

Science News-Letter

A Weekly Summary of Current Science

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GEOLOGY—ENGINEERING

How Science Magic Made Servants of Steam Djinns

Once upon a time there was a Prince. In the kingdom where he lived there was a valley where men could not till their farms and vineyards, because it was full of dancing and mischievous Djinns. They did not annoy people unless they got too close, and then they only drove them away with their boiling hot breath; but they did make nuisances of themselves with their constant idle dancing, above the little holes in the earth where they were born. And they made the days foggy with their fantastic, trailing white garments, and they made the nights hideous with their incessant hissing and roaring. They were very strong and agile Djinns, but they had lived lives of idleness for ages, because nobody, not even Solomon who had mastered most of their brethren, knew how to command them and set them to work at useful occupations.

The Prince, while he was still a young man, determined that he would conquer these Djinns and make them do some of the work that was wearing out the backs of the King's horses and the King's men. Accordingly he went to a school of Magicians and studied there until he was a competent Magician himself. It would be well for the people if more Princes were to study Magic.

Then he took some of his men and went into the Valley of the Djinns. The Djinns fought hard, and hurt a few of the men with their hot breath, but in the end the Prince's magic prevailed, and they were all bound in strait bonds of iron, and compelled to do the Prince's will. And if you go into the valley today you will see great brilliantly lighted castles, where the Djinns are doing the work of many men. The Prince, however, is not a hard taskmaster. After the Djinns have finished their labors, he lets them out to dance upon the roofs.

And if you do not believe this tale,



A "gusher" of steam instead of oil. The slender instrument alongside measures the pressure by means of a column of mercury.

just go to Larderello, in Italy, and you will see it all as it has been related, even to the white-robed Djinns dancing on top of the steam exhaust pipes over the electric power houses.

For the fairy tale with which this story opens is an allegory founded on the solidest kind of fact. The Prince is real, and he is really a prince. His name is Prince Piero Ginori Conti, Senator of the Kingdom of Italy. His magic is real, for he was educated as a scientist and an engineer. The Djinns he conquered and made servants to his will are the roaring jets of natural steam that spring from the earth in the neighborhood of Larderello, in the famous old region of Tuscany. He has taken a couple of little valleys hitherto pestiferous and useless because of their pseudo-volcanic activities, and by taming the wasted forces of nature has turned them into humming hives of industry, producing electric light and power for the whole

countryside and turning out borax and other chemicals in most profitable quantities.

Natural steam vents, like those made familiar to Americans by Yellowstone National Park and the Valley of Ten Thousand Smokes, have been known in many lands and in all ages. Their presence in Mediterranean lands doubtless had much to do with the early ideas of the after-life, in both Hebrew and Pagan tradition. It is worthy of note, for example, that Dante, like Prince Ginori Conti, was born a Florentine, and unquestionably had some first-hand knowledge of volcanic phenomena.

The world was a long time getting over its awe of earth-steam and hot springs as supernatural things, and even longer about attempting any use of the energy of which they were so obviously prodigal. During the nineteenth century a few attempts were made to harness the natural power of the Larderello "soffioni," as the steam springs are known in Tuscany; but these efforts were abortive, and it remained for Prince Ginori Conti to achieve the distinction of being the first man to make a real success of the exploitation of natural steam power, and to drill for steam exactly as we drill for oil or gas or artesian water.

It was natural, perhaps, that the first development of electric plants run by "volcano power" should come in Italy, where there is an abundance of volcanic phenomena but very little coal and oil to be used in the more conventional modes of artificial power generation. But once the new idea was abroad in the world it was only natural also that the next natural steam plant should be set up in America, if for no other reason than that the inventive Yankee is always eager to try an original and interesting-looking contrivance of foreign make even if he didn't think of it first. So it

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Radium Gift Useful

The gift of one twenty-eighth of an ounce of radium, worth \$100,000, made by the women of America to Madame Curie in 1921 has been instrumental in establishing and proving a new law of nature.

Mme. J. S. Lattes, a worker in Mme. Curie's laboratory, has described in *Annales de Physique*, her studies of filtering of radium rays.

