THE CULTIVATION OF CINCHONA.

Cinchona, Peruvian, or Jesuits' bark is the dried bark of many species of the genus *cinchona*, a tree belonging to the order *rubiaceæ* and sub-order *cinchonaceæ*. It grows along the chain of the Andes over a territory of about 2,100 miles in length and from 36 to 54 miles in breadth, extending from Bolivia to New Granada, and is usually found at an altitude between 3,600 and 9,810 feet. The forests in which the tree exists are difficult of access and situated far from the sea. The intervening territory on the Peruvian coast is an arid desert where sand storms are of constant occurrence; but when the forests are reached the total absence of vegetation gives place to tropical luxuriance and the dry hot atmosphere to one that is moist and equable in temperature.

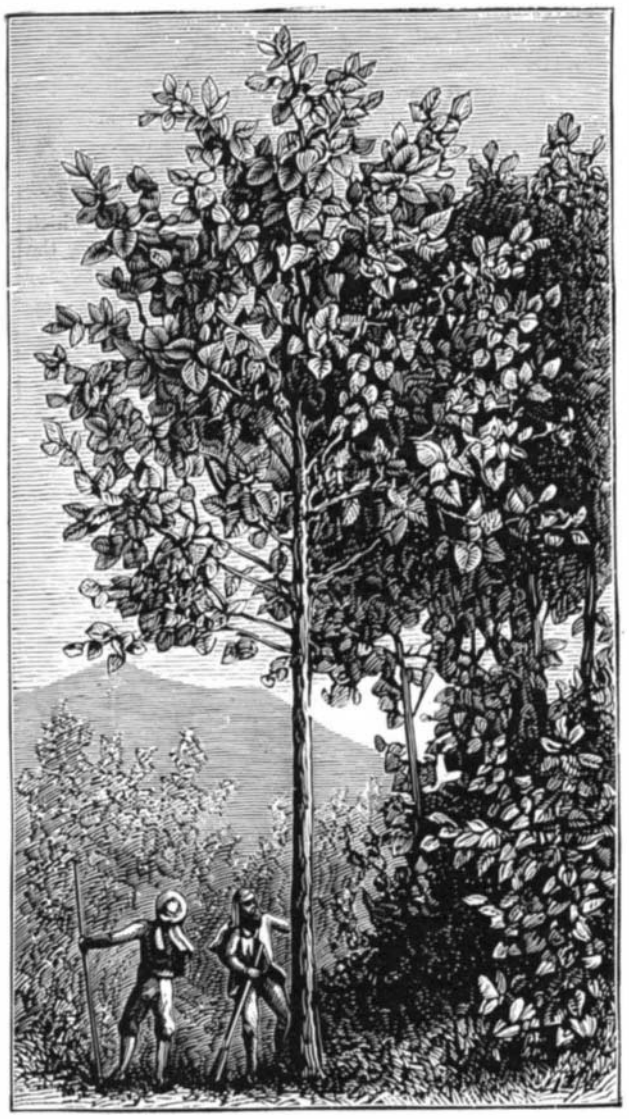
The cinchona tree grows, as shown in Fig. 1, to considerable height. The bark has a silvery exterior, the leaves are large and the flowers white, with rose and purple tints and an odor similar to that of the lilac. To obtain the bark, the "cascarillero," as the gatherer is termed, fells the tree, and with a keen knife makes deep long incisions, so that the outer covering is taken off in strips. These are placed in the sun to dry. If the bark is thin they shrink and roll up, producing the rolled cinchona commercially known. If, on the other hand, the bark is thick, the strips remain flat, and constitute another commercial variety. The various kinds of trees furnish barks possessing especial qualities. Although each species, or even variety, of cinchona may be supposed to produce a separate kind of bark, and although these varieties run into each other in such a way that hardly any two botanists agree as to the proper lines of separation, yet the commercial products may be divided into three classes, yellow, red, and gray barks. To these may be added the non-officinal or Carthagena barks, brought from the northern Atlantic ports of South America.

