

of 125.2°F. in four minutes; Typhoid bacillus at 139° in ten minutes; Staphylococcus pyogenes aureus at 136.4° in ten minutes.

In a comparison of boiling water and steam the former has a distinct advantage in that it more readily absorbs moisture and thus destroys the vitality of the bacteria. The same volume of steam contains 1,700 times fewer molecules of water. Another obstacle which steam encounters in penetrating bacteria is undoubtedly a coating of minute air bubbles adherent to the germs.

Plunged into water air has a tendency to rise to the surface. This is due to the great difference in the specific gravity of air and water. The difference at 100°C. is about 1:1,000, with steam it is only 3:5. The steam is deprived therefore of this valuable aid in freeing the bacteria from air bubbles.

*Carbolic Acid.*—This agent is so universally relied on and adhered to by the medical profession that it is well to be aware of its limitations.

Koch says that for the destruction of anthrax spores a 3 per cent. solution must act seven days.

The especial advantage possessed by carbolic is due to the fact that its action is not materially influenced by the presence of acids, alkalies, salts or albumen. In solutions free from the foregoing substances, carbolic acid is much weaker than corrosive sublimate. Uffelmann's experiments proving that a 5 per cent. solution of carbolic acid failed to destroy typhoid bacilla in one hour, does not tend to increase confidence in carbolic acid. The most interesting and useful fact about carbolic acid is that certain auxiliaries greatly increase its potency.

A 2 per cent. of crude carbolic acid with 1 per cent. of pure hydrochloric acid, destroyed anthrax spores in seven days, the same per cent. of these solutions separately did not destroy these spores in thirty days. Dr. Scheurlen, in a paper on the molecular conditions of aqueous solutions of disinfectants, as regards their efficiency, states that a 1 per cent. solution of carbolic acid in water failed to destroy Staphylococcus pyogenes aureus in five minutes, but a 1 per cent. solution of carbolic acid with 20 per cent. of common salt, destroyed the same organisms in one minute.

Upon Scheurlen's recommendation certain surgeons have used the one-half per cent. solution of ortho-cresol with 12 per cent. of common salt as a very satisfactory antiseptic. The rusting of instruments in it can be prevented by the addition of 1:1,000 of hyposulphite of soda.

It is well to emphasize Koch's statement and Lenti's confirmation that carbolic acid in olive oil or absolute alcohol has no effect whatever.