

# SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - - Editors and Proprietors

Published Weekly at  
No. 361 Broadway, New York

### TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico, \$3.00  
One copy, one year, to any foreign country, postage prepaid, 50 lbs. 5d. 4.00

### THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....\$3.00 a year  
Scientific American Supplement (Established 1876)..... 5.00  
Scientific American Building Monthly (Established 1885)..... 2.00  
Scientific American Export Edition (Established 1875)..... 3.00

The combined subscription rates and rates to foreign countries will be furnished upon application.

Item by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, AUGUST 6, 1904.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

### THE EXPOSITION AS AN EDUCATIONAL FORCE.

A great modern World's Exposition, like that of St. Louis, is intended first and last as a condensed exhibit, in concrete form, of the accumulated knowledge and practical achievements of the civilized world. The endeavor is made to gather this material together in such orderly arrangement and within such practicable limits of space, that the individual may turn to any part of it, and secure the information which he is seeking, with as much certainty as when he takes down an encyclopedia from his library shelves. To attempt the collection and arrangement of such an encyclopedia is a stupendous task in itself, and the writer ventures to assert, after many weeks careful study of the St. Louis Fair, that never, considering the magnitude of the undertaking, has so much material been gathered in one place and classified on an orderly and carefully considered plan, with such signal success as this. We have already spoken in terms of praise of the splendid architectural achievements of the Fair; and in the present connection, when dealing with its educational aspects, acknowledgment is due of the excellent manner in which the Director of Exhibits has brought to bear his experience in classification, gained in other great exhibitions of this character.

To anyone who watches critically the crowds that wander through the plazas and broad aisles of the exhibition palaces, what time they are not taking in the sights and sounds of that great highway of amusement, the "Pike," it would seem, at first sight, that the great bulk of the World's Fair visitors are drawn hither by the mere desire for amusement; but on a more careful study of the multitudes, and after taking note of the general run of comment and conversation, the conviction grows that the majority of the American people—there seem to be few foreigners at present within the Fair grounds—have come to St. Louis primarily to be instructed. The most positive proof of this is found in the crowded attendance at the various exhibitions of highly technical and scientific apparatus and phenomena, that are given in several different places throughout the grounds. Moreover, it is a significant fact that it is the more difficult and intricate exhibits, those that require intelligent thought and consideration if they are to be understood, that seem to present the strongest attraction to the sight-seers. This is as it should be; and it may surely be taken as evidence that the main object for which the Fair has been conceived and carried out, namely, that of acting as a powerful educational force, is being abundantly fulfilled.

Undoubtedly these great expositions exercise upon the average citizen a broadening influence, which in a certain degree gives him a touch of that cosmopolitan breadth of view, which is commonly supposed to come only by actual travel. This would not be possible were the Fair conceived upon a smaller scale, and its exhibits spread out with a less lavish hand. A three-ring circus or a Wild West show may afford the untraveled citizen a glimpse of the outside world; but it takes a two-million dollar Philippine government exhibit, or the splendid gathering of distinct tribes under the Anthropological Department, to say nothing of the costly representation of foreign life and habits shown in private exhibitions—it takes the aggregate effect of all these to give to the visitor to a World's Fair that sense of having been actually in touch with the great outside world which is being realized by millions of visitors to the present Exposition.

The same broadening educational influence must be making itself strongly felt upon those who are making an earnest study of the carefully-arranged exhibits in the various exhibition palaces. There is a sense in which the inhabitants of a country so vast as our own, because of the lack of any means of direct comparison of themselves and their surroundings with some outside standard, may grow to a certain self-sufficiency, for which a study of the elaborate exhibits of other nations, and a knowledge of how greatly they

exceed us in certain lines of achievement, will prove to be an admirable antidote.

