GEOLOGY

# Rich Titanium Mine

**One of richest deposits of titanium ore, or rutile, in the world has been discovered in Mexico. It will yield a new supply of this metal, so vital to modern industry.**

**See Front Cover**

By WATSON DAVIS

➤ ONE OF the richest titanium deposits in the world, literally mountains of high grade rutile ore, is about to be tapped to give the United States a new supply of the strong, rustless, light metal for use in jet planes, rockets, air-borne equipment, armor and, eventually, in all fields of industry.

This new mine, discovered a little more than a year ago, lies near the primitive Mexican town of Pluma Hidalgo, Oaxaca, so remote because of transportation that it takes about a day to reach it.

Development of the rutile deposit is being made by Republic Steel Corporation of Cleveland, headed by Charles M. White. Already more than 25,000,000 tons of ore, expected to average at least 20% titanium dioxide, which is rutile, have been proved by digging into the mountain sides with exploratory tunnels, or adits. In one place, the rock actually runs 95% rutile.

The proved ore is a small part of the story, for Republic has filed 38 claims covering about 8,000 acres, seven miles in length, of precipitous mountain terrain.

## Early Mesabi Days Recalled

For titanium, Mina Guadalupe de Tisur, the first to be worked, is reminiscent of the early days of the great Mesabi iron ore deposits of Minnesota. History may give it an equal place.

A small party of newspaper and magazine writers visited this new mine, and clambered over the ore bodies and the "up-and-down" site where a concentrating plant should be working a year from now, putting out 2,000 tons of concentrate, 95% rutile, each month.

We flew into Pochutla from Mexico City by special plane, landing on a small airstrip off which burros have to be chased each time the tri-weekly plane arrives.

From there, in a fleet of four jeeps, we visited the cluster of huts on the Pacific known as Puerto Angel, Port of the Angel, from which the titanium concentrate will eventually be shipped by water. No ships call there regularly, but coffee picking in this tropical area is in full swing and soon thousands of gigantic bags of green coffee will leave the small pier there for San Francisco by chartered ship.

Distance in this region is measured in hours, not miles. For the roads are impassable to anything but a jeep, sturdy truck, burro and by foot. The ruts, surviving from the rainy season that ended a little more than a month ago, are deep and steep. One travels with a continual bounce.

It took over an hour to go to Puerto Angel from Pochutla, a matter of only a few miles. To reach Pluma and then Republic's mining camp on a mountain top required the rest of the daylight. We were about 26 miles from the sea and one day from Mexico City.

The plains near the Pacific are lush tropics. As the jeeps plunged into the mountains, winding upward, fording rushing streams, the vegetation changed somewhat, with parakeets screeching in the distance. Giant tree ferns showed lack of frost since the days of the dinosaurs.

## Coffee Plantations Nearby

Soon the coffee trees, with fruits now becoming red, were seen covering the steep mountain sides, where they were planted several generations ago by German settlers, since dispossessed by the Mexican revolution. The titanium ore deposits lie beneath coffee plantations, or fincas as they are called.

Both coffee for the breakfast cups of America and the new metal, titanium, will be produced amicably from the same area.

From these mountain coffee "fincas" come 15,000 to 20,000 tons of coffee a year. Republic's titanium mine should produce in its first year a little more tonnage of concentrate, 24,000 tons. To this part of Oaxaca state, the new industry of titanium mining will add a new source of income giving 600 to 800 men work, the largest payroll in the state.

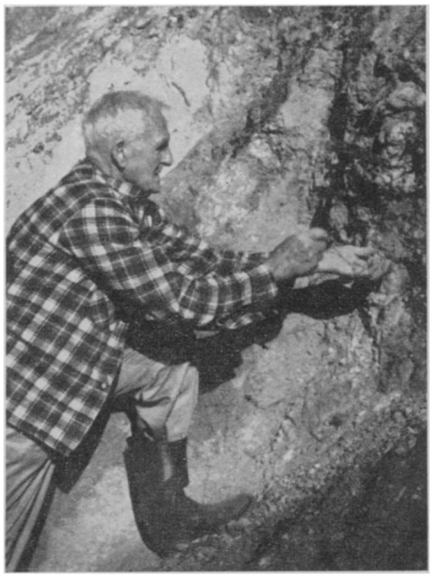
## Credit for Discovery

To 82-year-old Donald Gillies, old-timer in Republic's mining enterprises, belongs the chief credit for discovering this great rutile deposit. With two other mining engineers, Prof. W. A. Seaman, retired from Michigan School of Mines, and Ward A. Broadfield, Gillies went into this area in Sept., 1953, and found the ore in places others had looked over and abandoned.