The medicinal value of Peruvian bark depends upon the alkaloids which it contains. These are quinia, cinchonia, quinidia, cinchonidia, quinicia, and cinchonicia. Another alkaloid, called cincine, is found in small quantities in some of the inferior qualities. It is probable that the three latter alkaloids are artificial derivations from the former. In addition to these the bark contains, in varying proportions, gum, starch, lignine oil, yellow coloring matter, both insoluble and soluble, red coloring matter, kinic and kinovic acids. Quinia, the most important of the alkaloids, is crystallizable, and the sulphate of quinia or quinine is the chief medicament prepared therefrom.

The Dutch and British governments have made successful attempts to introduce the cinchona into their East India possessions, in Java and various parts of Hindostan, where the mountainous regions furnish the necessary temperature and moisture for their growth.

It has been found that the yield of some species of the cinchona in alkaloids may be much increased by covering the bark with moss, and also that a longitudinal strip of bark may each year be taken from a tree without destroying it; the decorticated portion renewing, if "mossed," its former covering, at least as rich in alkaloids as before. Bark from the English plantations has already been introduced into commerce. More or less successful attempts at cinchona culture have been made in Jamaica, the isle of Reunion, Guadaloupe, Brazil, the Azores, and Algeria.

In cultivating cinchona, the care and attention given is greatly repaid in larger proportions of quinia. It is stated that Javan bark has yielded as high as 90 per cent of the sulphate. An excess of azotized matter in the fertilizers used, however, produces an excess of cinchonidine at the expense of quinine. From recent investigations, however, it appears that this is no disadvantage. Dr. Weddell has pointed out that cinchonidine possesses properties as a febrifuge fully as energetic as those of quinine, while it has the advantage of being more easily tolerated by weak stomachs, and of not being so liable to produce intoxication and singing in the head. Trials made by the government of Madras showed that, of 1,145 fever patents, 400 out of 410 who took cinchonidine were cured while the proportions of recovery among those who took quinine were 346 out of 359, and 365 out of 376. This is of considerable importance, as cinchonidine can be obtained much more cheaply than quinine, owing to its being present in the cinchona bark in much larger quantities. It is possible that situations may be found within the limits of the United States suitable for the culture of the cinchonas, so that a new and profitable industry might thus be started.



THE CINCHONA TREE.

CINCHONA FLOWERS.

In our illustrations, which we take from *La Nature*, the cinchona flower is represented separately of natural size. The particular variety illustrated is the *cinchina succirubra*, which produces the red bark and grows chiefly on the western slopes of Chimborazo and the neighborhood.

The National Park.

In the northwestern corner of the territory of Wyoming, bordering on Montana and Idaho, lies a tract of country about fifty-five by sixty-five miles in extent, possessing a greater combination of remarkable features than any other known area of like dimensions under the sun. It contains 3,578 square miles. Its elevation above the sea level is from 6,000 to 14,000 feet. It lies mainly, but not entirely, on the east side of the main range of the Rocky Mountains. By act of Congress, approved March 1, 1872, this tract was withdrawn for ever from sale and set apart as a permanent pleasure ground for the amusement and instruction of the people, under the designation of the Yellowstone National Park. The grandeur and variety of its scenery, the salubrity of its summer climate, and the health-giving qualities of its thermal waters will, within a few years, make it the Mecca of the tourist, pleasure seeker, and invalid from all parts of the civilized world. Among its innumerable attractions are some of the grandest cataracts, cascades, cañons, and mountain summits on the continent. Its spouting geysers, in number and magnitude, exceed all others known. Its numerous mud springs, solfataras, fumeroles, and beautifully terraced hot springs are beyond description in the magnitude and splendor of their decoration and action. The sources of the Columbia, the Colorado, and the Missouri rivers are all said to lie within this pleasure ground of the nations. Its mountain summits are covered with eternal snows, while many of the valleys are made radiant with the sparkle of lakes whose waters are clear as crystal.