Furthermore, an aggregation of such fine architectural and landscape effects as is presented at such an Exposition as this, must exert a lasting artistic impression, unconscious perhaps to the subject of it, but none the less real. It instills in the thousands and millions that throng the grounds new and lofty impressions of the grand and the beautiful. To many of the visitors these impressions will be capable of subsequent expression, and will no doubt show themselves in the improvement of public structures, in a more intelligent appreciation of what can be done in improving the artistic effects of buildings whether for the home, the city, the state, or the nation. This educative effect will make itself felt at many a city council where the inspection of competitive plans for municipal or other buildings come to be passed upon. We do not say that the World's Fair will make an art critic or a connoisseur of every citizen that visits it; but it will most certainly carry forward that national education, in domestic and municipal art and architecture, which owes its birth in this country largely to the great Exposition held at Chicago eleven years ago.

### OSMON, A NEW COMBUSTIBLE FROM PEAT.

A new form of combustible, known as "osmon," has been lately produced in Europe from raw peat. Of the 90 per cent water which the peat contains, from 20 to 25 per cent is eliminated by an electric process. A direct current is passed through the mass of the peat, contained in a suitable tank. Under the action of the current, the water collects at the negative pole and flows out by openings in the side of the vessel. In carrying out the process, the inventors use from 10 to 12 kilowatt-hours per cubic yard of raw material. The process lasts about an hour and a half. The electrically-treated peat is then dried in the ordinary way and reduced to small pieces in a crusher. It is delivered to the trade in the form of balls or briquettes. The heating power of the new product is considerable. No trace of sulphur is found, and it does not smoke or leave much cinder.

### M. CURIE'S EXPERIMENTS WITH RADIUM EMANATIONS.

In a paper recently read before the Académie des Sciences, M. Curie brings out some of the physiological effects of radium. The emanation given off by radium causes the death of the smaller animals, when breathed by them. He used an apparatus in which the animal is placed in a confined space and is made to breathe air which is charged with the emanation. A large jar is filled to one-third with pumice-stone soaked with potash. Above this is a support which confines the animal (a guinea-pig) in the upper part of the jar. Oxygen is introduced into the jar to keep up the animal's respiration, while the carbon dioxide which he gives off is absorbed by the potash. The radium emanation is sent into the jar by another tube at the beginning of the experiment. At the end of a certain time, varying from one hour to several hours, the respiration of the animal becomes short and abrupt; he rolls himself up in a ball with his hair standing on end. Then he falls into a profound torpor and his body becomes cold. Before the animal finally succumbs, his respiration has fallen as low as six per minute. The effects of ozone are eliminated in this case, as it is transformed to oxygen by the potash.

An examination of the animal showed an intense pulmonary congestion. The composition of the blood was modified, especially as regards the white corpuscles, and their number is diminished. The tissues of the animal are found to be radio-active. When the body of the guinea-pig is placed on a photographic plate wrapped in black paper, it gives an image in which the hairs are very clearly defined. All the different tissues have a photographic action. The hair shows the greatest effect, and the skin but little. The heart, liver, and brain possess this property, and especially the lungs. This action may be due to two causes, according to M. Curie; either the induced radio-activity of the tissues or the presence of the emanation dissolved in the humors of the body. In the above experiments he shows that radium has a toxic action not only when applied to the exterior of the body, as he already observed, but when it is introduced into the interior of the body by respiration.

### TROPICAL SPECIALTIES FOR PORTO RICO.

Tropical Porto Rico is to be revolutionized. American influences there may not always have been for the best, but the process of adaptation is steadily progressing. When this is completed there will be a new future for Porto Rico. The prosperity of the island must always rest in its agriculture; but this must be brought up to date, and made to yield its quota of the world's goods that are in special demand.

Under the scientific directions of the Department of Agriculture it is proposed to make Porto Rico an island of specialties—specialties in tropical commercial fruits. Sugar, tobacco, and a few other staple products will not be abandoned; but the island's salva-

tion appears to lie in other directions. It needs more variety of industries—more materials out of which to weave a solid, substantial prosperity.

