SCIENCE NEWS

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TROPICAL AGRICULTURE

THE transplanting of rubber trees from the forest to the plantation opens a new era in the utilization of tropical products, according to Dr. Edwin E. Slosson, director of Science Service, Washington. In speaking before the symposium on raw rubber at the American Chemical Society meeting held in Philadelphia this week he said:

"The richest regions of the world are those where the sun strikes straightest and the rain falls heaviest, for such a climate, while uncomfortable to man, receives the greatest income of energy from the central power-house of the solar system. The recent rapid increase in wealth by nations of the temperate zone is due to their drawing upon subterranean reservoirs of oil and coal. Since we are continually making heavier drafts upon this limited stock, eventually they will be exhausted and we must grow our fuel as we grow our food, from year to year. When that day comes the salvation of civilization will depend upon the tropics.

"During the present century the northern races have been drawing an increasingly large proportion of their food from the southern climates. We get carbohydrates in the form of sugar and tapioca. We get fats in the form of copra and palm oil. The third great ingredient of human diet, the proteins, may also be derived in the future from tropical sources. At present, however, we are chiefly indebted to the tropics for those chemical compounds which certain plants have the peculiar capacity to secrete, chance by-products of their physiological processes they appear to be, such as the alkaloids, caffein and theobromine of coffee and cacao among foods, quinine and strychnine among medicinals, vanilla and aromatics among the condiments, camphor and caoutchouc among plastic materials. The problems underlying the cultivation of such peculiar products of the tropics are essentially the same, and their solution depends upon the application of systematic research.

"As people living in northern latitudes become more and more dependent upon the products of the tropics, the value of such territory will become increasingly realized. Already we see that lands which a few years ago were not thought worth the trouble of raising a flag over have come to be regarded as prizes worth fighting for. But economical utilization does not involve political control. Fortunately both Europe and the United States have to the south of them abundant sources of supply of these necessities of modern civilization. Africa and South America are similar in function as they are strikingly alike in form. In the future the great lines of commerce will run north and south rather than east and west, because the lines that connect different degrees of latitude are more important for the exchange of commodities than the lines that connect different degrees of longitude. For lines of latitude separate permanently different regions of the earth, whereas lines of longitude often divide nothing more significant than different stages of industrial development.

"The change from rubber-hunting to rubber-growing is a step of wide significance since it foreshadows the transition that must take place in all tropical products. The gold seekers in an unknown country such as Australia, South Africa and Central America pick up such nuggets as they can find on the surface or gold ornaments that they can purloin from the natives. Later gold seekers sink shafts deep into the quartz reef and treat the tailings with cyanide to extract the last traces of the precious metal.

"The cowboys of Texas and the rancheros of the Argentine in the early days took little interest in the breeding and the feeding of their cattle. They were hunters rather than herdsmen and the cattle to them were almost as much wild game as the buffaloes. The modern expert in animal husbandry on the contrary cultivates his stock as the horticulturist his plants. He counts the chromosomes and calculates the calories.

"The rubber planters might do for their trees what the dairymen have done for their cows, make them better milkers. It is by no means certain that the plantations of the Middle East were seeded from the best trees in the world and it is quite certain that the stock could be improved by scientific selection and cultivation. Individual trees in the same grove differ widely in their yield of latex and it may at least be possible to bring the average in the future up to the best of the present."

SEMI-COKE

THE scientific world is at work on a new fuel from coal which will be smokeless and almost wasteless, for it is expected to save a large portion of the three fourths ton of coal that now goes up the chimney for every ton burned in the ordinary way. At the meeting of the American Chemical Society chemists from all over the United States discussed the pros and cons of "semi-coke," the proposed new fuel.

The difficulties in the way are more economic than scientific. "Semi-coke" is to be made by a low temperature process which requires entirely different apparatus from that used in making ordinary coke in by-product ovens. The by-products of semi-coke are different from those of common coke and their economic value has not been established. In fact, it presents an entirely new group of materials for chemists to learn how to utilize.

In the old coke-making process the four primary products recovered, gas, tar, ammonia and light oils, are raw materials in the manufacture of explosives, fertilizers, dyes and chemicals used in American factories. The coke is used mainly in the making of steel. A small amount is used for domestic fuels, especially during war emergencies and coal strikes, but the housewife thinks that it is a poor product to burn in the kitchen range.

The new semi-coke, because it is heated at a low temperature, retains many of the higher oils and other combustible substances. It is smokeless and is said to burn as easily as coal and much more readily than finished coke. The gases, oils and ammonia that are lost in smoke when coal is burned are recovered. Semi-coke is therefore hailed by many scientists as the solution for a world problem.