The most magnificent of these lakes is the Yellowstone, the source of the river, lying nearly in the central portion of the park. Its form is similar to that of the human hand with the palm to the front and the fingers pointing downward. The altitude of the lake is 7,427 feet above tide water, and its present depth is about 300 feet. It is fed by the snows on the lofty mountains that flank it on all sides. The length of this beautiful sheet of water is about 22 miles, and the width 10 to 15 miles. Professor Hayden declares that there is nothing on the continent that equals it in the brilliant hues of its waters and the splendor of its surroundings. The clear green shading of the mountain slopes, with the ultramarine tint of its shining surface, produce an effect upon the observer which can neither be imagined nor adequately described. The temperature is that of cold spring water. In the early part of the day its surface is usually calm, and its varied hue, from livid green, shading off into a deep ultramarine, presents a picture of beauty that is dazzling to behold. During the later hours a strong wind sometimes arises, stirring the calm lake into all the fury of an ocean storm. The amount of vegetation produced in the depths of Yellowstone Lake is immense, vast ridges of it lining the shores at certain seasons after a high wind has swept over the surface. The only fish found in the lake and in the neighboring streams is the trout, whose numbers are said to be inconceivable. Most of the fishes in the lake are afflicted with the presence in the bodies of a peculiar intestinal worm which, for the time being, renders them unfit for use. The presence of hot springs, with their cones rising above the surface, is a singular fact, the water within the cones being almost boiling hot. Trout have been caught by persons standing upon these cones and cooked in the hot water without being removed from the hook, as declared by the United States Geologist, Professor F. V. Hayden.

But the most wonderful objects of interest in this region are the cataracts and cañons of

of the Yellowstone, with the spouting geysers in the valley of the Fire Hole river. Neither language nor the painter's genius and skill are adequate to describe either. The lower falls are more than 390 feet high. The walls of the grand cañon are some 2,500 feet in depth, and are colored by hues so various and brilliant that human art despairs of any attempt to reproduce them. "The wealth of red and yellow, brown and orange, pink and green, black, gray, and white fascinates and bewilders every beholder," according to Professor Marshall, "seeming to reproduce before his admiring gaze all the ravished splendors of a very gorgeous sunset, whose charms, no longer evanescent, are here not painted but dyed through and through these mighty cliffs, and made as eternal as the everlasting mountains they buttress." The geysers are even more grand and magnificent, because accompanied by much of the pomp and circumstance of elemental war in the spouting of immense columns of hot water to the height of 90 to 250 feet or more, in the shooting up of vast volumes of steam to an occasional altitude of 1,000 or 1,500 feet, and in the rumbling sound and vibrating motions that accompany the earthquake shock. There are three known geyser basins, but two of which have, however, been explored. These are in the valley of the Fire Hole already referred to, and lie to the westward of Yellowstone Lake, from which they are reached by a tolerably well worn trail. Some of the orifices of the geyser cones are twenty feet in diameter, and during an eruption a column of hot water, filling this orifice, rushes outward and upward with terrific force, and to altitudes varying from 15 to 275 feet in some cases. The cones, rims, and basins formed by the deposits from the springs and geysers are among the most magnificent of their attractions. Many of them have all the beauty of finish and brilliancy of coloring of the finest porcelain, while the waters within the rims and basins of many of the springs are so perfectly transparent that the smallest objects may be seen at the depth of forty or fifty feet.

