

## The Rain-Band Spectrum.

C. Piazzi Smith, the Astronomer Royal of Scotland, calls attention in *The London Times* to the use and value of the spectroscopic in foresting rain storms. This it does by showing whether there is more or less than the usual quantity of watery vapor permeating the otherwise dry gases in the upper parts of the atmosphere, this watery vapor not being by any means the visible clouds themselves, but the invisible water-gas out of which they have to be formed, and which when over abundant they produce rain. But how does the spectroscopic show to the eye what is declared to be invisible in all ordinary optical instruments? It is partly, says Prof. Smith, by its power of discriminating the differently colored rays of which white light is made up, and partly by the quality impressed on the molecules of water at their primeval creation, but only recently discovered, of stopping out certain of those rays so discriminated and placed in a rainbow-colored order by the prism and slit of the spectroscopic, but transmitting others freely. Hence it is that, on looking at the light of the sky through any properly adjusted spectroscopic, there is seen besides the Newtonian series of colors from red to violet, and besides all the thin, dark Fraunhofer or solar lines, in one very definite part—viz., between the orange and yellow of that row of colors, or "spectrum," as it is called—a dark, hazy band stretching across it. That is the chief band of watery vapor; and to see it very dark, even black, one must look at where the sky is brightest, fullest of light to the naked eye, at a low, rather than a high angle of altitude, and either in warm weather, or above all, just before a heavy rainfall, when there is and must be an extra supply of watery vapor in the atmosphere.

Any extreme darkness seen in that water-vapor band beyond what is usual for the season of the year and the latitude of the place is an indication of rain material accumulating abnormally; while, on the other hand, any notable deficiency in the darkness of it, other circumstances being the same, gives probability of dry weather, or absence of rain for very want of material to make it; and the band has, therefore, been called, shortly, "the rain-band." Thus, also, "the rain-band spectroscopic" have been specially constructed by several expert opticians in size so small as to be carryable in the waistcoat pocket, but so powerful and true that a glance of two seconds' duration through one of them suffices to tell an experienced observer the general condition of the whole atmosphere. Especially, too, of the upper parts of it, where any changes—as they take place there almost invariably earlier than below—enable such an observer to favor his friends around him with a prevision of what they are likely soon to experience.

## Educational—The Church Statistical

The Agricultural College at Hancock, N. H., will admit women pupils at its next term, who will be given a special course of study, including butter and cheese-making, and dairying and all its branches.

Kentucky has twenty universities and colleges, seven schools of medicine, six theological schools, two law schools, and one agricultural and mechanical college, with several hundred grammar schools, academies and colleges, each holding a high standard of education. With all these means of secondary education, her primary schools are confessedly poor. There are 250,000 illiterates in the State.

The total number of journals published in France is 3,272, being 1,343 in Paris and 1,929 in the provinces. Of the former it is surprising to find that the most numerous class is financial, 209; then medical, 97; illustrated, 88; fashions, 81; political, 71; law, 64; Catholic, 64; science, 41; literature, 30; and art, 19. The provincial papers are thus classified according to their politics: Republican, 615; Legitimist, 177; Orleansist, 146; religious 108; Bonapartist, 100.

The membership of the five largest Presbyterian churches in the country is given as follows: Dr. Talmage's Tabernacle Church, Brooklyn, 2,471 members; Dr. Cuyler's Lafayette Avenue Church, 1,761; Dr. Kittredge's Third Church, Chicago, has 1,755; Dr. Hall's Fifth Avenue Church, New York, 1,750, and Dr. Crosby's church, 1,324.

The Welsh Presbyterian Synod of Wisconsin held its first business session at Chicago. The synod has 45 ministers, 185 elders, 3,150 full members in its several churches, and 17,118 probationers. The question of forming a new synod of the churches in Missouri, Kansas, Iowa and Nebraska was discussed, and decided in favor of the proposed change. The success of missionary work in Nebraska, Kansas and Missouri was reported as beyond all expectations, but there was still room for more workers.

## Forest Fires.

Forest fires in Michigan, Wisconsin and Minnesota occur, and are the results mostly of carelessness on the part of explorers, or timber hunters, haymakers, and others having either business or pleasure in the woods, who leave their camp-fires burning, when they have cooked a meal or spent the night. This is generally in the months of July and August, when the pine leaves and branches from the last winter's cutting are dry and like tinder, liable to burn from the dropping of a match or a stroke of lightning. There is no necessity for this criminal negligence. Proper laws and their enforcement a few times will set the careless ones to thinking, and they will put out their camp-fires and be careful where they drop a match. It may seem hard to detect the offender, but it is not. Most men can be traced even in the pines, and if fires result from their acts they should be punished by imprisonment or fines.

