1860, he became the possessor of fifty flourishing young plants. These were set out in a loose, sandy soil, in rows five feet apart; they grew finely for two years, when the first leaves were picked, and from that time to the present the yield has been from five to six pounds yearly. To estimate the quantity which one acre of land planted in tea would make, a medium-sized plant was selected, and yielded one-quarter of a pound. The number of plants to an acre would be 1,764, giving 441 pounds of tea to the acre. An advantage of this crop is that neither cold nor heat, dry or wet, hail, winds, or insects, injure it. The process of drying is as follows:—

The leaves when picked are to be spread out on tables for ten or twelve hours, then they are to be rolled between the hands till the watery juices are expressed, again exposed to the sun for one hour, and rolled till each leaf is curled upon itself. Having undergone this operation, the process is completed by being placed in pans moderately heated and stirred with the finger till perfectly dry.

To make green tea, the leaves are not to be rolled, as in the above preparation of black, but are roasted immediately after the first drying, whereby the original green color is retained. During this process, the Chinese throw into the pan Prussian blue and gypsum, finely powdered, in proportions of a half pound of the mixture to every one hundred pounds of tea. When thoroughly diffused through the mass, this powder causes the leaves to assume a deeper and more brilliant hue.

According to a work published by Mr. Ball, late inspector of teas for the East India Company, in China, both varieties of tea are produced from the same plant, without the admixture of coloring matter, and the striking difference in color and flavor is due to the more violent and rapid action of heat employed in drying the green teas. For black tea, the leaves are slowly dried in the open air, sifted and tossed in large trays, and afterward allowed to lie until they begin to become tinged with red, when they are immediately roasted and rolled. Roasting and rolling are repeated three or four times, until juices are no longer expressed in rolling, when the final desiccation is commenced, in sieves placed over a charcoal fire in a common chafing dish. The fire is moderated by spreading ashes over it, as the evaporation proceeds. It is here the leaves begin to assume their black appearance. On the contrary, for the production of green teas, the leaves are immediately roasted after gathering, in a sort of iron kiln, which is heated red hot, about half a pound of leaves being thrown in at a time, and kept actively in motion. They are rolled and roasted alternately three times, and at the final roasting, begin to take on the tint of bluish green which distinguishes this description of teas.

Mr. Jones seems to have thoroughly mastered the art of preparing his teas in most approved Chinese style, and, according to his statements, his experiments must be a success. Whether the cultivation of the tea plant will attain any considerable importance in this country is still an open question. To prove profitable, we shall have to contend against the experienced labor of the Chinese, and if even the crop becomes one of our staples, it will be when the ingenuity of inventors has devised some more expeditious way to supersede the present tedious and primitive mode of curing the leaves; we may then hope to contend successfully against the exceedingly low price at which labor is rated in China.

FOGS, CLOUDS, AND RAIN, IN THE MOUNTAINS.

For the Scientific American.

A sojourn of a few summers in the southwest Alleghanies afforded me an opportunity of witnessing some of the interesting scenes, frequently occurring, in which fog and rain play their part. One morning, about 7 o'clock, while awaiting breakfast, I seated myself in front of the log cabin of Edward Delozier, with whom I had tarried over night. The house is located in Tuskegee cove, Cherokee county, North Carolina, and is surrounded on three sides, north, south, and west, by mountains, one of which ascends in a peak, fourteen hundred and fifty feet, and another eighteen hundred and fifty feet, above the Tuskegee Creek—the highest one having an altitude of about four thousand feet above the sea level. To the eastward there is a wide opening, in which hills of a moderate elevation only are interposed. On the south, a gap in the mountain affords an outlet to the horseman, and on the west a deep notch serves a like purpose.

Suddenly, a few misty flakes of fog came moving slowly through the notch, from the Chevah valley, on the west. Presently, larger masses followed, and these, again, were succeeded by still more extensive volumes. Breakfast over, we resumed our seats, Mr. Delozier warning me not to set out upon my journey. The fog was now rolling through the notch tumultuously, and filing off gracefully to the right and left, like soldiers passing a defile and preparing to attack an enemy, by extending the wings of their battalions.

