No. 9. Sep.

ACADIAN SCIENTIST.

Devoted to the Interests of Acadian Science Club, Teachers and Naturalists.

A. J. PINEO, EDITOR.

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Printed by ISAAC N. HALLIDAY, Halifax, N. S

The Acadian Scientist.

Devoted to the Interests of Education and Popular Science.

VOL. I. WOLFVILLE, N. S., SEPTEMBER, 1883. No. IX.

☞ The subscription price is only thirty-five cents a year. Canadian or United States stamps taken; denominations of 1 cent or 3 cents preferred.

DURING the past few months we have sent specimen copies of the SCIENTIST to a large number of Teachers of Nova Scotia, who are not already subscribers, with the request that they return the same, or otherwise notify us, if they should not wish to become subscribers. This was done as an act of courtesy towards our fellow-teachers, and we hope that it was so understood by all. Though we are endeavouring to build up a journal largely in the interests of Teachers, we do not wish any one to become a subscriber unless he can see that the SCIENTIST is likely to be of interest and value to him. It is, however, an encouraging fact that while *very few* of the copies thus sent out have been returned, many of those to whom they were sent have written us expressing their thanks and approval.

Several of those who returned their papers neglected to send name and address therewith. Such receiving this copy will please return it, with name and address written on the *wrapper*, or notify us by postal card.

THE BELL TELEPHONE.

IT is probable that the recent decision of the United States Courts recognizing Bell as "the discoverer of a new and useful art, (the electric transmission of speech), to which he has exclusive title," will soon be reversed, inasmuch as it is now established beyond question that Bell was not the original inventor of the telephone. That honor, according to Prof. S. P. Thompson, an eminent scientist, belongs to a German, Johann Phillipp Reis, "who discovered *the electric transmission of speech* in 1861, and used devices and instruments corresponding with those now used in what is known as the Bell system of telephony."

The establishment of these facts is a matter of great public interest, as this invention which gives such large promise of practical usefulness in everyday life cannot henceforth be monopolized by companies or individuals, who would retard its usefulness by heavily taxing a patronizing public. The priority of Reis's discovery gives the telephone to the world unrestricted by patents and free to all.

Louis Bell describes a natural sea-wall on the New Hampshire coast in the August Popular Science Monthly. At Cow Bay in Halifax County, there is a similar structure, but shorter and less perfect. This is a justly famous watering place for the Haligonians in the heat of the summer. There is much more of a fine sandy beach than of the sea-wall. The locality is also interesting to the geologist for the tales of pleistocene activity told by the material exposed in the neighboring headlands.

(*For the Scientist.*)

IRON COMBUSTION.

I have here before you a jar of pure oxygen gas, and there is a spiral made of a strand of fine iron wire. Before attaching it to this jar cap, my assistant, who is weighing it before your eyes, will write its weight upon the board. There it is, 165 grains. I take the spiral and heat the extremity of it in the flame of the lamp. I next touch it rapidly with this flour of sulphur, and immediately plunge it while flaming into the oxgyen jar. You see the sulphur instantly consumed, and a fierce white light seize hold of the iron spiral. There it goes, spattering showers of sparks, melting the wire which falls in white-hot liquid drops into the water-covered tray beneath.

As this miniature metallic fire-storm slowly follows the spiral, let us examine what takes place. Within the jar we have but the two elements oxgyen-gas and solid iron.