Each state should enact special laws on this subject, then circulate full information and cautions, so that ignorance cannot be pleaded.

The practice of lumbermen cutting pine in the winter is this: A tree is felled, the branches are lopped off and lie scattered over the ground; the summer following these become very dry and are like powder. A match thrown away, an emptied pipe—any thing with even a spark of fire attached, will start the burning. Being scattered so evenly over the ground, fire spreads and gathers force, and does not stop at the end of the old choppings, but runs on into the green forest; so where perhaps eighty acres were cut, double that or more may be burned or killed.

A remedy for this would be a law requiring the lumbermen to employ an extra man in the woods, and carefully pile these green pine branches and refuse in open spaces, where they may be burned at the right time, or should they take fire by accident, the fire may not spread.

The extra expense is very little, and a large proportion of forest fires can be traced to these scattered dry pine leaves, ready to catch. After the first season, there is but little danger of fires in these old choppings, as the pine leaves drop off and green hard woods, maples, poplars, etc., spring up and the danger is over in a great measure.

We have not been able to trace any forest fires to so-called "Indian" work. The Indian builds a very small fire and hovers over it for warmth. He says, "White man build heap big fire and no can come near him."

The Indian always carefully extinguishes his camp fire before he "marches on." So forest fires can not be laid to the Indian.

The dry sandy soils in many of the pine forests of the states of Michigan, Wisconsin, and Minnesota differ in many localities from the Eastern states, where most of the forests were hard-woods; fewer small streams are found; rain-fall is less; more danger from forest fires. Witness the horrible scenes of Peshtigo and vicinity in eastern Wisconsin, in 1871, and later in eastern Michigan, occurring on this dry sandy soil.

There are large areas of a still virgin forest, aside from the small amount of pine therein, or which has been cut and removed in these three states that can be saved. The practice has been, until within a year or two, by lumbermen, to cut the pine timber, and then abandon the land to the country. There would be an average of five pine trees to an acre cut and removed. The remainder of the timber would be small pine, cedar, tamarac, spruce, and the varieties of hard-woods, and unless the fire had run through, one would hardly notice that the land had been cut over.

Now, however, owners are paying up taxes and carrying these cut lands.

On this remaining forest, covering some 60,000,000 acres, as before stated, there is some white pine, perhaps 75,000,000,000 feet, that will be cut in the next ten years. After this is gone, and which at present seems to be the only timber of any commercial value, there will be left the same original forest acres, full of all kinds of hard woods, the cedars, tamarac and spruces, and the young white pines, all of which will become valuable, so that the forest that is left has really more value in its variety of useful trees that are now, or soon will be, in demand for the vast prairie country south and west of us.

There should be foresters appointed and paid good salaries; men of intelligence and knowledge, and of integrity and honesty of purpose; their duties being to inform themselves of every part of their district, its wants and capabilities; to collect information; go among the people; to settle in the wooded parts thereof; to instruct them in the use and care of timber, and how to save and utilize it; to have meetings in the country school-houses; to teach people who do not realize the value of our forests how

to care for them, etc. Not one person in ten has any idea of the necessity of care as to forest-fires, and it all comes from ignorance. Foresters should collect and distribute information, and advise as to the manner of cutting timber. Probably as much timber, or as many trees in number, are destroyed each year through ignorance and carelessness in cutting the pine timber for sawlogs, as there is that are cut and really used or taken to market.

As a matter of saving to the state at large, the simple effects of an intelligent forester, to educate the country people, by going among them, and giving them information, would pay in the end a thousand salaries, to wit: It is not generally known that even a branch broken from a hemlock tree kills it. The pine is also a sensitive tree; a broken limb or a slight burn on one side brings on decay; hence care should be taken in cutting. Again, fires should not be allowed to run, for no pine comes up again on burned land.

Lumbermen sending their men into the woods, exploring or haymaking, should charge them to take extra care of camp-fires.

The northern part of Minnesota and Wisconsin, and the upper pines of Michigan, fifty to seventy-five million acres of land, is well calculated for a forest reserve or park, from which all kinds of timber that grow in the middle and Northern states may be judiciously taken, and still the main forest remain intact, if it is intelligently and practically managed. The prairie states do not now perhaps so much feel the need of having such a forest to draw from, but they very soon will.

