about 20 years, lived with her husband in Calcutta. On October 17th, 1912, she visited her sister-in-law, L. K., and at about 7 p.m. on the following day she offered L. some white powder which she believed to be a specific remedy for acidity and indigestion. They each took some of the powder, and within half an hour they became ill and then unconscious. M. died soon after, but L. regained consciousness about four hours later, and recovered at the Medical College Hospital.

Post-mortem Appearances.

Rigor mortis present; body well-nourished; pupils slightly contracted; there were no external marks of violence visible. The brain, the meninges, and the lungs were highly congested. The liver, the spleen, the kidneys, the larynx, and the trachea were also found congested. The stomach contained about 9 oz. of sour-smelling food.

Chemical Analysis.

The viscera were forwarded to me for chemical analysis and I detected cocaine in them. There was no other poison present in the viscera. The dose taken by the deceased could not be ascertained, but death took place in this case in about half an hour.

CASE IV.

The case of L. K., sister-in-law of victim No. III, constitutes a fourth case, but it did not terminate fatally. The dose taken rendered the patient unconscious in half an hour, and kept her so for four hours. Her pulse and respiration are said to have been normal during her stay in hospital and her pupils slightly dilated.

The stomach washings were sent to me for chemical analysis, and I detected cocaine in them but no other poison.

Method of Detection.

In all these cases I extracted cocaine by Stas's process. The ethereal extract, on being applied to the tongue, produced very marked anaesthesia. When this was dissolved in dilute hydrochloric acid and evaporated to dryness in a water bath it left a residue which gave well-marked reactions with the principal alkaloidal reagents.

The hydrochlorate thus obtained, when treated with a solution of picric acid, gave a copious precipitate which under the microscope showed the usual long needles arranged in star-shaped bundles.

A fresh portion of the residue treated with a drop of a strong solution of alum and next with a drop of potassium permanganate solution yielded a deep reddish-brown precipitate. The latter, under the microscope, showed the characteristic rectangular plates.

Another portion of the residue was treated with strong nitric acid and evaporated to dryness. The addition to it at this stage of a few drops of an alcoholic solution of potash caused the characteristic peppermint-like odour of ethyl benzoate to evolve.

A 5 per cent. solution of chromic acid added to a solution of the hydrochlorate produced an abundant precipitate which disappeared on shaking. The subsequent addition of a drop of strong hydrochloric acid caused a copious yellow precipitate.

Treatment.

In acute cases the stomach pump should be used, as the anaesthetic effect of the drug on the mucous membrane of the stomach might interfere with the action of an emetic. Hot coffee and stimulants, such as brandy, ether, and ammonia, should be freely given, and hypodermic injections of ether, strychnine, and digitalis might be desirable. In convulsions I may say that chloroform is useful. Morphine appears to possess an antidotal action against cocaine, and

it might be used hypodermically. Inhalation of amyl nitrite has also been recommended. Perfect rest in a lying position should be enjoined in all cases.

My best thanks are due to Captain St. John Moses, M.D., D.Sc., F.R.C.S., F.R.S.E., I.M.S., police surgeon of Calcutta, for kindly supplying me with the notes of the *post-mortem* examination of the three fatal cases and for generally revising this paper.

AN EXPERIMENT TO ILLUSTRATE THE EFFECT OF SIZE OF POPULATION ON THE RATE OF SELECTION OF NEW BACTERIAL RACES.

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IN the course of a research into the question of the selection of a variant of *B. typhosus* in respect of dulcitate-fermenting power, the following experiment was designed with the view of ascertaining whether the bulk of the fluid medium in which the organism was grown had any marked influence on the rate of selection of the new race.

