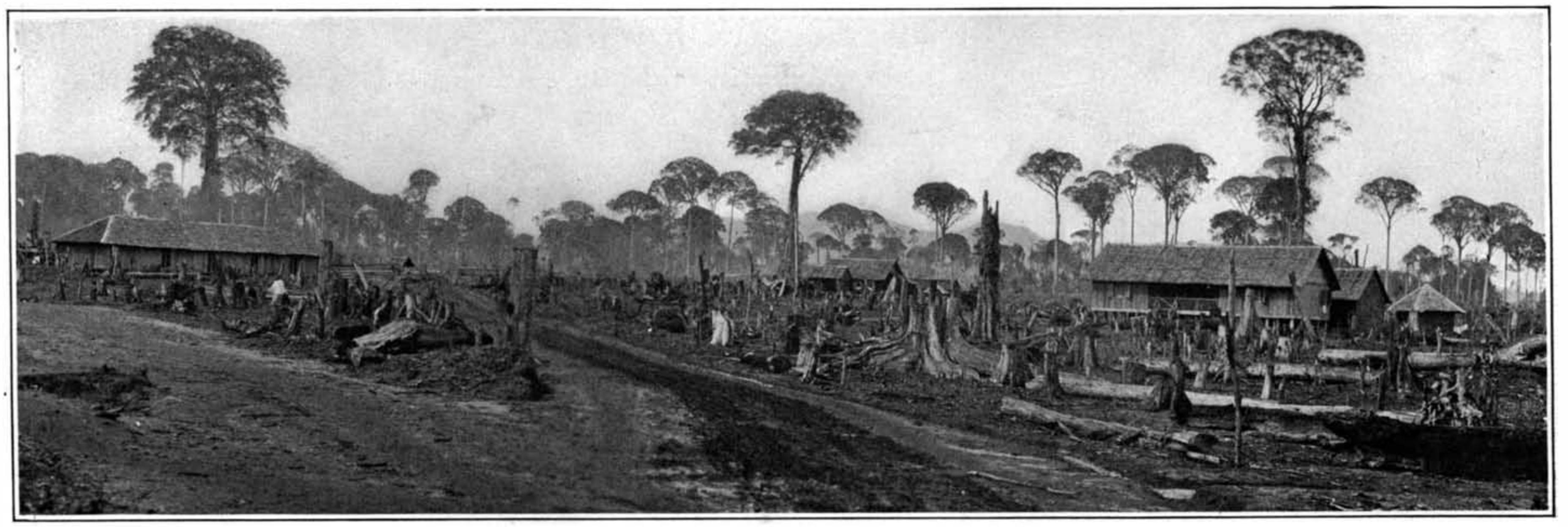

Virgin jungle, cleared and plowed for the planting of young rubber trees

Cultivated Rubber

How the "Plantation" Has Made It Possible for the Grower to Keep Pace with the Demand

By G. A. Orb

IT is a pertinent fact in the world of today that the wheels of industry must never stop: mills and factories must operate day after day—the demand is ceaseless. Hence when Mother Nature moves too slowly to supply these demands of modern industry with sufficient raw materials for its insatiable maw, then must the brain of man come on the job and devise ways and means to meet the ever-increasing need.

No greater romance is to be found in the world of industry today than that of rubber: rubber, not alone for tires that do heavy duty in the commercial pursuits or transport my lady on her round of pleasure, but rubber for the thousand and one other needs of mankind.

It seems a long way from the jungle of the tropics to the automobile tire; yet had this same jungle not been made to produce instead of being merely a shelter for wild life, motor transportation would not be where it is today.

Two decades ago "experts" declared that if the automobile industry was to develop much further it would be necessary to find some other resilient substance than rubber from which to make automobile tires. Yet a far different result has been accomplished; not only do we have sufficient rubber for tires but for a thousand uses never dreamed of in 1900.