Vast amounts of timber for agricultural implements, railroad ties, telegraph poles, fence posts, etc., are wasted each year. The demands increase as the prairie settles up. This forest is the only one left. A thousand things could be said on this subject, but what is wanted is prompt action on the part of those in authority, good laws made and executed, people educated up to the point; and this can be done by the right man or men in each district of said forest, meeting the people at their town-houses, school-houses and villages, and telling them what they must do, showing them how to do it, and making the common people understand that fires must be kept down, and the originators punished.—*Ex.*

## A Climbing Feat.

A successful ascent of the Dent du Gesant by an Alpine tourist, an Italian named Sella, has just been made. So many attempts to climb this colossal and practically perpendicular obelisk had failed that it was regarded as inaccessible. The pick of the guides—Swiss, French and Italian—met with no better success than simple tourists. Some years ago an English nobleman attempted to throw a cord weighted at one end over the summit, but the wind was too much for him, and the rope was blown back into the hands of the person throwing it. A flutter of excitement ran through the hotels of Chamounix and Courmayeur when it became known that a young Italian had scaled the peak. The means by which he was enabled to perform so remarkable a feat proved to have been simple enough. For several weeks past two guides had been occupied in cutting steps in the most slippery and least accessible places, in fixing hooks and staples, and attaching ropes to them. When these preparations were completed the ascent proper took place; but it was not accomplished without much difficulty and danger. No sooner was the news known at Chamounix than an Englishman started to make the ascent also. He succeeded.

## A Wise Landlord.

The Duke of Sutherland has undertaken a rather interesting agrarian movement on his Scotch estate. He has broken up the sheep farm of Kintross, which covers 44,000 acres, into nine holdings which are to be, or have been, let on favorable conditions. Most of the grazing areas of the Scotch uplands is in holdings of 20,000 to 70,000 acres, and therefore available only for heavy capitalists. The Duke began improvements on this property five years ago, when some 1800 acres were brought under cultivation, and have been so far filled that they now yield prodigious crops. In carrying out this new experiment the landlords will supply houses and fences, and the tenants will be left free to use their capital in the purchase and care of their stock.

## Dramatic Education.

The London Dramatic School has commenced work. There are thirty-five pupils, ladies and gentlemen. Two of the ladies are from Boston, having gone over specially to take the course of instruction. It is necessary that each pupil should give references as to position and respectability. The two young American ladies are induced by a bishop and a congressman. Mrs. Chippendale, one of the Professors, was, it is said, privately engaged with them prior to the classes

in explaining the difference between "American" and American, a point in pronunciation which John Bull is supposed generally to score against Jonathan. The subscriptions sent in to endow the school by the eminent people who made speeches about it at public meetings do not amount to £300. The School of Dramatic Art may be self-supporting; that, at all events, should be the aim of the promoters, and it seems as if they were resolved to give it a fair chance. The most active workers on the committee are the Earl of Wharfedale, Mr. A. Dubourg (the dramatist), Mr. Alfred Scott Gatty, Capt. Hozier, Mr. E. Pigott (Examiner of Plays), Mr. Lionel Tennyson (son of the Poet Laureate), and Mr. Edmund Routledge (the publisher). They are supported by a number of other distinguished men. The committee of ladies includes some eminent names. The arrangements are excellent. The leading branches of study are stage gesture and deportment, dancing (not ballet, but merely ball-room dancing), and fencing. At the end of the first or second terms pieces will be cast and played, the rehearsals being conducted by well-known actors and stage managers. The Professorate includes Mrs. Sterling, Mrs. Chippendale, Mr. Vezin, Mr. George Neville, the Rev. A. J. D'Orsay, and Mr. C. J. Plumtree (of Kings College). Fencing will be taught by M. Angelo, stage gesture by M. Marinetti, and dancing by M. Micheau. Public interest and curiosity are felt in the progress of the school, the more so that at present it cannot be said to be "popular" with the "profession."