From our position, the fog wore the appearance of gigantic fleeces of the whitest wool. Onward, and still onward, its masses rolled along, the foremost seeming to be impelled forward, not by the winds, for it was calm, but by the fog in the rear; or rather, perhaps, by the force of an upper current in the atmosphere, or the changing condition of the air from the warming influence of the sun's rays, now shining fully into Tuskegee cove, over the eastern hill-tops. But the darkening clouds accumulating faster and faster, soon covered not only the mountain sides, but overspread the whole area of the cove; and, advancing eastward, obscured the face of the sun as with a curtain, shutting out his beams from the landscape around. We were now startled by a sudden flash of lightning, succeeded instantly by the roll of the thunder, which, reverberating among the mountains, prolonged its tones to a duration unknown to the dwellers in the lowlands. The rain, which for a few minutes had fallen in a feeble drizzle, now descended at once in a copious shower, as though it had been awaiting the signal of the electrical flash, to do its errand of mercy.

Like all mountains composed of stratified rocks, those of North Carolina run in lengthened ranges, mainly, from north-east to south-west. In countries where the unstratified rocks prevail, the mountains are often thrown up into dome-shaped forms. Here and there, however, in this part of North Carolina, there are points which rise dome-like, a thousand feet above the ordinary elevation of the mountains. Some of them reach an elevation of two hundred or three hundred feet above the line at which the ordinary forest trees can grow, and are destitute of timber, though covered with grasses and flowers.

These elevated domes have much to do with the formation of clouds and the production of rain. The philosophical explanation of this fact is presented in the previous article on water spouts. These domes are locally called *balls*, from their rounded appearance and naked surface. In the clearest days, often, the clouds can be seen forming around them at a greater or less distance above or below their summits. At times the rain fall is limited to the area around the ball, where the cloud spends itself, so that its remaining vapor is drifted off or dissolved again in the atmosphere. At other times, the clouds accumulate largely, and either from the influence of currents of wind, or from electrical action, they move off so as to water the surrounding mountains and intervening valleys It is not unusual for two balls, or for the summits of the lower mountains, to be forming wreaths of clouds around their brows at the same moment. These clouds, not unfrequently, are attracted toward each other, and thus the vegetation of the intervening districts has an additional chance of receiving new life and vigor from the rains yielded by this means.

In 1857, in the month of July, I set out on foot from the head of Valley River, a branch of Hiwassee River, to measure, with Lock's level, the hight of the Valley River Ball. The distance was five miles, and the proximate hight above the Hiwassee proved to be within a fraction of three thousand feet. Before reaching the top of the main ball, a cloud came sweeping along from the direction of the Tusquitta Mountain, to the south-west, pouring down its rain as it progressed. This we could see very distinctly. It reached us in our elevated position in the form of a dense fog, as all clouds appear when one is in their midst. It first struck our mountain at a point about five hundred feet below its summit, and rolled along, greatly agitated, amid the trees to the top of the ball. While hovering there, as a hen over her brood, it sent an arm down the eastern side of the mountain, above the tree tops, to a distance of several hundred feet; and then, as if reluctant to lose any part of its mass, this arm was drawn up again into the bosom of the cloud. Rendered light and airy, from the loss of its rain, the cloud soon swept off to the eastward, so that our measurements could be completed.

Nearly all the balls in sight, more than a half-dozen in number, and many of the higher portions of the lower ranges of these mountains, were repeatedly covered by rain clouds during the day, which were either formed upon them, or floated to them from one or another of the surrounding elevated points. Four or five of these clouds passed up Valley River toward us, but were generally exhausted of their rain before reaching our positions. These showers presented varied appearances, as they succeeded each other. The first was from a cloud, the margins of which were equal in depth and density to the main part of its body. Its breadth was nearly equal to the width of the valley. There being little wind, the rain fell vertically, and presented the appearance of a large curtain, of semi-transparent gauze, suspended from the cloud to the earth, having a length of two thousand feet. A second shower fell, an hour afterward, from a cloud with attenuated margins but dense center. The sheet of water falling from it presented the appearance of a semi-transparent fog in its center; but it gradually shaded off, toward the margins, into a misty haze, scarcely obscuring the objects in the background. A third, which occurred during our descent, was from a dense black cloud that overshadowed the valley and half the adjacent mountains. It had also great length to the westward. The body of water which it afforded was so dense, and the distance through which the eye had to penetrate so great, that every object in the background was as completely obscured as though the pall of midnight had been drawn across the valley.

