Our Illustrations.

PRIVATE THEATRICALS AT RIDEAU HALL.

These took place on Thursday, the 13th inst., and were attended by a select number of *invités*. The piece of the evening was "To Oblige Benson," with the following cast:—*Mr. Benson*, Col. Stuart; *Mr. Trotter Southdown*, Capt. Hamilton; *Mr. John Meredith*, Lieut. Colson; *Mrs. Benson*, Miss Himsworth; *Mrs. Trotter Southdown*, Mrs. Stuart. The entertainment closed with vocal and instrumental music by Mlle. Perrault and Miss Lowe.

VIEW ON THE RIVER PICABAU, SAGUENAY DISTRICT.

The Picabau River, also known as the Upicha, Upika, and Upikubatch (the latter is the name used by Bouchette) is a tortuous river which rises in the county of Montmorency and flows into Lake Kanogami, which it joins at the southernmost end, forming a large bay. It descends from its starting point in a succession of rapids, between abrupt and rocky banks. The country through which it passes is very thickly wooded, and is the scene of extensive lumbering operations. In spring large quantities of saw-logs are floated down the stream. The neighbourhood possesses great attractions for the sportsman, and the river abounds in fish.

THE DRAWING-ROOM IN THE SENATE CHAMBER.

H. E. the Governor-General and the Countess of Dufferin held their first drawing-room since their return to Ottawa on Wednesday evening, the 12th inst., in the Senate Chamber. The occasion furnished our artist with the subject for a lively sketch. The attendance was very large, including the Senators, the Ministers of the Crown in Windsor uniform, and a large number of members of the Commons. Over six hundred presentations were made.

"WHAT D'YE LACK, MADAM? WHAT D'YE LACK."

This picture is by the same artist as the "Touchstone and Audrey" that appeared in our issue of the 15th inst., and is taken from the same source, viz: the *Art Journal*. The original was sent to the Royal Academy in 1861. The originality and quaintness of the subject, and its thoroughly artistic and clever treatment attracted much attention. The picture takes us back some centuries into the trading community of London, when tradesmen were accustomed to expose their goods in the open thoroughfares, and solicit purchases by word of mouth. "What d'ye buy? What d'ye buy?"—not unfrequently heard in the present day in front of the shops of butchers and some other dealers in ordinary comestibles—is but the echo, so to speak, of what greeted the ears of every one passing along the streets in olden times from various houses of business. Here, then, we see a London apprentice, of three or four hundred years ago, accosting the passengers with the cry of "What d'ye lack, Madam?" as he presents for notice some tempting fabric suitable for ladies' costume. He is a meek-looking youth, with straight unkempt hair, not altogether an attractive person to solicit custom from the fair *belles* of his day, and yet, possibly, a shrewd lad of business; his fur trimmed and embroidered jacket and his pointed shoes give to him a picturesque character as he plies his vocation. Other rich and costly fabrics, besides that he holds out, are displayed in a sort of higgledy-piggledy way, and not as one sees them in the ingeniously dressed windows of the other famous *marchands de mode* of the present day. The whole composition has a very primitive aspect in the annals of commercial pursuits.

(Written for the "Canadian Illustrated News.")

GOSSIPS ON POPULAR SCIENTIFIC SUBJECTS.

NO. IX.—RAIN.

Rain—what can be said about it? It is a thing so familiar to all, there are no striking phenomena connected with it, everybody knows that the earth wants a more refreshing stimulus to bring forth her increase than dews and mists, and that the vegetation of the country would soon disappear and our small rivers and streams would be dried up were it not for "the gentle rain from heaven that droppeth upon the place beneath." The scientists will tell us that one of the principal causes of rain is undoubtedly the transfer, effected by winds, of air charged with moisture in a warm damp district to a colder region, where the vapour it contains is partially condensed. The temperature of the lower as well as of the higher strata of the atmosphere being reduced by this transfer, it may fairly be inferred that condensation of vapour may also occur in the lower as well as the higher strata.

