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EARLY IMPRESSIONS AS A TEACHER.

By MAUDE PETITT.

WHEN asked to take this position it was natural I should feel some uneasiness, since my province never before extended beyond the boundaries of fiction. But for the sake of my hearers I promise this time, when I digress into fiction, to found it entirely upon facts.

I shall take you (if you will permit) as my imaginary heroine (I say heroine, for men have good reasons for deserting our ranks, though it is a profession in which we often feel we need the strength of manhood). I shall start your career in the Model School, for it is there we stand upon the threshold of our future.

There is perhaps no more exciting phase in Model School life than that of applying for schools. Do you remember that bright Saturday morning in the autumn, when you rose with the pleasantly exhilarated feeling which comes from doing something out of the everyday routine? You lingered before the mirror a moment to make sure that your cheek had that tint of rose, and your eye that brilliancy which certifies robust health. Then, armed with good spirits and good testimonials, you made your first plunge into the practical, business world, where you soon found men did battle for bread and butter with as much anxiety as though the universe depended upon the satisfaction of their needs.

You remember well that house where you made your first application. You had driven through several miles of rich fertile fields and orchards, where the trees were dropping their golden and rosy gifts. You were beginning to feel what a fair and prosperous land is ours when you paused at the door of a handsome country residence. It was such a beautiful scene surrounding you, as you awaited an answer to your knock. The little brook murmuring at the foot of the hill, the cattle resting in the shadow of the elms, the sheep upon the hill-sides; orchard and meadow land smiling in the sunlight, and farther off the acres of standing forest. Everything was so suggestive of plenty and of comfort, you fell to picturing what might be within; bookshelves lined with the cream of thought; poetry and music. You pictured the inmates gathering together in the long winter evenings over Tennyson, Ruskin or Shakespeare, while the paintings of a Taylor or a Hammond look down upon them from the wall. You soon found they were too materialistic for things of that nature. Your dream was broken upon. Some one had opened the door, and you were being ushered into the presence of the secretary of Oakville school. You were perhaps overly self-confident. For had you not taken honor matriculation and been congratulated and flattered by all

your friends? You had yet to learn that in this fair land of ours education counts for very little—the merest trifle in applying for a school. If a medalist from Oxford or Cambridge were to apply for a rural school beside a person holding a third-class certificate, we all know that the holder of the third-class could get the school by coming under ten dollars.

But, to return from fact to fiction, we left our school secretary discussing upon the multitude of teachers (not a very encouraging subject to an applicant).

“What’s yer figures?” asked he.

“Three hundred dollars.”

“Three hundred dollars? Oh, that’s too high.”

“Why, I thought you were paying three twenty-five.”

“Well, we hev been a payin’ that, but we’ve got teachers offering to do it fur two hundred dollars! Experienced teachers, too. There’s Warden’s son over here on the 9th. He offers to do it fer two hundred and fifty dollars, and pay the janitor out’ that. We always payed him twenty dollars.”

Warden! The name suggests a fine brick farm-house you have passed, a man who owns two hundred acres of land and three or four mortgages besides. It also suggests a nice appearing young man in the Model School whom I shall not attempt to describe, since he is here in the convention with us (under another name).

Your pride swelled up for a moment as you left the house. These were the people you were to serve! to cringe and bow low to! the people of “the almighty dollar, the fifty-cent piece and the copper cent.” It was to prepare for this you had spent your best years and labor. You turned again to your own profession—the profession you had gloried in, idealized! And yet your colleagues could stoop to this! However, you mustered all the courage

that was left and went to face another trustee.

“Well, I’ve just made up my mind to have nothing to do with it,” said Mr. Derwent when you interviewed him. “The way they’re actin’.”

“Why is Miss Bonar leaving?” you asked.

“Well, Miss Bonar has always given satisfaction as far as we knew. She boarded here with us, you know. But this young Warden, he slipped around to Mackay, the secretary, an’ offered to do it for two hundred and fifty and pay the janitor. Then Mackay comes to Miss Bonar and tells her she must come down to Warden’s figures or resign. Well, she thought about it, an’ she just told them if they didn’t think any more of her than that, after the way she’d worked for the school, they could take Warden.”

You made some faint inquiries about the other trustee, and found that, in order to win his favor, you must come at least five dollars below Mr. Warden. I have headed this paper “Early Impressions of a Teacher’s Life.” Perhaps I might more justly have called it “Early Depressions.” For certainly you were considerably depressed on your homeward way. It did not make matters any better to be told, on your return, that the market was too full; it was the same with everything, when the market is too full the price goes down. But—are we sheep for slaughter, or swine for shipment, that our value should go up and down accordingly as there are many or few of us? But that is not the greatest evil to which our nation is exposed. Not only is the teacher sold, but also the children. There was a time, to be sure, on this continent, when human lives were sold, when the black man stepped down from the block into the hands of the highest bidder. But there is something else being sold now. Our present system reads something like this: “We, the trustees of

this school section, offer to hand over the minds and characters of all the children in the said section, to be guided and moulded by whomsoever we find to be the lowest bidder." So it happens that the little folks are handed over to the lowest bidder, the under bidder, or, in a whisper be it said, to the underminer.

Now, let us look upon the effect of this cheap system, first, upon the teacher. Young teachers have the burden of saving sufficient for their expenses at the Normal, and the tendency is to say, "Well, I can't really afford this journal or that book on child psychology or that new edition of problems in arithmetic. The result is, instead of having a bright up-to-date, go-ahead teacher, versed in all the latest ideas and methods of his profession, we have a fossil gradually getting rustier and rustier till school life is a mere mechanical routine. If doctors, dentists, authors, clergymen buy all the latest works on their profession, and keep abreast of the times in art, literature, and politics as well, why should not school teachers? Ans. Because there isn't enough in their pockets. For, certainly, no energetic teacher should consider his reading on pedagogic lines ended when he leaves the schoolroom. Secondly, I believe that most of us agree that travel is of a very decided benefit to a teacher. I have only about three-quarters of the faith in travel as an educative factor that some people have, but I have the very firmest belief in that fraction, and it is a rather tight pinch for a young teacher to think of descending the St. Lawrence or even of spending a few weeks amid the culturing and refining influences of Grimsby Park. Thirdly, does it increase our self-respect as teachers and the respect in which we are held? I do not mean that riches or poverty should have anything to do with self-respect. But in

this case the salary is a test of the community's regard for us, and lack of appreciation seldom increases self-respect. Fourthly, what has become of the old-time schoolmaster? That grey-haired hero of the past, with his firm but kindly face! The old schoolmaster! The words have some melodious charm I cannot define. But he is an obsolete character now. A ragged wife and six ragged children were too much for him, and he went into farming or merchandise, or studied law or medicine. In their stead our conventions are filled with beardless boys with most of whom teaching is a mere side issue till they can go into something else. You can't blame them either. Few men care to continue in a profession in which they *must* remain celibates, and it would be a brave girl indeed who would share the lot of a rural schoolmaster at the present rate of salaries. I know there are those who say it is not a fit profession for men. I disagree with them utterly. Haven't time to say why.

But let us turn to the other side of the question, viz., the effect of poorly paid teachers upon the agricultural communities of our nation, for that is a more important side. Look for a moment at the position of a teacher in a rural district. In many such districts the people are, almost without exception, engaged in manual labor. A girl or two may have attended a High School a couple of years (let us hope she does not consider her education finished); a minister may be stationed there, or visit the section once a week; but often you are the only abiding representative of that intellectual life that glows or dies, a spark unseen by baser eyes. How important, then, is your life as an educative factor in that section! I need not spend time stating the effect of an unappreciated, unread, untravelled teacher as the leader of their mental life. It doesn't matter much whether the teacher is an old

fogy or a young fogy. It's foggyism anyway. Just as surely as the self-respect of the teacher goes down, the nation's respect for education and intellectual life is going down with it. When we become no longer their guide but their drudge, woe unto the nation we strive to guide! But most important of all, what is the outcome to them of this Jewish system? Does it not tend to bring out all that is selfish and small and bartering? All that is money-loving? If they are so mercenary with regard to educational matters, they will be equally mercenary with regard to other things, and the children we are training amid such surroundings will grow up more mercenary still. To be sure, they will build fine houses, have fine furniture, perhaps fine school-houses. But they will not pay for the unseen things. Education and culture are too ethereal for their minds. If they must pay out money, they will pay it out for things they can see and taste and handle, not for the unseen, the everlasting things of life. They will spend five thousand dollars on a barn, but they will not spend one thousand on the education of the son who is to manage the farm, because they can't just see what they are getting back in dollars and cents for it. But, ah! Is this the nation we love—our dear Canada—drifting on this muddy stream of materialism, amid brick walls and factory smoke, instead of afloat on the broad ocean, with God's blue sky above? Instead of the land of genius and of saints, a materialistic, money-loving nation! Why, if this thing goes on for a few generations, we'll have people paying their minister with a few bags of turnips, and billeting the teacher around among the poorest of his section, because the poor soul will not have fit clothes to appear among the wealthiest of his employers.

But of what use to murmur? It is not an hour for complaint, but for

action. One of our most brilliant ministers pronounces our system of engaging teachers as "rotten." The word, if disgusting, is expressive. *It is rotten*—a mushroom! a fungus! Then, why, in this era of change and reform, don't we alter it?

