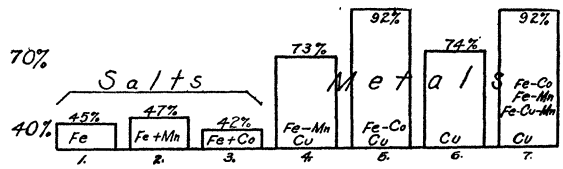

FIG. 2

were remarkably close to the horizontal line in the figure, when, on July 23, 1929, the indicated salts were added to the milk of the first three and the noted metals to the other groups, in weights seen in the table. The average rise in hemoglobin per cent. in each cage of 6 or 8 rats during 7 weeks is seen in the 7 graphs. Graph 6 shows effects of pure Cu only.

The rats in cage 7 were comatose and all below 38 per cent. hemoglobin with little appetite before the metals were put into their milk diet. After 4 days on metallized milk they were playing and ate ravenously, rising in eight weeks from below 38 per cent. hemoglobin to 92 per cent.

THE WEIGHTS OF SALTS FED PER RAT PER DAY IN FIG. 2

Cage	No. 1	No. 2	No. 3
	0.5 mg Fe as $FeCl_3$	0.1 mg Fe, 0.1 " Mn as chloride	0.1 mg Fe, 0.1 " Co as chloride

THE WEIGHTS OF COPPER AND ALLOYS PER RAT PER DAY IN FIG. 2

Cage	No. 4	No. 5	No. 6	No. 7
	Fe–Mn, 3.24; Copper, 0.31 mgs	Fe–Co, 0.135; Copper, .306 mgs	Copper .306 mgs	Fe–Co, 0.16; Fe–Mn, 3.04; Fe–Mn–Cu, .384 Copper, 0.27 mgs

These weights are cage averages. The sheet Cu is free from Fe, Al, Mg, Ni, Zn, Li, and has only traces of Co and Mn, respectively 10 parts and 1 part per million.

Copper alone is quite effective, but more so with other metals, suggesting that mutual influences probably exist when several metals function together, which may fail when they are separate.

After using metallized milk himself for eight months to determine possible pathological results, the writer secured the cooperation of physicians and executives in three local cotton mills and tests were made of the effects of metallized milk on a number of employees who had secondary anemia. Each person was examined after using a directed diet for two weeks including sweet milk, the percentage of hemoglobin being specially noted. Results typical of 50 cases are shown in Fig. 3, with a record of the

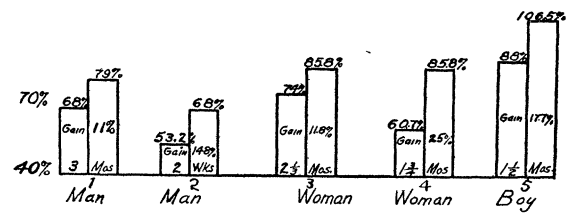

FIG. 3

hemoglobin percentage gain of each and the time involved.

The ages of the two men, two women and one boy, in order, are 59, 28, 49, 28 and 16 years. No change in color, odor or taste occurs if the immersed metals are pure. The man of graph 2, Fig. 3, ingested 0.5 mg of copper per day, and approximately 0.7 mg of iron. Tests of the duration of these effects are being made.

CONCLUSIONS

(1) Metals dissolve enough in milk to supply the requirements for rapid regeneration of hemoglobin in rat and man.

(2) Copper alone is effective but less so than when accompanied by other metals, especially iron.

(2) Much less mortality occurs among rats fed on metallized milk than when salts of the metals are used in anemia tests.

(4) These metals produce no odor, color, taste or other observed change in milk with the quantities used unless they are exposed to air and milk.

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BOOKS RECEIVED

ALLEE, W. C. *Animal Aggregations.* Pp. ix + 431. 35 figures. University of Chicago Press. $5.00.

BRIDGES, T. C., and H. H. TILTMAN. *Master Minds of Modern Science.* Pp. 278. 32 illustrations. Dial Press. $3.00.

HATCH, F. H. *An Introduction to the Study of Ore Deposits.* Pp. 117. 31 figures. University of Chicago Press. $2.50.

HAWKS, ELLISON. *The Book of Electrical Wonders.* Pp. 316. 40 plates and 91 figures. Dial Press. $3.00.

Kyoto Imperial University. *Memoirs of the College of Science.* Series A. Volume XIV. No. 1. Pp. 42. Maruzen Company, Tokyo.

PIERCE, FREDERICK. *Dreams and Personality:* A Study of Our Dual Lives. Pp. xii + 337. Appleton. $3.00.

SMART, HAROLD R. *The Logic of Science.* Pp. vii + 237. Appleton. $2.50.

VON BERNEWITZ, M. W. *Handbook for Prospectors.* Second edition. Pp. xi + 359. 89 figures. McGraw-Hill. $3.00.

WHITNEY, JESSAMINE S., Editor. *Facts and Figures about Tuberculosis.* Pp. 63. National Tuberculosis Association, New York, N. Y. $.75.