non-functioning, both in its cochlear and kineto-static portions. Records were taken of the effect of the caloric test on the electrocardiographic picture, each ear being subjected to the douching while the patient was in the electric circuit. The same findings occurred for the testing of both the active and destroyed labyrinth.

We therefore conclude from our experiments, that no reflex nerve path exists from the ear to the heart by way of the vagus nerve. That portion of the dorsal nucleus of the vagus which ccmprises the cardiac center of the vagus is not influenced by stimulation of the labyrinth by the caloric method, either during the period of reflex activity (nystagmus) or after consciousness reacts to the stimulation in the form of vertigo and nausea.

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The viability of hemolytic streptococcus in certain solutions containing gelatin.

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For certain quantitative biologic tests it is necessary to use a suspending medium in which the streptococcus will survive without increase or diminution in numbers for a considerable length of time.

Falk has recently reviewed the extensive literature on the subject of the inhibitory effect of the cations of various salts on the biologic activities of bacteria and other cells. He concludes that balanced solutions containing two or more salts in the proper proportions preserve the life of bacteria better than either distilled water or solutions containing single salts unless they are very dilute.

Robertson, Sia and Woo have recently found that 0.1 to 0.125 per cent gelatin in distilled water or Locke's solution greatly increases the length of life of the pneumococcus in these fluids.

With these facts as a basis, experiments with a hemolytic streptococcus obtained from an acute gangrenous infection of the thigh have been carried out with six different fluids: 1, distilled water; 2, "normal" saline; 3, Locke's solution; 4, a balanced solution containing 1 per cent sodium chloride and 0.05 per cent calcium chloride ("20-1"); 5, 0.2 per cent sodium citrate; 6, a balanced solution containing 0.5 per cent sodium chloride, 0.5 per cent potassium chloride, 0.5 per cent calcium chloride and 0.1 per cent magnesium chloride (Zeug's mixture).

Each fluid was prepared both with and without 0.1 per cent gelatin and titrated after autoclaving to pH 7.8. The streptococcus was grown in 1 per cent dextrose digest broth, washed twice and then suspended in the solution to be tested at a standard concentration, approximately one billion organisms per cubic centimeter. This was diluted down seven times with the fluid to be tested, each dilution containing a tenth of the number in the previous dilution so that the final dilution was estimated to contain 100 organisms. Each dilution was then divided up into one cubic centimeter quantities and allowed to stand, one series at room temperature (19-22°) and another series at incubator temperature (37.5°). Immediately after the dilution process was finished and at intervals of 6, 12, 18, 24, 48, and 72 hours, 5 cubic centimeters of digest broth were added to a representative tube of each bacterial dilution, both in the room temperature series and in the incubator series. These tubes were then incubated and growth or death was noted. Negative results were not recorded until after 72 hours incubation. In every case, irrespective of the fluid used, those containing gelatin maintained life longer than the corresponding fluid without gelatin. At room temperature in the gelatin Locke's, gelatin citrate and the gelatin "20-1" solutions the streptococci survived for 72 hours at dilutions with an estimated concentration of 100 cocci per cubic centimeter. At incubator temperature these solutions maintained life in the highest dilutions for twelve hours. These solutions may, therefore, be used for certain biologic tests. The other three gelatin solutions, namely Zeug's mixture, water and saline, were not as efficient and in the solu-

tions without gelatin there was very rapid death especially at incubator temperature.

When the six gelatin solutions were tested against each other it was found that the gelatin citrate solution maintained life in the two highest dilutions at room temperature until the end of the test—15 days. The others in the order of efficiency were Locke's, "20-1", Zeug's mixture, distilled water and "normal" saline. In the "normal" saline with gelatin the streptococci died after four days in the sixth dilution and after two days in the seventh dilution. Thus, although gelatin protects the streptococci in these solutions the protection is not absolute. After a time death takes place in about the same relative order as in the solutions without gelatin according to the relative toxic action of the fluids. The sodium cation in the citrate solution is not sufficiently concentrated to be toxic or its toxic effect is inhibited by the citrate anion, which may be nutrient.

By testing gelatin water and gelatin Locke's solution at different levels of hydrogen ion concentration it was found that the streptococci will survive in these solutions in the highest dilution, for at least three days in a zone ranging from pH 7.4 to pH 8.2 or even wider. If the solutions are adjusted before use to pH 7.8 they will maintain their reaction within that zone.

In experiments carried out in an effort to explain the protective action of gelatin there was found to be a protection against the mechanical injury of the diluting process. But the protection is more than that, for death takes place much more rapidly at incubator temperature than at room temperature, after the same degree of mechanical injury. There may be a coating of the organisms delaying the entrance of toxic substances. Probably also the gelatin has a slight nutrient action, enough to permit a slow metabolism or prevent autolysis, but not enough to cause a multiplication of the organisms. In the 1 per cent gelatin Locke's and gelatin citrate solutions the streptococci maintain an even numerical level for from 15 to 24 hours at room temperature and then gradually die off. At concentrations of 0.5 per cent and 1.0 per cent, however, they actually multiply.