There are at least two very important causes for this state of affairs. In the first place, there is an impression among many of the fathers of our country that, when they have gone to the expense of paying their daughters' board in town while they attend High School, they must make teachers of them to get back the money spent. Again, their materialism comes to the front. They do not see the use of an education unless they can make something by it. Culture is a myth to them. Of course, there are many cases where people are too poor to afford an education without doing something afterward to replace the expense. But why must they teach? There are countless other occupations. Why, for example, should a young lady with a first-class certificate consider it throwing her education away to be a nurse, dressmaker, milliner, stenographer, etc.? Why should not an education fit one all the better for such spheres? What we need is better educated tradespeople. Why, then, should this one profession be tumbled full of a lot of people, many of whom are no more adapted for the guiding and training of children than so many kittens, but who have got there simply because they have gone through a course of High School study? Then there is a cry of too many teachers—a woefully false cry! There are not too many, but too few. Too few earnest, enthusiastic men and women thoroughly in love with their profession. The real fact is, anybody can be what we call a teacher if they have an education. Our county Model School is a place of universal salvation. There were fifteen plucked last year, to be sure, but it was only

nominal. Practically none were, since a permit of one year was granted the unfortunates. All were found to be adapted and fit to belong to our ranks. Now, it is not going to improve matters to give harder examinations in the High Schools. That discourages the youth who are preparing for other professions as well. Besides, success at such examinations is not a good test of our ability to govern a school. It is the Model School that should be the testing place, that should let us know once and for all whether we have the patience, the perseverance, the insight, the indomitable energy, etc., that make a successful teacher. Our term in the training school should undoubtedly be at least twice its present length. The examinations should be more practical and more severe, and people of eighteen ought not to be entrusted with schools. They are too young.

Again, as far as salaries are to be discussed, why should not the Government settle the amount to be paid by each section, and forbid them to depart therefrom under penalty of law? I believe it settles the salaries of its customs officers, its postmasters, etc. Why not settle the salaries of those who are training the Parliament of the twentieth century, and thus do away with all this underbidding and undermining, which is enough to bring a blush to the face of any teacher? We do not ask an unjustly high salary. But we at least deserve justice; and we are not getting it when salaries go down to one hundred and seventy five dollars

per annum, as they have in some sections. We claim to be governed by the people through their representatives in Parliament. What's the matter with us, then? Are we not part of the people? Why, then, don't we regulate this through our representatives? If the teachers of Canada were to vote as a body for the fixing of their salaries by the Government, would our Minister turn a deaf ear, I wonder? Why not act now and forward our resolution at once?

But I have already infringed too far upon your time in presenting what is by no means my loftiest impression of pedagogic life. To sum up my impressions of such a life, I would say it is a profession in which we need the patience of Job, the courage of a hero and the endurance of a martyr. Let no one enter it who has not strength—strength of body, strength of mind, strength of soul. Let no one enter it who has not contemplated long and silently that Master of our art, the Great Teacher on the hills of Galilee. For this office of ours is a sacred one—and holy.

“A tale of strength; to suffer and be still,
With one strong purpose; though the world may change;
Content to wait the varying time, until
The soul, grown great, shall burst its narrow range,
And, from the thing I am forever free,
I rise to all that I have longed to be.”

TREMENDOUS RAINFALLS.—A recent remarkable rainfall of 31.76 inches in twenty-four hours, which occurred in northern Ceylon, leads a correspondent of *Nature* to recall other records of heavy rains. The greatest annual rainfall known occurs, it is said, in the Khasia Hills in India. It

amounts to 600 inches, or 50 feet! On one occasion $2\frac{1}{2}$ feet of rain fell in the Khasia Hills every twenty-four hours for five successive days. Gibraltar has been drenched with 33 inches of rain in 26 hours, and Genoa with 30 inches in the same length of time.

THE PUBLIC SCHOOL LEAVING EXAMINATION.

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Prin. H. S., Richmond Hill.

THE luckless results of this year's P.S.L. examinations have fallen with decidedly adverse effect on many a rural section. No such calamity could have been anticipated. Everybody wondered when it came, and yet *it did not come* uncourted or unforetold. Of the pupils who went up for this examination only about ten per cent. were passed and many of these only barely. Such a wholesale failure of honest efforts calls for an immediate investigation. Everyone interested in our national education should be anxious to locate the cause, and, if possible, bring to justice the guilty one. But if it be discovered that ignorance on the part of some has had this melancholy issue, then every effort should be made to instruct the unknowing, that such a disaster may not have to be recorded on the pages of our history yet unmade.

We have enquired from High School teachers in all parts of the province in order to obtain data for inference. A series of questions were given, of which these are the chief: 1. What per cent. of the P.S.L. class passed at your High School? 2. In what subjects did they fail chiefly? 3. Do you notice much weakness in drawing? 4. Were they low in book-keeping? 5. How do you account for the failure (if many failed)? Almost invariably the answers have been like this: "Three passed out of twenty-four," "one passed in class of tier," "two passed in class of eighteen." "They failed in drawing and book-keeping." "Mathematics plucked ours." "The arithmetic paper was the stumbling block." "They cannot draw." "They are poor in book-keeping." "We think the rural teachers have not had a fair

chance to prepare their classes." "The P.S. teachers cannot get time to teach all these subjects as they should be taught."

Now, we confess we have not looked as closely into the results of those examinations, where the pupils were prepared in the larger Public Schools, as into such where the pupils came from the small rural schools. For in schools of this kind too much is often attempted, and time is necessarily very limited. Besides in such schools one or at most two teachers have on their hands the work of the whole school, whereas, in the larger schools, we find in the highest form only the senior fourth and the fifth classes, and in some cases even the fifth alone. We cannot, therefore, find any fault with such an arrangement because, when it was made, due consideration was given to the fact that *time* is a very necessary element for the accurate working of the educational machine. But in many rural districts this principle, although really a fundamental one in pedagogy, is completely lost sight of in the calculation of ways and means for bringing the young mind into the marvellous light of wisdom's ways. And we are going to show that possibly the inveterate and hideous old habit of cramming had something to do with the sad calamity which has this year overtaken nearly ninety per cent. of our most promising Public School pupils. If such a conclusion can be logically reached, the educationists of Ontario cannot be too active in asserting the maintenance of true pedagogical laws in all our rural schools.

The damage done by such a wholesale "plucking" of honest pupils can

not be confined to one class of our people, nor will its effects be past in a day. In communities where ignorance of education's laws exists, the first and only measure of a Public School teacher's ability is the number of pupils he passes at the Entrance and P.S.L. examinations. If he is not as great as his neighbor in this respect complaints are soon heard, and not infrequently these complaints reach the teacher's ears, and this only serves as a stimulus for him to "cram" all the harder next year, and who shall say where it will end, and this is only one evil. The next is the effect on the pupils themselves. Failure seldom does an honest pupil good. Perhaps we may say never. It is useless for any one to argue otherwise. We have never heard of a teacher advising unlikely pupils to go up for examination. But this would be his proper course if he believed failure would benefit them, so we are going to make the assertion that no one believes a failure does good to an honest pupil. And failure is certainly not an indifferent thing. Therefore it must be harmful. Possibly no one will think of denying this. And, this being admitted, who can estimate the loss to our country's manhood and womanhood by the blighting of so many bright hopes and honest efforts. In what currency can such a misfortune be calculated? Many life purposes will necessarily be changed. Likely most will be blunted. How difficult a thing it will be to get these disappointed hundreds to vigorously prosecute their school work this year!

It seems the P.S.L. examination has long been misunderstood in rural sections. It is exactly what its name implies—an examination for pupils leaving Public School who do not intend to go to High School. Methinks the name has had a grim interpretation this year, as many will doubtless leave Public School although the examination has not been passed. Now, wisely

enough, the Departmental regulations have given this examination an Entrance qualification. It will admit to a High School. And in this very provision many a rural pupil has taken refuge. There are no fees at Public School, and so he continues there a year or more after passing the Entrance, to the very decided detriment of all beneath him. The careful and obliging teacher faces his task. His position depends only too much on obliging the parents of his section. He finds himself alone (or perhaps with one assistant) to prepare an Entrance and a P.S.L. class and teach about eight or ten other classes in the lower forms. He finds it necessary to begin operations at eight o'clock, and, having been satisfied with half an hour at noon, he sees the "level sun" as he leaves the school on the winter evening. He devotes, perhaps, two hours extra to his school work each day, and then, when the last lesson has been taught, and the year has rolled round, and the examination has been written, if his pupils have not achieved success, the heartsick drudge of a teacher, instead of receiving from the parents a "Well done, good and faithful servant," too often hears, "Depart from me, and look for another school, or take \$50 less next year."

This state of affairs has surely reached the climax now. Cutting off the Primary certificate is bound soon to make teachers less numerous. Then, this year's results have opened the eyes of many to facts they did not formerly know. A vigorous protest from all true educationists would surely do much to educate trustees in what is a reasonable amount of work for a teacher in a rural school. It is surely time to call a halt of this wretched farce. The profession should speak out and declare itself against cramming for Entrance and P.S.L. It is folly to hope that one teacher can properly prepare both classes in one year and do justice

to the rest of his school. Trustees should step in and object to parents thrusting back on the small schools those children who have passed the Entrance in every case where such a course will endanger the Entrance and lower classes. The interested teachers should themselves present the matter in a reasonable light and should not jeopardize the interests of so many because the school can get a special grant for every P.S.L. candidate passed.

In our own district we have noticed still another feature in which we are not likely to be unique. Such straining of efforts has brought the pupils only to a very moderate position at best. Few pass their examinations well. The result in most cases is a bare pass. This is very bad and is a misfortune usually underrated. A pupil who makes a poor pass sees only a low plane of excellence. His ideals are not high. His aims do not soar. He is far below a pupil who passes well, and thus learns the pleasure of doing well. The latter is much more apt to do well in all his other efforts than the one who has only the low a.m.

