

15 BOLIVIA a) Rubber in the Amazon basin

More than 50,000 articles are manufactured from rubber in peacetime, many of them essential for clothing, household goods, medical and industrial supplies, and transportation. In wartime, rubber is as important as men and ammunition. The seriousness of a rubber shortage came like an explosion to the United Nations in 1942 when the Japanese swept in to capture the most productive rubber areas in the world -- plantations in Malaya and the Dutch East Indies. Practically all of our rubber came from these countries. Synthetic rubber production was still in its infancy, and the great amount of experimentation necessary before synthetic rubber manufacture could begin was a tremendous obstacle.

Yet, all the while, there lay practically untouched the greatest storehouse of rubber in the world -- stands of Hevea brasiliensis growing wild over more than a million square miles in the Amazon Valley of South America. Hevea brasiliensis is the name of the tropical tree which is the best known source of natural rubber. Tens of millions of these trees in the Amazon have never been tapped, while it is estimated that just as many have never even been located. Strangely enough, these very trees produced the first rubber known to our civilization.

As early as the 16th Century, Spanish explorers who entered the Amazon region were amazed by a substance they found in common use among the natives. The Indians used rubber jars that would not crack; they protected their poisoned arrows with rubber shields; and they played games with rubber balls.

In 1735 a French explorer by the name of La Condamine made his way over the Andes from Peru through the dense, infested jungles of Bolivia to the headwaters of the Amazon, then by canoe he proceeded down the full course of this river, the largest in the world. La Condamine sent samples of rubber articles to Paris, and he described in detail the process by which they were made.

Experimentation in France, England, and finally in the United States resulted from La Condamine's initiative. In 1839, a little over a century later, Charles Goodyear, an American and probably the greatest of all rubber inventors, found that by adding a little sulphur and then heating the combination, the rubber became much stronger and did not change in form and consistency with variations in temperature. Goodyear called the process vulcanization.

In recent years attempts have been made to establish large rubber plantations in Brazil. An early attempt at this made by the Ford Motor Company in cooperation with the Brazilian government was not successful. But in 1933 a second plantation was selected. This plantation has been more successful; a model community has been set up in connection with the plantation; health, housing, recreation, educational opportunities have been given due attention in an attempt to establish a stable community where the rubber workers can live happy, healthy lives.

Unfortunately the Ford Motor Company's plantation was not started in time to save us from the acute rubber crisis that followed the Japanese capture of the far eastern plantations. In a desperate effort to procure rubber for military needs, and with the determination that rubber production should never again be confined to one limited area, the United States government has been encouraging and aiding rubber production in the Amazon. The Latin American countries, anxious to retrieve and expand this source of revenue, have cooperated in every way possible. The U. S. Congress has allocated funds; engineers have been sent to make way for improved health conditions such as malaria control and construction of sanitation systems; airlines and railroads have been urged to penetrate the Amazon jungle; and native laborers have been moved into the region. Exports of Amazonian rubber have increased as a result, but it remains to be seen how production from this area will compare with that of the far eastern plantations, and the amount of competition that will come from synthetic rubber factories.

Although most Amazon rubber lies in the jungles of Brazil, some Hevea grows in the northeastern fringe of Bolivia, a wild desolate area near the Madre de Dios (Mother of God) River, a tributary of the Madeira, which flows into the Amazon. One of the hundreds of little villages hacked out of the jungle in Bolivia is Cabaceras Mati, the focal point from which these photographs on the story of rubber were taken. The simple process employed by these Indians in gathering latex from the trees and smoking it has changed very little since the days of long ago when white explorers came upon Amazon Indian culture, yet the uses and manufacture of rubber have expanded to a great extent.

15A The trail shown here is one of the many hewn out of the jungle by the rubber workers. It is very long and winding for there are usually only two or three rubber trees to an acre of forest. Each day the rubber worker

Shortly after the invention of vulcanization there spread over Europe and the United States a frantic rush to get-rich-quick through the importation and manufacture of this new-found luxury. White men suddenly appeared on the edges of the Amazon jungles and exporting concerns were established. Before long steamships with cargoes of rubber plied the Amazon and even the smaller rivers were teeming with canoes, launches, and boats of all kinds.