With the world coal supply going down and the cost of production, labor and transportation going up, every coal-using country is trying to use coal less and get more out of it. Great Britain hopes to get fuel oil for her navy from the part of the domestically burned coal that is now wasted. In England as in the United States it is a question of what to do with the by-products of semi-coke, and how they can be made to pay. The new method yields more tar, but it is thin and oily and unlike the well-known coal tar. The yields of gas and ammonia are less, but the gas is much richer and higher in fuel value.

"Making semi-coke by low temperature carbonization of coal retains all its initial interest," said Professor S. W. Parr, of the University of Illinois, chairman of the division of gas and fuel chemistry of the American Chemical Society, "in spite of the preponderating element of adverse circumstances from the industrial viewpoint, such as costs of installation, operating expense and the undetermined value of the by-products, especially tar and ammonia."

The properties of these new by-products are already being studied by chemists. Sumner R. Church, of New York City, who has studied the by-products of low temperature carbonization of Illinois coal, found that satisfactory oils and pitches were obtained by refining the new tar in the old way.

"The new tars possess to a surprising degree the characteristics of the most desirable types of high temperature tar," Mr. Church said. "An important feature of the new tars is their high content of tar acids, falling between phenol and cresols in boiling range."

The strong red color of tar liquor and disinfectant emulsions made from low temperature tar oils, the cause of which has puzzled chemists, has handicapped the marketing of low temperature tar, Stephen P. Burke and Solomon Caplan, of Long Island City, told members of the American Chemical Society. They explained that the objectionable color could now be extracted by means of a borax solution.

The amount of heat necessary to carbonize various types of coal at the comparatively low temperature of 1,100 degrees Fahrenheit has been measured by Stephen P. Burke and V. F. Parry, of Long Island City. They found that Pittsburgh coal required only 7 British thermal units of heat energy while Utah non-coking coal took 37 and Denver sub-bituminous coal 81 units.

THE POTASH FIELDS OF TEXAS

THE potash fields recently discovered in Texas are now believed to be comparable with the famous German ones which before the war supplied the world with potash. Dr. John W. Turrentine, in charge of potash investigation in the U.S. Bureau of Soils, at the meeting of the American Chemical Society said that there was ground for hope that a potash industry of national importance may be developed here. Incomplete data so far available fail to reveal a workable deposit, Dr. Turrentine said, but amply justify the thorough exploration of this field.

The isolation of the Texas potash fields is a severe drawback to their commercial development, but it can be overcome, Dr. Turrentine believes, by a system of pipe-lines for the transportation of the concentrated brines from the mines to the nearest seaports. At these places the solution could be chemically refined and shipped by water routes to markets of the southern and middle western states.

The potash salts discovered in the Texas fields could be used for fertilizer without refining, but the low concentration, it is believed, would prohibit its transportation by rail to any great distances. However it might be used without refining in the southwest where no supplies of cheap potash are now available. These salts could be easily converted into rich potash compounds by simple chemical treatment which would reduce transportation costs and enable them to compete with the cheap Franco-German potash on the market to-day, Dr. Turrentine said. Potash recovery, which was formerly a mining industry, is now essentially chemical, through the need of making the final product richer and thereby cutting transportation costs. The Texas potash industry, he believes, will be no exception, and its success will depend on the ingenuity of the chemist.

MIRRORITE

A SUPER-TELESCOPE 25 feet in diameter, dwarfing all other existing astronomical instruments and making possible scientific discoveries of far-reaching importance, is perfectly feasible, if only $12,000,000 or so were forthcoming to make it. Francis G. Pease, of the Mount Wilson Observatory, describes in detail this hypothetical astronomical giant in an article about to be published in the *Proceedings* of the Astronomical Society of the Pacific.

Such a huge instrument would of necessity be a reflector, in which a concave mirror replaces the convex lens of the small spy-glass. While the mechanical problems of such an instrument would be relatively easy to solve, says Mr. Pease, there is at present no ideal material from which the mirror could be made.

The big 100-inch telescope at Mount Wilson, the largest in the world at present, in the design and construction of which Mr. Pease had an important part, has a mirror of glass, on the upper surface of which is a coating of silver. The making of a glass mirror 25 feet in diameter possesses no more inherent difficulties than did the construction of the 100-inch, he believes, but glass has certain disadvantages, such as change in shape with variations in temperature, and tarnishing of the silver coating. Astronomers therefore look forward, says Mr. Pease, to a material such as a hypothetical alloy, which he calls "mirrorite." "Mirrorite," when made into a mirror,

should reflect light as well as silver, should be free from tarnish like the stainless steel now often used in cutlery, should not change appreciably with the temperature, a property now possessed by a steel alloy known as invar, and should be as light as magnalium, an aluminum-magnesium alloy which has already been used for some smaller telescope mirrors.