Our purpose in referring to the park was not so much to attempt a description of its really indescribable wonders, as to call attention to the work of vandalism already inaugurated within it by tourists and visitors. Many of the magnificent structures built up by the action of the hot springs and geysers are being disfigured and destroyed by trophy-hunters and others, actuated, too often it is to be feared, by a pure love of destruction. This shameless raid upon the varied glories of the "Wonderland" should at once be stopped by the strong arm of the law. Congress ought promptly to take such action as will protect and preserve the decorations that Nature for ages past has treasured up among these "everlasting hills," and in the radiant valleys of the upper Yellowstone. A resolution was passed at the recent meeting of the American Association for the Advancement of Science, calling upon our national authorities to act in this matter. It is a subject of quite as much interest to educators as to men of science, inasmuch as the park may be justly regarded as a vast museum whose unlimited resources are capable of illustrating almost every object of thought or subject of study within the range of created existences. Let our educators and friends of education, therefore, add their voices and votes to those of the scientists in the effort to preserve from desecration, and for the high purposes of instruction, the grandest heritage of natural sublimity, beauty, and utility ever bestowed upon man.—*The Educational Weekly.*

WATER HEATER FOR BATHS.

The annexed engravings represent a simple apparatus for heating water for bathing purposes. The heating device, in Fig. 1, is a small stove surmounted by a flue, A B, leading to the chimney. Surrounding the flue and fire chamber is the water reservoir, M N, which communicates with the bath tub faucets. Cold water enters this vessel in the direction of the arrows.

A still simpler construction is shown in Fig. 2. The bath tub communicates by two tubes, R, S, with a cylinder, C, which is filled with water and heated by lamps or a ring of gas burners underneath. In the upper portion of the cylinder is a receptacle for warming towels, linen, etc.

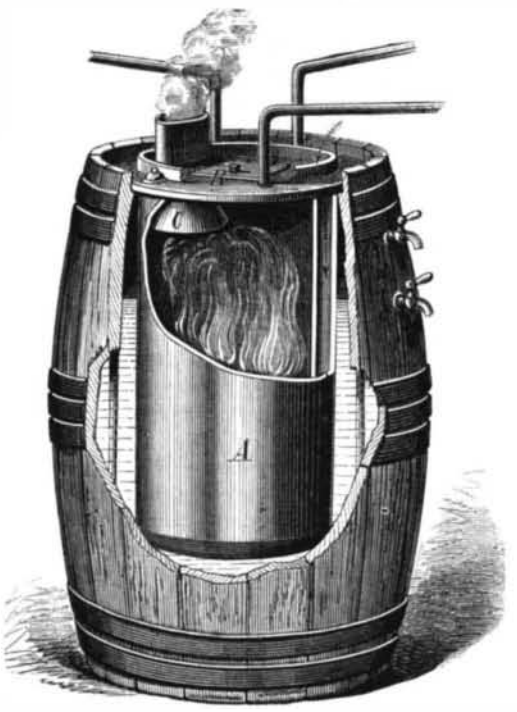
A Blue Printing Process.

The following process, says *Photo. Wochen-Blatt,* may be recommended for printing purposes: Float Saxe or Rive paper for from four to five minutes in a solution of citrate of iron. A tolerably well saturated solution may be obtained by stirring the salt for a considerable time on the boil. The sensitized paper is then dried in the dark, and exposed under the negative till a feeble yellowish trace of the lines of the picture is visible on the paper. In summer five or ten minutes will be found sufficient, and in winter from thirty to fifty for the printing. The prepared side of the paper must be then drawn gently (for a few seconds) over a tolerably strong solution of red prussiate of potash, when with great rapidity there is developed a blue picture, which should be quickly passed through pure spring water, and, if not then sufficiently strong, placed again for several seconds in the above solution, and then for a short time thoroughly well washed. An over-exposed picture develops so quickly that there is hardly time to wash it before the lights begin to tone.

