ence of action than any of the 3 other substances examined. This property of the propionate was still more striking in the small number of short interval (36 hours) experiments. The unit dose was considerably higher under these conditions but the action persisted more than 20 days.

The absolute values obtained in this study may require revision. Various circumstances indicate that they will be found somewhat lower in a larger series of experiments, when the experimental conditions are better established as, for instance, the volume of the hormone solution injected and the time interval between tests on the same animal. However, if the general results of these experiments are confirmed in a larger series of tests, a new bio-assay method becomes available which offers several advantages, *viz.*, animals need not be sacrificed, autopsy and histological examinations or measurements of organs are not required, and the persistence of action can be registered on the individual animal continually.

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Blood Copper and Iron in Addison's Disease.

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In a series of anemias previously reported,[1,2] we have shown that with few exceptions that low blood iron was accompanied by an increase in blood copper. We report now 3 cases of Addison's disease, a comparatively rare condition accompanied by secondary anemia and characterized in most instances by an increased degree of pigmentation of the skin. The fact that the copper content of the skin has recently been closely associated with increased skin pigmentation[3,4,5] makes these determinations of added interest.

We have made iron and copper analyses on the blood of 3 patients with Addison's disease. Iron estimations were made by a dry ashing method using potassium thiocyanate as the reagent, and

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copper determinations by a modification of McFarlane's method, using sodium diethyldithiocarbamate as the reagent.[1, 6-9]

TABLE I.

Name of patient	Red Cells per cc. mm.	Hemoglobin, gm. per 100 cc.*	Iron, mg. per 100 cc.	Copper, mg. per 100 cc.	Degree of Pigmentation
Mr. S., 26 yr.	4,370,000	10.47	35.08	0.141	4 plus
Mrs. H., 39 yr.	3,880,000	10.42	34.92	0.224	3 "
Mrs. C., 38 yr.	3,888,000	10.64	35.64	0.193	1 "

*Hemoglobin calculated from blood iron by the factor: mg. of Fe per 100 cc. divided by 3.35 = gm. of hemoglobin per 100 cc.[10]

In comparison with our figures obtained for normal individuals, the blood findings in the three patients indicate the presence of anemia. The blood picture in the two female patients shows a hypo-erythrocythemia and hypoferronemia accompanied by hypercupremia. The blood in the male patient reveals a hypo-erythrocytemia and hypoferronemia, the copper content being slightly higher than the average but yet within the normal range.

In the 3 cases of Addison's disease reported in this communication we are unable to deduce any correlation between the copper content of the blood and the amount of skin pigmentation. Mr. S., who possessed the greatest degree of pigmentation of the three, had the least blood copper content. Mrs. C., who displayed the least skin pigmentation, had 37% more blood copper than Mr. S. However, it must be remembered that skin pigmentation in Addison's disease is a very slow and gradual process, and as a result the blood copper may show no deviation from the normal.

We wish to thank Dr. Russel M. Wilder, of the Mayo Clinic, for permission to make copper and iron determinations on blood samples from the 3 patients mentioned in this paper.

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9 Fabian, A. A., Sachs, A., and Levine, V. E., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 662.

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