Cultivation of rubber was first attempted in 1876, when the seeds of the Para tree (*Hevea Braziliensis*) were planted in Kew Gardens, London; the next year it was introduced into Ceylon, and later into the Federated Malay States, Straits Settlements, southern India, Sumatra, Java, and Borneo. And it was in 1900 that the first trees of these far eastern plantations came into bearing, producing four tons of rubber. In 1907 the production of cultivated rubber had increased to 1000 tons and in another decade to 200,000 tons: while the output of wild rubber had remained practically stationary at 40,000 tons a year. About 80 per cent of the 700,000 tons of rubber produced annually is now cultivated.

In 1916 a leading American rubber company decided to make certain a sufficient supply of crude rubber by starting its cultivation, placing William Vaughan—an authority on rubber cultivation—in charge. A 20,000-acre tract in Sumatra was purchased, native labor cleared the virgin jungle, miles of modern railroads were built, proper quarters furnished for the 7500 natives employed on the plantation, and today much of this tract has the appearance of a city park.

When the car owner sits comfortably in his luxurious car, speeding over roads of every character with little inconvenience, little does he realize the many processes to which the rubber in his tires has been subjected in order to obtain the resiliency and wearing qualities that makes motoring a pleasure.

Plantation rubber—or cultivated rubber—is much preferred by the manufacturer for the reason that it arrives in this country in a far superior condition to that of native rubber. Difference in freight cost, shrinkage, and ease of handling are matters of very great importance to him; and wild rubber comes on the market with from 10 to 50 per cent moisture and foreign substance in its composition, while the Far Eastern cultivated product is exceptionally uniform. This uniformity is due to the scientific methods of coagulation and preparation; yet it has as great tensile strength as the finest grades of Para.

Ordinarily it takes the young rubber tree five years before it begins to bear latex—a thick milky fluid, slightly alkaline, containing three per cent proteids, traces of sugar and mineral salts, about 58 per cent water and 35 per cent rubber.

Natives gather the seeds of the rubber tree—which are about the size of the hickory nut—and plant them in nursery beds. At the end of six months the seedling has reached a sufficient growth to have the top cut out, a process known as "stumping." This causes several shoots to spring out; these grow rapidly, and at the same time the plant becomes hardy enough to withstand the attacks of the white ants.

After burning over the ground—clearing it of trees and underbrush—these young trees are planted some 20 feet apart, allowing about 100 trees to the acre. Afterward the ground is carefully kept free of weeds and grass that the trees may have every particle of nutrition that the soil affords.

When the trees are old enough to begin to yield latex, they are ready to be "tapped." Just underneath the outer, corky bark lies the layer of cortex cells—a layer some 3/16 of an inch thick and having a slightly pinkish tint: it is in this layer that the latex cells are found. They run vertically, up and down the trees,

