into the blood stream, and eventually the tissues, and that of peritoneal irritation, another factor should be considered in evaluating the administration of saline intraperitoneally. If the delta, electric conductivity, chloride and urea concentrations of the fluid are determined at the end of an hour, calculations may be made which reveal the presence of achloride electrolytes and organic crystalloids in the fluid.[2] These have entered by permeability changes. Thus, while water and chloride enter the blood, other electrolytes and crystalloids are deviated from the blood into the injected fluid. What significance this deviation may have is problematic.

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## Autosterilizing Power of the Nasal Mucous Membrane.

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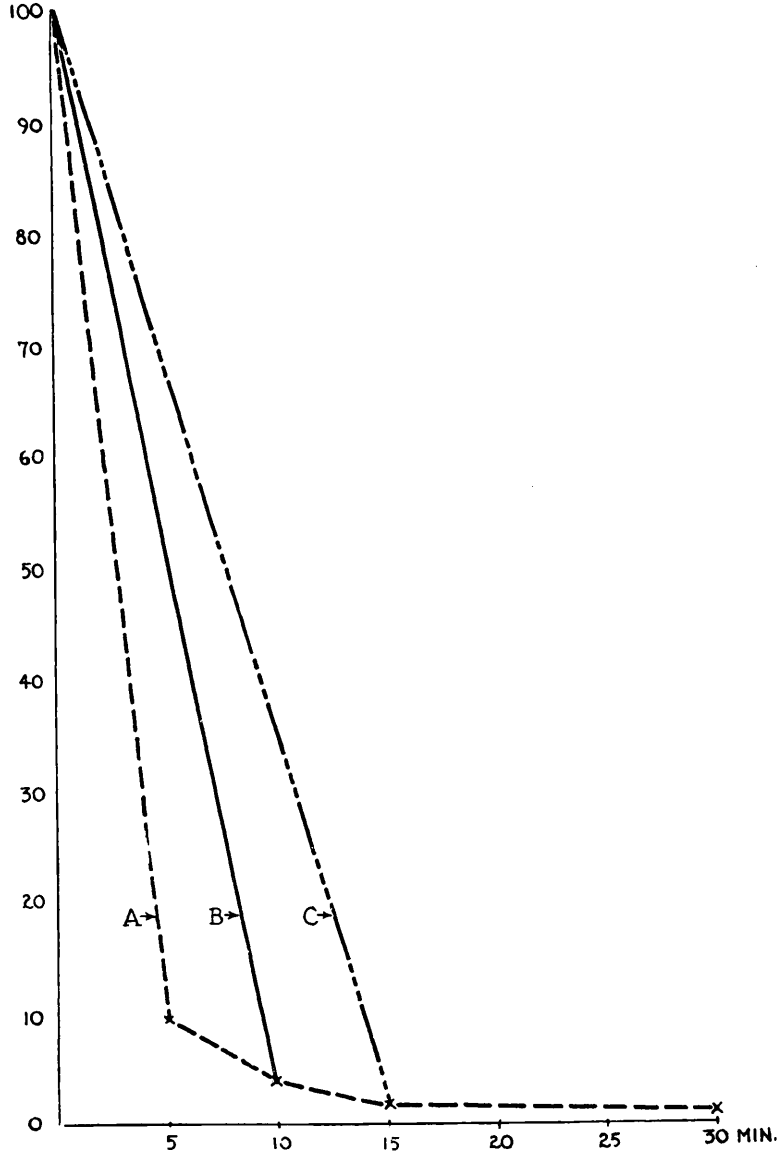
The average rate of disappearance of bacteria sprayed upon the mucous membrane of the nose has been determined for a series of animals, including guinea pigs, rabbits, dogs and humans. The technic finally used was the following: Broth cultures were diluted 1:200 with saline. A spray delivering 0.15 cc. ($\pm$0.01) was used to distribute the bacteria in each nares. A swab touched upon the surface of the respiratory portion of the nose at several places in a uniform manner and streaked well over the surface of an agar plate. This technic was repeated at intervals varying from one minute to one hour. An average of 400 experiments in normal humans, using 42 different subjects is shown in the accompanying graph. The average number of viable bacteria sprayed was 20,000,000. The swab taken immediately after spraying contained an average of 2,000 bacteria. After 5 minutes the number was reduced to about 50 colonies, 10 minutes about 15 colonies, after 15 minutes about 8 to 10 colonies, after 30 minutes about 5 to 10 colonies. At times none were present after this period. After one hour sometimes 1 or 2 colonies appeared, but ordinarily all of the sprayed bacteria were absent from such agar cultures. The same results were obtained with the other animals used by us. There were 185 animal experiments. If the same bacteria are sprayed in the same number in both sides of the nose, immediate swab only being ob-

tained from one side, and after 5 minutes specimen collected from both nares, the rate of reduction in both sides being the same. This




GRAPH 1.