A phenomenon of a very strange nature occurs at Clayton, Ga. This town is located a little to the south of Rabun Gap—a low depression in the Blue Ridge. The mountains on each side of this gap rise to the hight of fifteen hundred feet. The sun was just rising on the morning after my arrival at this town. Looking toward the north, I beheld a vast volume of fog, filling Rabun Gap from base to summit, and occasionally extending even above the highest parts of the mountains on either side. It was as white as snow, and resembled a vast deluge of cotton as it falls loosely from the gin. In front of the main gap, and between it and the town, there stands a small mountain, detached from the principal range, with a gap upon each side. The fog, as it rolled through the main gap, was deflected into the smaller gap, to the east of the little mountain.

On viewing it for a few minutes, I was soon startled by noticing that, though the whole immense volume of the fog was rolling forward at quite an observable rate of speed, yet it never passed much beyond the southern side of the little mountain. Onward it came, with a sufficient force and bulk to overwhelm, in its shadow, the whole southern side of the Blue Ridge; but beyond the line named it could never pass. A barrier existed there, in the different conditions of the atmosphere, which at once dissolved the fog, and left the air beyond as transparent as ever. Once in a while a small portion of the fog would whirl forward, a few hundred feet beyond the main mass, like a bold leader in front of an army, but in vain; leader and follower being instantly involved in a common fate. The law which controlled the movement of the fog, said to it emphatically: "Hitherto shalt thou come, but no further."

Turning to my friend, who had patiently watched me while I was absorbed in contemplating this wonderful scene, I inquired if it had ever occurred before. "Yes, sir," he answered," it occurs every clear morning, preceded by a calm night, from spring to fall. Beginning to roll through the gap a little before sunrise, it continues till eight o'clock sometimes, and as late as ten at others; and this it re-

peats every clear morning, as I said, and has repeated, doubtless, ever since the dry land appeared, and the mountains and the rivers were formed."

A word or two, only, of explanation: Saussure and Kratzenstein have investigated the nature of fogs and mists. The vapor in this condition, is found to consist of minute globules, upon which rings of prismatic colors were discovered like those seen upon soap bubbles, but which are never observed upon drops of water. From this discovery it was concluded that the globules are hollow, and filled with air or gas. The size of these globules is greatest when the atmosphere is very humid, and least when it is dry. With this explanation, the phenomena of the fog at Clayton can be readily understood.

The Little Tennessee River takes its rise in Rabun Gap, and run north-west. It is walled in on each side by mountains of fifteen hundred to twenty-five hundre feet in hight. The sun during the hottest hours of the day, teems down its rays into the valley, and imparts a great amount of heat to the waters of the river, as well as to the rocks among which it runs. The temperature of the water is thus kept up during the night, while, at the same time, the surrounding mountains cool the overhanging air. The vapor which rises rapidly from the heated water, coming into contact with the cold atmosphere above, is converted into fog. As the sun rises in the morning, his rays at once act upon the air south of the gap, where no obstruction exists; but his heat cannot affect that of the narrow valley of the Tennessee, till the sun attains a sufficient elevation to overcome the altitude of the mountain upon its eastern side. The rarefaction of the atmosphere on the south side of the Blue Ridge, while that of the Tennessee valley remains at a lower temperature, produces a current of air from north to south that bears the fog along with it through Rabun Gap. But here the increased heat, expanding the air or gas in the globules of vapor composing the fog, bursts the bubbles as fast as they advance, and the fog is dissolved by absorption into the warmer atmosphere, as transparent vapor. D. C.