My argument, therefore, is that we should not be satisfied with merely passing our pupils, but we should pass them well. The certificate is not the goal. Excellent standing is. We should place high ideals before our classes. This is education. We should, accordingly, cry down all attempt to lower the standard of work done in our Public Schools. These schools should only attempt as much as they can do well. It is of vital importance that this point be observed. The welfare and very existence of our race depends on this principle. Much depends on the teacher. In conclusion, we should be glad to know that in every district the local paper is made a medium through which the High School might keep in touch with the Public School. A unity of interest could thus be preserved, and much might be done for general education. By this means rural trustees and parents could easily be shown that, in schools with not more than two teachers, both Entrance and P.S.L. work cannot, with wisdom, be attempted.

LIFE.

BY THE REV. PREBENDARY HARRY JONES, M.A.

ACCORDING to Scripture, in the beginning God created the heaven and the earth, and every living creature that moveth. But we know no more of life than he of old who said, "It is a vapour that appeareth for a little time and then vanisheth away." Wise men, armed with microscope and telescope, travel, peering back, looking up and down, and try to find, in their own way, what it is and how it began. But the wisest are stopped at last. They are left to face an unseen Almighty Power, the Author of every living thing, great

and small. The name of such a countless creation is Infinite, and we stand ignorant before this mighty herd. Nevertheless above it rises man, having a peculiar relationship to the Maker who gave him dominion over all the earth and its manifold inhabitants. We Christians have learnt Him to be, in a sense shared by no other, "Our Father which art in heaven," in the knowledge or knowing of whom standeth our eternal life.

But along with this greatest mystery of all there are some things common to the highest and lowest of His

creatures here. Their bodies alike return to the earth of which they are made, and share the heat of the sun without which mortal life is inconceivable.

And yet neither of these great powers give us life. They only support it for a while, one by light and warmth, the other by material products, till we die. Thus between them, successive generations, animate and inanimate, appear and retire. The bud is unfolded in the summer air, and then the leaf falls to feed the hidden root of the trunk whose twig has brought its yearly food of sap. The long-grown forest-tree bows to the clay upon which it has looked proudly for a thousand years, and from which it rose, only to lie down at last. So with all moving creatures upon the earth which claims the warm-blooded eagle floating in the sunlit air, and the cold worm creeping in the soil.

And it is appointed unto man to die. "Dust thou art," says the Almighty Voice, "and unto dust shalt thou return." Nevertheless, though he shares the passing life of animate creation he claims part in that which is eternal, according to the vital sentence, "in the image of God made He man." He holds fast to this. His soul is kin to his Creator, though he leaves others to do their will with the familiar house in which it has lived since he was born. Thus the mourner is met by the words, "Forasmuch as it hath pleased God of His great mercy to take unto Himself the soul of our dear brother here departed, we therefore commit his body to the ground, earth to earth, ashes to ashes, dust to dust."

But though the believer is assured that there is a spiritual body which he will receive in exchange for that of our humiliation (mis-rendered "vile"), there are incessant signs of his passage through the mortal life which he shares with others, and which he does

not always interpret as he might and should. They tell him of the subtle process always going on in our earthly house of this tabernacle which shall be dissolved, whatever care we take of it, for however long the physician may stretch the span of our days and put back the clock of dissolution. And, without any sinking of heart, it is possible for a man to note the significant tokens of his mortality. As I have said, we are here subject to the earth and sun, which attract and revive us, however wisely or unwisely we use the material sustenance of the one or admit the mysterious operation of the other. We are in the presence of Him to whom all things are naked and open. And Nature is His sentinal, to whom darkness and light are both alike. She knows no rest or sleep, but ever waits by night and day to draw us to the ground. She watches the drowsy eyelid till it droops, and then gently lays its wearied owner down. She never takes her hand off us whom she owns, but, though its pressure may be long unfelt, she leaps upon the lightest-footed body if it should slip, and throws it to expectant earth, which, however often balked, knows that a day will come when its final claim is due.

So with the other power which suns us directly from above; or from below through blazing logs upon the hearth which shed back flame imbibed from on high before the axe laid them on the ground, or through light and heat stored in coal once fed with vital shine upon primeval trees. For a little while it warms the moving dust of which a man is made, till he is left as stiff and cold as the clay in which he is laid at last. There is not a waking hour without some perceivable token of the powers which attend and support our present life. We may not feel them unless when we are tired or chilled, but every now and then their touch is felt, and maybe a flash of

thought whispers what they mean to do when the pulse has stopped.

So far much is plain. We are daily dealing with what we can touch and taste. And it is unwise to resent the lessons which it sets. We need not, indeed, nurse a melancholy mind by counting the steps which lead to dissolution, for though death comes to all in time we are moved by God to drag its wheels. He is the Saviour of the body and has honored it by the Incarnation of Himself. And He has permitted the great teacher, "Pain", to warn us against that misuse of life which cuts it short. But we do not believe in annihilation—nothing is destructible, however changed. And thus, though now we know not what another life may be, our chief aim in the conduct of this should be to lead it so that we may not fear to die. A man may follow the best-known rules of health till then, but the most constant and successful sanitary caution is but a short ignoble thing. He has to reckon with the Spirit, and this is found through Christ, who saw beneath the letter which killeth—*i.e.*, not below mere words alone, but under all such outer signs of life as mark our course and point to mortal death. And true communion with Him who suffered that He might bring us to God cannot be severed from that keeping of His commandment which follows, but does not create it. And what are they? No dry catalogue of regulations possible of observance by a pedant in Christianity, but laws of life. And the greatest of them, that by Himself called "new," is "Love," the spiritual power which never faileth, leading us onwards into another world where those powers which rule the natural body cease to operate, where no sun warms us nor are we claimed by a hungry watchful earth. But love is the secret of immortality, which is no period measurable by the calendar and clock, but is sent to vitalize us even

here, while we are subject to those conditions of mortality which depress or shed only a fading cheer. The law of charity or love alone rules the rise into another life, and casteth out fear, especially that of death.

Love, indeed, has been interpreted in manifold ways: as covering a multitude of sins with sweeping good-natured ignorance of what they may be, or it is limited, as that which for a while protects helpless offspring with intensity of concern. This is shown by a hen that gathers her chickens under her wings. Yet this love begins to fade as her young approach full growth, and finally evaporates when they have reached the cares of parentage themselves. Love is, however, chiefly and popularly apprehended in that which culminates in marriage. But this "mortal" affinity is assumed, in accordance with the language of our Church, to expire when a man or his mate is laid in the grave. Each promises love to the other "till death do us part." And yet we say that "holy" matrimony signifies the mystical union that is between Christ and His Church, which is undying, and He Himself said, when pressed by questions about material relationships between man and wife, that (though realized by "the children of this world") such as were accounted worthy to obtain the resurrection from the dead neither married nor were given in marriage. This might help us to apprehend the love that rules another life, and is the leaven of all that works here, for it excludes the tangible, and knows no tie of "flesh and blood"—which "cannot inherit the kingdom of heaven." It is seen in that mingling of spirits which know no divorcing coolness, inasmuch as it can exist only in communion with Him who is the same yesterday, to-day, and for ever. It has its growing forecast and flashes of reality in that understanding between souls, which sanctifies all human

relationships, though these are sometimes shadowed here by passing clouds of ignorance. In this love is the secret of that vitality which is subject to no such influences as affect the flesh-made body. It ripens, grows to full stature and operation in the loving of God—*i.e.*, in such apprehension of His power who ordereth all things in heaven and earth as makes us look for ultimate satisfaction in nothing which we can touch, taste, or handle. This perfect

love quickens us here. It carries us over the borders of mortality, casting out the fear of death or of that which is felt in drinking some mysterious cup of sorrow. There can be no greater love than such acceptance of divine law as we adore with supreme devotion in Him whose last words in doing the will of God were, "Father, into Thy hands I commend my spirit."

—*Good Words*, Sept., 1898.

THE GENESIS OF GEOMETRY IN THE RACE, AND THE EDUCATION OF THE INDIVIDUAL.

BY BENCHARA BRANFORD.

MANY years have passed since Herbert Spencer, in his work on "Education," made vigorous application of the doctrine—previously formulated by Condillac, Comte, and possibly others; foreshadowed dimly, too, by Plato—that "the education of the child must accord, both in mode and arrangement, with the education of mankind, considered historically. In other words the genesis of knowledge in the individual must follow the same course as the genesis of knowledge in the race." As regards the *form* in which this doctrine is stated, no great acumen is needed to see that, in the use of the word "must," there appears to be a confusion between the possibility or advisability of the parallelism and its necessity: the doctrine, as thus enunciated, clearly cannot rank as a principle; its *role* is rather suggestive. How far the education of the child necessarily follows that of the race, and to what degree, assuming a tendency to the parallelism, it is advisable to modify or even to counteract such a tendency, these are questions suggested, but not answered, by the formula. So far as I am aware, few serious attempts have

been made to indicate, with any precision, the germs of truth concealed in the doctrine when liberally interpreted. Turning for guidance to biological science, we find a precisely similar doctrine applied to the physiological aspect of man; but here we are carefully cautioned to interpret the theory very widely. Thus we are told that an organism may take "short-cuts" in its development along ancestral lines; the suggestiveness of this to educational science is obvious. Fenced in with provisos of this kind, the theory appears to be firmly established from a biological standpoint. But the moment we take it from its real birthplace—biology—and inquire as to its application to the *mental* evolution of the child and of the race, we are at once confronted by our extreme ignorance of facts by which to test its validity. What do we know of the human embryo, of ancestral life, *qua* mental? There appear but the merest shreds of knowledge concerning either party between which a parallelism is to be established. Nor does our ignorance stop even here. What scientific knowledge have we of the mental development even of the infant, and to

what scene in the evolutionary mental drama of ancestral life does infant life correspond? The mere statement of such questions suffices to show that no application to infant education, and still less to the education of the embryo (I use the term "education" as implying any deliberate attempt to influence the growth of an organism), can at present be made of any such doctrine of parallelism of mental development between child and race, even were such a doctrine known independently to be true.

