detailed report of operations will be made public as soon as practicable.

Jay L. B. Taylor

Pineville, Mo.

SOME SUGGESTIONS FOR PHOTOGRAPHING FOSSILS

For some time the writer, when photographing fossils, has used the whitening process contributed by Professor S. H. Williams, but, with many others, he has found it not altogether satisfactory. In order that the whitened specimen should contrast with a white background it has been necessary to over-expose or over-develop the prints. Because of this, many of the minor details of fossils have been lost in reproduction, and the pictures, as a rule, have seemed flat and "lifeless." In addition, it is usually the practise to opaque the background of the negative as an aid in determining how far to carry the development of the print. This process is painstaking and slow at best.

Some time ago, the writer, with the assistance of Mr. Parke Bryan, developed a slight variation in the photographing of whitened fossils that seems to be a decided improvement. The time required is materially shortened, in that the negative requires no opaquing, and the results are so gratifying in the way of improved reproductions that it seems worth while to outline briefly the method.

The method is a combination of the common lighting arrangement used in portrait photography, and the whitening process of Professor Williams. The specimen is mounted on a slender stick with modeling clay and then coated with a thin film of white. A dull white background, placed some distance behind the specimen, is turned at an angle such that it receives the full light but does not reflect it toward the camera. After the photographing table is orientated so as to give the conventional light direction and the desired light-shade contrast to the relief features, a screen is placed between the specimen and the source of light so as to intercept the direct rays. The screen consists of one or more thicknesses of cheesecloth sewed on a wire frame, the number of thicknesses depending on the intensity of the light. Every feature of the fossil now shows clearly on the ground glass of the camera, although the specimen appears dark against a pure white back.

It has been found that the shadows on the under side and away from the light source are more intense than the image on the ground glass indicates, and except in the case of relatively flat specimens it has been necessary to use a slight back reflection. A sheet of dull finish white cardboard held at the proper angle has in every case been sufficient for this purpose. If an actinometer is used to determine the time of exposure, it is obviously the light of the shaded specimen that is to be tested.

Maurice G. Mehl

Department of Geology,
University of Missouri

SCIENTIFIC BOOKS

Vitamines: Essential Food Factors. By Benjamin Harrow, Ph.D. New York, E. P. Dutton & Co., 1921. Pp. 219. Price $2.50.

The author of this book has been at great pains to popularize a subject which the laity will certainly be glad to have so clearly presented. About half the volume is preliminary to the specific topic; it is a general account of nutrition and the story is well told. One is disposed to wonder whether readers who require such a very elementary introduction will appreciate the later chapters which are of necessity more difficult. However, a rare degree of order and simplicity is maintained to the end. The writer has a judicial attitude; he does not assert opinions of his own but quotes others with fairness and has evidently been in correspondence with the leading investigators that he may accurately express their views.

Of course not much space can be devoted to controverted matters in a book of this character. But a dogmatic tone is avoided. It should be plain to the reader that many problems await solution. Among the questions not fully settled may be mentioned the

following: whether rickets is due to lack of Fat Soluble A, whether there is an antiscorbutic vitamine (Water Soluble C), and in what sense pellagra may be rated as a deficiency disease. All the material is handled in a cautious and modest way with the result that no encouragement is given to faddists of any kind.

PERCY G. STILES

EXPERIMENTS ON THE RECORDING AND REPRODUCTION OF CARDIAC AND RESPIRATORY SOUNDS

WE have recently conducted experiments at the Bureau of Standards in which permanent records of cardiac and respiratory sounds have been made and reproduced by the use of a telegraphone. The records have also been made audible throughout the room with the aid of audion amplifiers and a loud-speaking telephone.

A carbon telephone transmitter of ordinary type with a rubber adapter substituted for the mouthpiece was used for the stethoscope. The currents from the telephone transmitter were amplified by means of a five-stage audion amplifier which was connected to the recording element of a steel wire telegraphone. The magnetic records of the cardiac and respiratory sounds thus obtained were made audible by connecting telephone receivers to the telegraphone in the usual manner. The telegraphone currents were also amplified by means of a three-stage audion amplifier which was connected to a loud speaking telephone. In this way the sounds were made audible throughout the room.

This method of obtaining permanent records of cardiac and respiratory sounds and of reproducing them offers interesting possibilities in the study of normal and pathological conditions of the heart and lungs and their demonstration to an audience for purpose of instruction.

FRANKLIN L. HUNT
BUREAU OF STANDARDS
MAGNUS J. MYRES
MEDICAL CORPS, U. S. A.

SPECIAL ARTICLES

THE SEPARATION OF THE ELEMENTS CHLORINE AND MERCURY INTO ISOTOPES

IN SCIENCE of March, 1920, Harkins and Broeker reported that they had obtained a separation of chlorine into isotopes by diffusing hydrogen choride gas. The separation at that time amounted to an increase of atomic weight equal to 0.055 unit, or a change of density amounting to 1,550 parts per million. This separation has been definitely confirmed by Dr. Anson Hayes and the writer, who have secured an increase of 0.04 unit of atomic weight in a larger quantity of material. Elaborate purifications have been resorted to, and definite evidence has been secured to show that the increase in density found is actual, and not due to impurities. The details of this work were supposed to have been printed in the August number of the *Journal* of the American Chemical Society. However, since the date of publication of this number is doubtful on account of the printers' strike, it seemed advisable to answer here the considerable number of inquiries as to whether we have secured definite evidence of the separation.

About six months after our notice of the separation of chlorine into isotopes had been published, Bronsted and von Hevesy published a notice in *Nature* indicating that they had separated mercury into isotopes. However, since the extent of the density change reported by them was only about *one thirtieth* of that previously obtained by us in the case of chlorine, it seemed to us that the evidence for this separation of mercury was inconclusive, since a change of 50 parts per million in density might be due to minute amounts of impurities. In order to see if they could confirm these results, Dr. R. S. Mulliken and the writer have vaporized mercury at low pressures. The mercury was carefully purified by five fractional distillations in air at low pressures, and one in a high vacuum, after initial purifications with nitric acid. The increase in density obtained amounts to 69 parts, and the decrease to 64 parts or a total