Today, Gillies outclimbs visitors along the 60-degree slopes and he is as surefooted as a burro.

Prof. Seaman is shown examining one section of the mine in the photograph on the cover of this week's SCIENCE NEWS LETTER. Native Indians are working around him.

Some ore has been produced in the exploratory digging, but there is no place to store it. There is no level ground. Within



*DONALD GILLIES — Shown here taking a sample from the recently discovered titanium mountain in Mexico, Gillies is credited as being the chief discoverer of the ore deposit.*

a few weeks, crushing and concentrating machines will be ordered in the United States and shipped to Oaxaca, to be carried 122 miles over progressively worse roads to a plant site between the Rio Zaragosa and the Agua Pluma.

Before the next rainy season, the concentrators should be working and the enriched ore will start toward the United States. Roads will be improved and the mine will lose some of its remoteness.

Getting a concentrate is only the first step in producing titanium. Both rutile, or titanium oxide, and ilmenite, titanium iron oxide, will be produced, but more rutile than ilmenite. Rutile runs 60% titanium and ilmenite only 20%. What happened in the long stretches of geologic time is that nature changed ilmenite into rutile.

The concentrating plant will separate the two minerals. Most prized will be the rutile, reddish and showing crystal faces. It is the stuff of a new metallic age.

Snatching the oxygen from the titanium in rutile and producing the silvery elemental metal is an arduous process now, involving changing the titanium oxide to titanium tetrachloride and then reacting it with metallic magnesium without air to get spongy metal titanium.

## Partial Processing in U. S.

This will be done for the present in the United States and Republic may not actually process the sponge. The process is

expensive now. There is hope that it can be improved and made cheaper.

Titanium sponge is now $4.50 per pound. Rolled into sheet for use in structures, it triples or quadruples in cost. The new source of ore and a new process could cut these costs in the future, giving the world a new practical metal. That is the hope of Republic's engineers and officials.

From the mine to the capital city of Oaxaca is a good ten hours. Truck or jeep must be used over the first 12 miles. It is 122 miles in all. Over the mountains, the rain forests disappear. The last coffee tree is seen. The fields lie sparse and dry. One is in another land.

Oaxaca may be as well known for the titanium that lies beyond it, as for the ancient ruins, Monte Alban and Mitla, built by the ancestors of the Zapotecs who till the fields, pick the coffee and who will work the mines.

The Indians, skilled, honest, faithful, hard-working, are partners in the new-found riches of their land, not just the rock drillers, the blacksmiths, the carpenters and the laborers.

Engineer Francisco De La Pena surveys the land. Engineer Ramon Garcia is mine superintendent.

As for Pedro Vara, there is no better jeep driver in all the world.

Science News Letter, January 8, 1955

The flightless *kiwi* of New Zealand lays an egg that is one-fourth its own weight.

NATURAL RESOURCES

# Water Shortage Solution

➤ A PROGRAM to cope with the increasing demands for water in the United States was proposed by Carl G. Paulsen, chief hydraulic engineer for the U. S. Geological Survey, to the American Association for the Advancement of Science meeting in Berkeley, Calif.

Mr. Paulsen pointed out that although the United States is blessed with a plentiful water supply, consumption has risen fourfold from 1900 to 1950, and that it is expected to double again by 1975.

He presented the following proposals to stretch the water supply for the growing needs of the future:

1. Use of low quality water, perhaps even ocean water in some industries.

2. Reduction of evaporation losses by building reservoirs deep rather than wide and placing them in areas of low evaporation.

3. Cutting down pollution of streams by industrial wastes and also reuse of water in some factories.

4. Possible conversion of sea water to drinking water and possible seeding of clouds to change precipitation patterns.

Although there is a lot of water in the United States, he said, many areas have shortages. Household appliances such as air conditioners and washers are taking up great quantities of water, and the many new electrical devices have increased the consumption of water by power plants.

In addition, industry is using more and more water in the manufacture of nylon, synthetic rubber, oil products and other products. Not only do these plants use water directly, but they also pollute streams, making them undesirable as water sources.

Cloud seeding and making fresh water from the ocean are both under study. The ion-permeable membrane system for salt water conversion might be the answer to the needs of some areas, he said.

He outlined methods to prevent salt water from ruining some of the underground water sources. Included are plugging unused wells and halting the salt water with a fresh water barrier.

Another possible answer to the water problem in some areas may be to remove some of the phreatophytes, or water-loving plants, which consume great masses of underground reserves. In 15,000,000 acres of 17 western states, these plants suck up a volume of water estimated to be equal to twice the average annual flow of the Colorado River at Lees Ferry.

Science News Letter, January 8, 1955