Mr. Pease believes that the hope for such a substance is no idle dream. "There is a promising field for research in the investigation of metal alloys suitable for mirrors. When one considers the enormous number of possible combinations of metals, it should be possible to find an alloy which would be light in weight, which could be cast either solid or as a ribbed plate, and which could be easily silvered if not in itself possessing excellent permanent reflecting properties.

"Alloys are now known which possess some of these desirable properties, and it may be that the addition of other metals, or new combinations of them, would yield the desired material."

THE CAUSE OF TRACHOMA

DECLARED a "dangerous contagious disease" by the U. S. Public Health Service in 1897 and one which has cost thousands of foreigners their privilege of entry into the promised land of America, trachoma, a dreaded eye infection, may eventually yield to the magic of vitamins or proteins. Dr. B. Franklin Royer, medical director of the National Committee for the Prevention of Blindness, says that trachoma which often ends in blindness may be a deficiency disease like scurvy, rickets, beri-beri, pellagra, and another eye disease, xerophthalmia.

"Geographically, trachoma is one of the wide-spread scourges of the earth," Dr. Royer says. "Egypt and Palestine are said to be the countries worst affected. The interior of China has a very high percentage of the disease. It is common in northern Russia and Siberia, in Hungary around Galicia, in parts of Prussia, Poland and the Balkan states. It is also common in Japan and northern Brazil. In the United States the highest incidence is among the native whites of the mountainous southeastern states and among the American Indian people. Both in the Old World and the New, trachoma has been found in children's institutions."

Just as smallpox was not differentiated from measles in early times, so trachoma has not been properly distinguished from other forms of transmissible eye infections since the days of modern bacteriology. The fact that on Ellis Island, where hundreds of cases of trachoma were handled each year and where there has almost always been some trachoma, no doctor, nurse or orderly has ever seemed to contract the disease, has made him believe that its infectiousness and transmissibility may have been overrated. In long steerage trips from eastern Mediterranean ports passengers with trachoma never caused outbreaks of this dangerous disease during the voyage.

In reviewing the medical literature of trachoma thoroughly, Dr. Royer says he was amazed to find no convincing evidence either of dangerous contagiousness or of the successful transmission of the disease. Practically all studies contained statements that might have been copied from the ancient Greek doctor, Hippocrates.

"If we study the food habits of the peoples most affected, we can not escape the thought that if this disease is due to a definite germ it in some deliberate way shows an affinity for the poor and underfed of the world, and truly infectious diseases do not respect social conditions and food habits. "What we need to do is to recast all the evidence we have and search every possible influence that might cause the disease. On food studies alone, exhaustive inquiry must be made in the homes in which trachoma has occurred and must cover a number of years."

Dr. Royer believes that trachoma may be preceded by an eye disease like xerophthalmia, which is caused by the lack of vitamin A in the diet, a vitamin that occurs in milk and butter and many other food products that are sometimes hard for poor people to get. Trachoma first affects the tissues of the eyes and thickens and inflames the lining of the upper lid. The rough granulations rub the eye ball continually and ulceration results. Itching causes the patients to rub their eyes and the whole gamut of germs that customarily prefer the eye can then find invasion easy. Scarring, lid deformity and blindness may follow, after long periods of suffering.

Experiments on animals should be made to find out whether trachoma is the result of the invasion of weakened tissues by a number of well known germs or whether it is due to infection by some one type hitherto unknown.

ITEMS

THE iodine that is found in certain marine plants is 200 times as effective as inorganic iodides in its power to bring the thyroid gland back to normal. Dr. J. W. Turrentine, of the U. S. Bureau of Soils, who told of his researches at the meeting of the American Chemical Society, said that small doses of iodine-bearing substances coming from seaweed cured simple goitre. The symptoms of iodism that often result from using inorganic iodides were lacking and there were no disturbances such as result from taking thyroid gland preparations. It appears that the iodine is present in a colloidal form in the marine plants and is absorbed very slowly by the digestive tract. This lessens the chance of over-dosing.

THE secret of turning tropical grasses and other fibrous substances into clothes to wear is believed to have been solved by Dr. Dinshaw Nanji, of Birmingham University. Chemical processes are said to have been perfected for separating the fibers from the raw materials and preparing them for spinning. The fabrics, if commercially successful, may take the place of cotton in the regions where large supplies of grasses are available. It is thought that new and interesting materials may be developed for wearing apparel and for other uses.