THE CULTIVATION AND USES OF FOREST TREES.

Something must soon be done in the oldest settled portions of this country to encourage the growth of our forests and to prevent the indiscriminate and wholesale destruction to which they appear to be exposed. The annihilation of forests has within a few generations greatly injured the productiveness of some soils, dried up the springs, and cut off the sources of streams. The same causes which have in the old world turned fruitful plains into sterile deserts, will work in time a similiar result here. For this reason we welcome such sound advice as the following from the "Forest Tree Culturist," lately published by Geo. E. and F. W. Woodward, 37 Park Row, New York.

"I know many large land-owners who have been toiling for the past thirty years to lay up something to keep them in their old age and leave a balance to their children. They have worn themselves out as well as their land, and that something for which, they have so arduously labored has not been obtained and their children are likely to inherit a poor, worn-out farm instead of that competency which their father expected to have left them. Suppose These men had left one half their farms covered with the original forest, or if it was already cleared when they came into possession, they had planted one half with forest trees, and then expended all their labor upon the other half, they would have produced better crops and with more profit; one half of their farms would have been rich, and the other half covered with a forest that would be a fortune worth inheriting.

"Thousands of men are toiling this day to lay up wealth for their children, when if they would invest a small amount in land, and then plant a few acres of our best forest trees, their money would grow into a fortune by the time their children had grown into manhood. To some this may appear visionary; but the writer has lived long enough to see trees grow from saplings that would hardly bear his weight at ten years old, up to great trees two feet in diameter, and he has scarcely passed the half-way house of three-score and ten.

"In many portions of our country we need forests, not only for supplying us with timber, but for protection against winds and hurricanes. The farmer's grain is often prostrated by winds that never reached his fields until these protecting forests were destroyed. Fruit-growers are seeking the best means of shelter for their orchards, and a remedy for that dry atmosphere which sweeps through their gardens, shriveling up their finest specimens, checking, if not entirely annihilating, their ardor for fruit-growing.

"The little stream that formerly came singing and dancing down from the great wood on the hill is now seen only for a few weeks in the early spring and fall, and then there is nothing left but its dry, pebbly track. Is it not time we beagn to retrace our steps and again cover our now barren hill-sides and many of our valleys with those trees which were not only an ornament and blessing to our land, but would now be a source of incalculable wealth?

"The great West, with its wide-reaching, treeless prairies, feels the need of forests even more than we do in the Atlantic States. The farmer on the prairies needs a shelter from the winds, the value of which no one but those who have experienced the want can appreciate. In no way can such a protection be provided better or cheaper than by a belt of trees. Then the convenience of having timber near at hand for building fences, stakes for vines, trees, and a thousand little necessities for which wood is indispensable.

"A farmer who has provided a belt of trees around his farm, has protected his fields from winds, and his grain will remain standing until ready to harvest. His fruit remains on the trees until ripe; and in a great measure his buildings are safe against those fearful hurricanes which frequently rush with such destructive force across those level plains. If people will persist in residing on those prairies, they certainly ought to be protected, but they should learn how to do it themselves, and not expect that Nature will rear it merely for the asking, without putting forth an effort on their part.

"I those piece which leads me to think that years near those grand old prairies where the wind went and came without hindrance. One afternoon, on coming home, I found my house unroofed, and the place where a greenhouse stood in the morning swept clean, not a flower-pot, brick, or piece of glass left to show that I ever possessed a conservatory of fine plants. I can call to mind several instances of like character, each of which leads me to think that a strong protection is often required to enable the settler in the West to keep his foothold after he has obtained one.

"The question is, How shall protection be the most readily provided?—how shall we get the trees we need? My only answer is, *Grow them!* This will require time and expense, most certainly—and what blessing does not? It takes time to get wealth unless you are so fortunate, or unfortunate, as the case may be, as to have it given you; if so, it probably required time for the giver to obtain it. The great and important truth which I wish could be impressed upon the mind of every land-owner in America is, if you want improvements, *begin*, yes, begin them now! Do not put it off because you have no time to attend to it at present, nor because it will take so many years, and a little outlay at the start. You may say, I cannot wait so long.' Who asks you to wait? Time moves in spite of you. Plant the seeds to-day, and while you are making up your mind whether you will wait a few years for them or not, the trees will be growing."