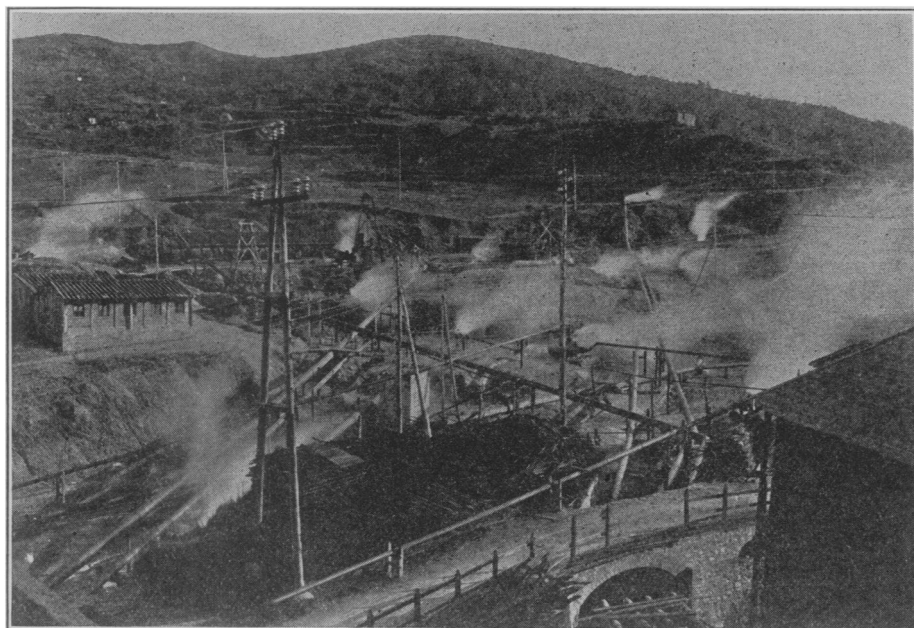
Madame Lattes was originally interested in finding the best method of wrapping up the applicator tubes which are brought in contact with the flesh of a patient who receives radium treatment, but her results led her into fundamental studies of the absorption of radium rays by different materials. She was able to confirm definitely, using the American radium, a law discovered last year by Georges Fournier in the same laboratory, according to which there is a simple mathematical relation between the absorption coefficient of a material and its atomic number. She also attained her original object, for she learned how to avoid the destruction of the flesh, or necrosis, which occurs when a radium tube is improperly used. Essentially her method is to use first a thin sheath of a dense metal, such as platinum, around the radium, and then to wrap the tube in many layers of light material, such as gauze, to absorb the secondary rays issuing from the platinum. This method which has also been developed empirically is now for the first time clearly understood and explained.

In her latest report, published in the *Annals of the University of Paris*, Madame Curie tells of the great and growing activity of the group which she directs. No less than thirty investigators are studying different problems of radioactivity, and fifteen scientific papers were published from the laboratory between November, 1925, and May, 1926. In addition, the various technical services of the laboratory have been kept up. Madame Curie's daughter, Dr. Irene Curie, who accompanied her mother on her visit to this country, is one of the most productive research workers at the Radium Institute, and also has charge of some of the laboratory teaching.

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A deadly substance secreted by certain toads is used by primitive tribes to poison arrow tips.

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View across the valley at Larderello, in Tuscany, Italy, showing the webwork of steam pipes and high-tension electric wires that turn into useful power hitherto wasted energy—and steam, steam, everywhere.

Servants of Steam

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happens that a plant somewhat like Prince Ginori Conti's has been erected in Sonoma County, California, where some unusually powerful natural steam vents have been "capped," and the power is used to generate electricity for use in the surrounding region.

So far the Sonoma plant is the only one that has been built in this country, and our abundance of coal and water power will probably make further growth of this novel industry slower than it will be in Italy, where there is better economic reason for its development. On a recent visit here, Prince Ginori Conti suggested that America has, in the Valley of Ten Thousand Smokes, up in Alaska, an area of far greater potential power than any in Italy. But at present there is very little prospect of its industrial development, because of lack of population and also because of long distance from any present world markets. But if the next few generations see the growth of transpolar aviation lines, there is no telling what may happen.

It is more likely, however, that so great a natural wonder as this Alaskan volcanic valley will be held by the Government as a national park, and the policy of the National Park Service has been to set its face like flint against any suggestion of commercial development in any of the areas under its control. There is enormous natural steam power displayed in Yellowstone National Park, for example; "going to waste," the more material-

minded of the tourists sometimes say. But the Park Service figures that it is not going to waste: that the illumination of electric signs or the manufacture of chewing-gum, or other useful consumptions of power, are of a lower order of utility than the illumination of people's minds or the generation of wonder in their hearts by the contemplation of the unconstrained might of the forces of nature. So it is highly likely that natural steam power plants will be built in this land of ours only in such peculiar localities as have an abundance of steam vents without any particularly striking or spectacular features about them. Of such peculiar circumstances the Sonoma plant is a good example.