A set of nine beakers, each beaker being 5½ cm. in diameter, and a set of nine test tubes, each tube being 1 cm. in diameter, were filled to the depth of 1 in. with the same sample of dulcitate peptone water of the following composition, and containing litmus as indicator:

Peptone (Witte)	...	...	...	20 grams
Dulcitate	...	...	...	5 "
Salt...	...	...	...	5 "
Water	...	...	...	1 litre

The dulcitate-peptone water was rendered faintly alkaline to litmus and sterilized by steaming on three successive days. The tubes and beakers were of the same height, so that the condition of aëration of the medium was strictly similar in each series. This precaution is necessary, as it is well known that alkali formation from the peptone is greatly favoured by free access of air. Each member of these two series was inoculated with the same quantity of *B. typhosus* broth. The strain selected for this purpose was one which, from previous testing, was known to acquire the power of fermenting dulcitate more slowly than the majority of strains. All the cultures were incubated at 37° C.

The time taken to produce acidity in the original beakers and tubes is given in Table I, and it will be noted that no test-tube culture became acid during the period of observation (twenty-six days).

After eight days' growth subcultures were made from each tube and each beaker into 6 c.cm. quantities of dulcitate-peptone water contained in ordinary test tubes. The times taken to produce acidity in these subcultures are given in Table II. Again no subculture from the original test tubes became acid.

After a further period of seven days—that is, fifteen days from the commencement of the experiment—subcultures were again made from the original beakers and tubes into ordinary 6 c.cm. quantities of dulcitate broth. The times required for appearance of acidity are indicated in Table III.

These various tables show that a fermenting race is much more quickly produced by growth of the organism in large quantities of culture medium than in small quantities. If the original small tubes be inoculated with small doses of *B. typhosus* broth and the beakers with large doses, the sizes of these doses being related to each other as the volumes of the dulcitate broths to be inoculated, the fermenting race is again found to arise more quickly in the large quantities.

The original small tubes never developed an acid reaction, and their subcultures likewise did not, within the limits of observation. The large cultures in beakers developed an acid reaction in every case by the fifteenth day. Their first subcultures showed three with a full acid reaction by the tenth day. In the second subcultures from the original beakers nine became fully acid in reaction by the sixth day.

The experiment above detailed was led up to by a preliminary experiment performed with a *B. typhosus* strain which was known to acquire the power of fermenting

dulcitate more quickly than the above-mentioned strain. The details of this earlier experiment were as follows: 50 c.cm., 20 c.cm., and 5 c.cm. quantities of dulcitate-peptone water were put up in three series. In each series there were ten such quantities. Every member of the different series was inoculated with the same dose of *B. typhosus* broth. On the tenth day after inoculation all the broths were subcultured into ordinary test tubes containing 6 c.cm. quantities of dulcitate broth, and the times required

to produce acidity were noted. The results are given in Table IV.

It will be observed that all the subcultures from the initial cultures of 50 c.cm. showed full acidity by the second day. The subcultures from the 20 c.cm. quantities showed four with a full acid reaction on the second day. In the case of the subcultures from the 5 c.cm. tubes not one showed a full acid reaction on the same day.

We conclude, therefore, that, other things being equal,

Beakers.										Small Tubes.									
1	2	3	4	5	6	7	8	9	CON TROL	1	2	3	4	5	6	7	8	9	CON TROL
-	-	-	-	-	-	-	-	-	-	8th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	af	-	-	9th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	12th	-	-	-	-	-	-	-	-	-
af	-	af	-	-	-	-	-	-	-	13th	-	-	-	-	-	-	-	-	-
-	af	af	af	-	af	-	-	af	-	14th	-	-	-	-	-	-	-	-	-
-	af	-	af	af	af	af	-	af	-	15th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	20th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	26th	-	-	-	-	-	-	-	-	-

First Subcultures from Beakers into Small Tubes (6 c.cm.).										First Subcultures from Small Tubes into Small Tubes (6 c.cm.).									
1	2	3	4	5	6	7	8	9	CON TROL	1	2	3	4	5	6	7	8	9	CON TROL
-	-	-	-	-	-	-	-	-	-	2nd	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	6th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	af	-	-	7th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	8th	-	-	-	-	-	-	-	-	-
af	-	af	-	-	-	-	-	-	-	10th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	11th	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	19th	-	-	-	-	-	-	-	-	-

