NOTE ON STERILIZATION BY HEATED OIL.

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The sterilization of syringes by oil heated to a temperature of 140° F. has been recommended as a general method by Sir A. E. Wright, on the ground that oil heated to this temperature "will sterilize instantaneously everything with which it comes in contact," while the temperature is not high enough to melt the solder of the syringe. Dreyer and Walker have however, pointed out that since "the heating of spores in glycerine or oil has no greater disinfecting action than exposure to dry air at the same temperature for the same length of time"... therefore, "if resistant spores are present, sterilization of instruments cannot be ensured with certainty in a brief period.

The following observations show that even non-sporing organisms are not destroyed instantaneously by oil heated to a temperature of 140° F.

In the course of a series of control blood cultures from normal individuals, an appreciable number were found to be contaminated. By a process of exclusion the syringe was suspected as the source of infection. The method of sterilization which had been employed was as follows: Three to six barrelfuls of oil heated to 140° F. were drawn into the syringe, taking care that the oil reached every part of the interior, the needle was then fitted on and oil drawn up twice through the needle.

The following experiments were made:

An emulsion containing cocci and bacilli from a contaminated blood culture, was drawn up into the syringe and expelled. Six syringes of oil at 140° F. were then drawn up in succession. In order to preclude the possibility of either extraneous organisms falling on the needle, or oil from the exterior of the syringe running on to it during cooling, the needle was simultaneously sterilized in boiling water, and the needle arm of the syringe was plunged into the same water the moment before the needle was attached. Broth was then drawn into the syringe, expelled into a sterilized test-tube and incubated. Both cocci and bacilli were recovered. The experiment was repeated with organisms which had been previously identified.

The Bacillus coli was recovered after two syringes of oil at 140° F., but was killed by four syringes.

Streptococcus faecalis was recovered after four syringes of oil at 140° F., but was killed by six syringes.

Staphylococcus aureus was recovered after six syringes of oil at 140° F.

The experiment was repeated with the needle fitted to the syringe,

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1 "Technique of the Teat and Capillary Tube," p. 194.
2 Journ. Path. 1912. xvii, p. 142.
the heated oil being drawn up through the needle. Again *S. fecalis* was recovered after four syringes of oil, but *S. aureus* was only recovered after two syringes, and was killed by four syringes.

It is therefore clear that this rapid method of sterilization is not effective even in the case of non-sporing organisms.

Further experiments were performed as follows:—

A small portion of growth from an agar slope was picked up on a platinum loop. The wire was plunged into the oil bath at 140° F., and held there for a definite period. A broth tube was then inoculated.

*B. coli* was recovered after a period of ten seconds, but was killed by twenty seconds in the oil. *Streptococcus fecalis* was recovered after thirty seconds, on two occasions after forty seconds. *Staphylococcus aureus* was killed by five seconds in the oil.

We have found the following to be a convenient and reliable method of sterilizing syringes for blood cultures. An all-glass syringe is fitted together with needle attached. Alcohol is drawn through to ensure absence of moisture. The piston is withdrawn a quarter of an inch to prevent sticking after the heat. It is then placed in a large test-tube with a wool-pad at the bottom and plugged. The whole is put in the hot air sterilizer, which is heated to 160° F. for fifteen minutes. The air is then allowed to cool gradually. The syringes do not crack, and are ready for use without further handling, and need not be exposed to the air until the moment of employment.

This method of hot air sterilization has been tested by contaminating the syringes with the same organisms as were employed in the foregoing experiments. The non-sporing organisms were killed by an exposure to 140° F. for fifteen minutes. The spores of *Bacillus subtilis* were not destroyed by the same exposure, but they were killed by a temperature of 160° F. for a similar period.