cial fertilizers has been made in cooperation with the Mining and Geology Division. Action is currently under way to provide the raw materials for the production of suitable fertilizers for the use of Japan and other countries in the Orient. These raw materials, together with the large fertilizer-plant capacity of Japan, will do much to reduce the need for the import of large tonnages of food.

Fish constitutes the most important single animal food for the Japanese. Japan has caught more fish than any other nation in the world, but her actions as a fishing nation have been selfish and damaging to international fishing. The Fisheries Division has taken the initiative in helping Japan produce the requirements of a minimum subsistence diet during the immediate postwar emergency. The Division has initiated a program of providing the Japanese fishery fleet limited requirements of fuel oil and fishing equipment. The area opened to Japanese fishing is rigidly prescribed, consisting of waters adjacent to the home islands and a limited area for whaling around the Bonin Islands, although no landings are permitted at that location.

Fuel is next in importance as a commodity necessary to life in Japan. Production of the principal fuel, coal, dwindled almost to the vanishing point with the release of Korean and other slave labor. In addition, mining equipment and mines have deteriorated badly during the war period. The Natural Resources Section initiated the actions that have resulted in raising the monthly coal production to the level of monthly requirements. It is expected that coal production will be further increased.

Charcoal has also long been important in domestic heating in Japan. The Forestry Division has concentrated great efforts on charcoal production and has done much to meet this demand. This Division is also making a complete study of Japan's forest resources, lumber and allied products, wood pulp, and paper requirements. The forests were severely overcut during the war years, and the lumber and plywood requirements for housing needs of the occupation forces and for reconstruction in Japan are far in excess of the amount of timber that can be supplied domestically without serious damage to the forests and forest lands. All aspects of this problem are being studied in order that it may be resolved as rationally as possible.

In addition to the work on coal and fertilizer the Mining and Geology Division has assembled basic data on all metals, minerals, and petroleum in order to supply information regarding imports essential for the postwar emergency and the export of materials badly needed elsewhere.

The four Divisions have assembled basic data on all natural resources which may be considered as a possible source of reparations. In this connection the Section has received a letter of commendation from the Japanese (Pauley) Reparations Mission for the information, advice, and counsel supplied to that mission.

The Section is also conducting a complete study of Japanese research in the field of natural resources, particularly during the war years. The information obtained in the collection of possible basic data and a study of Japanese research is expected to meet the needs of all current problems. The long-range plan for the work of the Section has been set up with the ultimate goal of obtaining full knowledge of Japanese natural resources for publication as one or more comprehensive reports that should constitute a reference work for many years to come.—*Hubert G. Schenck*, Lt. Col., Chief.

In the Laboratory

Modifications of Specimens in Electron Microscopy

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Ample evidence has been given for the relative stability of many electron-microscope specimens during dehydration and electron bombardment in the instrument. Although a surprisingly large number of specimens maintain their shape, from time to time evidence points to substantial changes of structure or shape in some objects. The observed stability of specimens under given conditions is by no means proof of similar stability for different specimens or even for the same specimen under changed conditions. Generally speaking, the electron microscopist will have to establish independent proof of the correct reproduction of the structures imaged in the electron microscope before drawing any definite conclusions. Some definite specimen changes are discussed below, and means for their detection and prevention proposed.

For some time during use of the gold shadowing technique of Williams and Wyckoff (*3*), discrepancies between the apparent object size and the width of the shadows produced by them were observed. In the case of rather small particles, such discrepancies were not regarded seriously and generally were explained by lack of contrast at the edges of the particles in the unshadowed specimens. Recently, however, such flagrant cases of discrepancy were observed that no such interpretation could be allowed. Fig. 1 reproduces a large particle with a shadow not only considerably wider than the particle but even extending a little

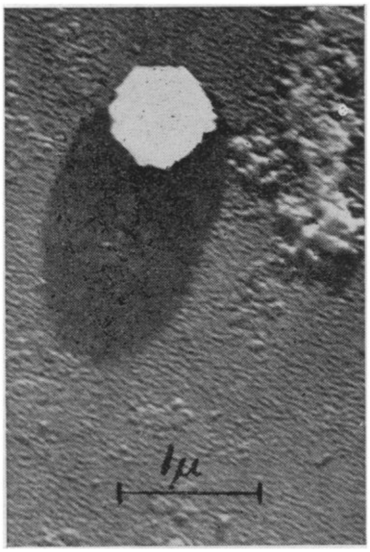

FIG. 1

toward the source in front of the particle. An examination of this and several similar micrographs excluded all interpretation other than a shrinkage of the particle *after* gold shadowing. The specimen in Fig. 1 consists of accidental impurities of unknown origin on a collodion film, which was gold shadowed in an evaporation apparatus and then transferred to the electron microscope. Apparently the particle size changed during observation (focusing) in the electron microscope and shows, therefore, a different appearance from that expected from its shadow. The observed shrinkage in this particular case is as much as 40 per cent. The question whether the particle changed previous to its gold shadowing is left hereby entirely open.

It is proposed, therefore, that in addition to such methods as comparison with other evidence (light microscopy, ultracentrifugation, streaming birefringence, etc.) as much evidence as possible should be gathered in the electron microscope about eventual structural or shape changes during observation. Gold shadowing, if carried out carefully, can be used quite advantageously by comparison of the particle size with the dimensions of its shadow.

Another method of observation is a modification of an earlier procedure outlined by Marton (*1*), which involved focusing on a dummy specimen and then substituting the true specimen. Von Ardenne (*2*) applied the same principle by providing a shadowing wedge, protecting part of the specimen during focusing. The modification, as used in this laboratory, consists of carrying out the focusing, which requires a beam of relatively high intensity, on a part of the specimen which can be sacrificed. After the best focus is achieved, the beam intensity is reduced to the minimum required for photographic recording and the stage shifted to a part of the specimen which has not been irradiated previously. A micrograph can then be obtained with a minimum of irradiation and corresponding minimum changes. In a variation of the same procedure the whole surface of the specimen is scanned first at very low intensity and the most interesting part preselected. A shift is then made to a less important area which can be sacrificed. This is brought into focus at high intensity and then, after reduction to low intensity, a shift is made back to the good area. Care should be taken that the two areas are far enough removed so that essentially no high-intensity beam can reach the part which has to be protected. In both cases the filament current can be reduced when the image of the filament is produced in the object plane by means of the condenser lens, and increased again to the optimum value when the condenser setting corresponds to the one required for photographic recording.

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Frozen-dried Preparations for the Electron Microscope

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Most native proteins are strongly hydrated whether they are in molecular suspension or form part of an organized biological tissue. When this water is lost during air-drying for electron microscopy, it is likely that the elementary particles of many proteins will shrink and distort. Dehydration cannot now be avoided, and therefore techniques are needed which will desiccate with a minimum of alteration. Quick-freezing and desiccation from the frozen state does this.