the hemolytic streptococci of the throat as was found in this series of air streptococci. It is possible that the percentage of group A cultures of air was augmented by the coughing of individuals with group A infections of the throat.

The presence of group A streptococci does not necessarily indicate that they were suspended in droplets in air, for, as shown by studies of hospital air[5, 6] and as has been demonstrated experimentally by Wells and in this laboratory, bacteria sprayed in air may float for many hours after all droplets have evaporated. In conclusion we agree with Brown and Allison who, after studying the streptococci in the air of scarlet-fever wards, stated, " . . . . and while contact, direct or indirect, is probably of considerable importance in the transmission of infection the possibility of infection via the air other than that due to droplets cannot be dismissed."

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9940 P

Germicidal Efficiency of Some Silver Compounds Tested by the Improved Tissue-Culture Method.

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Silver compounds are employed for their antiseptic and germicidal action on bacteria. The effectiveness of such preparations is due largely to the free silver ions. The higher the concentration of free ions the greater will be the germicidal effect. *New and Non-official Remedies* (1937) states, "The antiseptic action of silver nitrate is complicated by irritation, pain, astringency, and corrosion. These may be desirable for the destruction of tissue or the stimulation of indolent wounds; but when they are not necessary for such purposes, they are distinctly undesirable. They may be avoided by the use of colloidal silver preparations."

The colloidal preparations differ from the silver compounds in that the silver does not exist to any great extent in the form of free ions. The silver does not, therefore, precipitate chlorides or proteins and is noncorrosive and relatively nonastringent and nonirritating. The germicidal action is not proportional to the silver con-

tent of the preparations but is due to the liberation of very low concentrations of silver ions. The degree of ionization or liberation of silver ions varies with different preparations.

In an earlier paper[1] a new method was proposed for the evaluation of germicidal substances. The compounds were tested for their effect on the growth of living embryonic chick tissue as well as for their ability to kill bacteria. A number known as the toxicity-index was determined which is defined as the ratio of the highest dilution of disinfectant showing no growth of embryonic tissue in 10 minutes to the highest dilution required to kill the test organism in the same period of time. The tests were run at a temperature of 37°C in the presence of a standard amount of organic matter. Theoretically the smaller the index the more nearly perfect the germicide.

In the present paper a number of silver preparations were tested. These were: (1) silver nitrate; (2) silver lactate; (3) silver citrate; (4) silver protein mild, U. S. P.; (5) silver protein strong, U. S. P.

Effect of germicides on bacteria and tissue. The silver preparations were tested against embryonic chick tissue and the organisms *Staphylococcus aureus* and *Eberthella typhosa.* The killing concentrations of the germicides for tissue and bacteria and their toxicity-indices are given in Table I.

TABLE I.

Compound	Highest dilution showing no growth after 10 min. at 37°C in the presence of organic matter			Toxicity index = A/B	
	Staph. aureus = B	*E. typhosa* = B	Tissue = A	*Staph. aureus*	*E. typhosa*
Silver lactate	1:110	1:690	1:100	0.9	0.15
" citrate	1:600	1:4500	1:610	1.0	0.14
" nitrate	1:80	1:1250	1:140	1.8	0.11
" protein strong, U.S.P.	1:15	1:175	1:25	1.7	0.14
" protein mild, U.S.P.	1:12*	1:70	1:30	2.5	0.43

*Failed to kill. A more concentrated solution could not be prepared.

The results show that of the non-colloidal compounds silver lactate and silver citrate are of about the same order of toxicity against *S. aureus,* being superior to silver nitrate. On the other hand the 3 compounds exhibit about the same degree of germicidal action against *E. typhosa.*

Of the colloidal organic compounds tested silver protein mild,

[1] Salle, A. J., McOmie, W. A., Shechmeister, I. L., and Foord, D. C., PROC. SOC. EXP. BIOL. AND MED., 1938, **37**, 694.

U. S. P., cannot be relied upon to destroy *S. aureus* in the presence of the concentration of organic matter used in the above experiments. However, it rated considerably better against *E. typhosa*. On the other hand, silver protein strong, U. S. P., was effective against both organisms but rated slightly lower than the non-colloidal compounds.

9941

Inefficacy of Prontylin in Experimental Tuberculosis.

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The interest in chemotherapy aroused by the discovery of the therapeutic value of prontosil and related compounds has been applied to the study of their effects against many infectious agents. At least one prior report has been concerned with the chemotherapy of tuberculosis with Prontylin. Rich and Follis[1] administered the drug as dry crystals by mouth to guinea pigs inoculated subcutaneously, and sacrificed both treated and control animals 5 or 6 weeks after inoculation. Pathological surveys revealed less extensive lesions in treated than in control animals and indicated a possible beneficial effect of the drug.

In our experiments we have employed the intracerebral route of inoculation,[2] by means of which acute disease and death are induced in a short time by a small number of virulent organisms. The criterion of efficacy was survival-time following such inoculation.

Twenty healthy male guinea pigs were divided into 2 groups of 10 according to weight. Individual weights of 9 animals in the 2 groups were identical, and the mean weights of the 2 groups were 344 and 350 g. The twenty animals were given intraäbdominal injections of Seconal,* 20 mg per kg, to induce anesthesia, and were then inoculated intracerebrally with 0.00001 mg (moist weight) of a human strain of tubercle bacilli (designated Lockett), isolated in this laboratory. Beginning 24 hours after inoculation 10 animals

1 Rich, A. R., and Follis, R. H., Jr., *Bull. Johns Hopkins Hosp.*, 1938, **62**, 77.

2 Smithburn, K. C., *J. Exp. Med.*, 1936, **64**, 771.

* Sodium propyl-methyl-carbinyl allyl barbiturate, Lilly, supplied by Eli Lilly and Company, through Dr. G. F. Kempf, Indianapolis City Hospital.