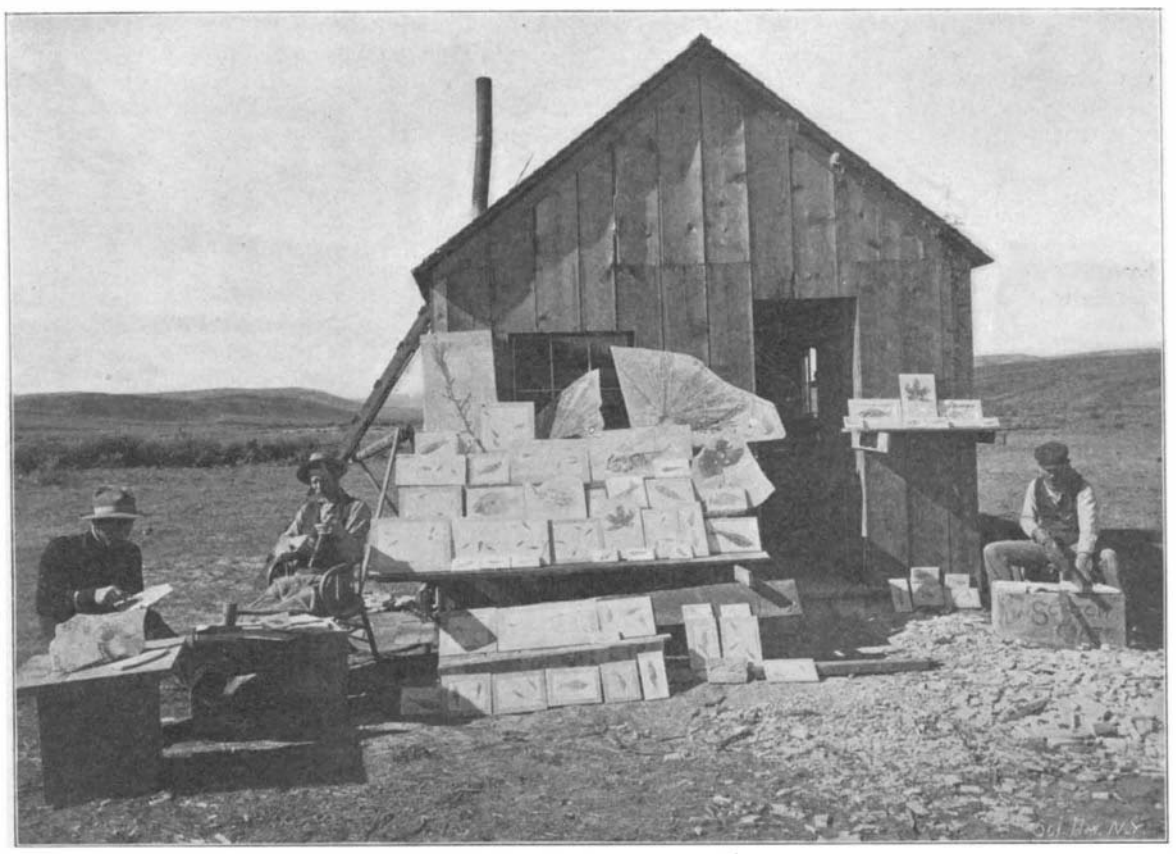
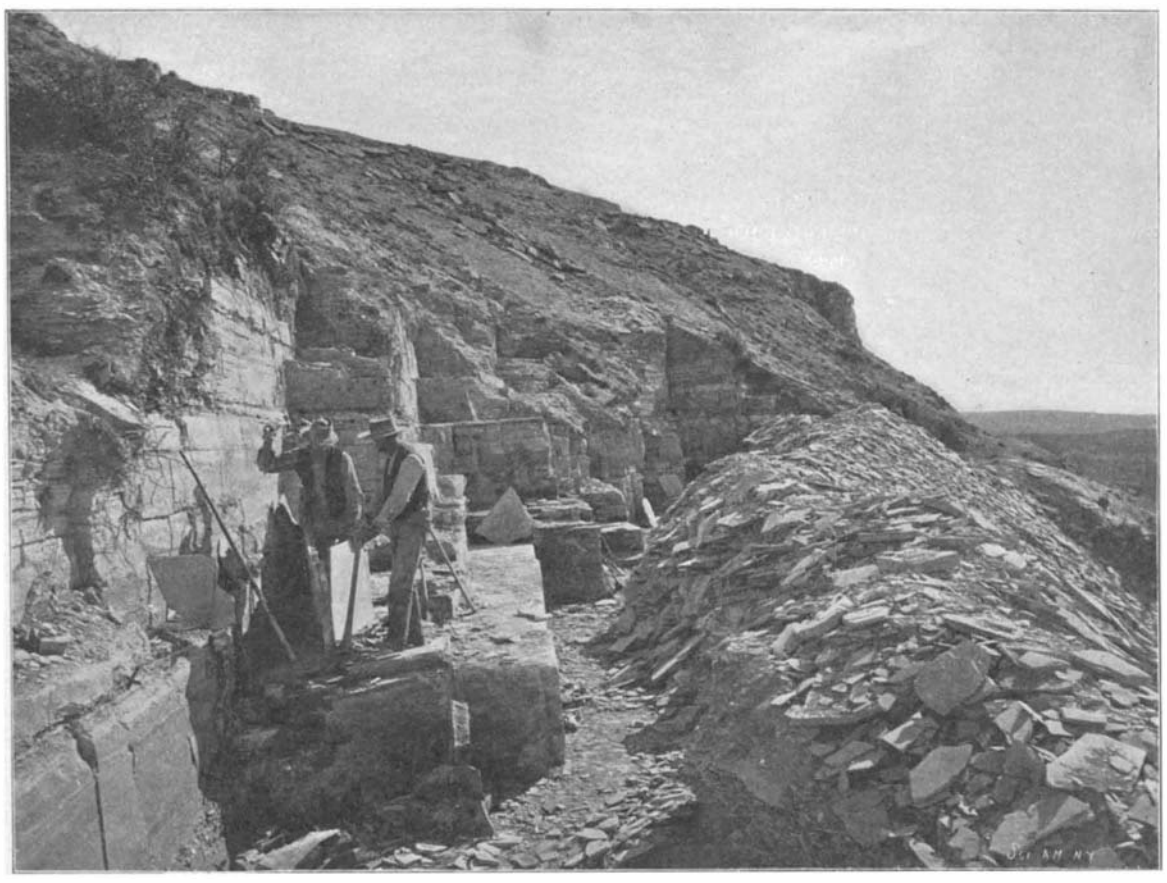
A WYOMING FOSSIL QUARRY.