But, although observation and experiment have, as yet, supplied altogether insufficient data for trustworthy induction regarding so early a period of the human life, valuable conclusions may, I believe, be drawn respecting mental development during later years, which, while in no wise based on the validity of the parallelism in question, have been inspired by this analogy, and themselves in turn contribute independent support to its truth, while simultaneously indicating certain limitations to which it is subject. My inquiries have been directed to the bearings upon the education of the individual *qua* mathematical, of the genesis of geometrical science by the race. My aim is to exhibit a parallelism between the actual mode of evolution of geometrical knowledge in the race, from the earliest times at which we have authentic historical information, and that by which the school youth can most readily and efficiently assimilate this experience. It is to be specially remarked that I make no attempts to prove—what, indeed, I hold to be obviously incapable of proof—the existence of a necessary parallelism between the racial and individual development of geometrical knowledge. Nor am I here concerned with the very interesting question of the almost automatic genesis of space-perceptions in the first years of infancy. What I hope to do is something quite different,

viz., to show that, for educational purposes, the most effective presentation of geometry to youth, both as regards matter and spirit, is that which, in main outlines, follows the order of the historical evolution of the science.

A brief outline is desirable of the order in which I propose to deal with the inquiry. First, I epitomize (with such fulness of detail as I deem necessary for the avoidance of possible misunderstanding in the use of philosophical terms) the history of geometry from its existence as an empirical art amongst the Egyptians to its final development as a science by the Greeks, with definitions, axioms, theorems, and all the logical paraphernalia incident to a perfect science. The first part of the inquiry will be dealt with from two points of view—the order of development of the *matter* of geometrical knowledge, and, of equal importance, the *spirit* in which, at each stage, it was cultivated. In conclusion, I briefly appeal to modern educational experience to establish the doctrine I advocated above.

The earliest authentic knowledge we have of the state of geometrical knowledge before the Greeks applied their subtle intellects to its advancement is obtained from an ancient Egyptian papyrus, known as the Rhind Collection, in the British Museum, which has been deciphered only within the present generation. The date of this MS. has been variously estimated from 1700 to 1100 B.C. It is thought to be an epitome of all the mathematical knowledge at that time possessed by the Egyptians, in the persons of their priests. What kind of knowledge was this? Simply a set of *empirically discovered rules*.

It is necessary in these inquiries, where a clear mutual understanding of terms is of the first importance, to be quite definite, a result only to be obtained by a sufficiency of detail. What, then, precisely do I mean here

by the phrase "empirically discovered rules"? Suppose we have a rectangular surface before us—a room, a field, a figure on the blackboard—and I wish to know the magnitude of its surface.

There are but two ways of procedure—for our present purpose—and these differ *in toto*. I propose to consider one of them.

It is clear we must have a certain surface (called a unit) with whose magnitude we are familiar—itsself also rectangular. I now take this unit and find, by actual trial, how many times I can lay it down on the given rectangular surface, each time in a quite new position, before I have used up all the space included within the boundary. Then, neglecting certain obvious considerations foreign to the purposes of the illustration, if it appears that the original surface does not contain the measuring unit an exact number of times, I may either neglect the piece over as inconsiderate, or I may select another and smaller unit with which to again make a similar series of measurements. Thus, by repeated use of smaller and smaller units, I at length arrive at one whose magnitude is so small that I cannot well make use of a smaller. There now appears to me to be no piece at all neglected. I call the measurement exact. But is it so? Certainly not; it is now correct to say, not that I have measured exactly, but that I have reached the limit of my measuring powers. The exactness is only relative, for I have merely to employ an individual with keener eyesight and more delicately manipulative capacity to obtain what *he* would doubtless, in his turn, call an exact measurement; and yet, though certainly more exact than mine, it is still clearly only a relative exactness. A little reflection, indeed, will convince one that there is no end to such an inquiry; no surface, concrete and actual, admits of absolutely exact measurement. Why not? Because, amongst other equally im-

portant reasons, we cannot define, with absolute precision, what we mean even by the *boundary* of such a surface. The very attempt lands us in a discussion of the subtlest problems of philosophy. Every succeeding generation of scientists, with deeper knowledge and better instruments, would improve on the measurement of its predecessors. From this aspect civilization appears as a function of the place of the decimal point. There is no finality.

Such measurements, then, as above described let us call experimental or empirical. Now observe that the measurement obtained with so much trouble applies only to this particular rectangular surface; *it gives no information about other rectangular surfaces*. Further, let us suppose that repeated measurements, by this very obvious method, of all sorts of rectangular areas, have been thus experimentally made, and the results tabulated. In addition, let the measurements of the *sides* of these rectangles be obtained in similar direct manner (by use of units of length)—whatever may be the purpose of such—and let these results chance to be tabulated alongside the others. [We presume total ignorance of geometrical *science* on the part of our practical geometricians.] Finally, let us imagine some observant individual amongst them discovering, either by chance or with intentional quest, that, if he multiplies together the numbers giving the measures of the sides, he obtains, in all the cases observed, numbers very close to those measuring the areas. [It is, perhaps, interesting to observe that the discovery of such relations would appear to be almost impossible for races whose means of computation were meagre, unless the unit of length chanced to be (as above) related in some extremely obvious way to the unit of area, as, for instance, being the side of the square which is the unit of area.] This parenthesis serves to illustrate the significance of the part

played by chance in the discovery of important facts, such as, doubtless, the above would be, in the history of a nation's mental development. It also serves to indicate the kind of stimulus that an appropriate study of empirical geometry should give to the *inventive* faculty of the child. Here, indeed, at once, we perceive a valuable educational parallelism such as we previously contemplated. We have, then, supposed the discovery of a certain relation, or law, between sides and area. The larger the number of cases tested, the stronger would be the belief in the universal applicability of the relation. But, however many be the tests, the law is still only an empirical statement; the two groups of numbers spoken of—the numbers giving respectively the area and the product of the sides—will never exhibit more than an approximate correspondence; the equality cannot, from the nature of the case, be absolutely exact. However valuable in future use the discovery may be, it is not a logically proved geometrical theorem, but a wide empirical induction. It ranks as a fact of experimental geometry, but forms no part of a scientific geometry. The relation might be discovered—and, indeed, appears to have been discovered—by one unversed in such abstractions as straight line, axiom, theorem, etc.

By way of sharp contrast, let the same problem of measuring a certain rectangular surface be now proposed to a man who grasps the spirit of a scientific geometry. He is aware that, from certain arbitrarily formed definitions (of straight lines, parallels, etc.)—which, observe, are creations of the intellect worked up from sense-data, mere conceptions of the understanding—he cannot deductively prove from the definition of the abstract geometrical figure, termed a rectangle, that its area can be got by multiplying together the numbers measuring the lengths of

its sides, provided they have a common measure, while, if they have not a common measure, a product can be obtained giving the result to any degree of precision required. Observe that incommensurability is not a property of objectively existent lines; it can logically be proved of, and therefore applied to, only ideal geometrical creations. Hence the glory of the Pythagorean school of mathematics—the creation of the theory of incommensurable magnitudes.

So far all is pure theory; the corresponding geometrical figures exist only in the imagination, as ideas of the man's mind; they are simply conceptions. In applying these to concrete, visible surfaces, our geometrician foresees that the so-called sides of the objectively existent rectangle he wishes to measure cannot possibly be more than rough approximations to his ideally defined straight lines (*e.g.*, they must have breadth, or he could not see them); that the surface of the rectangle, that the angles, etc., are but rough copies of his geometrical plane surface, right angles, etc. But, although this is so, such facts simply serve to exhibit the excellence of his ideal geometry for purposes of application to the concrete; since, however closely approaching straightness lines may be actually drawn, and however nearly plane surfaces may be actually made on matter, the geometrical theorems, being based on lines defined by man's own creative thought as perfectly straight, and on plane surfaces that are similarly defined as perfectly plane, etc., are thereby efficient to cope with any kind of physical measurement, however precise it may become. Indeed, the absolute precision of geometrical science ever offers an ideal towards which actual physical measurement may strive, but which it can, obviously, never reach, though ever approaching nearer. In this aspect geometry has analogy with moral law,

which has neither greater nor less cogency and application to human life than geometrical theorems to the material world. In the language of the mathematician, physical measurement and geometrical are mutually asymptotic.

This distinction, which is of importance for our purpose, and frequently misapprehended, may become still clearer if we reflect what could have been the progress of physical science—in which advance appears, from one aspect, to lie ultimately in the possibility of measuring to extra decimal places (note the discovery of argon)—had geometry remained empirical. Imagine a stone geometry, in which deductions are made in terms of such points, lines, and surfaces as can be obtained on stone, with the aid of stone. How could such a geometry cope with the niceties of measurements flowing from the use of steel instruments on steel surfaces? Clearly we should need to reconstruct and refine our geometry incessantly, as instruments become more precise and muscles more adaptable. Stone geometry would succeed wooden, steel geometry stone, and soon we might be floundering in the difficulties of a celluloid geometry.

