

of this mixture is placed upon a sterile cover-glass, and allowed to become dry, after which it is fixed by holding over a Bunsen flame between the finger and thumb, until unpleasantly warm; the cover is then placed with the bacilli downwards upon a little aqueous solution of gentian violet for ten minutes, after which it is removed, washed with water, and examined by a high power.

The flagella are not stained in this way, but they may be stained when obtained from a young agar-agar culture by employing a mordant consisting of

Tannin solution (1 to 4 parts of water). 10 cc
Saturated solution of ferrous sulphate. 5 cc
Saturated aqueous solution of fuchsin. 1 cc
Caustic soda solution. 1 cc

After fixing, the cover-glass is covered with a large drop of this mordant, and gently heated until it begins to steam, for about a minute; then rinsed thoroughly, if necessary, using a little absolute alcohol to remove mordant. After again allowing to dry, the following stain is used (after filtration):

Fuchsin. 5 grms.
Saturated aniline water. 100 cc.

Let stand twenty-four hours with frequent agitation, and filter. By this means the flagella are stained pink, whilst the protoplasm of the bacilli is a very deep red.

The Spirillum of Cholera.

Koch recommends the following method for identification of cholera spirilla in water: To 100 cc. of the water add 1 gm. of peptone and 1 gm. of salt, and place in incubator at 37° C. Agar agar plates are poured after ten, fifteen, and twenty hours, and the mixture is also examined microscopically. Any suspicious colonies, i.e., those which are white and semi-transparent with well-defined margin, are examined by microscope, and also inoculated into fresh tubes for the indol reaction, the physiological test, and general microscopical appearances.

Indol Reaction.—This reaction has been described when referring to the detection of typhoid bacteria, but in the case of the cholera spirillum it is unnecessary to add sodium nitrite, because the nitrite has already been formed by reduction of nitrate present in the peptone, the addition of pure sulphuric acid (free from nitrous acid) is alone necessary. It is important, however, that the test should be applied only to a pure culture in order to eliminate the action of other bacteria. The reaction succeeds best in peptone solution (one per cent. peptone, one-half per cent. salt).

Physiological Test.—For this one and one-half m.g. of the surface growth of an agar culture is mixed with 1 cc. of sterile broth, and injected into the peritoneal cavity of a guinea pig. This quantity should be a fatal dose for an animal weighing 300-350 grammes. Rapid reduction of temperature ensues, resulting in death.

Gelatin Tube Culture.—At 20° C. in puncture cultivations a thin, white thread appears along the needle-track; this

thread suddenly widens out just below the surface, causing liquefaction, whilst a bright, glistening bubble of air appears in the tunnel-shaped liquefied portion. The liquefaction gradually proceeds until the whole contents of the tube becomes fluid.

Microscopic Examination.—The cholera spirillum is a short, bent, rodlet, with rounded ends, frequently actively motile, and when stained may be seen to possess flagella, either singly, or in pairs at both ends.

In conclusion, great as has been the advance of this young but vigorous science, there is no doubt that we are at present but opening the clasp of a casket filled with some of the choicest gems of knowledge, each of which is enclosed in its own case, the secret spring of which can only be found by patient search, and which will be passed over untouched by the careless experimenter. Much remains to be done in the description of undescribed forms, or the more ready identification of those already known; and I venture to think the chemical side of the subject will be fruitful of much. I mean the study of the products obtained by cultivation of various bacteria in media containing traces of chemical substances of definite composition, more particularly of oxidizing and reducing agents.

To any who wish to commence the study of bacteriology, I would recommend Migula's "Introduction to the Study of Practical Bacteriology," which may be followed by Frankland's "Micro-organisms in Water," and Crookshank's "Manual of Bacteriology."—*British and Colonial Druggist.*

Points on the Making of Pills.

Mr. A. H. Miles writes to the *Bulletin of Pharmacy*:

"I have found it profitable, in my retail experience, to make a good many of the pills called for, and some of the methods followed may be of practical help to any druggist minded to make a trial. Large pills are better left to the manufacturing pharmacist. Many of the small ones, however, may be readily and quickly made, and, with but little experience, well enough made to satisfy the most fastidious.

"I am provided with a copper pill machine with three sets of double plates, from one quarter grain to six grains. My mass diluent is pure cut-loaf sugar powdered in the store, and my excipient is Remington's for all pills which are to be white. I make just enough at a time to fill a single prescription, if the prescription calls for a size or kind not likely to be again wanted. Of the staple pills, however, I make from 500 to 2,000; usually selecting a number which is some multiple of the number my plate will cut, of the size of pills to be made. With but little experience and calculation the weight of each pipe-cut may be ascertained, and the whole mass divided by weighing or cut on

the six-grain plate. I have found it very conducive to perfect uniformity to roll all my pill pipes at once, where I am making one thousand pills or less of one kind at a time. I do this by rolling between pieces of plate glass about the size of a small pill tile. Of course it might be accomplished as well by wood rollers if the surfaces were as true. These pipes will vary in length a little, even if weighed. It is not difficult, however, to get them to average the desired length with a little care. The number of pills will not vary more than two or three from this calculation. With pipes thus rolled, it is possible to cut six or even seven at once on the machine.

"My young men can make and finish a thousand pills an hour, and so perfect and uniform as to leave nothing to be desired. This is true of morphia in all sizes, strychnia sulphate and nitrate in the many sizes required, atropia and other pills where the medicament is much less in bulk than the diluent, and in some cases, as in quarter and half-grain morphia, where there is but little sugar required.

"The pharmaceutical manufacturers' products are cheap, and some of them are getting cheaper, but at present prices for most of the small alkaloidal pills any pharmacist who wishes to fill his leisure hours usefully can pay for his outfit, with a good margin beside, if he will undertake pill-making to a limited extent."

Estimation of Spirit of Nitroglycerin.

J. B. Nagelvoort (*American Journal of Pharmacy*) gives the following method: Cool a proper quantity of a 10 per cent. alcoholic solution of nitroglycerin to 15° C. Take 50 cubic centimetres of it; pour this quantity into two litres of water; agitate the mixture, and set it aside in a cool place over night. (In cold weather take care that the water cannot freeze and break the bottle so as to endanger your life.) The next morning siphon off the water, only leaving enough in the bottle to transfer the nitroglycerin—which has separated and lies as a syrupy fluid on the bottom—into a 50 cubic centimetre graduate, which is graduated in 0.5 cubic centimetres. Use a funnel—this insures against loss; let the funnel drain. If the 10 per cent. alcoholic solution of nitroglycerin is of the required (U.S.P.) strength, there should be about 2.5 cubic centimetres of nitroglycerin in the graduate. Since we measure, instead of weighing, our nitroglycerin, its volume has to be multiplied by its specific gravity, which is 1.600, in order to obtain its weight: $2.5 \times 1.6 = 4$. Applying a correction for the solubility of nitroglycerin in a large quantity of water (Allen says it is 1 gram in 800 cubic centimeters), it is a simple calculation to verify the fluid under examination. Dilute, according to the figures found, to pharmacopœial strength.