The oxgyen is fast disappearing, and the air of this room is rushing in through the cap to fill the vacuum. Soon the amount of oygyen will be too small to support this vivid combustion and it will suddenly die out. What becomes of it? The heated iron combines with the adjacent gas, and in doing so becomes still futher heated. A large portion of the iron becomes an oxide, and with a considerable amount of molten and yet unoxidized iron it drops into the water. The chemical affinity or attraction which compels the two elements to combine is changed into this intense melting heat. There is no flame, because the oxide produced is neither a vapour nor a gas. But now the fury of the liquid fire ceases. The white glow darkens, and congeals into a metallic sphere. This I break off after withdrawing the remains of my spiral strand, which my assistant weighs. He makes the unburned wire 99.3 grains. As 165 grains were put into the jar, it follows that the remainder 65.7 grains have been burned. Now let us collect the ashes of our little conflagration, to see whether the burned 65.7 grains of iron appears diminished or increased by the fiery operation. I collect all the metallic globules and fragments, and place them on this pan which is heated by a spirit lamp. The fragments soon become heated and perfectly dry; and remember they are the products of the combustion of 65.7 grains of pure iron. My assistant weighs them. He makes it 77.5 grains. The process of combustion has therefore added 11.8 grains of weight to the 65.7 grains of iron. This 11.8 grains must therefore be the weight of the oxgyen combined with the iron, or as, you can easily calculate, between 30 and 40 cubic inches of oxgyen combining with iron produce all the light and heat developed in our experiment. But by careful experiments it has been found, that were the iron thoroughly burned in this operation 3 grains of oxgyen would combine with 21 grains of iron forming what is called the magnetic oxide of iron $F_3 O_4$. If 8 grains of oxgyen combine with 21 grains of iron, then 11.8 grains of oxygen have combined with 30.97 grains of iron in our experiment. Therefore of the 65.7 grains of iron burned, only 30.97 grains have been truly burned into the magnetic oxide, while 34.73 grains of uncombined iron remains mixed with the oxide in these globules. Our metallic fire therefore is the product of the chemical combination of 30.97 grains of iron and 11.8 grains or about 35 cubic inches of pure oxygen. By the slow oxidation of the same amount of iron to the red oxide, $F_2 O_3$, by leaving the iron exposed to the weather, even a greater amount of heat would be given out than in our experiment but the period of oxidation being a long one, the amount of heat would be given off gradually during the whole period, and would not be sensible except to very delicate instruments of investigation.—*Note Chem. Lect. Pictou Academy.*

COLLECTING FERNS.

[REPRINTED FROM FIFTH MONTHLY REPORT OF ACADIAN SCIENCE CLUB, SEPT. 1882.]

Every ardent admirer of nature is a lover of ferns, but is not always so situated as to be able to collect those beautiful plants, and establish them alive in a fernery. In such a case the best thing to do is to gather the fronds or leaves and preserve them in a fern portfolio. Of course it is desirable to find the most perfect specimens of the fronds it is intended to preserve and such a search will require great care and attention. If there be any breakage, or any unnatural discoloration of the frond, or injury by insects, such a specimen must be rejected. It is essential, too, that a frond, to be gathered for preservation, should be completely unrolled and unfolded into its most perfect state of growth.. When possible, the time for taking the frond should be just before the ripening of the fructification. If the latter be fully ripe the spore cases will burst in the process of drying, and the specimen will not be so interesting as an object of study when transferred into the portfolio. As there are various periods of the year for the arriving at maturity of the fructifications of different kinds of ferns, it would not be possible, on one tour, to gather all the kinds at the same stage ; but by collecting thoroughout the summer and autumn during successive years, whenever the opportunity occurs, a complete collection of fronds secured at the right season of growth could be obtained. However, as objects of beauty to the collector, ferns, with or without their fructification, are always an acquisition to the fern portfolio.

But as to the manner of collecting and preserving ferns. First of all it must be borne in mind that the object of the collector is to preserve the color and entire form of the leaf in a dry state. On starting therefore, on a collecting tour it is neccesary to go provided with a number of dryers. The sheets are to be carried between two boards, secured by two strong buckle straps with a third passing under the other two and buckled for a handle by which to carry this combination press and collecting case. The proper size for the boards is about twelve by seventeen inches. The usual size of botanical paper for mounting specimens for the herbarium is eleven and a half by sixteen and a half inches, and the plant to be mounted must be a little smaller.