All this may appear trivial, but, in view of notorious historical misapprehension of the basis of scientific geometry, the grotesque misapplication of Euclid to elementary education, and the vagueness evinced by even well-educated people concerning the nature of geometrical truth, I believe such illustrations have their use. Moreover, it is high time that teachers turned their attention to the history and philosophy of the subject they teach.

To return to the measurement of the rectangular surface, our scientific geometrician has, we suppose, logically deduced from his conceptions of straight lines and rectangles a formula for obtaining the area of any rectangle

whatsoever—*i.e.*, a rectangle in his ideal sense of the word. Then, with the utmost precision of which he is capable, he measures the lengths of two adjacent sides of the given material rectangular surface, and, according to his formula, multiplies together these numbers, thus obtaining, in units of area, the magnitude of the given rectangle. As far as his measuring precision is reliable, so far can he trust his result; the applicability and validity of his abstract formula he never dreams of questioning—and rightly.

Observe the difference between the two methods of procedure. In the first (the practical geometrician's method), we start with direct, particular sense-perception and experiment, and end with a wide empirical induction, based on repeated rough measurements; in the other the process starts with a general scientific conception (formula based on rigorous reasoning from definitions, etc.), and we end in getting, through its aid, a particular experimental result. One process leads to an experimental or empirical geometry; the other proceeds from a scientific geometry. One deals with particular facts; the other with general theorems.

I have stated above that the earliest documents—the Egyptian Rhind Papyrus—respecting the geometrical knowledge of the ancients consist of the statement of the results of particular measurements, or, at most of empirically discovered rules. "The papyrus contains," says Allman ("Greek Geometry from Thales to Euclid") "a complete applied mathematics, in which the measurement of figures and solids plays the principal part; there are no theorems properly so called; everything is stated in the form of problems, not in general terms, but in distinct numbers—*e.g.*, to measure a rectangle, the sides of which contain two and ten units of length; to find the surface of a circular area whose

diameter is six units ; to mark out in a field a right-angled triangle whose sides measure ten and four units. . . . We find also in it indications for the measurements of solids, particularly of pyramids, whole and truncated. It appears from the above that the Egyptians had made great progress in practical geometry." As witnessing to the very empirical state of geometry as it existed among the Jews, Babylonians, etc., it is to be noted that they appear to have thought that the circumference of a circle is just three times the length of its diameter. Thus we read that Hiram made for Solomon "a molten sea, ten cubits from the one brim to the other ; it was round all about . . . and a line of thirty cubits did compass it round about." (1 Kings vii. 23.) Even this may be too much to attribute to them ; there is always a danger of reading into statements of this kind more than was originally intended, a danger due to our own vast modern mastery of the science. Possibly Solomon's architect simply found by measurement that the circumference of this particular circle measured in length three times its diameter, without being aware of the general empirical truth that the circumference of every concretely drawn circle bears a fairly fixed ratio to its diameter, much less of the scientific theorem that for all abstractly defined circles this ratio is absolutely fixed (and incommensurable). Incidentally here remark that, unless the idea of a possible numerical dependence of circumference on diameter (or *vice versa*)—the notion, in fact, of a mathematical function—already exists or is suggested by analogy from other experience, there is nothing to urge the mind towards a search for the *precise* measure of this dependence. Here, as elsewhere, we see only what we look for, over and above that which is obvious to all. Now this idea that, in some *definite* way, the two lengths are

numerically related appears to have been born with difficulty. Nor, indeed, is the notion of a mutual numerical dependence common even among modern well-educated people. Many are those who know, and can mechanically apply, the fact that 1,728 cubic inches make one cubic foot, and yet are unaware what dependence this large number has on the fact that twelve inches make one foot. A specific education fails in its due effect in such cases as these, where the bare particular fact is remembered by rote, while the valuable part of the matter (here, the idea of a function) is never assimilated. Such fundamental defects largely characterize elementary education. Egyptian geometry, then, the predecessor of Greek geometrical science, appears to have been practical, approximate, inductive, not scientific, deductive, exact ; in one word, it was *empirical*.

I pass on to Greek geometry. Dr. Allman (in the work above cited) has indicated the precise relation in which Greek geometers stood to their Egyptian predecessors, a relation which appears to have been often misunderstood. It is probable that the influence of J. S. Mill's fallacious treatment of mathematical ideas in his great work on "Logic" is answerable for many of the fallacies and mistakes perpetrated by modern mathematicians in connection with the philosophical basis of their science ; especially is this so in the case of geometry. His constant confusion between *conceptual* thought, which deliberately frames definitions as a basis of deductive reasoning, and *perception*, which is of external objects ; between conceiving, as the result of self-consistent thought, and the quite different conceiving that we call visual imagination ; between the possible in concrete experience and the possible in thought, all lead to the most startling paradoxes. If Kant's famous dictum that "the understand-

ing makes nature" overstates the truth, as is now generally, I believe, admitted, yet it implies a true aspect of the relation between mind and nature that Mill appears to me to have here entirely overlooked. If the Kantian idealists are wrong in stating that the idea of space is antecedent to the experience of the senses, and that the geometrical axioms are pure creations of the intellect, Mill and the empirical school have but gone to the other extreme of error in attempting to derive these axioms from purely sensuous experience by processes of induction, thus transforming geometry into an empirical science. Stallo ("Concepts of Modern Physics") has clearly stated what appear to be the truer bearings of the case: "All the geometrical axioms which serve as starting points of deduction contain two elements—an element of intuition (as a part of sensation); and an element of arbitrary intellectual determination, which is called *definition*. The facts of extension and its limits—surfaces, lines, and points—are given in intuition; without sensible experience we should not know anything about geometrical solids, surfaces, lines, and points; but *nothing is deducible from the existence of these elements, or our intuition of them, until they are defined.*" "Every axiom which is geometrically futile involves a definition."

To the same purpose speaks Poincaré: "If geometry were an experimental science, it would not be an exact science—it would be liable to a continual revision. . . . *Geometrical axioms are neither synthetic a priori conclusions nor experimental facts.* They are *conventions*; our choice, amongst all possible conventions, is *guided* by experimental facts; but it remains *free*, and is only limited by the necessity of avoiding all contradiction. It is thus that the postulates can remain rigorously true, even when the experimental laws that have deter-

mined their adoption are only approximate. In other words, *axioms of geometry* (I do not speak of those of arithmetic) are only definitions in disguise."

Had Mill been acquainted with modern researches on what has been termed "transcendental geometry" (due to the labors of Lobatschewsky, Bolyai, Riemann, Helmholtz, and others), doubtless his position would have been radically modified. Possibly even a familiarity with the comparatively simple idea of incommensurable magnitudes would have stood him in good stead. I lay stress on these matters as they are so helpful to gaining true insight into the true educational function of geometry. The mixed basis of geometry—partly sense-data, partly creative thought—clearly indicates use for and training of both *hand* and *thought* in geometrical education. Philosophy has long been dissociated from the teaching of mathematics, to the great detriment, I am convinced, of the latter. Education is sure to suffer in the hands of a teacher who is not familiar with the philosophy of his subject. This brief epitome is by no means inserted to inform—philosophy cannot thus be digested in compressed tabloids—but simply to draw attention to the expediency of inspiring a love of philosophical thought in the minds of teachers. The philosophic mind is specially needed in these days of educational maxims, when the teacher is on one side advised to apply the valuable maxim: "Learn by doing"; on another side, to rely on the equally valuable maxim: "Do by learning." Only the teacher with philosophic breadth of view can reconcile these two half-truths into an applicable unity of method, wherein, if doing is precedent to learning at one moment, in the next as assuredly is learning precedent to doing, education being the deliberate attempt to methodize an incessant action and reaction between these two.

A clearer understanding of the basis of geometry prepares us to appreciate the advance in geometrical knowledge due to Greek intellect. "The first name," says Allman, "which meets us in the history of Greek mathematics is that of Thales of Miletus (640-536 B.C.) . . . Thales himself was engaged in trade, is said to have resided in Egypt, and, on his return to Miletus in his old age, to have brought with him from that country the knowledge of geometry and astronomy. To the knowledge thus introduced he added the capital creation of the geometry of lines, which was essentially abstract in its character. The only geometry known to the Egyptian priests was that of surfaces, together with a sketch of that of solids . . . obtained empirically; Thales, on the other hand, introduced *abstract* geometry, the object of which is to establish precise *relations* between the different parts of a figure, so that some of them could be found by means of others in a manner strictly rigorous. This was a phenomenon quite new in the world, and due, in fact, to the abstract spirit of the Greeks."