The Amazon and its tributaries were then, and still are, the lifeblood of the wild-rubber industry, for there is no other means of transportation through the dense jungles of the region. It was the Amazonian Indian who gathered the rubber from the wild trees. Before the rubber boom, the natives had led a simple existence along the river banks. The climate was warm, little clothing was needed. Most of their food grew wild about them, although some they raised. For these Indians the rubber boom brought employment on a regimented schedule at variance with their normal and casual way of life -- long hard hours tapping trees farther and farther in the jungles. In its wake came exploitation, disease, and increased hardships.

In 1826, a few years before Goodyear's discovery, the total amount of rubber exported from the Amazon region amounted to about 30 tons annually; 80 years later exports had leaped to an average of 42,000 tons a year.

Towards the end of the 19th Century the British Colonial Office grew concerned over the lack of important raw material in their empire, and they began to consider planting and cultivating rubber trees in their far eastern possessions, where the tropical climate that nurtured the Hevea brasilliensis also prevailed. In 1875 Henry Wickham, an English botanist and soldier of fortune, collected seeds of the Hevea brasilliensis from the Amazon and transplanted them in a London greenhouse. These seedlings were later transplanted to the Far East by rubber companies in England, the Netherlands, and other European countries. Thus, the cultivation of latex became a matter for international financial and political concern.

Lack of transportation and difficulties of working in the jungle made competition between the Amazon region and the orderly plantations of the Far East impossible, so that almost overnight the scene of rubber production shifted to British Malaya, the Dutch East Indies, and even to the Philippines. The rubber lords suddenly vanished from Latin America and the Indians returned to their fishing and small crops.

must hike over his trail twice, once to make the cuts and place the cups, and again to empty the latex which he has gathered. The flow of sap diminishes with the heat of day, so he must rise very early to begin his rounds, sometimes starting out before dawn. In Amazonia the tapping season occurs during the dry months, from June to November.

- 15B This photograph shows the Hevea brasiliensis, a beautiful and stately tree, which rises upward through the jungle growth sometimes to a height of more than 100 feet. The straight ash-grey trunk is crowned with rich dark green foliage, in season bearing small yellow-green flowers. The fruit of the tree is composed of seeds containing an oil similar to linseed, which in time may become popularly used as a vegetable oil.
- 15C The rubber worker here is making an incision in the tree to start the latex flowing. Latex is a milk-like substance originating in the innermost layer of bark. Its function to the tree is unknown, and although it resembles cow's milk, latex is very different in composition. Actually, if you were to drink latex, it would probably kill you because the stomach acids would turn the latex into a mass of rubber.
- 15D After making an incision in the tree, or reopening one previously made, the worker places a metal cup under the flow of latex. The Indians originally used a folded leaf or hollow gourd for this purpose. The flow stops about an hour after the incision has been made; meanwhile the worker has gone on to the next tree.
- 15E This is a full-view photograph of the tapper as he pours the milk from catch-cup into bucket. Afterwards he scrapes the cup, making sure he has obtained all latex possible. A good rubber worker collects an average of three gallons of liquid rubber every day. In terms of weight this means about 24 pounds of rubber. On plantations, where working conditions are of a higher standard, the tapper can collect enough between dawn and noon to make as much as 35 pounds of crude rubber. On a few modern plantations pipelines transport the milk directly from the trees to a central processing plant.

- 15F The rubber is emptied from the bucket into a burlap bag, which the worker carries on his back. The bag has been rubberized both inside and out to protect the latex.
- 15G In this picture the worker is pouring the latex out of his bag into a basin in preparation for the smoking process. At his side you will note smoke escaping from the oven he has built out of dirt. He has already been at work for about nine hours, but he must now begin the task of smoking the fresh latex because it will keep only a few hours. A bacterial action begins creating acids and the milk becomes moldy and useless if not smoked. By coagulating the latex with the use of smoke, the bacterial action is halted and the solid rubber will keep indefinitely.
- 15H He pours the latex on the pole, then rolls the pole back and forth over the smoking mouth of the oven. The ball of rubber shown here is fairly large and is the result of several days' collection.
- 15I It takes a good worker about two weeks to make a ball weighing 200 pounds as this one does.
- 15J When the plancha is finished, it is taken from the smoke and rolled back and forth to press out the water that remains even after smoking. The stick through the center of the ball is removed and will be used to start a new one the next day. At the completion of each day's work, the laborer marks the ball with his company's trademark and his own number so that it cannot be stolen.