## Science.

In any reference to the physical history of the sun the stupendous magnitude of its sphere must be kept vividly present to the mind. With a diameter 109 times larger than that of the earth the solar orb looks out into space from a surface that is twelve thousand times larger than the one which the earth enjoys. The bulk of the sun is 1,800,000 times that of the earth. If the surface of the sun were a thin external rind or shell, and the earth were placed in the middle of this hollow sphere, not only would the moon have space to circle in its usual orbit without ever getting outside of the solar shell, but there would be room also for a second satellite, nearly as far again as the moon, to accomplish a similar course. The weight of the sun is three hundred thousand times the weight of the earth, or, in round numbers, two thousand millions of millions of millions of millions of tons. The mean distance of the sun from the earth is now so well ascertained, through investigations which have been made in several distinct ways, that there can scarcely be in the estimate an error of 500,000 miles. The distance at the present time given is 93,885,000 miles. This measure is in itself so vast that if any traveler were to move at the rate of four miles an hour for ten hours a day, it would take him 6,500 years to reach the sun. Sound would traverse the interval, if there is anything in space capable of transmitting sonorous vibrations, in fourteen years, and a cannon ball sustaining its initial velocity throughout would do the same thing in nine years. A curious illustration, attributed to Professor Mendenhall is to the effect that an infant, with an arm long enough when stretched out from the earth to reach the sun, would die of old age before it could become conscious, through the transmission of the nervous impression from the hand to the brain that it had burned its fingers. In order that the earth, thus moving round the sun with a chaste of 93,000,000 miles of intervening space between them, may not be drawn to the sun by the preponderant attraction of its 330,000 times larger mass, it has to shoot forward in its path with a momentary velocity fifty times more rapid than that of the swiftest rifle ball. But, in moving through twenty miles of this onward path, the earth is drawn out of a straight line by something less than the eighth part of an inch. This deviation is properly the source from which the amount of the solar attraction has been ascertained. If the earth were suddenly arrested in its onward flight, and the momentum were in that way destroyed, it would be drawn to the sun, by the irresistible force of its attraction, in four months, or in the twenty-seventh part of time which a cannon ball would take to complete the same journey.

It is an old and true saying that opportunity has hair in front, but is bald behind. If you catch her by the forelock you can hold her, but if you wait till she gets by, your hand slips and you lose her.

It is estimated that the toothpick-toed boots have added at least 1,000,000 corns to the corn crop of the country.

It is not so much a question as to whether or not a man can spare the money to buy a gun, as to whether or not he can spare the boy.

## The Study of Historical Costume.

Persons of taste have long been annoyed by the persistence with which persons without taste dress badly; wearing, that is to say, the wrong things at the wrong time, and the right things never. A Russian General, who now holds a very important command in the far East, complained, when, some five or six years ago, he visited London, that it was impossible to understand on what principle the English dressed themselves. A few male friends had invited him to dinner; and on appearing among them he found himself the only one of the party who wore a frock coat. The next morning he was to breakfast with a few more friends; and, determined this time to be on the safe side, he presented himself in a dress suit. We have met with a novel in which one of the principal incidents was the refusal of a check taker at the Royal Italian Opera to admit a distinguished foreigner who, with the regulation evening coat, wore a pair of light-colored trousers, such as, in a like connection, would be accepted on the Continent (at least in summer) as quite appropriate to a festive occasion. The only approach, indeed, to a despotism of taste that now exists in England is the authority exercised in the matter of costume by our operative officials, who tolerate nothing but black and white. In ordinary life people will doubtless continue to dress as they may think fit, without heeding the remonstrances and appeals addressed to them by those who have studied the subject, and who have at once better information and better perceptions than the general mass of mankind. But what may be permitted to ordinary individuals cannot be tolerated on the part of painters, sculptors and stage-managers. Smith, Jones and Brown live, dress absurdly, die, and are forgotten. But the men whose lot it is to influence the public mind have heavier responsibilities; and the evil they do lives after them. It is, indeed, of considerable importance that accuracy of costume should be observed in pictures, in statuary and in theatrical representation; and for this reason encouragement is due to the "Costume Society," now being formed under the auspices of Mr. Alms Tadema, Mr. George Godwin, Mr. Louis Fagan and others, and for which the cooperation of the chiefs of several foreign Academies has been secured. The object of this association is to promote the study of costume in its historical aspect and significance, so that there may be an end, once and forever, to the anachronisms of all kinds in dress by which the works of artists, architects and dramatists are now so often disgraced. The Costume Society will issue prints and engravings periodically to its subscribers. But its chief importance will consist in the authority with which it will be able to speak on all questions within its sphere that may from time to time be submitted to it.

A painter is dealing, let us say, with an incident of the fifteenth century in Norway. Instead of hesitating, speculating and lingering without avail how he is to dress the protagonists of his scene, he can in future make application to the Costume Society, when he will receive without unnecessary delay a colored drawing showing him precisely what he wished to ask.

Animals in Norway.