Rain falls sometimes when no cloud is visible and the sky is perfectly clear. Various observations of this nature are cited by Humboldt and Arago. A meteorologist at Geneva has left on record that upon a fine clear night when the stars were shining with their ordinary brightness, rain, composed of large tepid drops, fell over the city of Geneva for six minutes. The same phenomenon is reported by an eye-witness to have taken place at Constantine at noon, when the sky was intensely blue and clear; so we learn that it is not necessary to have aloft either the *nimbus* with its gloomy grandeur, or the *cirrostratus* with its rugged and patchy appearance, making what the sailors term "an ugly sky."

Rain, as most of our readers know, is very unequally distributed over the earth's surface. In the valley of the Nile it is extremely rare, so much so, that were it not for the overflow or inundations of the river the whole country would become sterile. About the 60th degree of latitude or circumpolar zone, no rain falls in the winter owing to the extreme refraction of the limpid atmosphere which extends over the immense expanse of snow where no fogs are seen to form, excepting where there is open water. There are other parts of the earth where rain is almost unknown, for instance, on the coasts of Peru, and the Desert of Sahara is said to be denied rain, and from the sandy plains of Africa there rises only a column of burning air, while not even a drop of dew falls to moisten the parched surface and there develop vegetation. What a remarkable contrast to the Ghaut Range of mountains in Central Asia, where the enormous quantity of fourteen and a half inches have been known to fall in one day!

In order that our readers may more correctly form an estimate of the quantity of water contained in fourteen and a half inches of rain, they must multiply 22,623 by 14·5, which will give a fall equal to 338,023 gallons per acre. Again, the mean annual fall of rain (including its equivalent in melted snow—at Toronto, is estimated at about thirty-one and a half inches, which would give to an acre 712,614 gallons, so that nearly half the quantity of rain fell in Central Asia in 24 hours that falls upon an average in twelve months in Western Canada.

According to Lieutenant Maury, the average amount of rain that falls annually upon the surface of our globe has been estimated at 1·5 yards in depths—(54 inches). Thus, then to raise enough of water from the ocean every year, in the form of vapour, to cover the earth with a spherical coating 1·5 yards deep; to carry that watery vapour from one zone to another; and then to precipitate it in different forms at certain determinate points at chosen epochs, and in appropriate quantities, such are the functions of the great atmospheric machine. The water vapourized in this manner being taken principally from the torrid zone, the atmosphere in that zone alone must absorb a liquid mass of nearly five yards in thickness, and three thousand marine miles in breadth, upon a development of twenty-four thousand miles; raise it as high as the clouds, and then let it fall again upon the earth. This it must do, moreover, every year! What a wondrous and powerful mechanism, then, is this atmosphere of ours, and how harmoniously its different elements must be combined in order that this work,—which overwhelms the imagination,—may be carried on without the slightest disarrangement, ever manifesting itself in a totality of functions as complex as they are varied!"

By the amount of annual rain fall, (including snow and hail), at a given place is meant the depth of water that would be obtained if all the rain which falls there in a year were collected into one horizontal sheet; and the depth of rain that falls in any given shower, or on any given day, is similarly reckoned. It is the depth of the pool which would be formed if the ground were perfectly horizontal, and its surface glazed or vitrified, so that none of the water could get away. The instrument employed for determining the depth of rain is called a rain gauge—the terms *ombrometer* and *pluviometer*, being now only used by pedantic meteorologists.

The simplest form of rain-gauge would be a flat tray with a vertical rim three or four inches high; if such a vessel were placed upon an open grass plot before a shower began, the water would of course cover it to the depth which would have covered the whole grass plot had it not soaked into the soil. A rule dipped vertically into this tray would perhaps show that the water was a quarter of an inch or a half of an inch deep—that is that a quarter or half of an inch of rain had fallen. This ideal rain-gauge would have many serious faults, and it is only described that it may clearly be understood that, by a quarter or half an inch of rain is meant such a fall of water as would cover the ground to that depth, supposing it all remained on the surface, none percolating, running off, or evaporating.