THE McCALL AND SLOPER PROCESS FOR PRESERVING FRESH MEATS.

We have several times called attention to the results of the above process as shown in experiments on a large scale, the products of which were discussed, a few weeks ago, at a banquet given by the managers of the enterprise, in London. Knowing that our readers would be interested in ascertaining the *modus operandi*, we have procured from the English Patent Office a copy of the specification. It will be recollected that at the banquet referred to, beef, from the South American pampas, was served up in steaks, roasts, joints, boiled, in soups, and in every style of cooking, and was pronounced good by all who partook. It was claimed on that occasion that good fresh beef could be brought to London and sold at retail for four pence per pound. The following are the specifications and claims in the patent of John McCall and Bevan George Sloper:

"Our improvements relate to preserving fresh meat, poultry, game, and fish. We treat such food in one or other of the following methods:—We immerse in or surround the meat for a short time, say from ten to fifteen minutes, more or less, with a solution of bisulphite of soda or potash, in the case or vessel in which it is to be preserved, and which must be capable of being made air-tight. By this immersion we remove the air which filled the vacant spaces in the case; we then withdraw the solution and replace it by carbonic acid gas; we repeat these immersions and supplies of gas occasionally as required. We introduce into the case containing the food a regulated quantity of dilute sulphurous acid, and an equivalent quantity of carbonate or bicarbonate of soda or potash separately. The acid and alkaline salt do not come into contact until the case is hermetically closed, when they are brought into contact by agitation, and the liquid resulting charged with carbonic acid bathes the surface of and impregnates the meat; or the acid and salt may be brought into contact before the case is closed; or we place the meat in a case provided with two stop-cocks, one in or near the bottom, the other in the lid. By the lower stop-cock we introduce a solution of bisulphite of soda or potash, filling the vacant spaces in the case; we then close the stop-cock in the lid and exhaust the case of its liquid contents by powerful hydraulic suction, or by the action of an air-pump. We leave the meat under this exhausting suction and thus draw out from the meat as much air as it will yield up, which we then expel from the case by the introduction of a solution of bisulphite of soda or potash, which we afterward withdraw and replace by carbonic acid gas. We repeat at intervals these alternate introductions of the alkaline solution and carbonic acid gas.

"When metallic cases are used either for preserving or packing the food we use a lining both for the top, bottom, and sides of a non-metallic nature, such as thin matting, wickerwork, veneers of wood, cloth, or other suitable materials.

"We preserve poultry, game, and fish in the same manner as that described for meat.

"And having now described the nature of our said invention, and in what manner the same is to be performed, we declare that we claim as our improvements in preserving fresh meat, poultry, game, and fish—

"First, the employment of bisulphites of soda and potash, substantially in manner hereinbefore described.

"Second, the process hereinbefore described whatever the antiseptic salt employed.

"Third, the employment of an alkaline salt together with carbonic acid, or the substances producing the same, sulphurous acid and carbonate or bicarbonate of soda or potash, acting in manner hereinbefore described.

"And we claim as our improvement in the vessels employed in preserving fresh meat, poultry, game, and fish, by any of the methods hereinbefore described, the lining of the same with matting, wickerwork, or other like suitable material to protect the substance being preserved from contact with the vessels."

IN a note on the employment of a double wire rheometer in experiments on radiant heat, sent to the Academy of Sciences by M. P. Desains, the author states that he employs a kind of differential apparatus essentially composed of a single source of heat, of two piles, of a double wire rheometer, and finally of a rheostat. The apparatus is so arranged that the equilibrium, once obtained, remains uniform however the heat from the source varies; but if the smallest variation takes place in one of the radiations the needle quits the zero point. M. Desains has applied this apparatus to the examination of the absorption of heat by transparent gases, and finds that it gives very delicate and certain indications.