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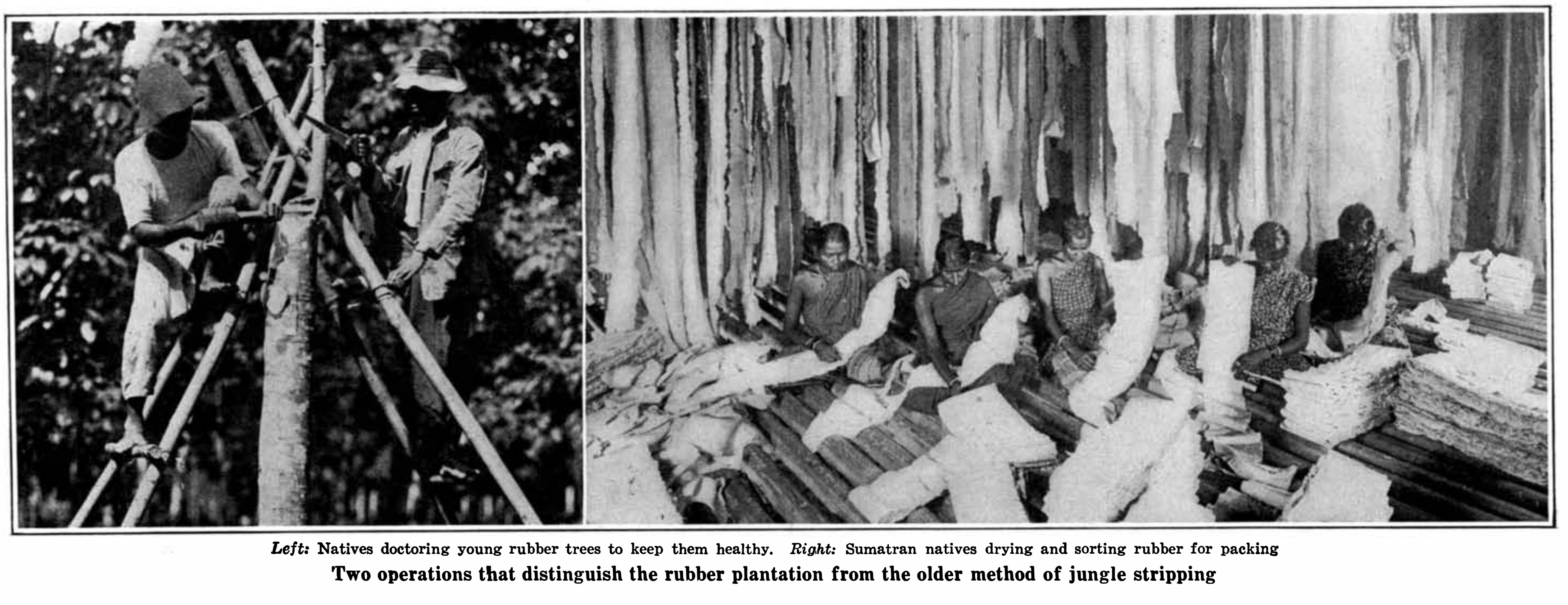

Left: Natives doctoring young rubber trees to keep them healthy. ***Right:*** Sumatran natives drying and sorting rubber for packing

Two operations that distinguish the rubber plantation from the older method of jungle stripping

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Industrial Alcohol

(*Continued from page 173*)

Already the U. S. Industrial Alcohol Company has erected a large plant for the specific purpose of making a motor fuel with an alcohol base on a large scale and it is operating on part capacity. As soon as economic conditions permit the plant will be put in full operation. The first motor fuels of this type will have other ingredients to give the mixture the characteristic properties of gasoline. But as gasoline is gradually replaced, it is reasonable to believe that better combinations will come into use and that the designers of internal combustion motors will alter their designs to get maximum economy from the fuel. And this happy day for the motorist, there is every reason to believe, is not many years away.

Cultivated Rubber

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and in tapping the knife cut is made across these cells causing the latex, or milky white sap, to exude. Lying just beneath the cortex is the cambium whose function it is to produce both latex cells and wood cells. Hence in tapping great care must be taken not to injure the cambium else the tree is seriously hurt.

When the tree is ready for tapping, the inspector passes it and guide lines are placed which are to be followed in the cutting. Of the many methods of tapping the oldest is the V method, while the most popular method in recent years is known as the herring-bone method.

In tapping, the incision is made entirely through the outer bark to the cortex and almost up to the cambium and a thin shaving removed.

Immediately the tree starts to bleed—the latex, a thin milky fluid, commences to trickle down the trunk of the tree. A glass or porcelain cup has been placed at the bottom to receive this. After a few hours the flow gradually decreases and finally it coagulates and a clot is formed. Then the tapper strips off the clot and makes a further incision.

Each tree will yield approximately three-fourths of an ordinary cupful of latex per day; and the tapping is done in the early morning in order to obviate the coagulating effect of the tropical sun.

At five o'clock in the morning the tappers gather in front of the manager's house, roll is called, and the natives start on their rounds. Each coolie takes a basket, into which he puts the strippings of latex or clots of the previous day's cut. By nine o'clock he has completed his first round, also done the tapping. He then starts his second round on which he collects the latex from the cups placed under the incisions.

The latex collected is taken to the factory and poured through a cloth strainer into a large "settling" tank, while the bark shavings are dumped into the "soaking" tank. The fine particles of bark that may have fallen into the cups during the draining process are removed by means of a sieve—so too with any latex which may have formed into lumps. The strained fluid is allowed to settle, after which the top is skimmed, freeing the surface from any bubbles and small clots.