The soil, climate, and other conditions are all there, and even the products, in some instances, but there have been lacking the brains and the ability to adapt nature to the demands of the day. For some time now government experts have been studying the botany of the island, and incidentally experimenting with some of the native and imported plants of commercial value. The opening of the new prosperity of Porto Rico will begin with the cultivation of these plants according to the most recent scientific methods. Many of them are indigenous to the island, but either through lack of proper culture, or ignorance of their commercial value, they have been of little real use to the natives. Others are to be imported from the Orient and transplanted to the island for cultivation. They are eminently adapted to the soil and climate of Porto Rico, and hence there is little doubt, in the minds of the scientists having the matter in charge, about their success.

One of these new plants to be transplanted from southern China or British India is the litchi tree (*Litchi chinensis*), which is eminently adapted to a climate and soil such as furnished in Porto Rico. Specimens of these trees have been brought to this country and experimented with in the Washington greenhouses, and plantations of them are expected to be planted in Porto Rico by the government experts within the next year. A litchi orchard once started should prove a source of income for the owner for a lifetime. The fresh fruit has a delicious flavor, and dried the fruits resemble raisins in appearance. A few of these dried fruits are imported from the Orient every year, and they sell as high as fifty cents a quart. In the Far East, however, they are eaten chiefly in their fresh, acid condition. Enormous quantities are consumed, and they are considered by natives and visiting foreigners in southern China, British India, and the Malay Peninsula as most excellent fruits. The cultivation of plantations of these fruit trees in Porto Rico should open a market here for their products, and in a short time the industry should prove a most paying and satisfying one.

The sapodilla tree is one that visitors to Florida see at times, but it has never been raised on a commercial scale in that State. The sapodillas are fruits that are greatly enjoyed in tropical countries, and there is a growing demand for them in our northern markets as they are better appreciated. The question of raising these in Porto Rico on a large commercial scale is not a doubtful or visionary one. It is believed that there is a great future for the trees when they are raised in sufficient quantities to make it worth while to introduce the fruits in our cities. These fruits could be brought by steamers direct to this country, and if properly refrigerated in transportation they would offer a tempting fruit to the millions of consumers in the United States. In Porto Rico there is no frost to endanger the life and production of the trees, and a plantation should continue to produce for upward of twenty years. When too old to yield a good crop, the trees furnish a most excellent and costly, close-grained wood that sells for nearly as much as the cost of starting and cultivating the grove for the first few years.

The tree which produces the cashew nut of commerce is a tropical growth that can be raised in Porto Rico on a large scale, and it is estimated that plantations of this tree alone should add many millions of dollars to the island's income within the next half century if its cultivation is wisely and faithfully attended to. The cashew nut is of superior flavor, and of great value in candy making. Its flavor is delicious, and the oil expressed from it is considered for many purposes superior to almond oil. The few cashew nuts brought from the West Indies to this country are readily absorbed, but their imports have been so small, and the prices so high, that they have never received the popular attention they deserve.

From the juice of the cashew tree many commercial products are made, such as mucilage, chewing gum, and various lotions and anesthetics. The use of the products of the tree is so varied that it would require a good deal of descriptive text to explain them. The wood of the trees is excellent for commercial purposes, and has a close, compact, unyielding grain. Plantations of these trees should represent an agricultural specialty proof against nearly every kind of local disaster, except possibly hurricanes.

A tree known as *Cedrela odorata*, but commonly spoken of in tropical countries where it grows as ylang-ylang, thrives wonderfully well in Porto Rico. It is known in that island as the West Indian cedar, and its wood is more compact and beautiful than the best Central American mahogany. From different parts of Porto Rico this tree has been foolishly cut down and wastefully used for cabinet work and house-building. The flowers of this tree are beautiful and fragrant. From them is extracted a commercial product almost equal to the famous attar of roses. This attar of ylang-ylang is what makes the trees most valuable. It sells as high as five dollars per