Average of 425 normal human experiments. Ordinate, % of bacteria in relation to the number found upon the nasal mucosa immediately after spraying. Abscissa, time in minutes after spraying bacteria into nose.

A—Swabs taken after 5, 10, 15 and 30 minutes.

B—Swabs taken after 10 minutes.

C—Swabs taken after 15 minutes.

Average rate of reduction is not influenced by mechanical removal of bacteria by swabbing nasal mucosa.

type of experiment has been carried out many times with several different time intervals. The mechanical removal of bacteria by swabbing the mucosa does not play a demonstrable rôle in this reaction.

Swabs taken from the posterior pharyngeal wall show that these bacteria are not removed to an appreciable extent by being passed into the throat from the nose. Immediately after spraying 20 millions of bacteria into each side of the nose there are none found in the throat in the majority of our experiments. After 10 minutes there are from 25 to 40 colonies upon an agar plate surface smeared with a swab taken from this region. There is a reduction in the number after this time. At the 30 or 45 minute interval few if any viable test organisms can be found in the throat.

*B. prodigiosus* and *B. coli* have been found most satisfactory for this work; both disappear in the same ratio. "S" and "R" types of *B. coli* are removed at the same rate. In isolated instances we have observed an "R" variant appearing on the agar cultures after spraying the "S" type of *B. coli*. In one experiment lysogenic coli colonies were observed after the "R" type was seeded on the nasal mucosa.

As many as 8 successive seedings of the same bacteria at 30 minute intervals were placed in the nose. There is no evidence of exhaustion of this disinfecting mechanism, in fact, the bacteria are removed at a more rapid rate upon successive application. This is probably due in great part to the mechanical irritation of repeated application of the swab to the mucous membrane.

Broth cultures have been made from one of the few colonies appearing upon an agar plate 15 to 30 minutes after the application of the bacteria to the nasal mucosa. These were sprayed into the nose in the same manner the following day. The same technic has been carried out for 9 successive days. There was no evidence of an acquired resistance on the part of these bacteria that had survived the maximum period of time.

Nasal washings, nasal secretions collected by packing the nose with dry sponges do not contain inhibiting substance for the same bacteria *in vitro* experiments. Such secretions, collected after a period of repeated spraying of the nose with bacteria, do not contain inhibiting substance in various dilutions in broth cultures. In fact all of our results demonstrate growth promoting substances in nasal secretions for the same bacteria that are rapidly rendered non-viable when placed upon the normal nasal mucosa.

Normal human subjects placed in a cold room (45° F., humidity 30%) do not differ in the self-disinfecting power of the nose as

determined by our technic from that found in the ordinary room temperature (70° F., 70% humidity). The same subjects placed in hot rooms (95° F., and 90% humidity) show a retardation in the removal of sprayed bacteria. After 45 minutes to one hour the bacteria have disappeared but the curve is nearer a straight line. The rapid reduction of 90% of the inoculated dose within 5 minutes does not usually hold for the hot room environment.

This self-disinfecting power of the mucous membrane of the nose of healthy volunteers may play a major rôle in explaining the failure to seed the nose and throat with bacteria in influenza and other respiratory epidemiological studies.

*Summary:* 90 to 95% of the viable bacteria placed upon the mucous membrane of the nose are rendered non-viable within 5 to 10 minutes. Repeated application of bacteria to this mucosa is not associated with an exhaustion of this disinfecting mechanism. Cultures obtained from bacteria that have survived the initial period of disinfecting action are removed as promptly as the original strain from the nasal mucosa. Repeated applications did not lead to the development of a resistant strain.

"S" and "R" types of *B. coli* are removed at the same rate. Isolated instances of the appearance of an "R" variant from an "S" type of *B. coli* and also of lysogenic *B. coli* colonies were observed.

We were unable to demonstrate growth inhibiting substance in nasal washings and secretions *in vitro*.

Subjects in warm rooms showed a retardation in the disappearance of the bacteria from the nasal mucosa.

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## Influence of Local Application of Fresh Animal Serum, "Complement," on Acute and Chronic Gonorrhoeal Infections.

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Human serum has no complement for gonococci (Scaltritti[1]). This fact gives us a new viewpoint in the treatment of gonorrhoeal and blenorrhoeal conditions. With the expectation of a mild reaction I (Pribram) tried this treatment in a 4-year-old girl who had a

[1] Scaltritti, A., *Annales de l'Institut Pasteur*, 1925, xxxix, 865.