A correspondent makes the following remark on a very pleasant feature of the Norwegian character, viz., kindness to domestic animals. In that country, he says, these animals are treated as the friends rather than the slaves of man. As a result, vicious horses are unknown; foals follow their dams at work in the fields or on the road as soon as they have sufficient strength, and thus gently accustom themselves to harness. I heard of a foal trying to force its head into a collar in imitation of its mother. Horses are trained to obey the voice rather than the hand, bearing-reins are not used, and the whip, if carried at all, is hardly ever made use of. Great care is taken not to overload carts, especially in the case of young horses, and consequently a broken knee is rarely seen, and the animals continue fat, in good condition, and capable of work till the advanced age of twenty-five or thirty. So tame are the Norwegian horses and cows that they will allow casual passers-by to caress them while they are lying down. Even domestic cats will approach a toy with confidence, knowing that no chasing or worrying awaits them. One very hot summer's day I met a woman holding up an umbrella to carefully screen what I supposed was a little child at her side from the scorching rays of a midday sun, while her own head was covered only by a handkerchief. In driving by I tried to gain a glimpse of her charge, and found, to my great surprise, that the object of her care was a fat black pig. The question of humane methods of slaughtering animals has lately been prominently brought forward in Eng-

land. In this the Norwegians show us a good example; they never use the knife without first stunning the animal. In the above remarks I am alluding to the country districts of Norway; in the towns the national characteristics become modified, although even under these conditions kindness to animals is still remarkable. To those whose hearts are sickened by the sights of cruelty daily witnessed in our streets it must be a consolation to learn that a country exists where these things are unknown, where men are instinctively considerate to the animals dependent on them, and where no legislation is required to enforce the claims of the dumb creation.

## Paganini's Pet.

One day, while approaching Paris in a diligence, after his visit to England, Paganini had the mortification of seeing his beloved Guarnerius fall from the roof of the coach. The delicate instrument received a palpable injury, and had to be taken to Vuillaume, the famous maker and repairer of violins established in the French capital. Vuillaume not only mended it—as the story goes—but made an exact fac-simile of it, taking both to the Italian virtuoso with the remark that the two instruments, lying side by side in his laboratory, had puzzled him as to their identity. The dismayed musician seized first one and then the other, played upon both, and carefully examined them, together and apart, and ended by exclaiming in distress that he could not decide which was his own.

He strode about the room wild, ecstatic, and in tears—faith and fury alike struggling for the mastery in him, till the honest Parisian, overcome by the sight of a grief and a bewilderment so genuine, and never from the first intending to deceive his client, asked him to keep both violins as a pledge of his esteem and admiration, at the same time pointing out the sham Guarnerius, for which he begged an honorable place in Paganini's household. Who can doubt after this that new violins may be made to look, and speak, as well as old ones.

## Why He Couldn't Have Emily.

One of the daughters of Jonathan Edwards, the celebrated theologian and the first President of Princeton College, had some spirit of her own, and also a proposal of marriage. The youth was referred to her father. "No," said that stern individual, "you can't have my daughter." "But I love her and she loves me," pleaded the young man. "Can't have her!" said the father. "I am well-to-do, and can support her," exclaimed the applicant. "Can't have her!" persisted the old man. "May I ask," meekly inquired the suitor, "if you have heard anything against my character?" "No," said the obstinate parent; "I haven't heard anything against you; I think you are a promising young man, and that's why you can't have her. She's got a very bad temper and you wouldn't be happy with her." The lover, amazed, said: "Why, Mr. Edwards? I thought Emily was a Christian. She is a Christian, isn't she?" "Certainly she is," answered the conscientious parent; "but, young man, when you grow older you'll be able to understand that there's some folks that the grace of God can live with that you can't!"

## The Legend of the Holy Grail.

The Holy Grail is said to have been a precious stone, a Jasper of great brilliancy, which fell from Lucifer's crown when hurled from heaven. This was caught by the angels, and held pendant for a long time between heaven and earth. When Christ came down to be the Saviour of the world the stone also descended, and a cup was made from it, which came into the possession of Joseph of Arimathea. At the last supper the Lord drank from this cup—and Joseph caught therein his blood shed upon the cross. On this account the cup received the power of giving everlasting life, and was called the Grail—from the Gallic word signifying dial or vessel. Joseph was said to have been kept alive forty-two years in prison by its miraculous powers. After the destruction of Jerusalem, Joseph was released from prison by Titus, and, being commanded by an angel, made a receptacle for the Grail, the guardianship of which was to be intrusted only to pure hands. It was handed down to Titurel, the father of Amfortas, a French king, who built a castle for the guardians of the Grail and a sanctuary for the holy cup itself. A religious order called Templars was instituted, who were elected for their virtues and were supported by the miraculous powers of the holy vessel, which was renewed every Good Friday by a dove which brought from heaven a consecrated wafer which it laid upon the stone. The castle was surrounded by an extensive forest through which no one could pass unobserved by the Grail. To Paganini the Grail was quite invisible, but to believers His will could be read upon the stone in writing, which disappeared again. The Knights of the Grail were selected by it, from all countries, for their moral worth and purity, as their names appeared upon the surface of the Grail. Its first guardians had been those angels who were neutral during Lucifer's revolt against God.