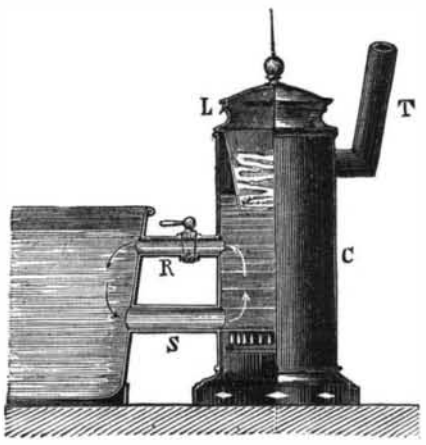
This process of blue printing is of great importance to engravers, who restore by it the stencil for the pantograph. Also for enlargements, wood engraving, etc., it is very useful, and can be worked at a fabulously cheap rate. By washing the picture when finished in water, to which a little ammonia has been added, it will appear more of a violet tint.

A NOVEL STEAM GENERATOR.

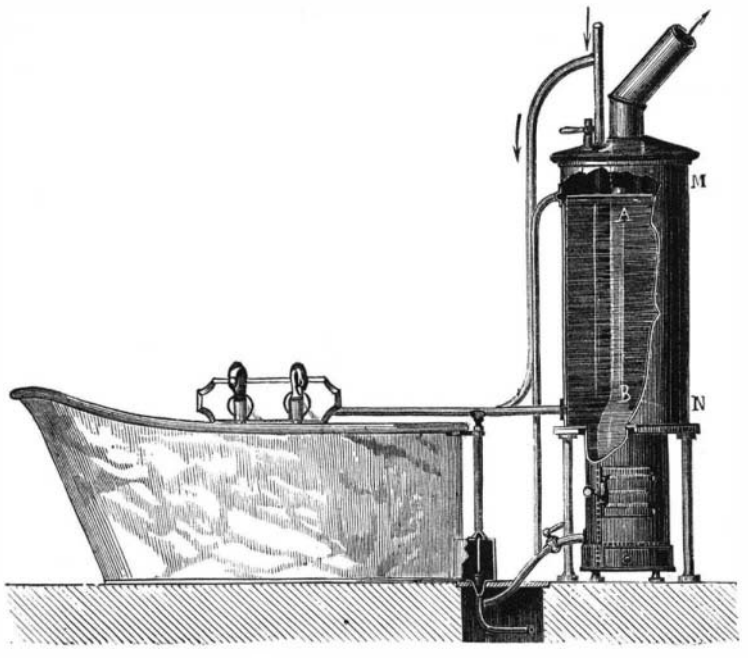
We illustrate a curious method of generating steam, which reverses the ordinary methods, and resembles putting the cart before the horse. Instead of setting the boiler over or



in the fire, the fire is placed over and in the boiler. The barrel in the illustration is cut away to show the interior construction of the generator. A is a sheet iron cylinder closed at both ends and fitted to a cast metal barrel head, B, the lower part being immersed in the water contained in the barrel. A brisk fire is lighted in the cylinder and kept supplied with fresh air by the flue indicated by the arrows.



WATER HEATER FOR BATHS.—Fig. 2.



WATER HEATER FOR BATHS.—Fig. 1.

The funnel, C, acts as a stove pipe. An opening in the barrel head gives access for fuel. The bent pipes shown rising from the barrel carry off the steam generated to any point. Very little heat is thus wasted and a head of steam is quickly secured. This ingenious device was patented through the Scientific American Patent Agency, by T. F. Butterfield, of DeWitt, Iowa.

Astronomical Notes.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, January 19, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Mercury rises	6 08 mo.	Jupiter rises	6 47 mo.
Venus sets	8 18 eve.	Saturn sets	8 55 eve.
Mars in meridian	5 29 eve.	Uranus rises	7 21 eve.
Mars sets	0 04 mo.	Neptune in meridian	6 16 eve.

FIRST MAGNITUDE STARS.