Second Subcultures from Beakers into Small Tubes (6 c.cm.).										Second Subcultures from Small Tubes into Small Tubes (6 c.cm.).									
1	2	3	4	5	6	7	8	9	CON TROL	1	2	3	4	5	6	7	8	9	CON TROL
af	-	af	-	-	-	-	af	af	-	2nd	-	-	-	-	-	-	-	-	-
af	-	af	af	af	af	-	af	af	-	3rd	-	-	-	-	-	-	-	-	-
-	-	af	af	af	-	af	af	-	-	4th	-	-	-	-	-	-	-	-	-
-	af	-	-	-	-	af	-	-	-	5th	-	-	-	-	-	-	-	-	-
-	af	-	-	-	-	af	-	-	-	6th	-	-	-	-	-	-	-	-	-

af=full acid reaction.

A=acid. The fractions indicate grades of partial acidity.

TABLE IV.

	1	2	3	4	5	6	7	8	9	10	Day of Observation.
Subcultures from tubes of 50 c.cm.	A.f.	A.f.	A.f.	A.f.	A.f.	A.f.	A.f.	A.f.	A.f.	A.f.	Second day.
Subcultures from tubes of 20 c.cm.	A.f.	A.½	A.f.	A.½	A.½	A.½	A.f.	A.½	A.f.	A.½	Second day.
" "		"		"	"	"	"	"		A.f.	Fourth day.
" "		"		"	"	"		A.½			Fifth day.
Subcultures from tubes of 5 c.cm.	A.½	A.½	A.½	A.½	A.½	A.½	A.½	A.½	A.½	A.½	Second day.
" "	A.½	"	"	"	A.f.	"	"	"	"	A.½	Fourth day.
" "	A.f.	A.½	A.½	A.½		A.½	A.½	A.½	A.½	A.f.	Fifth day.

the larger the culture the sooner will a new race be selected out. This more effective selection from a large population is mainly due to there being more extreme variants from the mean in the large population. The explanation is not chiefly to be sought in the fact that in the larger cultures a few more generations are required to produce the same population per cubic centimetre. By inoculating into constant volumes of dulcitate broth seedings of *B. typhosus* of different size the number of generations required to produce the same population per cubic centimetre is altered, but the tubes with small seedings do not give regularly earlier acidity than the tubes with large seedings.¹

Since bacterial selection can be conducted more efficiently from a large population, it would appear probable that the selection of variants by animal passage would, other things being equal, be more successful in a large rather than in a small animal.

CONCLUSION.

The rate of selection of dulcitate variants of *B. typhosus* varies directly with the size of the population from which the selection is made.

REFERENCE.

¹ Penfold (1911): Studies in Bacterial Variation, *Journal of Hygiene*, vol. xi, p. 30.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TOXIC SYMPTOMS AFTER TAKING A PROPRIETARY PILL.

In the JOURNAL for May 11th, 1912, and in subsequent numbers correspondence took place on green urine due to a proprietary pill, and while in two cases it was stated that those who took the pills showed symptoms of illness which might be referable to the pills, the majority of the cases seemed mainly interesting from the fact that green urine was passed. The correspondents at that time all wrote from parts of England. The proprietors of the pills are now evidently transferring their energies to Scotland, for besides the following case, which is of interest, a practitioner in the town has informed me that one of his patients has been taking the pills without, however, showing any symptoms except the green urine.

J. M., a mason, had for some time felt a pain in the back on rising in the morning, but this passed off soon after starting work. He thought his kidneys were affected, and when a sample of kidney and bladder pills was handed in at his house he thought he would give them a trial. On October 14th he took one pill before dinner, one before tea, and two before going to bed, as directed on the box. That evening on passing urine he noticed that it was greenish, but as the instructions informed him to expect this he was in no way alarmed. On October 15th he took one pill before breakfast, and now noticed small round spots like "heat spots" appearing on the front and back of the neck. Another pill was taken before dinner, and by this time the spots had greatly increased, appearing now on the face, and the neck had become so swollen that he had to take off his collar and put on a muffler before he could go out to his work. He began to think that the pills might be the cause of his condition, as previously he had been in good health except for the slight backache. He had taken six pills in twenty-four hours, and now ceased taking them. By evening the eyelids were swollen and felt stiff and heavy, the right eye being almost closed. The spots were still present on the face, neck, and upper part of the chest, and felt hot and itchy. A poultice with vinegar and water added was applied to the neck and diminished the swelling, but on October 16th his face had such a blotchy and puffy appearance that he could not go to work. He called to see me on the evening of October 17th, and the red papular eruption was very marked on the face and neck, while below both the lower eyelids there was marked oedema, the skin pitting on pressure. Several of the papules were scaly on top, while in various places on the face and neck there was a fine desquamation. Since he had left off taking the pills his condition had improved, and by October 19th all trace of the eruption or oedema had disappeared. The urine two days after

