east coast of the island, to operate a system of electric tramways. A French company has recently obtained the concession for an interurban line connecting Trapani, on the west coast, with Monte S. Giuliano and Paperella. Electric traction is to be substituted for steam at Messina; the existing system has a narrow gage road about 10 miles long. At Athens a system of lighting and traction is now being installed; the generating station will at first be equipped with two alternators of the triphase type, of 750 kilowatts capacity each, and the number of machines will afterward be increased to 6 or 7 according to the demands of the service. The alternating current will be sent to substations where it will be transformed to direct current; besides, the main station is to contain several direct current generators which will supply a part of the circuits.

VARIABILITY IN LIGHT OF EROS.

The discovery by Dr. Oppolzer that the light of Eros is variable suggests some photometric problems of great interest. If, as seems probable, we assume that the variation is due to the rotation of the planet, we can, from measures of its light, determine the time of rotation, and the direction in space of the axis of rotation. Owing to the varying position of the observer with regard to the planet, much information can be obtained which is impossible in the case of a variable star.

Assuming that the variation in light of Eros is due to its rotation, two explanations may be offered as in the case of variable stars of short period. First, that Eros is darker on one side than on the other, as is probably the case with Iapetus, the outer satellite of Saturn, and secondly, that it is elongated, or double, as has been assumed by M. André and others. In the first case, the successive maxima would always have the same intensity, and would succeed each other at equal intervals which would be equal to the period of revolution. The same would be true for the minima. In the second case, if the two bodies differed in diameter, the successive maxima and minima might have unequal intensities, and if the orbit were elliptical the intervals between them would be alternately long and short. This seems to be the case with Eros, and the first hypothesis seems therefore improbable.

On the other hand, if the variation in light is caused by two similar bodies alternately eclipsing each other, it is difficult to see how more than half the light can be cut off in each case, and the minima more than three quarters of a magnitude fainter than the maxima. It then becomes necessary to assume that the two bodies are of unequal brightness, that they are elongated, or that we have a single body of the shape of a dumb-bell. Some observers have found the minima two magnitudes fainter than the maxima. To account for this, we should be obliged to assume that one axis of the body was six times as long as that at right angles to it. Observations show that the light of Eros is continually varying, while if the case were that of a simple eclipse, as in the stars of the Algol type, we should expect that it would retain its full brightness for a large portion of the time.

If the bodies were of the same size, and the orbit circular, it might be impossible. from the light curve, to distinguish between the two hypotheses. The fourth of the corrections mentioned above, however, furnishes a means of distinguishing between them in any case. If the body is dark on one side, the time of revolution will equal the interval between the successive maxima, and the correction for the position of the observer will be proportional to this quantity. If then the position changes 180°, the correction will be one-half the interval between the successive maxima. In the second case, the time of revolution will be double this, that is, equal to the interval between a given maximum and the next but one, so that the correction for position will now be twice as great as before, and approximately equal to the interval between the successive maxima.

Much material already exists for determining this. Several of the photographs of Eros taken in 1893, 1894 and 1896 had an exposure of an hour or more. Owing to the motion of Eros, it formed a trail on each of these plates, which in some cases shows distinct variations in brightness. This was noticed when the plates were first examined, but was supposed to be due to changes in the haziness of the air. As this is an easy method of discovering the variability of an asteroid, it is hoped that astronomers engaged in a photographic search for such objects will examine carefully all trails, to detect any changes in intensity. An examination of forty-one asteroid trails photographed with the Bruce telescope, seven of them on a single plate, failed to show, except in one or two instances, any change beyond that apparently due to varying atmospheric absorption. Generally, more than one asteroid appeared on each plate, and in such cases all showed the same changes in intensity.

The photographs of Eros taken in 1893 and 1894 fail to show any marked variations in light, and it is probable that the range was, at the time, small. The plates taken during 1896 give more conclusive evidence of changes.

The photometric measures made in 1898 furnish an accurate determination of the times of maximum, and of the range for that epoch.

