9005 P

A Mixture of High Molecular Alkyl-dimethyl-benzyl-ammonium Chlorides as an Antiseptic.*

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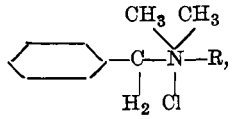
Recent investigations have shown that certain alkyl-dimethyl-benzyl ammonium chlorides,



possess characteristics highly desirable in an antiseptic or germicide. The product is obtained as a mixture of homologues in which the alkyls represent radicals derived from the fatty acids of coconut oil. The mixture has been found to be quite uniform in composition.

This compound is an amber-colored solid of soap-like consistency. From the solid is generally prepared a 10% aqueous stock solution, which is slightly acid in reaction and which has a surface tension of less than 36 dynes/cm.

Germicidal tests were carried out according to F.D.A. methods.† The cultures of *Staphylococcus aureus* and *Eberthella typhosa* used were secured from the Food and Drug Administration at Washington, D. C., the streptococci from the Boston City Hospital, and the other organisms from the collection of the Department of Biology and Public Health at the Massachusetts Institute of Technology.

All the bacteria were cultivated in Reddish broth, with the exception of the Streptococci, which were grown in Bacto-brain-heart infusion containing 0.1% agar. The molds were grown on Sabouraud's dextrose-agar and subcultured in Sabouraud's dextrose-broth.

Table I shows the results of some germicidal tests.

Both Gram-positive and Gram-negative pathogenic organisms were readily destroyed by the ammonium compound in high dilution. The hemolytic streptococcus, *E. typhosa* and *C. hominis* were

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† Food and Drug Administration Methods of Testing Disinfectants and Antiseptics. Circular No. 198. U.S.D.A. 1931

destroyed in the highest dilution at 37°C. *Monilia albicans* was most resistant at 20°C., but was quickly destroyed by a 1/10,000 dilution.

TABLE I.

Organisms	Average phenol-coefficients		Highest dilution of the chemical destroying the organism in 10 but not 5 mins. (Average values)	
	20°C	37°C	20°C	37°C
S. aureus	279	407	1/20,000	1/35,000
Eberthella typhosa	250	429	1/20,000	1/70,000
E. coli	160	358	1/12,000	1/40,000
Str. hemolyticus	435	579	1/40,000	1/95,000
Str. viridans	384	434	1/35,000	1/65,000
Cryptococcus hominis	214	395	1/24,000	1/70,000
Monilia albicans	111	274	1/10,000	1/35,000

Effect of Temperature. The germicidal action of the chemical against *Staphylococcus aureus* and *E. coli* at low temperatures was determined. At lower than 1°C., *S. aureus* was destroyed in 10 but not in 5 minutes by a dilution of 1/4,500 (average value), and *E. coli* by a dilution of 1/1,000. Neither freezing nor storage at above 50°C. for a period of 18 days, caused any apparent reduction in the germicidal action of the chemical.

Action in the Presence of Organic Matter. Tests were carried out in which normal horse serum was substituted for some of the dilution water in preparing dilutions of the chemical. All the bacteria listed in Table I were readily destroyed in the presence of 20% serum—twice the amount advocated by F.D.A. Methods—at both 20° and 37°C. *E. coli* was the most resistant micro-organism but it did not survive for 10 minutes in a 1/3,200 dilution at 37°C.

In the presence of 50% serum, a 1/200 dilution of the chemical destroyed *Staphylococcus aureus* in less than 15 seconds at 37°C., and in less than 30 seconds at 20°C. A dilution of 1/1,200 was effective in destroying this organism in 10 but not 5 minutes in the presence of 50% serum at 20°C. In comparison, a well known commercial mercurial—a 1/200 tincture—failed to destroy *S. aureus* at 20°C. when diluted to 1/400 by the presence of 50% serum.

Bacteriostatic Tests. The tests were run by incubating tubes at 37°C., each of which contained 8 cc. of Reddish broth, 1 cc. of a dilution of the chemical and 1 cc. of a 1/10 aqueous dilution of the test organism. Alkyl-dimethyl-benzyl ammonium chlorides pre-

vented the growth of the Gram-positive bacteria, *S. aureus* and *B. subtilis,* in a dilution of 1/100,000. Under similar conditions a 1/20,000 dilution of the chemical prevented the growth of *E. coli.*

The mixture of alkyl-dimethyl-benzyl ammonium chlorides investigated possesses high bactericidal efficacy, and has compared favorably with some of the best antiseptics in use.

9006 C

Integrity of the Skin in Relation to Cutaneous Absorption of Insulin.*

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Telfer[1] reported that insulin in the form of an ointment when rubbed into the skin of rabbits produced a fall in blood sugar. This work stimulated further investigations along similar lines and several reports from a number of workers have appeared in the literature; however, the results on insulin inunction have by no means been uniform.

Of particular interest is a recent report by Major[2] who showed that a solution of insulin mixed with diethylene glycol monoethyl ether when rubbed into the skin of rabbits produced a marked fall in the blood sugar. The experimental procedure adopted by Major was as follows: the skin over the abdomen was shaved and several drops of glycerine first rubbed in over the shaved area. Ten to 15 minutes later, 25 units of insulin was applied. The blood sugar diminished markedly, and in a number of animals hypoglycemic convulsions ensued 3 to 4 hours later. Major further observed that in the course of repeated experiments on the same rabbits, some animals apparently became refractory after the insulin had been applied to the skin of the abdomen 3 or 4 times. He further stated that such animals were found not to be refractory if the hair was shaved off the back or thigh and the insulin applied on this fresh area.

Our frankly negative results on insulin inunction in humans (unreported studies) led us to believe that the positive results obtained

* Aided by a grant from the Harriet Weil Fund.

1 Telfer, S. V., *Brit. Med. J.*, 1923, **1**, 715.

2 Major, R. H., PROC. SOC. EXP. BIOL. AND MED., 1936, **34**, 775.