sonable to demand a full presentation of her data on the inheritance of *albinism* in mice. In fact, a careful repetition of such work should be expected before her claims are to be accepted.

To those unfamiliar with the work of the geneticists above mentioned, Slye's paper might be taken as presenting the well-known principles of Mendelian inheritance. With a knowledge of the facts, however, it is obvious that the type of inheritance which she outlines has not been observed in similar material by any of the investigators above mentioned. That this discrepancy is not based on an oversight on the part of Miss Slye has been determined by personal correspondence.

C. C. LITTLE

HARVARD UNIVERSITY

RADIUM FERTILIZER

IN a recent number of SCIENCE[1] there appeared an article by Hopkins and Sachs of the University of Illinois on "Radium Fertilizer in Field Tests" in which they gave results of a series of tests where they used .01, .1 and 1 milligram of radium per acre. Their results showed that radium used in these amounts had no effect.

It is well known that radium is present in all substances in slight traces. I thought it of interest to calculate the amount of radium in one acre. The question immediately arises, What is the volume of an acre? For agricultural purposes I think that every one will agree that the soil should be at least 5 inches, $12\frac{1}{2}$ centimeters, deep.

There are 43,560 square feet in one acre. This when reduced to square centimeters is approximately 40,000,000 or 4×10^7. This when multiplied by the depth, $12\frac{1}{2}$ is 5×10^8 cubic centimeters. Taking Rutherford's average value for the amount of radium in the crust of the earth as 2×10^{-12} grams radium per gram of material,[2] and calling the density of the soil, which is about 1.2, unity, and then multiplying 5×10^8 by 2×10^{-12} we have

[1] Vol. 41, p. 732, May 14, 1915.

[2] "Rutherford Radioactive Substances and Their Radiations," p. 650.

1×10^{-3} grams or 1 milligram of radium in an acre of soil.

Thus Hopkins and Sachs in using their maximum amount, 1 milligram, at a cost of $100 only doubled the amount of radium in the soil. A fertilizer is on the market which contains radium, .05 to .08 microgram, or 5 to 8×10^{-8} grams to the pound. The company recommends one pound of the fertilizer to fifty square feet of soil. Fifty square feet of soil, figured as above, contains about 5×10^{-7} grams of radium. Thus the average soil contains ten times as much as they recommend in their fertilizer.

Besides the radium in the soil we have the radium emanation, a gas which slowly rises through the soil from the interior of the earth. Experiments show that about $1,000 \times 10^{-12}$ curies of radium emanation issue from every square meter of the earth's surface in an hour. (A curie of emanation is the amount of emanation which is in equilibrium with one gram of radium, or the amount which will collect in a closed vessel in 30 days when the vessel contains one gram of radium.) Every square centimeter of the earth's surface gives off $.1 \times 10^{-12}$ curies per hour, or $.0003 \times 10^{-12}$ curies per second. One curie equals about 4.8×10^5 gram seconds. (A gram second is the amount of radium emanation given off by a gram of radium in a second.) Then $.0003 \times 10^{-12}$ curies equals about 150×10^{-12} gram seconds, or the amount of radium emanation which is continually given off by 150×10^{-12} grams of radium.

Thus the amount of radium emanation given off by the soil is 50 to 100 times as much as that which is given off by the radium in the upper five-inch layer of the soil.

To double the emanation in the soil one must use about 75 milligrams of radium per acre at a cost of $7,500 per acre.

R. R. RAMSEY

DEPARTMENT OF PHYSICS,
    INDIANA UNIVERSITY

SUGAR-BEET MOSAIC

ALTHOUGH this disease of the sugar beet has been observed for more than a dozen years it