The simplest and perhaps the best form of rain-gauge is that commonly known as "Howard's Bottle." This gauge is a copper funnel with an accurately turned brass rim, exactly 5 inches in diameter, terminating with a straight tube about 6 inches or more in length—resembling an ordinary funnel such as is used for decanting wine or spirit—the rain falling into this funnel is collected in a bottle which is emptied every day into a graduated measuring glass whose area is about ten times less than the area of the funnel, consequently a tenth of an inch of rain will fill the glass about one inch deep, enabling the rain-fall to be got to the one-hundredth part of an inch. A rain-gauge of this description would cost complete only four dollars. A still more simple rain-gauge, and practically as efficient, may be made for two dollars. The clergyman or schoolmaster of a rural parish may readily undertake the registration of the rain-fall in his district. There are at present about 800 stations in Great Britain and Ireland, and perhaps as many in the United States, while in Canada they can only be counted by tens. A more extended registration of the rain-fall would materially increase the benefits of Meteorological science.

The rain-fall of Canada has not engaged the attention of agriculturists, civil engineers, harbour commissioners, and medical men to the extent its importance demands. The Government are, however, awakening to the importance of the subject, and under the superintendence of the Director of the Magnetic Observatory at Toronto, we hope to see a rain-gauge set up in every parish in the Dominion. Every intelligent person must be aware that the rain-fall is an essential particular in our climate; and until its seasonal and mean amount is known for any region, the meteorology or the science of the weather is necessarily defective and incomplete. Ignorance of what affects so powerfully the health and comfort of populations, the fertility of the soil, the purity and temperature of the atmosphere, the prosecution of many of the acts of life, the operations of engineering and drainage, and much else, can be remedied and removed only by careful and prolonged observations made simultaneously at many points.

Unfortunately there are too many short-sighted and narrow-minded utilitarians whose continual cry is *Cui bono* when any matter of science or scientific exploration is canvassed, and more especially if the Government or a city corporation is called upon for a money grant for the purpose of conducting anything connected with the science of meteorology.

We have a certain measure of contempt for these "cui-bonists," and think their what-good-will-it-do questions are beneath notice, yet for the sake of others we may give a few illustrations how rain-fall investigations may affect the public health and the public benefit.

Many scientific physicians in their lectures on the poisons of spreading diseases have proved how a certain amount of dilution by water renders the most virulent organic poisons innocuous; that much dilution may destroy organic poison; and that an insufficient rain-fall over an area bespread with animal excreta for the purposes of agriculture may have a most injurious effect upon the health of the neighbouring community. Dr. Edward Ballard in a paper read about six years ago before the Royal Medical and Chirurgical Society, on the influence of temperature in the production of disease, appended a diagram which well illustrates the effects of a downfall of rain in diminishing the amount of sickness.

The flooding of large tracts of land by excessive rains might in many instances be arrested if the rain-fall of the district were studied, and the outlets for the superabundant water made adequate for its removal. Malarious diseases often follow in the wake of rain-floods, and frequently they leave an indelible stamp upon the *physique* of their victims.

The facts developed by the rain-gauge have the most multiplied and remarkable practical as well as theoretic relations. They concern physical geology, agriculture, climate, and public health, and are the most indispensable data to the hydraulic engineer engaged in the supply of water to cities, or in great works of drainage or of irrigation, and again, to those engaged in our inland navigation.

Correct notions about rain, how it falls in proportion to seasons and time, how it flows off the ground, ought to be of the utmost importance to engineers, practical farmers, and agriculturists; but alas, they seem, for the most part, indifferent to a proper registration of the rain-fall; they bestow little or no attention to the subject, even though it is a most important one to themselves.