The State of Wyoming is a geological wonderland, and the reason for this is, that geologically speaking it is the newest land on the continent. The Mesozoic period has left rich fossil deposits in this State, the remains varying in size from little invertebrate ammonites to the giant vertebrate dinosaurs of the Jurassic age. In 1899 a thoroughly organized scientific expedition, composed of eighty members, spent some forty days in exploring and examining the fossil exposures and gathering specimens, and the result of their labors was fully described in the SCIENTIFIC AMERICAN of December 16, 1899.

We now illustrate and describe a fossil quarry where smaller specimens are found, situated in the extreme southwestern part of Wyoming, near the town of Kemmerer, at the summit of a mountain 8,200 feet above the sea level. The geological formation is known as the "Green River Tertiary." The shale is laminated and carboniferous and some streaks are bituminous, carrying paraffine and oil in large quantities. The quarry is worked exclusively by hand, that is to say, no blasting operations are carried on. The shale is split into slabs, broken with sledge hammers and thrown over the bank by hand. Our engraving shows the shale formation, which ends a few feet above the heads of the men. From the top of its level to the "floor," a few feet below where they are standing, the shale contains fossils. When the slabs containing the specimens are cut and taken out, they are very moist and are dried out to about a third of their original weight before the cleaning process begins. It is difficult to clean the fossils when the shale is too dry, for the impressions are exceedingly thin and it requires the utmost skill and care to clean the more delicate specimens. Knives and saws made especially for the purpose are used. The hut or cabin is situated at the foot of the mountain, more than a mile from the quarry, and the workmen bring the slabs to this place to prepare them. The specimens when they are properly cleaned are exceedingly beautiful, the fishes with all their bones outlined being especially interesting. The Green River fishes are considered the finest specimens of fossil fishes, although they may not be more perfect, as far as skeletons are concerned, than those from Monte Bolca, Italy. The Monte Bolca specimens are in a softer and more chalky stone than those from Wyoming, and hence do not present so fine an appearance. The collections from the Green River Tertiary are not, however, rich in species. We are indebted to Mr. A. J. Livingston, of Butte, Mont., for our photographs.



