

*"Today, in our complex civilization, we could not exist without metals. Metals have pictured the progress of civilization. Certain stages in man's advancement are designated by such names as 'Gold Age,' 'Bronze Age,' 'Copper Age,' and 'Iron Age.' Metals are the basis of modern industry and we would be lost without them. I, for one, should like to become a part of this living, breathing creature called 'industry.' For me, the greatest glory would be in playing a leading role in the life of the metals. It would be of the greatest honor, and I should feel that a privilege had been bestowed upon me if I could actively participate in developing this exciting field.*

*"I now know that I should like to become a research metallurgist. I wish to know more about these fascinating metals—from the moment they are torn from the dark caverns of the earth and separated from their ores, until they emerge as the thousand and one different articles without which life today would be much less comfortable.*

*"It is my firm intention to enter a school of high standing where I may earn a degree in metallurgical engineering, then when I have acquired this background and training, I will go forth into the industrial world and attempt to become a helpful, useful cog in the machine which is carrying on the work of the world."—From the essay of Marion Cecile Joswick.*

## NUTRITION

## Study of Hungers Affords Scientific Opportunity

By DR. WARREN B. MACK

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*Address given before the Science Talent Institute.*

➤ HUNGRY plants and hungry people open many fields of study for the young scientist. Thus far, scientists have only begun to find the nature and extent of the hungers that exist. Much more knowledge is needed on these aspects of hunger before an understanding can be attained of the ways in which the existing hungers may be satisfied.

Examples of studies on hungry plants and hungry people are the two researches now in progress at Pennsylvania State College. One of these, known as the Pennsylvania Mass Studies in Human

## PHYSIOLOGY

## Inheriting Atoms

➤ EVIDENCE of great economy in the animal body's use of mineral elements is offered in a study by Prof. G. Hevesy of the University of Copenhagen, on "tagged" atoms of artificially radioactive phosphorus in laboratory mice. The research is reported in a testimonial volume celebrating the sixtieth birthday of the noted physicist, Prof. Thé Svedberg of the University of Uppsala, recently published in Sweden, copies of which have just been received in this country.

Prof. Hevesy injected into the bodies of pregnant female mice a solution of a phosphate which had been rendered artificially radioactive, so that the atoms could be detected by suitable apparatus wherever they turned up. After the young

mice were born, one was immediately killed and its body tissues analyzed to find how much of the maternal dowry of "tagged" phosphorus had been passed on to it. After three months, when the new mice were full-grown, another was killed and similarly analyzed. It was found that 40% of the phosphorus concentration present in the newborn mouse still remained in the body of its litter-mate three months later.

In another series of experiments, the radioactively "tagged" phosphorus atoms were traced through three generations. The concentration in the granddaughter mice was found to be six-tenths of one per cent of what it had been in their mothers at birth.

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Nutrition, has been in progress during ten years under the direction of Dr. Pauline Beery Mack, Director of the Ellen H. Richards Institute. In this study, a staff of medical and dental scientists, chemists, physicists and geologists has examined individuals and families selected to represent the population of certain cities, towns and rural areas in Pennsylvania in the same proportions as the various racial, age, economic, and social groups that occur in the respective population. Records are kept of the foods eaten by the persons examined, and these are compared with the nutritional status or condition of these persons or families. Measurements of nutritional status include medical and dental examination, physical measurements to show body build, development, posture and conformation, chemical analyses of body fluids to find their content of vitamins, minerals and proteins; microscopic examination of the skin and tissues of the eyes, mouth and tongue, X-rays of bone to reveal structure and mineral content, and measurements of certain functions known to be related to the nutrition. The studies include also observation on the improvement in various respects brought about by certain foods and dietary supplements added to the diet of certain groups on an experimental basis.

The study of plant nutrition engaged in by Dr. Mack is one which has been carried on by Dr. Walter Thomas, plant physiologist of the laboratory of plant nutrition of the Department of Horticulture at Pennsylvania State College dur-

ing more than 35 years, the last 10 with the cooperation of Dr. Mack. In these studies, the mineral nutrition of crop plants grown by commercial methods had been analyzed by determining the concentration and proportion of chemical nutrients in selected leaves, the plant organs in which important syntheses occur. These concentrations and proportions are determined from time to time during the growth of the plant, and are related to the development and yield of the plants, as well as to the different fertilizers, cultural practices, and climatic conditions to which the plants were subjected.

Both of the research studies described have shown that plants as well as humans are suffering from many varieties of hunger. They indicate that, to satisfy these hungers, not only must new foods and nutrients be adequate and of the right kind, but also they must be in the proper proportion. They show also that hungry plants result in hungry animals and hungry people, because they do not supply the qualities needed to satisfy the hungers of the final consumer. Vast areas of soil in this country either lack the nutrients or supply the improper proportions to nourish fully plants, animals and people living on them. Studies similar to these pioneer researches at Pennsylvania State College are yet to be made in most of the country, but are needed if our increasing population is to be well fed; they offer abundant opportunity for great numbers of talented young scientists.

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