A very large number of photometric measures of Eros have been made since July, 1900. Observations have been obtained with the 15-inch equatorial on 51 nights, the number of photometric settings each night being, in general, 32, but sometimes more. It has also been observed on 56 nights with the 12-inch horizontal telescope, 32 or more settings being made each night. Some months will be required to reduce these observations completely, owing to delay in adopting magnitudes of the comparison stars.

The range of variation in the light of Eros, which has been diminishing during the spring, has now become zero.

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CULTIVATION OF RUBBER IN MEXICO.

BY ENOS BROWN.

A very large amount of Pacific coast capital has, within the past few years, been invested in the rubber plantations of the southern Mexican States. In years gone by the rubber industry of Mexico was of considerable importance, but the improvident native method of harvesting was fatal to the industry, and the large returns dwindled as the number of trees decreased, until the export of native rubber ceased to be of much account. The States of Tabasco and Chiapas, adjoining the isthmian region of Tehuantepec, have been the former sources of rubber supply. In soil, temperature, rainfall and other general conditions, these States possessed ideal qualifications for the cultivation of the tree. The soil is the accumulation of long centuries of tropical decay, while the annual rainfall ranges from 150 inches and upward. The temperature required, hot and humid, is here found, while the dense shade which the rubber tree is said to crave is afforded by the untouched forests which abound in the extended valleys of the watercourses of a labyrinth of navigable streams emptying into the Gulf of Mexico. The capability of these lands for the cultivation of the rubber tree has been remarked by consuls and travelers for many years, but the project seemed not to attract capital on account of their inaccessibility and the unhealthy nature of the occupation; but the increasing scarcity of supplies, accompanying the enormous increase of demand, has stimulated the investment of capital, until at the present time not less than 200,000 acres in the Tehuantepec provinces have been acquired, principally by Americans, who have invested $5,000,000 in planting and development.

The rubber tree responds quickly to intelligent care and cultivation, and thrives best in lands having an elevation above sea level of from 200 to 1,200 feet. It requires a rainfall of at least 100 inches in twelve months. The soil required must be rich and fertile. It is a rapid grower, like all "soft" wood trees, and in nine months has been known to attain a height of 9 feet 5 inches. In 6 years, sometimes in 5, the tree is ready to be tapped, and an average yield of 3 pounds of rubber is anticipated. At 7 years of age the tree yields 4 pounds, and at 8 years of age 5 pounds, increasing from year to year. A tree known to be 50 years old yielded 35 pounds of rubber in 1900. The companies have planted nurseries for raising the plant from the seed. It is estimated that 1,500,000 young trees are ready to be transplanted onto the cleared lands. Two hundred trees are planted to the acre. When planted they require no farther care, and in six years they begin to produce. It has been found that dense shade is not always a requisite, and cultivators find it an advantage to clear the lands to a great extent, affording more light to the growing trees, as well as a contingent profit in the marketing of mahogany and other valuable timbers which flourish in this region as nowhere else.

The principal difficulty so far met with is scarcity of labor. The natives are indolent and good-natured, but are constitutionally averse to hard labor. Arrangements have been consummated for the importation of a large contingent of Asiatics.

Throughout the State of Chiapas there are wonderful remains of monuments of a past civilization. Palenke, the capital of the ancient races who once swarmed over this region, possesses many types of ruins, covered with mysterious hieroglyphics, as yet undeciphered, which demonstrate the high standard of civilization to which these ancient people once attained.

Mr. J. W. Ellsworth, managing director of the Chiapas Rubber Plantation Company, who is now supervising planting and improvements on the property of the company, reports, in a communication dated March 21, 1901, on the growth and yield of trees grown in the district in which the company's plantation is located. The measurements were taken and the trees tapped during the month the report was made, under the personal supervision of the director, and with precautions that insured absolutely precise, accurate and reliable results, for the purpose of determining the probable yield and growth of the rubber tree under intelligent and careful cultivation, and with the conditions existing in the department of Palenke, State of Chiapas. It was found that trees five years of age had attained a diameter of from 8 to 10 inches, and yielded from 3½ to 4¼ pounds of pure rubber. Trees six years of age were 10 to 11 inches in diameter, yielded 4 to 5 pounds per tree, and from those trees seven years old, from 14 to 16 inches in diameter, the yield was 6½ to 8½ pounds per tree. All these trees were cultivated in partial shade. From those grown without shade the yield was materially less.