PREPARING AND CLEANING THE FOSSILS.



THE FOSSIL QUARRY, KEMMERER, WYOMING.

Improvement in Steel Rails.

BY WILLIAM GILBERT IRWIN.

For some years the various railroad companies have been endeavoring to secure rails of a harder quality, the heavy modern locomotives and steel cars frequently breaking down the ordinary rail. For several years the American Society of Civil Engineers has been investigating the resistance strength of steel rails, and the tests made by this body have fully demonstrated the fact that the softness in steel rails is due to the method of rolling rather than to any defect in the composition of the steel.

As well known, the Carnegie Steel Company, of Pittsburg, Pa., is one of the largest manufacturers of steel rails in the country, and when, a few months ago, a number of the leading roads gave notice that their future orders for rails would carry with them a proviso that the rails should be treated after the manner suggested by the American Society of Civil Engineers, this big concern soon devised a way in which these requirements might be met. Steel men have known for years that the manner in which steel is worked has much to do with its quality, so the Carnegie Company set about to make improvements in the methods of rolling rails. In some of the experiments it was found that several of the methods by which the improvement of the product might be accomplished would necessarily curtail the output of the plant.

It was the object of the Carnegie Company to secure the desired improvement without any decrease in the output. It was generally agreed that in order to accomplish the desired improvement it would be necessary to roll the rails at a lower temperature than the ordinary white heat in which the customary shapes are so easily obtained; but there was great danger of this reduced heat working to the deterioration of the product by reason of physical changes during the rapid cooling. The difficulty, however, has been successfully overcome by the Carnegie Company, and the new process for improvement in the manufacture of rails is now in successful operation at the Edgar Thomson plant of that company.

It has been found that by reducing the temperature of the unfinished rail before it passes through the finishing roll, the product is brought up to the standard of hardness which the railroads are now demanding. In the new process, as conducted at the Edgar Thomson mills, the rails are allowed to cool from thirty to forty seconds before being passed through the third or finishing set of rolls. This is accomplished by means of a cooling table which is so arranged that it does not interfere with operations, the roughing of the rails proceeding while the cooling is going on. Under the new arrangement the unfinished rails are shoved out under the rolls onto the cooling table, with the head of the hot rail placed next to that of the one which preceded it. Being thus placed, the flange, which is thinner, cools at about the same temperature as the head, the heat being equalized so that the flange is not in a different condition from the thick head in the final rolling.

It is generally conceded that this invention is one of the most important discoveries made in the steel industry for many years. A very peculiar fact in relation to the new process is that Thomas Morrison, superintendent of the Edgar Thomson Steel Works of the Carnegie Company, and Julian Kennedy, a well-known Pittsburg mechanical engineer, both made the same discovery within a few days of each other and neither knew of the other's work along this line. Both made application for the same patent at about the same time; but since that time they have combined their interests, and the new process, which will be known as the Kennedy-Morrison patent for rolling steel rails, will be used exclusively by the Carnegie Company.

The chemical tests made of the new process show that by the slower radiation of heat and by working the steel colder, a loss of carbon is prevented, with a greater resulting hardness. The delay in completing the final process of rolling gives greater tensile strength in the physical test, and the microscopic test shows that the rails contain a finer and more even fiber.

Importance of Apples.

The statement made in the Independent that the value of the apple crop of this country is greater than that of its wheat production will bring a surprise to many. Thus it is stated that the total yield of apples in 1900 was 215,000,000 barrels. Supposing that an average price of $2 a barrel was obtained, the aggregate value of the crop was $430,000,000. The average value of wheat is but a little over $300,000,000 annually. By this estimate the apple crop is worth about 50 per cent more than our wheat. The export of apples exceeds 4,000,000 barrels a year and it is increasing. The price abroad ranges from $2 to $4 a barrel, the most of the fruit bringing nearer the larger price. Its production ranges over a wide extent of country, though few sections of it make the apple their chief reliance for support.

Prof. Dewar, in a recent lecture before the Royal Society, reduced hydrogen to a solid and announced that a temperature had been produced which was eight or ten degrees lower than this, or within nine degrees of the absolute zero. He is sanguine of success in the liquefaction of helium. Another gas must be found even more volatile than helium in order to reach within one degree of absolute zero.