"In connection with the new impulse given to geometry, there arose with Thales, moreover, scientific astronomy, also an abstract science, and undoubtedly a Greek creation. The astronomy of the Greeks differs from that of the Orientals in this respect—that the astronomy of the latter, which is altogether concrete and empirical, consisted merely in determining the duration of some periods, or in indicating, by means of a mechanical process, the motion of the sun and planets; whilst the astronomy of the Greeks aimed at the discovery of the geometric laws of the motions of the heavenly bodies." Thales "measured the Pyramids, making an observation on our shadows when they are of the same length as ourselves, and applying it to the Pyramids. . . . Thales meas-

ured the distance of vessels from the shore by a geometric process." Note these applications to the concrete. Again, we are told by the historian Eudæmus that he attempted "some things in a more abstract manner, and some in a more intuitional or sensible manner." Thus it is clear that he would continue to employ empirical measurements to obtain approximate results, which, by the creation of definitions and the use of axioms, he would gradually replace by strictly scientific theorems. Allman attributes to Thales the discovery of the two theorems—(a) The sum of the three angles of a triangle is equal to two right angles; (b) The sides of equiangular triangles are proportional. (Hence the basis of the theory of *similar* figures.) Thus, from a philosophic point of view, says Allman, "we see in these two theorems of Thales the first type of a *natural law*—i.e., the expression of a fixed dependence between different quantities, or, in another form, the disentanglement of constancy in the midst of variety—has decisively risen"; whilst, from a practical point of view, "Thales furnished the first example of an application of theoretical geometry to practice, and laid the foundation of an important branch of the same—the measurement of heights and distances." After Thales comes the contribution of the Pythagorean school. "Pythagoras changed geometry into the form of a liberal science, regarding its principles in a purely abstract manner, and investigated his theorems from the immaterial and intellectual point of view." He was the first person who introduced weights and measures among the Greeks. The geometry of areas plays an important part in the work of this school (e.g., Euclid I. 47), thus exhibiting the mode of evolution from its Egyptian empirical source. Again, "the Pythagoreans first severed geometry from the needs of practical life, and treated it as a liberal science, giv-

ing definitions, and introducing the manner of proof which has ever since been in use." Let us carefully remember that "one chief characteristic of the mathematical work of Pythagoras was the combination of arithmetic with geometry," culminating in the theory of proportion. "In this respect he is fully comparable to Descartes, to whom we owe the decisive combination of algebra with geometry." Allman says of this unifying aspect of his work: "We are plainly in presence of, not merely a great mathematician, but of a great philosopher. It has ever been so; the greatest steps in the development of mathematics have been made by philosophers."

Of equal importance with the question of the historical order of development of the *matter* of geometrical knowledge is a consideration of the attitude of mind of the ancients towards the subject, the spirit in which at different times they cultivated geometry, as art or science or both. First we find the Egyptians employing a crude empirical geometry for architecture and land-surveying, rendered necessary by the obliteration of landmarks caused by Nile floods. These approximate rules of thumb come to the knowledge of a people of higher intellectual calibre — the Greeks. Hence there gradually emerges the vague conception of the possibility of a *science* of geometry, in which clear, abstract definitions shall refine on mere sense-perceptions, axioms peculiar to geometry combine with axioms at the base of all reasoning, and thereby the empirical laws be absorbed once for all in rigorously deduced abstract theorems. Of course the emergence of all this was very gradual; *there was incessant action and reaction between the concrete and the abstract* (a fact of fundamental importance for education, remark). At length we reach a time when geometrical knowledge has assumed a perfectly abstract

form, become evolved into a science; we find it now in the hands of professional philosophers, who follow and value the study of it partly as an intellectual discipline, and partly out of scientific curiosity, but with no other motive. Plato (himself a student of geometry, though apparently not a specialist therein) appears simply to express a feeling common in his time when he denounces the application of scientific geometry to "vulgar handicraft" as demeaning to the science; and we all know the motto written over the entrance to his Academy: "Let none ignorant of geometry enter my door." To Plato and his attitude I shall presently return.

This divorce of geometrical science from the needs of common life must not be misinterpreted as a sundering of the abstract from the concrete; bearing in mind the presumed educational application of this epitome of the history of geometry, I lay great stress on the fact that, "side by side with the development of abstract geometry by the Greeks, the *practical art of geometrical drawing*, which they derived originally from the Egyptians, continued to be in use." The true significance of this must not be overlooked.

The ideal of Greek geometry may fairly be described as *construction under self-imposed definite limitations*. For example, as regards problems in a plane, from the abstract side of thought the attempt was made to solve all such by ultimate reference to the concepts, straight line and circle; from the concrete standpoint, all constructions were to be reduced to use of ruler and compasses only (the respective concrete embodiments of the ideal straight line and circle). In the former aspect geometry was entirely independent of mechanics, but in the latter dependent on it; but not for long can the two be separated without gravest danger to arrestment of the one as art and of

the other as science. Plato himself, not dreaming apparently of the possibility of the immense stimulus geometry was in future ages to receive from the needs of the mechanical art, advocated warmly the educational claims of geometry on its purely abstract side, condemning, in his prejudice, its alliance with the concrete. Despite, however, Plato's great influence, Greek geometers, wisely trusting their genius, constantly overstepped those limits which Plato and others would have imposed: we find them making experiments, constructing curves as loci of points got with ruler and compasses; and, finally, when the continuous description of certain curves demanded for the solution of problems—*e.g.*, the trisection of an angle—was seen to be impossible without an infinity of single points (out of the reach, consequently, of ruler and compasses), we find them inventing and using mechanical instruments and methods for the continuous description of these curves, precisely as a pair of compasses draws concretely a continuous circle.

In these tendencies, not to be suppressed, we recognize an affinity to the

genius of Newton—"At æquatio non est," he says, "sed descriptio quæ curvam geometricam efficit," and, in modern times, to Cayley's fondness for geometrical drawing and for the modelling of surfaces, and to Sylvester's interest in linkages. The condemnation of Plato's view and the admission of mechanical ideas to the sacred realm of mathematical science become decisive and final when we reach Lagrange, who expressly included mechanics (the concept now, of course, being infinitely wider embracing) as a branch of pure mathematics.

Plutarch tells us that the strictures of Plato had, at least, the unfortunate effect of retarding for long the development of mechanics. A precisely similar error we ourselves make in the mathematical education of our scholars. This remark suggests considerations that I cannot here develop.

Finally, we reach the foundation of the Alexandrian school of science (about 300 B.C.), where we first find in existence the full-blown professional mathematician, no longer a philosopher in the Greek sense of the word, but pursuing the science, not for culture, but for its own sake.

(To be continued.)

OUR NATIVE MAPLES.

ELLA M. POWERS.

NO trees during these early autumn days are more gorgeously attired than our native maples. Their brilliant colors of crimson, scarlet, orange and yellow are wonderfully attractive to the childrer, who gladly collect specimens and study their characteristics. Leaves should be collected, pressed, and mounted; also bark and twigs, the fruit, and specimens of the wood should be avail-

able to make the lessons of greater interest.

THE RED MAPLE.

One of the maples which early dons its gay autumn gown, and is the brightest of them all, is the red maple. We see its rich foliage from the damp northern forests southward to the lowlands of Florida and westward to the highlands of the Dakotas. We easily

recognize it by its reddish branches, the twigs of young trees being a bright dark red. The head of the tree is usually rounded and somewhat low.

The leaves are thick and make a dense shade, although variable in size. A close examination of the leaf shows there are three distinct divisions, sometimes five, although the lower lobes near the stem are very small. The hollows between the lobes are pointed and extend about one-third of the distance to the base of the leaf. The margin of the leaf consists of tiny saw teeth.

In August and early September the leaves are a bright deep red, and by the first of November the leaves have fallen. Often during the summer days we see a branch of brilliant scarlet among the green branches—evidently the flow of sap in that branch is arrested, an insect may have stung the stem, a worm may be gnawing at the pith, or some unseen living creature may be the cause of this brightness among the surrounding green.

The bark of the Red Maple is smooth and of a warm gray color when young, but in old trees it becomes furrowed, rough, easily cracks in scales and turns a brown color. Light gray lichens are often seen clinging to the bark of a red maple whose home is in a swamp.

The fruit of the red maple is ripe in September and is the smallest and most delicate of all maples. It is red, and found hanging in pairs from stems two or three inches long. The wings of the "keys" slightly diverge and are about one inch long.

The wood is hard and of a light color, having a reddish tint. Its grain is fine and compact and when the fibres are in wavy lines or "curled" it is highly prized, for, as the wood takes a fine polish, it is greatly valued in cabinet work.

WHITE MAPLE.

The white maple or silver maple, is a favorite shade tree, as it is most ornamental. This large, stately tree, one of the most graceful of the maples, is found from the Atlantic to the Indian Territory. Its long, slender branches spring from the trunk in an upward, rather than outward, direction at first. They spread at the top, then slightly droop.

In old trees the bark of the trunk and large limbs is rough and furrowed. The color is a dark granite gray inclining to brown. The smaller branches are smooth white, the young shoots are of a light green.

The leaves are among the most beautiful of our shade trees, the upper surface being a bright green, while the under surface is light, almost a silvery white. In these autumn days the leaves show varied colors of orange, scarlet and a purplish crimson. The leaves, on long slender stems, have five divisions, separated by sharp notches and tapering to a point. The edge is prettily and finely toothed.

In early summer the fruit ripens and now, in September, we find many a wayside dotted with the new seedling trees. The fruit is supplied with long, stiff wings, arranged in pairs and set at wide angles.

The wood is soft, white and light. It is not durable and so not highly prized.

ROCK MAPLE.

There is no grander maple than the rock maple or sugar maple tree. This grows in some localities over one hundred feet high, is erect and exceptionally symmetrical. In the region of the great lakes it attains its finest development.

Its lower branches, firm and stiff, lack the grace of the white maple's more slender branches. The bark of the young tree is an ash gray, light

colored and smooth, but when old it becomes dark, scaly, rough and deeply furrowed, and then assumes a gray brown. Greenish lichens are often seen in patches upon the trunks of old trees in the forests.

The leaf of the rock maple is easily distinguished from the others as it has no tiny saw teeth on the margin. This long stemmed leaf has five divisions, not deeply cut, and the notches between the lobes are curved. During these fall days the foliage on many of the rock maples is a clear straw yellow, on others it is a light red with orange tints. This gorgeous coloring depends upon different conditions of temperature and moisture. In old England there is no brilliant foliage to compare with that in the United States and Canada.

The fruit is of a pale yellowish green. The seed, ripening in September, is too late to grow little seedling trees the same season. The wings of the seed are about one inch long and are slightly curved towards each other.