When the first frond is taken, the boards must be opened and one of them laid flat upon the ground ond covered with a couple of dryers. On this the frond, which should be cut from the root stalk at the base of the stem, should be placed. Upon it should be placed the remainder of the sheets beginning at the apex of the frond, holding the superincumbent sheets in the left hand, the left wrist keeping them down, while the right hand—as the sheets are being gradually lowered—is employed, with the aid of a pointed stick, in adjusting the frond in a manner to prevent any crumpling or doubling of ths parts. As soon as the frond has been thus arranged it may be followed by another in a similar way, always keeping a dryer between or, if no other is at hand, the remaining dryers should be carefully laid upon the pile, the second board placed upon them and the whole secured by the straps

The next step, after the collector reaches home with his spoils, is to arrange them for drying. They should be examined carefully in order to remedy any folding or crumpling. This can be easily done, while they are green and pliant, by the aid of the pointed stick already mentioned. The small magnifying glass mentioned in a former report would be found very useful in arranging the fronds, especially of the smaller kinds of ferns. A fresh set of drying papers should now be used and the fronds laid carefully upon them -two or three dryers between each—the whole placed between thick boards and a pressure, moderate at first, but increased, as the specimens dry, to thirty or forty pounds, applied. The dryers should be changed daily at first, afterwards not so frequently, until the fronds become thoroughly dried, care being taken each time that the parts are properly arranged.

From the press the transfer to the portfolio is an easy process. Here arrangement must be left in a great measure to the taste of the collector. A few suggestions may, however, be of service. When ferns have two kinds of fronds—barren and fruitful—specimens of each should be obtained; and it is desirable to have two specimens of the fronds of every species so that the front and back may be shown side by side, the front being generally distinguished by greater depth and richness of coloring, while the back has its arrangement of spore cases, and their coverings. The order of arranging the fronds should be according to genera, and in a portfolio provided with guards and containing sheets of stout white paper, such as is used by botanists. The specimens should be lightly fastened to the paper by means of fine threads passing over and secured at the back of the sheet. A label should be attached to each specimen bearing the name, when it can be ascertained, and the time and place of gathering. In this way can be arranged an object not only of interest to the botanical student but a thing of beauty that must be admired by all who have, in any degree, taste to appreciate the beautiful in nature.

(For the Acadian Science Club.)

LECTURES ON MINERALOGY.

III.—PHYSICAL CHARACTERISTICS OF MINERALS.

The chief physical properties to be determined are: 1, *Hardness*, which is determined by the ease or difficulty with which it is scratched. The following minerals may be taken as a *scale of hardness* for comparison. 1. Talc, 2. Gypsum, 3. Calcite, 4. Fluorite, 5. Apatite. 6. Feldspar, 7. Quartz, 8. Topaz, 9. Sapphire, 10. Diamond. The hardness is usually determined by trying the mineral with the finger nail, the point of a knife, or by drawing a sharp edge across a piece of glass, then comparing with the *scale*. Should it be the same as calcite it is said to have the hardness of 3; if it is a little harder than this, but not so hard as fluorite, it is 3.5. The numbers above 7 & 8 in the scale are not often needed. H., is the abbrevation used to denote hardness

II. *Specific Gravity* (Gr). The relative weight of the mineral compared with water, may be determined approximately after a little experience by its sense of weight in the hand.

III. *Cleavage*, the tendency to break in certain directions. It may be described as *eminent*, *distinct*, *indistinct*, *in traces*, *or difficult*. It is also named according to the direction in which it takes place.

IV. *Fracture*, the kind of surface obtained by breaking where there is no cleavage. The following are the principle forms noticed, *even* when the surface is flat, *uneven* when the surface is rough, *hackly*, when covered with sharp jagged points. *Conchoidal*, when covered with curved surfaces.

V. *Color*, depending on the kind of light reflected or transmitted. A *play of colors* is an expresssion used where several prismatic colors appear on turning the mineral. *Irridescence*, where prismatic colors are seen within a crystal. *Tarnish*, where the surface color has been changed by exposure.