And the coolies' work for that day has ended at noon.

After the latex is strained and skimmed it is ready for the coagulating process. This is accomplished by the addition of acetic acid. The fluid is then stirred with wooden paddles and allowed to stand over night. In the morning rubber is found floating on the top of the tank; it is a tough elastic mass of whitish color.

This mass of rubber is cut into lumps weighing from ten to fifteen pounds, and these are run through washing machines and come out in long sheets which are placed over wooden bars to dry. These sheets are known as crepe, and in the drying process the color is changed from white to a beautiful yellow. Some of these rubber sheets are smoked, changing the color to dark brown. These crepe sheets are then packed ready for shipment, and start on their 10,000-mile journey to the manufacturer of tires—and one of the greatest achievements of mankind is completed—only to start another industrial romance.

The Heavens in September, 1921

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in the southeast. Aquarius and Capricornus have no bright stars, but Grus, which barely rises above our horizon, is a conspicuous constellation for observers further south. The eastern sky is a little better, with Taurus rising, Aries above, and the great square of Pegasus still higher.

The Planets

Mercury is an evening star all through September. He is hardly visible, however, until the latter part of the month, but at its end he sets at 7:30 P. M. and should be easy to see in the twilight. Venus is still a morning star, rising at 2:30 A. M. at the beginning of the month, and at 3:20 at its close. She is by far the brightest thing in the sky and cannot be mistaken. Mars too is a morning star, rising at 3:40 A. M. in the middle of the month. He is moving eastward in the sky, but not as fast as Venus, so that she gradually overtakes him, and by the end of the month they are close together.

Jupiter and Saturn are evening stars until the 21st and 22nd, when they come into conjunction with the sun within a day and a half of one another, Saturn being the first. On the morning of the 14th these two great planets are in conjunction and only a degree apart. A conjunction of these two planets is rather an unusual affair, occurring only at intervals of twenty years—Jupiter completing 1⅔ revolutions about the sun, and Saturn ⅔ of a revolution, in this interval. This time, unfortunately, the two planets are only six degrees from the sun, and there is no hope of seeing them, though they will be pretty close together when we lose sight of them early in the month.

Uranus is well placed for observation, being in 22h. 38m. 9s. R.A. and 9° 29′ 37″ south declination on the 3rd, and in 22h. 34 m. 14s. R.A. and 9° 52′ 38″ south on October 1st. This puts him from 2½ to 3½ degrees west, and a little less than two degrees south, of the fourth magnitude star Lambda Aquarii. He is observable until long after midnight. Neptune is a morning star in Cancer and rises about 2 A. M., so that he can just conveniently be observed before dawn by anyone who has occasion.

The moon is new at 11 P. M. on the 1st, in her first quarter at 10 P. M. on the 8th, full at 2 A. M. on the 17th, in her last quarter at 4 P. M. on the 24th, and new again at 7 A. M. on October 1st. She is nearest the earth on the 29th and farthest away on the 13th. During the month she is in conjunction with Mercury on the 2nd, Jupiter and Saturn on the 3rd, Uranus on the 15th, Neptune on the 27th, Venus and Mars on the 29th, and Jupiter and Saturn again on the 30th.

At the new moon which comes just as the month ends there occurs a total eclipse of the sun. As in many other eclipses when the moon is some distance from its node, the shadow track lies entirely in the polar regions. Beginning in the south Pacific, it just misses Cape Horn, turns southward, and crosses the Antarctic continent to a point close to the south pole. It is doubtful whether the total phase will be seen by anyone except perhaps a few sailors. As a partial eclipse it will be visible throughout all South America below latitude 14° south.

Finally, it may be noted that at 9:20 A. M. on September 23rd, the sun crosses the celestial equator and enters the "sign"—though not the constellation—of Lyra. According to almanac reckoning, at this time autumn commences.

En route, C.P.R.R. west of Winnipeg,
August 19, 1921.