danger of cutting the patient, because if the cut is made from above downwards, the tendency of the knife is to draw out or away from the skin.

In conclusion I would summarize as follows: By using crenoline from which the sizing has been removed, by carefully working the plaster-of-Paris into the mesh of the cloth, and without the use of salt, a bandage may be applied that shall be no heavier than those made of dextrine or silicate of potash, but which shall possess more strength than either of these, and which will harden almost as rapidly as it can be applied. In the removal of the bandage, the plaster should be moistened, and it can be cut most conveniently with a knife having a concave edge.

ON AN APPLICATION OF AGAR-PLATE CULTURES TO WATER ANALYSIS, WITH SPECIAL REFERENCE TO THE DETECTION OF THE BACILLUS OF TYPHOID FEVER.

BY ALLEN HAZEN AND F. W. WHITE,
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IN determining the number of bacteria in waters by Koch's gelatine-plate process, the rapidity of growth of the colonies is largely dependent upon the temperature. Probably the best average temperature for the growth of bacteria in general, is that of an ordinary room, namely, 15° to 20° C., and, as a rule, the common forms of bacteria found in unpolluted waters, grow best at this temperature, while higher temperatures check or retard their growth.

There is, however, another class of bacteria, the parasitic germs, which, normally habituated to the bodies of warm-blooded animals, grow best at blood-heat, although usually they do grow more or less at lower temperatures.

Bearing these facts in mind, we can readily understand what takes place in a gelatine plate containing bacteria of both these classes, as, for example, a plate made from a sewage-polluted water containing typhoid fever germs, and which is cultivated at the ordinary temperature. Most of the common species are well suited to this temperature, and grow rapidly into large colonies, while the pathogenic germs are retarded in their growth, the temperature being nearly 20° below their normal. The chance of finding these pathogenic germs is thus comparatively small, since the common germs, having the advantage over the former in more congenial temperature conditions, grow vigorously, and cover the plate, especially if they liquefy the gelatine, before the pathogenic germs have time to form colonies large enough to be recognized.

It seemed to us altogether probable that, if the plates could be kept at blood-heat, the above conditions would be reversed, the common germ retarded and the pathogenic germ favored, so that the chances of finding the latter when present might be greatly increased. Unfortunately, gelatine, even when made much stronger than usual, is melted far below this temperature, and so some other substance must be used for this purpose. Agar, when made up with bouillon according to Koch's formula, in two per cent. solution, melts at about 90° C., and solidifies again at about 50° C., and can be kept indefinitely at blood-heat without softening. It is, of course, inadmissible to mix the water to be examined with melted agar at 90°, or even 50° C.,

because even this temperature might kill a portion of the bacteria, but if the agar is thoroughly melted in boiling water, and then suddenly plunged into water at 40° C., it can be cooled to this temperature without instantly solidifying. While the agar is in this condition, fluid, and yet cool enough for safety, the water to be examined is quickly mixed with it, and the whole poured out upon a glass plate, when it almost instantly solidifies. There is ample time to perform this operation, but there must be no delay, for the agar will not long remain liquid. This method of making agar plates is already well known.

Using Petri double dishes, instead of plain glass plates, moisture often rises from the agar, and condensing upon the cooler cover, falls back on the agar, and softens it in places, so that the colonies extend unduly on the surface. We find that this can readily be prevented by turning the dishes upside down. The plates are almost always sufficiently developed in twenty-four hours, and there is no liquefaction by the colonies.

We have applied the method very successfully to the isolation of typhoid-fever germs from river water inoculated with a minute quantity of the bacilli, the agar plate sometimes presenting, after only twelve hours incubation in the thermostat, almost a pure culture of these germs. Using fæces from a typhoid patient, the typhoid germs were often detected when the gelatine plates failed to show them, though in this case the plates also contain *Bacillus coli commune* and others from the intestines. It is probably in this direction that the method has its greatest practical outlook, namely, as an improved and rapid method for detecting pathogenic germs in drinking water, in fæces, etc.

Gelatine plates, grown in the ordinary way, give approximately the total number of bacteria of all kinds present, making especially prominent by rapid growth and large colonies, the common forms growing at low temperatures. Agar plates on the other hand, incubated in the thermostat, present a selected number, namely, those which can live at blood-heat, including, we may believe, most of the parasitic and pathogenic germs, which, under the circumstances, are the ones of greatest interest; and eliminating those species which cannot grow at the temperature of the body, and are, therefore, in most cases, as such, presumably harmless.

RECENT PROGRESS IN SURGERY.¹

BY H. L. BURRELL, M.D. AND H. W. CUSHING, M.D.

LIGATION OF THE VENA SAPHENA MAGNA FOR VARICOSE ULCERS OF THE LOWER LEG.

TRENDELENBURG²⁸ advocates the ligation of this vein for the relief of varices and ulcers of the lower leg. Briefly the rationale of this treatment depends on the theory that the superficial venous system forms with the deep veins of the leg through the communicating branches, a vascular circle. When the varicose condition of the former exists, the circulation towards the vena cava through the large saphenous vein, on account of the weight of the column of blood and other causes, is greatly impeded. The vein is relieved by the escape of blood through the communicating veins into the

¹ Continued from page 387.

²⁸ Beiträge z. Klin. Chir., 1890, Bd. vii, 193.