The capture of earth-steam is not always a simple matter of "capping" the natural vent and attaching a pipe running to an engine. All sorts of difficulties attended the Larderello venture from the very start, and it was only because of his combination of great natural courage and resourcefulness with adequate scientific training that Prince Ginori Conti finally succeeded where others had failed. In the first place, the steam of most "soffioni" is acid, and will eat the insides out of an engine cylinder if used "as is." The earlier workers had attempted to meet this situation by not using the steam directly in their engines, but by running it under boilers filled with pure water, as if the steam were fire, and then operating the engines with the "second-hand" steam generated in the boilers. But this, for various technical reasons, did not work

(Just Turn the Page)

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Servants of Steam

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very well. Now the chemicals that make the steam acid are removed first and the steam sent directly into turbines. Incidentally, these chemicals, notably the valuable boracic acid and to a less extent carbon dioxide and hydrogen sulphide, pay a very considerable share of the profits of the enterprise. There is helium in this steam also—and to a nation as interested in the dirigible business as Italy, this alone may make these strange wells priceless.

Then there is the problem of low pressure to solve, for in spite of its roaring, the steam that issues from natural vents in the earth has no great force behind it. Many of the jets utilized at Larderello have pressures of only about one atmosphere, or fifteen pounds per square inch, and few of them have pressures of more than two atmospheres. This difficulty was met by designating special types of steam turbines, which could make economical use of such low pressures. Greater pressures were obtained, and the supply of steam very much increased, by boring deep wells with the same kind of rig that is used for oil or gas. It is even more dangerous work than oil drilling, but a number of "steam wells" have been brought in. The largest of these now has a regular yield of over 120,000 pounds of steam per hour, at a pressure of two atmospheres, and some of the new wells now being opened will yield much greater pressures, estimated to run as high as fourteen atmospheres, or 1306 pounds per square inch.

But Prince Ginori Conti, having subdued his Djinnns and made orderly and hardworking servants of them, is not resting on his laurels. He is looking for other worlds to conquer, and wondering whether he can not perhaps steal a little fiery breath from the great volcanic Dragons that sleep all around the kingdom he lives in. Natural steam vents as well as geysers

and hot springs, according to the most widely accepted geological ideas, are due to the meeting of water trickling down through the rocks from the surface of the earth, with heat from buried masses of lava far beneath. This boils the water and returns it to the surface as steam, bearing with it some of the energy of the slumbering beds of molten rock. Why not, suggests the Prince, bore some deep holes where we know there is lava beneath, and thus make our own steam wells to order? He realizes that this is a ticklish proposition, for these volcanic Dragons are a vast deal bigger and fiercer than his conquered Djinnns; so he makes his suggestion somewhat charily. But you can see that his fingers are itching to tickle a Dragon's nose, just once. And if he gets away with it—

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The California condor lays an egg four inches long.

Oxygen was discovered by Joseph Priestley, in 1774.

Assyrian sages as early as the seventh century B. C. attempted to foretell lunar eclipses.

The beautiful sculptures on the Parthenon at Athens were made of marble from Mount Pentelicus.

The killdeer's appetite for grubs and insects makes it one of the most useful birds on the farm.

Balboa, who visited the Pearl Islands, near the Bay of Panama, reported that the canoe of the chief was richly decorated with pearls.

A new mine safety-lamp has been perfected which furnishes light for the miner and also glows in warning if the deadly "fire-damp" be present.

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STUDY HELPS FOR SCIENCE CLASSES

(These articles will be found to be especially useful in class work.)

GENERAL SCIENCE

How Science Magic Made Servants of Steam Djinnns, p. 81. Predicts California Rains, p. 83. Building American Highways for Safety, p. 85. Life on Mars? p. 91. Anniversaries of Science, p. 95. Articles marked with * in classification below.

HYGIENE

Rat Survey to Oust Plague, p. 83. Proteins Cure Paralysis, p. 95.

CHEMISTRY

Cellulose Skins for Sausage, p. 83. Radium Gift Useful*, p. 87.

BIOLOGY

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PHYSICS

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