ceasing to take the pills had lost its greenish colour, and was in no way abnormal.

Dundee.

MARTIN SMITH.

THE RISK OF ECLAMPSIA RECURRING IN A SUBSEQUENT CONFINEMENT.

A VERY personal interest concerning the above impels me to sound a note of warning to those of the profession who are especially concerned in obstetric practice, and who may be called upon to express an opinion in the matter. For myself, I can never again give a hopeful prognostication, for the following reasons, as exemplified in two recent cases.

CASE I.—Four years ago a lady, aged 36, the wife of a major in the Indian Medical Service, came home to be delivered of her first child. She was advised to fortify herself for the event, somewhere in Scotland for preference, and, accompanied by her husband, she proceeded thither, a sheltered seaside resort being selected as the temporary home. Analyses of the urine were made from time to time, and all went well until early in the seventh month, when eclampsia gripped her with great suddenness and violence. Thanks to a most excellent village doctor—one of God's good men—and to his promptness in securing the best of skill from Edinburgh, she was spared on this occasion, though convalescence was very protracted. Eighteen months later she was back in Bengal, and in a year, becoming pregnant once more, she was again sent home. Every precaution was taken, nothing apparently overlooked; but, despite every attention and treatment, including Caesarean section, she died in an eclamptic state (at about the end of the seventh month of pregnancy).

CASE II.—A lady, aged 30, daughter of a noted surgeon in a Canadian city, and therefore, as in the case of the former patient, able to secure the best attention, had the same experience exactly as regards the incidence of eclampsia in each of her two confinements, with this exception, that Providence spared her life and that of her infants. Albuminuria in her case was transient during the sixth month of her second pregnancy and absent in her first, save at the crisis. Labour in each instance was, of course, induced and at about the eighth month.

As both the foregoing cases occurred in my family circle, is it any wonder that for the future I shall not have much use for the actuary, nor time for his statistics, and that I shall, should the occasion arise, feel it to be my duty to urge on those interested that there is indeed a very grave danger of a repetition of what might easily lead to irreparable disaster?

Putney.

ATHELSTANE NOBBS, M.D.

ATTEMPTED SUICIDE BY DRINKING LYSOL.

On October 18th I received an urgent call to a patient, aged 63 years, suffering from melancholia, who had swallowed an unknown quantity of lysol. Two days previously I had seen her for this nervous breakdown, and had warned the family to be careful and watchful, as she would probably try to take her life. It never occurred to them that she would drink the lysol, which was used for disinfectant purposes, and was placed upon the washstand.

I found her sitting upon the bed, coughing and hawking up frothy, thick mucus; her voice was rough and hoarse, as if some of the fluid had gone into the larynx. The mouth inside was whitish, and the lips excoriated; the characteristic odour of phenol was present. Upon swallowing she made a very face, and held her hand to her chest as if the act was painful; she was excited and talkative between the spasms of retching and spitting, and informed me that the devil was inside her; nothing I could give her would do her any good—God had given her up, and she could not die whatever she took. She drank the lysol at 3 p.m. The family discovered it at once owing to the smell and the convulsive coughing, and immediately gave her three glasses of milk. This was vomited soon after she drank it, the vomit smelling strongly of lysol.

It was 4.30 p.m. when I first saw her, and, taking into consideration her general condition, the fact that she had vomited the contents of the stomach soon after taking the poison, and the length of time since the act occurred, I did not wash out the stomach, but contented myself with giving her a solution of magnesium sulphate, which she