statements seem to be quite warranted by the facts observed:

1. That a bacillus, identical with the *B. dysenteriae*, described by Shiga as the specific cause of acute dysentery in Japan, can be isolated from the stools of many cases of asylum dysentery.

2. That the blood serum of some of these cases of asylum dysentery possesses a specific agglutinative action when tested against *B. dysenteriae* isolated from the stools of other similar cases, and also against other strains of *B. dysenteriae* isolated from cases of dysentery in tropical countries.

On the other hand, the experience of an extended series of examinations of the stools of patients suffering from asylum dysentery will permit me to state:

3. That in order to detect the presence of *B. dysenteriae*, the stools must be examined when fresh.

4. That *post-mortem* material must be collected and examined as soon after death as possible, as after a few hours' delay, even in quite acute cases *B. coli* becomes the predominant organism in the intestinal canal.

5. That under these conditions (3 and 4) the isolation of *B. dysenteriae* from the stools of patients suffering from acute asylum dysentery is comparatively easy by the methods I have indicated—when those stools are, naked eye, typically dysenteric.

6. That in cases of chronic asylum dysentery *B. dysenteriae*, if present, is so outnumbered by *B. coli* and other intestinal saprophytes as to render its isolation a matter of extreme difficulty.

DIFFERENTIATION OF *B. TYPHOSUS* AND *B. COLI COMMUNIS* BY MEANS OF THE PHOTOGRAPHIC PLATE.

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It does not appear to have been recorded that the gelatino-bromide photographic plate is sensitive to direct application of the products of certain bacterial cultures in a very remarkable manner, and that, further, the effect on the plate is variable with the special nature of the bacteria to a degree which renders easily possible, in at least one important case, a discrimination between bacteria otherwise difficult to differentiate.

My observations having been mainly confined, so far, to the typhoid bacillus and the *B. coli communis*, I will refer at present to these only.

Cultures of these bacilli are made in broth, samples of the same broth being used for each culture. After, say, 24 hours a few drops of each culture are placed upon the sensitive surface of a photographic plate and spread so as to wet an area of any desired extent—say, 1 cm. or 2 cm. in diameter. (In general, 0.2 c.cm. of the culture has been allowed to spread by itself upon the plate, covering an area of about 1 square cm.) This is done in a red light sufficiently faint to avoid sensible fog upon the plate. An opaque cover—an empty developing dish will do—is now turned over the plate, and it is left thus screened for about 40 minutes.

The cover is now lifted and the superfluous fluid upon the wet areas drawn off with a pipette. No change is observed at this stage of the experiment. The plate is then developed in the usual manner, and during development it is best screened from light. It will now be found that the moistened areas develop with very different densities of silver deposit. The *coli* culture produces a full and marked reduction of the salt. There has progressed over the area wetted by this culture an action similar to the formation of a photogenic material in the film. But where the typhoid culture has acted the result is quite different. Only a very faint deposit is, in general, obtained. And if the plate has, in fact, been exposed sufficiently to the red light (either wilfully or incidentally) to produce a general fogging, it will be found that its effect is even inhibitive and its presence marked by an area almost free from reduced silver.

The following points are of interest, but can here only be briefly noted:

(a) The discriminative action is the same, with some variation in degrees of distinctness, when typhoid and *coli* cultures of the same age are compared at very different periods after inoculation. Thus, cultures of these two organisms in broth compared, after 4 hours' growth and after 33 days, react as above.

(b) The activity of each increases with time up to a certain

age which has not been accurately ascertained. This activity possibly varies with the physical conditions attending culture, but may be taken as increasing from shortly after inoculation to 4 days of growth.

(c) A *coli* culture of 24-hours age, when compared with a typhoid culture of any age (tested up to 33 days) gives the more marked reducing effect.

(d) After a few hours' growth the broths may be boiled and thus sterilized, and the differential effect upon the sensitive surface persists.

(e) This discriminative reaction has been obtained with four cultures of *coli* from different sources and with five typhoid cultures from different sources.

(f) It will be found that if the sensitive plate is wetted with tap water and also with sterile broth, and simultaneously applications of the cultures are made—four separate areas being thus prepared for comparison—the typhoid and sterile broth do not differ markedly in their actions upon the silver bromide, whereas the effect of the tap water has been intermediate between that of the *coli* and the typhoid. It is known that water is to some extent a sensitizer.

(g) The time of exposure of the plate to the application of the cultures has varied between 10 and 90 minutes, and the discriminative action of 24-hour cultures found to be best marked with an exposure of 45 minutes. But from at least 10 minutes exposure upwards the difference is obtained with any broths in which there is a visible growth.

(h) While in some of the earliest of these observations, and before I had gained experience as to the best methods to employ, a few cases occurred in which the distinctive difference was not well marked, in all my recent observations, twenty-four in number, I have unfailingly obtained the differential effect.

(i) Finally I have observed that if pools of well-grown *coli* and typhoid broth cultures are poured on a photographic plate and exposed to light, a reduction of silver is seen in a few minutes without development. After about 30 minutes the deposit due to the typhoid broth is distinctly darker than that due to the *coli* broth. If the pools be now poured off the sensitive plate the difference reaches its maximum, but as the gelatine dries the distinction is almost completely lost. Tap water has no visible effect, except the swelling of the wetted gelatine of the plate.

I am continuing the experiments, and am not without hopes of more extended applications of the phenomenon.

NOTE UPON THE CAUSATION OF CANCER.

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THE observations of Professor Farmer and others with regard to the mode of division of the nucleus in cancer cells render it possible to formulate a theory which seems to me to afford reasonable explanations of many of the difficult points in connexion with cancer.

Briefly stated, my view is that cancerous growth is caused by the degenerative reversion of epithelial cells to a germinal type, in association with a local irritant and in the presence of an abundant blood supply. The post-heterotypic multiplication of the cells having once commenced, as a result of the degenerative reversion to an ancestral type, the local conditions serve to continue and fix the type, with the result that the growth becomes practically a colony of unicellular parasites. These act as one would expect members of such a colony to act; they encroach upon the tissues of the host, preferring to multiply along the lymph channels both on account of the resistance being less in this direction than in any other, and also on account of the favourable nutritional environment there met with; or when they permeate the walls of a vein tend to be washed off from the colony as independent units, which, when they lodge in suitable situations, give rise to new colonies, namely, the metastatic growths.

Just as in animals we find an ascending and a descending stream running along parallel lines, so in cells, with regard to specialization, evolution may be downward as well as upward. Again, just as the individual in his development presents a brief epitome of the history of the race, so, to a certain extent, does the individual cell in its decay tend to approximate to an earlier type of cell similar to that from which it has been evolved, and with similar attributes and powers. However, the more specialized the cell the greater