The wood, of a yellowish tint, is much used in cabinet work. It is hard, compact, tough, fine grained and, as it takes a high polish, a satin-like lustre, it is greatly valued for interior finish in buildings and for furniture. When the fibres are knitted or twisted we get the beautiful "bird's eye maple." The wood is valuable for fuel.

No tree is more attractive to children than this sugar maple, for its sap, drawn upward and compelled to fill the long rows of buckets in our groves, soon yields the longed-for maple sugar. How many children have stood before these tapped trees counting the seconds by the drops that fall! Four gallons of sap will yield about one pound of sugar. One tree often yields thirty gallons of sap. Many of these trees are tapped annually for forty years.

To be able to distinguish these three varieties, regardless of the striped maple with its downy leaves so finely pointed and its striped bark and the mountain maple with its coarsely toothed leaves and small fruit widely separated, is to awaken new interest. After studying these ask such questions as :

What seeds ripen in early summer?

What species are valued as timber?

How is the white maple distinguished from the red maple?

Which maple has the most shapely and deeply-cut leaves?

Which maple leaf is without saw-teeth margins?

Which maple bears the largest leaves?

Which maple has the smallest fruit?

Which has the brightest leaves?—

Intelligence.

BIRDS.

NO animal displays so much power and instinct in its distant excursions as the bird; these have something really prodigious in them. It is only by the aid of accurate instruments and knotty calculations that the sailor trusts himself upon the sea, whereas our winged travellers, without guide or compass, and without ever losing their way, transport themselves from

the polar circle to the tropical regions. The cranes pass the summer on the stormy sands of Scandinavia, and the winter amid the ruins of the palaces of the Pharaohs.

The mechanism of birds is admirably suited to aid their rapid flight. Their aerial oars, moved by muscles of extraordinary power, easily adapt themselves to all the hazards of their pere-

grinations through the elevated regions of air. There are animals, as the swallow, for instance, to which flight is so easy that they seem to make sport of it. A passive force further assists their suspension in the plains of the atmosphere; air, rarefied by the warmth of the body, penetrates into all its cavities and even to the interior of the bones. Rendered thus specifically lighter, like balloons filled with warm gas, they float without effort amid the clouds. Such is the daring flight of those condors which launched themselves from the frozen summits of the Andes toward the sky, and soon disappeared from the sight of M. d'Orbigny, without one's being able to explain how they could breathe so rarefied an atmosphere.

The bird, though endowed with such a slight frame, nevertheless surpasses in strength the ponderous engines which glide along our railroads. Its vessels and fibres, notwithstanding their wonderful delicacy, work and resist more energetically than our heavy wheel-work and cast-iron tubes; in the one is seen the finger of God, in the other only the genius of man! Launched like an arrow into space, the bird, playing the while, silently clears twenty leagues an hour. A locomotive going at high pressure, enveloped in fire and smoke, attains the same speed only by consuming heaps of coke and water amid the infernal uproar of its wheels and pistons.

According to Sir Hans Sloane, the sea-mews which nestle on the rocks of Barbadoes take every day a journey over the sea of one hundred and thirty leagues, to amuse themselves and seek for food on a distant island,—the industry of the animal thus excelling that of man.

The migrations of certain birds are understood; we know whence they start, where they halt, and where they end their journey. Thus, for instance, in autumn, bands of quails,

which are emigrating, constantly arrive exhausted at the island of Malta, where they meet with fatal hospitality. They are taken in swarms in the streets of the town and on the roads, and as the inhabitants cannot consume the whole of this living harvest, it is sent to distant markets. The deck of the ship in which I left the harbor was laden with them.

During one of my wanderings across the Mediterranean, some strayed swallows happened, when we were midway between the two coasts, to fall totally exhausted on the deck of the frigate which was carrying me toward Africa. Every one on board, soldiers and sailors, overwhelmed them with attentions, which they received without exhibiting signs of fear. When they had at last recovered from their fatigues, they recommenced their journey toward the high regions of Senegal, and perchance rested beneath the cabins of savages long ere we had greeted the ports of Algeria.

But after long and perilous journeys these charming visitors of our dwellings return each year with touching fidelity to find their old domicile again. If the rains and winds have injured it, the architects quickly repair it before making it witness of their loves. Spallanzani has even noticed that the feathered couples become strongly attached to their particular nests. Having fixed parti-colored ribbons to the feet of some of them, he recognized them the year after, when they came to take possession again. He saw them return thus for eighteen successive summers. How many among us never enjoy such a long tenancy!

Less remarkable for the instinct which guides them than for the innumerable multitude of their army, the passenger pigeons traverse the forests of America in such compact masses that they absolutely intercept the rays of the sun, and cast a long track of

nadow on the ground. Their compact columns extend over such a space that the eye cannot take in the full extent of it. It has been calculated that it is often sixty leagues in length. The passing of these columns sometimes lasts three hours, and, as these birds travel at the rate of nearly twenty leagues an hour, their army must necessarily extend over fifty to sixty leagues of sky.

This immense host never travels by night; so soon as darkness overtakes them, they precipitate themselves breathless and exhausted upon the nearest forest, there to rest from their fatigues. Their legions accumulate in such numbers upon the trees that the great branches yield or break beneath their weight, and all the invaders are soon after composed to sleep.

The cold of winter drives most animals from the polar regions, and compels them to withdraw to countries

more favored by the sun. The penguins of the Cape alone seem to evade this universal law. These bird-fish being intrepid swimmers, are most at home in the midst of the ices or the roaring waves. They only haunt the shores of Africa in order to scoop out their nests, hatch their eggs, and rear their young. When the young have become sufficiently robust to support the fatigues of the journey, they all suddenly disappear from the African shores, and seek during six months of winter the frightful regions of the south pole, condemned to incessant struggles amid tempests and ice. But at the return of spring the penguins reappear in numerous troops, and encumber anew the banks now smiling with verdure, grouping themselves in long processions, seemingly occupied only in revelling in light and love.—*The Animal World*, D. Appleton & Co.

A NATIONAL OR CENTRAL BUREAU OF EDUCATION FOR CANADA.*

THE organization of a National or Central Bureau of Education for Canada has, I believe, become at last a practical question, and in accepting it as the topic allotted me at this auspicious gathering of Canadian teachers, I have the feeling that were it not for the inaptitude of the speaker it cannot be other than an interesting one. And there comes an echo from the past of this same old city in which we have been privileged to hold our convention, as there comes an echoing of the present from every nook and corner of this Canada of ours, which assures me that, if the organization of such a Bureau can be shown to be pregnant with the true interests of Canada as a community growing nationwards, there is spirit enough to be found among our public

men and their constituencies to demand that trial be made of it as a realizing practical force at the earliest moment possible. For what is there nearer to the heart of our *amour de la patrie* of the present than the hope that this country of ours may become more and more of a Canada to us,—what is there more likely to be eagerly examined by us as a consolidating people than some possibly neglected ethical force that perchance when rehabilitated will assure and perfect the consolidation? In these latter days so much is being said and written about Canada as a budding potentiality among the nations of the earth that the less poetic of us are somewhat diffident in approaching the theme. The great stretches of Canada's territory, the magnificence of her mountain scenery, the picturesque

*Paper by Dr. Harper, read at Dominion Educational Convention, Halifax, August, 1898.

grandeur of her spacious waterways and woodlands, the romantic charms of her hills and dales, and the sweet comeliness of her farmland homes, have all come to receive attention from our poets and *litterateurs*; and the story of her greatness *in esse* has become so far the foundation of the story of her greatness *in posse* that for me to expand on it here would be somewhat out of place in view of the special message I have been called to utter in your presence. And yet you will have to forgive me if I awaken, for the emphasis of my theme, that echo from the past which I have referred to as coming from this same old city of Halifax,—an echo that, as a prophecy, being fulfilled, must, I am assured, be all the more pleasant to your ears. With the thirty years' experience we have had of Confederation, it is perhaps easy enough for us to prophesy after the event, but, long before the Confederation agitation, there came to the various provinces a message uttered in words of fire by the greatest of Nova Scotian orators,—a message that has lost none of its charm as the veritable voice of fate itself, that would not be stayed, though the prophet who uttered it fought for a time against its fulfilment. From the vantage-ground of his marvelous influence, old Joseph Howe was believed then, as he is credited now, when he said: "You feel at every step that Canada must become a great nation, and at every step you pray most devoutly for the descent upon the country of that wisdom and foresight and energy which shall make it the great treasury of British institutions upon this continent, and an honor to the British name. All the lakes of Scotland thrown together would not make one of these great inland seas, which form, as it were, a chain of Mediterraneans; all the rivers of England, old Father Thames included, would scarcely fill the channel

of the St. Lawrence. There is a grandeur in the mountain ranges, and a voice in the noble cataracts which elevate the spirit above the ignorance and the passions of the past and the perplexities of the present, and make us feel that the great Creator of the Universe never meant such a country to be the scene of discord, but will yet inspire the people with the union, the virtue and the true patriotism, by which alone its political and social condition shall be made to take, more nearly than it does now, the impress of its natural features. Canada is a country to be proud of; to inspire high thoughts; to cherish a love for the sublime and the beautiful; and to take its stand among the nations of the earth in spite of all circumstances which oppose the growth and progress of a young country."