"If the registration of the rain-fall," says a writer in *Once a Week*, (July 12th, 1862,) "seems dull work in ordinary seasons, the observer is amply repaid when exceptional weather occurs. By carefully noting it, he may then increase the interests of science. Amongst unscientific mortals, too, he becames at once an authority; like Squire Ralph, he is

> Infallible
> As three or four-legged oracle,
> Deep-sighted in intelligences,
> Ideas, atoms, influences;

men look up to him and quote his sayings. In many secondary ways, too, the occupation may be useful to a man. We knew an old gentleman very fond of his rain-gauge, and so attached to his garden that nothing short of a general election could tempt him through the streets to the news-room. Suddenly one November came a mighty storm. Torrents of rain fell. Walls were carried away—a brook broke into the road and drowned a passer-by. Then was our friend in his element indeed. He chuckled and rubbed his hands, appeared in public (like the lady of the toy houses who ventures out in fine weather), collected different reports, informed all men that so many inches, an unprecedented amount, had fallen in three days, he never remembered so much wet 'since the Walcheren Expedition.' Though usually a martyr to gout every autumn, this unaccustomed activity proved so salutary that no doctor appeared at his house that winter!"

Miscellaneous.

A new French loan and a new Russian loan are spoken of.

It is said that Bradlaugh will visit this continent on a lecturing tour.

The next autumn manœuvres will, it is said, take place at Dartmoor.

The latest news of Dr. Livingstone is that he left Ujiji for the fountains of the Nile last August.

It is stated that during the Vienna Exhibition sleeping cars will be introduced between London and Vienna.

A Vienna letter asserts that, "Notwithstanding the official denial of the Saxe-Coburg Gotha press, it is positively affirmed that a marriage between the Duke of Edinburgh and a Russian Princess is arranged."

The Chinese mandarins in Canton have adopted a new method of punishing criminals for slight offences. They inflict a fine, which if the prisoner is unable to pay, they cut off his pigtail, which appendage has a market value of about $1.50 for the European hair market.

We are told curious things concerning the amusements of great men who lived long ago. Studious minds often take up some oddity to rest their brains in spare moments. Swift used to run up and down the steps of the deanery for exercise and amusement; Dr. Samuel Clarke, the Bible commentator, amused himself by jumping over tables and chairs; Shelley took great pleasure in making paper boats and watching them as they floated on the water; Tycho Brahe amused himself with polishing glasses for spectacles, and Socrates in playing with children; Petavius, at the end of every second hour of study, used to whirl his chair for five minutes.

A great act of generosity, says the *Court Journal*, has at length been accomplished by the Liberal Government, and we are happy to record it. The crew of the steamer Don having landed at Tongbo, in China, the natives, "fell upon them," stripped them naked, and maltreated them most shamefully. When they were being kicked and cuffed through the streets the Mandarin of Tongbo came to their rescue. Like a good Samaritan, he clothed, fed, and lodged the crew until he got the means of conveying them to Amoy. For this generous conduct, it is said, Her Majesty's Government have presented the mandarin with a pair of opera glasses! If he wants to look at the photos of our Government through them, we should recommend him to look through the big end.

Colour-Sergeant Bates, of "star-spangled-banner" notoriety, has just published an account of his pilgrimage through England, and among other curiosities of the book is the record of the different offerings which the sergeant received in different towns from his admirers. At Bolton he was entrusted with a turtle dove to present to General Grant—an emblem of peace and goodwill between the two countries; and a select *History of Banbury* and a box of pills. After this the sergeant seems to have had no more presents offered him, with the exception of a codfish by a London costermonger. The Manchester citizens, however, seem entitled to pre-eminence in the practical expression of sympathy. They, we learn, on the sergeant's departure, insisted on slipping numbers of coppers into his pockets. Such is public fame!

A pamphlet addressed *Ai veri Cattolici* is creating a sensation in Roman clerical circles. It accuses Cardinal Antonelli of all the misfortunes which have happened to the Pope and his Church. To him it is attributed that Pius IX. did not leave Rome immediately the Italians entered in 1870. He is called a *miserabile de sonnino* because he rejoiced in secret at the bill on the religious corporations. He is said also to be for the reconciliation of the Vatican with the Quirinal, because some months ago his brothers, as members of an economical society, signed a programme, in which it is said that the present Government is more favourable to the development of the resources of the country than the *régime*. The friends of the Cardinal are not forgotten in the pamphlet, notably Cardinal Berardi, the Cardinal Archbishop of Naples, and the Archbishop of Bologna, whose sin it was that in taking possession of his archbishopric he said publicly, "Our mission is henceforth entirely spiritual."