SCIENCE NOTES.

Herbert Spencer was eighty-one years old on April 27, and is in fair health. He has just completed a two-volume autobiography which will be published after his death.

A farmer in West Virginia has an elephant to do his plowing. He finds that the animal eats little more than a horse and does many times the work and is gentle and docile, so that the owner is well pleased with the experiment. A small circus broke up near the farmer's place, and its property was sold at auction and the elephant was purchased at a moderate price.

On June 30, 1900, there were 4,099 petty officers in the United States navy, of whom 57.3 per cent were native born, 33.6 per cent naturalized, 6.5 per cent had declared their intention of becoming naturalized, 1.5 per cent were aliens resident in the United States, and 9 per cent were non-resident aliens, while 90.9 per cent of the whole number were citizens of the United States.

In every street car in Leipzig are hung copies of a bi-weekly newspaper, containing advertisements of the railroad, time-tables, a few jokes, and notices of performances that are to be given at different theaters. The newspapers are fastened on racks which are hung upon hooks in the corners of the cars. Passengers have the privilege of taking the papers down and reading them.

It has been found that aluminium cooking utensils permit of greater fuel economy. This has been tested in the Madras Lunatic Asylum, where aluminium cooking utensils have been adopted. During six months of the last year before the introduction of aluminium vessels, the monthly weight of wood burned per head in cooking was 34 pounds. After the change the consumption fell to 19 pounds, a reduction of nearly 45 per cent.

Young Orris Benson, the deaf, dumb and blind rival of Helen Keller, has recently heard spoken words, and by a purely mechanical process has also been taught to speak many words and even sentences intelligently, so that he no longer admits that he is mute, and his teachers usually understand his spoken efforts readily. He is an expert typewriter, working the instrument rapidly and accurately. He uses the machine for all his written work.

A new plan having for its object the distribution of young trees throughout the country will be put into practical operation next year by the Secretary of Agriculture. An investigation has been made to discover the varieties which will thrive best in the various localities, and the distribution will be made in a manner somewhat similar to that employed in the seed distribution authorized by Congress. Special attention will be given to trees of the nut-bearing, shade, and lawn variety, and oaks. Ash and lindens will also constitute a prominent portion of the distribution. The Secretary believes that the idea will prove popular.

The Internal Revenue Bureau has prepared a statement showing the receipts, by items, resulting from the additional taxes imposed by the war revenue law. The figures cover the period from June 13, 1898, the date the law became effective, to February 28, 1901. The receipts were as follows: Schedule A, documentary stamps, $98,420,099; Schedule B, proprietary stamps, $12,784,694; tobacco, $42,405,859; beer, $89,154,822; special taxes, $14,026,359; snuff, $2,393,275; cigars, $8,291,608; cigarettes, $3,547,490; legacies, $6,889,055; excise tax, $2,398,823; mixed flour, $20,609; additional taxes on tobacco and beer, $978,816; total, $281,311,515.

M. L. Beulaygue has made some interesting experiments upon the influence of darkness on the development of flowers. He finds that flowers open in darkness later than in sunlight, and that the color of the flowers is in general less intense in darkness than in sunlight, the diminution of intensity being small for some species, while others lose nearly all their color. Flowers developed in darkness have, in general, a smaller size than those developed in the light, but, on the other hand, the pedicels are sometimes more fully developed. He also found that the weight and the size of flowers developed in darkness, including the pedicels which support them, are less than for flowers developed in sunlight, except in some rare cases where the increase of size of the peduncles counterbalances the diminution of the rest of the plant.