decreased by a further increase in solution concentration. Thus, it would appear that hemolysis by these agents is concerned with surface concentration rather than with solution concentration. If we assume that the time of hemolysis is inversely proportional to the surface adsorption the time of hemolysis can be expressed by the equation

$$t = amx^{-1/n} \text{ when}$$

t = time of hemolysis,
x = concentration of hemolytic substance,
m = constant dependent upon the extent of adsorbing surface.
a and n are impirical constants.

This equation, which is the reciprocal of the adsorption formula, is graphically similar to the plotted values from experimental data which further indicates that hemolysis by surface tension reducing substances is a matter of surface concentration or an adsorption phenomenon.

141 (2101)

The fragility of erythrocytes treated with soap and saponin.

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It was shown by preliminary experiments with hemolytic agents which were active in reducing surface tension that in very low concentration the time of hemolysis was greatly prolonged. The work here reported has been done to determine if a surface concentration of these substances on red blood cells could be demonstrated when the surface concentration was insufficient to cause hemolysis.

Having determined what concentration of castor oil soap and saponin in 0.9 per cent. NaCl would not hemolyze erythrocytes in a number of hours, red blood cells were placed in solutions of the determined concentration and allowed to stand for varying lengths of time. These cells were then removed and resuspended in 0.9 per cent. NaCl and time-fragility tests performed. We have found that the adsorption of castor oil soap on the sur-

face of red blood cells in concentration insufficient to cause hemolysis greatly increases the time of hemolysis in a time-fragility test. When saponin is adsorbed by erythrocytes in a non-hemolytic concentration the time of hemolysis by hypotonic saline solutions is decreased. This increased and decreased fragility demonstrates the presence of the hemolytic agent definitely in connection with the red blood cell surface, and bears further evidence that hemolysis by agents of this type is an adsorption phenomenon. The difference of castor oil soap and saponin in producing a decrease and increase in fragility would seem to indicate that there is a difference of mechanism of hemolysis even in those hemolytic agents acting by surface adsorption. We have found a great difference of susceptibility to the action of soap and saponin in the case of human, sheep and bovine erythrocytes, and a similar variation is also observed in our time-fragility tests.

142 (2102)

The fragility of erythrocytes in obstructive jaundice and pernicious anemia.

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Our previous work demonstrating the action of small amounts of hemolytic substances as castor oil soap and saponin in decreasing and increasing the fragility of red blood cells would seem to have some bearing upon the fragility test as used in medical diagnosis. The preliminary work to determine the rôle of adsorption hemolysis in clinical conditions is here reported.

Bile from various animals has been used as a hemolytic agent for various animal erythrocytes and we have found its action to be very variable in different samples. The surface tension of bile solutions has also been studied and its surface tension reducing property is likewise very variable.