VI. *Streak*, the color of the mark made by the mineral on some hard white surface like unglazed porcelain. It simply shows the color of the finely pulverized mineral, which is often quite different from the solid specimen. Its determination is of considerable importance.

VII. *Luster*, depending on the manner in which light is reflected. The kinds of lustre are: 1 *Metallic*, the luster of metals; where it is imperfect it is called *sub-metallic*. 2. *Vitreous*, luster of broken glass. The term *sub-vitreous* is also used. 3. *Pearly*, like pearl. Talc is an example. 4. *Resinous*, like resin, or zinc blende. 5

Adamantine, diamond-like. 6. *Silky*, as fibrous gypsum. The *Intensity* of luster is denoted by the following terms: 1. *Splendent*, where a definite image is reflected as in iron pyrites. 2. *Shining*, bright, but no definite image is produced, as in calcite. 3. *Glistening*, a general reflection where no image is formed, as in copper pyrites. 4. *Glimmering*, where the reflection is very imperfect, as in flint. The term *dull*, denotes total absence of luster, as in chalk. The determination of the crystalline form is also of importance in classifying minerals, but space prevents me from dwelling on that subject. By carefully studying the chemical and physical properties as given in this brief course the student should be able, with the aid of a good manual of mineralogy, (Dana's being one of the best) to name all common minerals and ores. Should any further information be desired by those taking the course, please correspond with the author.

S. K. HITCHINGS.

(*For the Scientist.*)

CASSIOPEIA,

Or, The Lady's Chair.

BY PROF. A. E. COLDWELL.

During the late summer and autumn months, there may be seen in the N. E. heavens a somewhat conspicuous constellation resembling in shape a W, or inverted M, though it is sometimes likened to a chair. This is Casseopeia, a beautiful group, containing in all 55 stars, visible to the naked eye, of which five are prominent and form the outline of the W, three at the angles and two at the extremities. This constellation is about 30° from the North Pole, in the opposite direction from the Dipper, a line passing Megras in the latter, *(delta Ursae Majoris)* and through the Pole Star, passes through a star in Casseopeia, called *Caph* or *beta cassiopeiæ*. This line continued around the heavens, forms the important great circle, called the Equinoctial Colure, or First Meridian.

The five, brightest stars of this constellation are known as follows, beginning at the N. E. or right hand side of the W: 1st, beta cassiopeiæ, or caph; 2nd, alpha c, or Shedir; 3rd, gamma c; 4th, delta c; 5th, epsilon c.

The position of this constellation especially of caph, is important to the mariner and surveyor, as it is a guide to the Polar Star, indicating when it is E. or W. of the true pole, and also when it is on the meridian. In a former article I stated that the pole star was 1° and 31' distant from the true pole of the heavens. If we wish to get the exact latitude by the North Star, we must make our observation when it is exactly E. or W., of the true pole, that is when it and caph are in an east and west line or parallel to the horizon. If we wish to get the magnetic variation we must make our observation when the pole star and caph are in a line at right angles to the horizon. This of course happens twice in 24 hours.

There is on foot a project for the construction of a ship canal through Palestine, commencing at Acre, thence across the plain of Esdraelon to the River Jordan, thence down the valley of the Jordan, through the Dead Sea, and southerly to the head of the Gulf of Akabah, an arm of the Red Sea—in all about 275 miles. The filling of the valley of the Jordan up to the sea-level would create a large inland sea.

It is proposed to build a ship canal from Bristol Channel across the peninsula of Somerset and Devon to the English Channel, at an estimated cost of about fifteen millions of dollars.

NEWS AND NOTES

The silver willows in Pictou have their leaves affected by a blight which gradually b'ackens them.

The unification of geological nomenclature, and of the systems of colors used for geological maps, is expected to come up before the International Congress of Geologists at its next meeting in Berlin.

