The force used in producing this result as measured by Jolly balances was found to be one and three-quarters (1¾) pounds.

Approximating teeth were subjected to elongation tension and its opposite a depression tension. This double pull stretched the supporting tissues to a great degree and the effect was one in which the bone at the alveolar crest, the overlying connective tissue and mucosa have been pulled or dragged out of their proper position and have followed the movement of the attached tooth.

At the apex of the tooth the space between it and the bone is filled normally with a few layers of peridental membrane. The tooth which was pulled gradually from its socket showed a different picture. In this case the amount of peridental membrane had increased to 5 or 6 times its usual thickness.

The apex of the tooth which was being forced through the end of the socket was deeply eroded.

The fibres of the dentin matrix also show changes. They do not branch in the usual manner near the junction of dentin and cementum; they are smaller in number and in size and appear to be attenuated at the ends. The condition resembles somewhat the appearance of the fibres under an area of caries in which secondary dentin is being deposited.

When comparison is made between the processes concerned with the radicular resorption of deciduous teeth, it is at once apparent that differences are clearly manifest. There are even more striking dissimilarities demonstrable when bone absorption resulting from apical infection is studied.

In this case a low grade chronic infection may develop into an acute abscess. But in neither case has it been found possible to increase experimentally the rate of bone or tooth absorption.

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Studies on the Combination of Iron With Certain Proteins, Amino Acids and Related Compounds.*

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The present work is a continuation of the studies which have been carried out in this laboratory on the mode of combination of

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proteins with the inorganic elements. Previous reports have dealt with the compounds of proteins with the alkali metals[1] and with the alkaline earth elements.[2] This work has now been extended to include the compounds which ferric iron forms with certain proteins, amino acids and related substances.

The method employed consists in adding the substances to be tested to a known solution of ferric iron. To this a standard amount of ammonium thiocyanate is added and the reaction is adjusted to a definite pH. The color of this solution is compared with a standard iron thiocyanate solution. If the substance tested forms a compound with iron (*c. g.*, complex ions) which is less dissociated than ferric thiocyanate, the color of the solution will be less intense than the standard. If the ferric compound is dissociated to a greater extent than ferric thiocyanate, no appreciable effect on the color will be noted.

The results showed that at pH 2.5 substances which possess a hydroxyl group alpha to a carboxyl group markedly reduce the color of ferric thiocyanate. The effect is less pronounced when the hydroxyl group is in the beta position. Dicarboxylic acids, which may be considered as hydroxy acids, show some effect. Hydroxy acids which contain a double bond oxygen (=O) and hydroxy groups in an arrangement such as occurs in phosphoric acid, arsenic acid and sulfuric acid markedly reduce the color of ferric thiocyanate. Casein and gelatin likewise exhibit this property. Substances which contain only hydroxyl groups (glycerine, borates, etc.) showed within the limits of concentration tested, no effect. The mono-amino, monocarboxylic amino acids (glycocoll, alanine, δ-amino valeric acid) and the diamino mono-carboxylic amino acid (lysine) exhibit no effect.

Starkenstein[3] has recently published data from which he concludes that a great many substances combine with ferric iron to form complex compounds.

The present work is being continued.

[1] Greenberg, D. M., and Schmidt, C. L. A., *J. Gen. Physiol.*, 1924, vii, 287.

[2] Greenberg, D. M., and Schmidt, C. L. A., *J. Gen. Physiol.*, 1926, viii, 271.

[3] Starkenstein, E., *Z. Ges. Exp. Med.*, 1929, lxviii, 425.