	H.M.		H.M.
Sirius rises	5 42 eve.	Altair sets	6 18 eve.
Procyon rises	5 17 eve.	Fomalhaut sets	6 53 eve.
Regulus rises	7 20 eve.	Algol (2d mg. var) in merid.	7 03 eve.
Spica rises	11 58 eve.	Capella in meridian	9 10 eve.
Arcturus rises	11 00 eve.	7 stars (cluster) in meridian	7 43 eve.
Antares rises	4 08 mo.	Betelgeuse in meridian	9 51 eve.
Aldebaran in meridian	8 32 eve.	Rigel in meridian	9 11 eve.
Vega sets	7 30 eve.		

REMARKS.

Mercury rises 1 h. 13 m. before the sun, and 48′ north of the sunrise point. He will begin to advance, or move eastward among the stars, January 21. Venus is a large crescent. Jupiter rises 34 m. before the sun, and 2° 54′ south of the sun's path. Uranus is approaching Regulus in right ascension, and is now ½° east and 8′ north of the star. Neptune commenced advancing among the stars January 16. Algol will be at minimum brilliancy January 19, 9 h. 23 m., evening; also January 22, 6 h. 12 m., evening; for Washington time, subtract 12 m., for Boston, add 12 m. By an oversight the time of minima, etc., of Algol, last week, was given for Boston. Regulus is occulted by the moon this evening. This is the only bright star occulted this month. It will not be visible north of 16° south latitude. At Rio Janeiro it takes place 1 h. 30 m. after sunset, the moon being ½ hour high, and near the full.

Professor Tyndall on the Development of Bacteria.

Professor Tyndall has recently addressed a letter to Professor Huxley in which he details the results of experiments on the development of bacteria which he thinks settles the question of spontaneous generation, to the destruction of that hypothesis. Fifty flasks containing various organic infusions were sterilized by boiling. Twenty-three were then opened in a hay loft, and the remaining twenty-seven (with special precautions that the air should be uncontaminated by his own presence) were opened by Professor Tyndall on the edge of an Alpine cliff. Both were then placed in a warm room, with the result that twenty-one of the twenty-three flasks opened in the hay loft became speedily filled with organisms, while all the flasks opened on the edge of the precipice remained as clear as distilled water. This furnishes remarkable evidence of the influence of the air on the development of the bacteria, but biologists will hardly acquiesce in Professor Tyndall's rather sanguine assertion until his no less positive opponents, and most especially Dr Bastian, are heard from.

The Oroheliograph.

M. le Commandant de la Noë lately presented a curious looking panoramic instrument to the Photographic Society of France, which he called "Oroheliograph." In a few words, it consists of a camera, the place of the ground glass forming the base, and the lens looking up perpendicularly to the sky. Over the lens is placed a silvered mirror, half globe-shaped, completely circular on its plan and parabolic through its vertical section. The result is that an image of all surrounding objects reflected from this half-ball-shaped mirror is received by the lens always in focus thereon, and transmitted thereby upon the sensitive plate underneath, with its surface forming a right angle with the axis of the lens and circular mirror; by this means a circular panoramic view of the horizon is obtained, as seen from the station the oroheliograph occupies.

The instrument shown to the Society is the first rough model, and the proof exhibited showed some astigmation which would be corrected.

Mr. W. Harrison, in a letter to the *British Journal of Photography,* states that the vertical lines are true and sharper than the horizontal ones; this is caused by the use of a defective reflector silvered on the exterior, which will, however, be obviated. The curves were calculated by Colonel Mangin, of the Engineers. The instrument is considered of value for military reconnaissances, and the angles and heights can be measured from the views taken at two or more stations.

New Tests for Milk.

For the analysis of milk, Professor Lehmann, of Munich, proposes the following: A weighed quantity, say 9 or 10 grammes of milk, is diluted with an equal weight of water, and poured out in a thin layer upon a porous plate of burnt clay, very dense and fine-grained. The water of the milk, as well as the milk sugar, albumen, and a portion of the salts dissolved in it, are absorbed by the clay plate, while the total amounts of fats and casein in the milk