Bartsia Odontiles, Huds. (Red Bartsia) *Senecco Jacobæa, L.*, (St James Ragwort, alias Stinkin Willie) and *Senecco Viscosa. L.*, (Clammy Ragwort) are too abundant in Pictou County. In what other counties are they found? They are slowly spreading. The worst of them by far, is *S. Jacobaea.*

Dr. Oscar Leuz maintains that the aridity of the Western Sahara crossed by him between Morocco and Timbuctoo, is comparatively recent, and was caused by the felling of the forests on the Ahaggar mountain range. The growing aridity of some portions of the United States and Canada, and the increasing violence of floods, are traceable to similar causes. Intelligent legislative action on this subject is urgently required in Nova Scotia.

The following are the heights of the most remarkable high buildings in the world: towers of Cologne Cathedral, 524 ft. 11 in., or 515 ft. 1 in; tower of St. Nicholas at Hamburg, 473 ft. 1 in; cupola of St. Peter's, Rome, 469 ft. 2 in; cathedral spire at Strasburg, 465 ft. 11 in.; Pyramid of Cheops, 449 ft. 5 in; of St. Stephen's, in Vienna, 443 ft. 10 in; cathedral of Antwerp, 404 ft. 10 in.: St. Paul's, London, 365 ft. 1 in.: at towers of Notre Dame at Paris, 232 ft. 11 in.

Baron Nordenskjold's expedition to Greenland started recently in the *Sofia, a* small steamer loaned by the Swedish Government, under the command of Captain Nilsson, and a crew of thirteen hands. The Baron is accompanied by some half dozen assistants, representing different departments of Natural History and Science; two Laplanders, two Norwegian ice-masters, and one harpooner. The *Sofia* carries fourteen months' provisions. The work which Baron Nordenskjold purposes to accomplish is to penetrate into the centre of Greenland, in order to test the theory that the interior is not a vast stretch of ice fields, as commonly supposed, but a land made green, at least in summer, by its verdure. After returning from his trip to the interior, Nordenskjold proposes to search for traces of the Norse colonies founded nine hundred years ago. The Baron's expedition is of great public interest, as it is hoped that thereby some important additions will be made to our knowledge of the early settlement of America, and further information be gained in regard to that boreal portion of our hemisphere about which so little is now known.

CELLULOID PRINTING-PLATES.—Celluloid, though comparatively a recent product, is being continually applied to new uses in the arts. A French inventor, M. Jennis, has succeeded in producing remarkable results by means of celluloid printing-plates, both from wood-engravings and font type. These are said to possess great fineness, and to be considerably more durable in service than either metal stereotypes or electrotypes. The process consists in taking a copy of the engravings on wood, or of the type, with the use of a special cement, which hardens rapidly, and takes the finest lines sharply. After about twenty minutes this coment is hard and resistant. The press in which this first impression is taken should be slightly heated; and a sheet of celluloid is employed to obtain a counter-impression from this, which is then prepared by ordinery methods for the printing-press.

M. Jannin is now engaged, on a large scale, in making celluloid reproductions of letter-text, engravings of all descriptions, bas-reliefs, medals, and imitations of carvings in ivory. The work is executed very rapidly. A plate can be made within an hour, while to make a good electrotype by the usual process requires from twelve to fifteen hours. A celluloid plate has been subjected to twenty-five thousand mpresions, apparently without losing any of its sharpness.

When used as a substitute for wood in the production of large printing-type, it is found to be much preferable to wood. It has a fine surface, possesses great durability, can be readily worked, is light, and can stand all the rough usage of the job press.—*Popular Science News.*

CORRESPONDENCE.

Editor "Acadian Scientist:

If your botanical readers, who are commencing practical botany would send me as many of the weeds and and plants growing in their vicinity, *with their common names as used in their locality*, I would not only be very much obliged, but would gladly return them the botanical names and render such other assistance as I might be able. My object is to find out to what extent the same popular names are applied to the same plants in different sections of the country. If your readers take an interest in the work, I shall be happy to give them the results of my observations, when completed, in the SCIENTIST.

All parcels addressed to "Pictou Academy, Nova Scotia," shall receive immediate attention. Marked "*botanical specimens*," they pass through the Canadian and American mails at the rate of only one cent for every quarter of a pound.

A. H. McKAY.

A correspondent from New Brunswick asks an explanation of a selected paragraph which appeared on page 5 of the July No. of the SCIENTIST, in which it is stated that a man weighing 150 lbs. on the earth would weigh 45,000 lbs. on Jupiter. In reply, the Astronomical Director would say that he is ignorant of the source of this selection and further that he cannot defend the statement. The law of attraction is this—The attraction of a sphere upon a point at its surface is directly as the mass and inversely as the square of its radius; that is if you double the mass of a sphere while the diameter remains the same you double the weight of a body on the surface; if you double the diameter while the mass remains the same the weight of a body at the surface is reduced to one-fourth. Now the mass of Jupiter is 213 times that of the earth but its diameter is 11 times as great; therefore the relative attractions at the surfaces of these two planets would be as 213 is to 11^2 or 121, and 1 lb. on the earth would weigh $\frac{213}{121}$ lbs. on Jupiter, or nearly 2 lbs., if the two planets were at rest. But Jupiter rotates in about 10 hours and its circumference is 11 times that of the earth so that a point on Jupiter's Equator is rotated 25 times as fast as a point on the earth and would consequently have a correspondingly greater centrifugal force or tendency to overcome the force holding it to the surface. I have no doubt therefore that the common assertion that gravity on the larger planets is vastly in excess of the same force on the earth is entirely incorrect. The difference in centrifugal force should overcome the slight difference in attraction and render the weight of our assumed man about the same on either planet. If I am wrong in this, I am open to correction for I know that a very different statement is often made.

A. E. C.

LITERARY NOTICES.

The current number of the Princeton Review is at hand, and proves to be of more than usual interest. The leading article is one by President Porter of Yale College, entitled "A College Fetich" and which reviews the utterances of Mr. Chas. Francis Adams, Jr., before the Harvard Alumni. Mr. Adams, it will be remembered, referred to the study of the classics as the fetich worshipped in colleges, and claimed that small benefit was derived by himself and classmates from such study, and that French and German would have been of greater service to them in practical life. President Porter holds that a thorough knowledge of the classics not only makes simple the study of modern languages, but that such knowledge cannot fail in its beneficial results to the student in any profession in practical life.

A not less interesting paper than this, and one which will repay a careful perusal, is by Herbert Putman on "Our Iron, Woolen and Silk Industries." As is well known, these industries were at first protected by the Government of the United States, because they could not support themselves, but, if it is shown that they have no need of protection or that they will never be able to support themselves, then the reason for protection does not exist. Mr. Putman conclusively proves that they are no longer "infant" industries ; they are now able to stand alone, and protection should therefore be denied them.

Other articles in the number are "Incineration" by the Rev. J. D. Beugless, President of the New York Cremation Society which advances the claims of Cremation as a superior method of disposing of the dead. "Recent French Fiction" by J. Brander Matthews. This paper is interesting in its review of the methods of the leading novelists of France, and the tendencies of their work. The writer says, that "French novels are far more widely read in America than in England" and that, "the novelists of France have influenced the novelists of America far more than the novelists of any other nation—England alone excepted.

"The Anticedent Probabilities of a Revelation" by President David J. Hill of the Lewisburg University, "The Artist as Painter" by John F. Weir, N. A., Yale School of the Fine Arts, are other essays in the number.

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The author treats of the origin and development of religious ideas among the principal civilized nations of ancient times, and developed by researches of men of science. The work exhibits the perfection of literary style combined with profound scholarship. In thirteen chapters it details the legends of the past about the creation ; the history of creation as told by science ; the legends of the past about mankind ; the story of the early races of man ; the Aryan or, Indo-European nations; Hindu religion ; the religion of Zoroasters ; of Buddha ; of Chinese ; of the Semitic nations ; Mohommedanism, etc. Sent post-paid on receipt of price. Address, A. J. Pineo, Wolfville, N. S.

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