And, as a further emphasis to this fulfilling prophecy, is there one of us that cannot stand at his own doorstep and feel the *amen* of it, soothing as a patriotic song? Under my own verandah, in old Quebec yonder, right on the ground where the destiny of Canada was pledged in the death of James Wolfe (for I live on the Plains of Abraham), the *amen* of such a song sounds as frequently as elsewhere from Halifax to Vancouver. There, of a summer's day, "Nature hums its olden song, and plays with history's fingers to assure the tune," in presence of the "velvet charms" of St. Charles' Plain shut in by the old Laurentides, in presence of the holm-enclosing windings of Cartier's St. Croix in front, with an unwritten song in its every ripple, and in the hearing of the hum of the crowding streets of old Stadacona to the right, with a tale to tell in each of its landmarks. There, in presence of the best that Canada has to give of scenery and history, of the present and the past, there are few that would not fain to join in the anthem:

“Hail, beauteous shrine of nature, gay
 festooned
 With woodland grandeur, where the
 fervent soul
 May drink a draught from summer's
 rippling sheen,
 That's shed like sweet ambrosial odour
 mortalized !”

Or, seeking a homelier utterance and perhaps all the sweeter, there are few who would not be willing to join in the lusty chorus :

“Though other skies may be as bright
 And other lands as fair ;
 Though charms of other climes invite
 Our wandering footsteps there ;
 Yet there is one, the peer of all,
 Beneath bright heaven's dome,
 Of thee I sing, O happy land,
 My own Canadian Home.”

When the Fathers of Confederation were maturing and co-ordinating their opinions on the great question before them they had more than the opinions of the higher statesmanship to co-ordinate. There were constituencies in those days who fed themselves on the prejudices of self interest, just as there are constituencies of that nurture in all great movements, just as there may possibly be in the undertaking I have to advocate this evening. There were publicists in those days who prophesied ruin to the weaker provinces and tyranny by the stronger, just as there were those who lit up the prospect with the exaggerating light of their imagination which may have deceived and certainly bewildered thousands of voters. There were those who, in actively opposing the scheme uttered the most lamentable wails of loss of liberty, loss of trade, increased taxation and other calamities ; while there were those who, in promoting the change, joyously proclaimed it to be the panacea of all political and commercial ills. And, as the Fathers of Confederation sought to secure their

deliberations against the overwhelming tendencies of these outer prejudices that beset them, eliminations and additions had to be made in the constitution they had been called together to frame—at least so the wisdom that met in the old Parliament House at Quebec, in 1866, deliberated and decided. The Constitution as it left their hands was perhaps not what it ought to have been, but it was the best the times could be brought to countenance. And we of to-day, while loyally cognizant of the consolidation of interests it has produced, through the growth of the Canadian notion in our literature and statesmanship, are often compelled to ask why the Provincial notion has not by this time found its oblivion altogether in the Canadian nation. That there has been a drawing together of our interests as a consolidating people, a unifying of Provincial sympathies in a broader communal, no one can for a moment doubt. But when we turn to find, after the inductive method, the Provincial who is a Canadian first and a Provincial after, the Nova Scotian or New Brunswick trader who is more of a Canadian than a Nova Scotian, the Ontario man who does not even yet rejoice over Provincial aggrandizement and absorption, the Prince Edward Islander who does not fail at times to look upon the Manitoban or North-Western man as a kind of foreigner, we retreat from before our investigations and within the shelter of our own thoughts marvel at the phenomena of patriotism we have collected. And when I look at this assembly of teachers drawn, in theory at least, from all parts of our wide Dominion, and ask, as I have done repeatedly, why a teacher of the Maritime Provinces, east or west, has as weak a professional claim in the communities of the interior of Canada, and *vice versa*, as a French teacher would have in Prussia or an English teacher in France, I readily find the text from

which I have to preach this evening a practical and let me hope an orthodox discourse—a discourse which at this point is fittingly illustrated by the doubts which a certain beadle had about the orthodoxy of his fellow-parishioners.

There is temerity, perhaps, though no lack of loyalty, let it be understood, in my hinting at imperfections in the British North America Act. Constitutions would be amended much more frequently were it not for the awe that hangs around them; and yet, when I say that the British North America Act is not a complete embodiment of all the unifying forces that tend to make a nation, there is no disloyalty in my statement towards the union or its constitution, not even a desire on my part to advocate any change in its clauses, or any longing on your part, I hope, should you join with me, for anything in the shape of a revolution. The organization of a National or Central Bureau of Education for Canada, let me here say as emphatically as words can emphasize, may be accomplished without any change in the constitution of the country or infringement of the rights of any province; and if it come to be recognized as a substitution for a constitutional element, eliminated or suppressed in 1867, whereby the common school was relegated to the provinces and can never now become a national institution, then surely there are two very strong reasons for the support of my thesis, especially on the part of the members of an association that has been organized on a national or inter-provincial basis as ours has been.

And here I may say that just as I was in the act of writing the last sentence the mail unexpectedly brought to my hand—a strange coincidence, you will say—the last volume of the report of the Commissioner of Education for the United States, and when you learn that it is the report of the

National Bureau of Education at Washington you will at once understand how much of a satisfaction it was to me to receive it. It comprises a volume of over eleven hundred pages, and I have only to tell you that the Bureau, over which Dr. Harris so worthily presides, has no more of a constitutional oversight of the State school systems than the Department of Agriculture at Ottawa has over the functions and activities of the Departments of Agriculture in the various provinces, and then proceed to place a copy of the report in question in each of your hands, in order to convince you that a National or Central Bureau of Education at Ottawa is of a truth a consummation devoutly to be wished for. And here, on the principle of providing a model for the moment, it may be as well to look at the constitution of the Washington Bureau and the influences that led to its organization.

The relationship between the Washington Government and the States' Governments is not altogether identical, as you know, with the relationship between the Ottawa Government and the various Provincial Governments. In the matter of education there are many differences, for the Federal Government has more than once come to the direct assistance of the schools of the various States in more ways than one. For instance, in 1876 the Government at Washington distributed forty-two millions of dollars among the schools of the various States then existing, while no less than ten millions of acres of land have been apportioned in behalf of education, and large sums spent on the schools for the colored population in the South, for the Indian schools, and towards the educational development of Alaska. Our own Federal Government has not been altogether behind-hand in making provisions of a kindred character, and, on this account, we have the very

strongest hopes that it will go further and take a leaf out of the book of educational enterprise at Washington in the organization of a Canadian Bureau of Education.

In 1867, the year of our own Confederation, the Bureau of Education of the United States was organized under the Commissionership of Dr. Henry Barnard, as a sub-Department of the Department of the Interior; and when one considers the interblending of educational influences that has taken place since its organization and how it has brought about the nearest possible approach to "one country, one educational prestige," the United States is ever likely to see; and when one considers, with all due loyalty, how far we in Canada here are still from a truly national consolidation even after thirty years of Confederation, and how effectually the common school brought under co-ordinating influences and wider national sympathies can be made a nursery for the true patriotism, it is our duty as teachers, it is our duty as Canadians, to plead for the organization of a like institution in our own country.

And, open though I may be to a charge of repeating myself, I may further say that to advocate a national system of schools for Canada now is to shut our eyes to the constitution of our common country and the provincial rights and interests it protects. The establishing of a national system of education for Canada means revolution, and, as my friend Dr. Parkin may tell us, we are hardly prepared for a revolution; that is, if it should eventuate in our *going it alone*. In the organization of a Bureau of Education for Canada there is not, as I have already said, the least tendency towards revolution, its functions being for the most part missionary and its administration *ex officio*. All that would be required would be a vote for its support as a sub-Department under any

of the great Departments at Ottawa with liberty to work out its own destiny of usefulness, as has the Bureau at Washington — a great co-ordinating force in the educational affairs of the Dominion. As such a force it would neither be over nor under any Provincial authority, perhaps not even advisory in an official sense, yet bringing about by judicious and justifiable means an assimilation of Provincial educational necessities and pedagogic affinities that would eventually bring all the teachers of Canada, and, through them, the rising generation, to see the Provincial shading away into the Federal, into the national.

And if, after what I have said, and what may be said in the after discussions on the subject, you as a Dominion Association care to appoint a committee to take charge of this matter and press it upon the Federal authorities as a practical question, your memorial would not differ materially from the memorial presented to Congress by the educationists of the United States urging the organization of the Washington Bureau, and which I venture to give here as a concrete setting forth of what our Bureau at Ottawa might be expected to accomplish. It is as follows:

"It was the unanimous opinion of the Association that the interests of education would be greatly promoted by the organization of such a Bureau at the present time; that it would render needed assistance in the establishment of school systems where they do not now exist, and that it would prove a potent means for improving and vitalizing existing systems. This it could accomplish:

"1. By securing greater uniformity and accuracy in school statistics, and so interpreting them that they may be more widely available and reliable as educational tests and measures;

"2. By bringing together the results of school systems in different com-

munities, states and countries, and determining their comparative value ;

"3. By collecting the results of all important experiments in new and special methods of school instruction and management, and making them the common property of school officers and teachers throughout the country ;

"4. By diffusing among the people information respecting the school laws of the different States, the different classes of school officers and their relative duties, the various modes of providing and disbursing school funds, the qualifications of teachers, the modes of their examination, and the agencies provided for their special training, the best methods of classifying and grading schools, improved plans of schoolhouses together with modes of heating and ventilation, etc.—information now obtained only by a few persons and at great expense, but which is of the highest value to all entrusted with the management of schools ;

"5. By aiding Committees and States in the organization of school systems in which mischievous errors shall be avoided, and vital agencies and well-tried improvements be included ;

"6. By the general diffusion of correct ideas respecting the value of education as a quickener of intellectual activities, as a moral renovator, as a multiplier of industry, and a consequent producer of wealth, and, finally, as the strength and shield of civil liberty."

And with this memorial as a foreshadowing of what the councils of this Association may accomplish—an Association that had its birth, let us hope, in the desire for a broader federal communing one with the other over school interests and educational advancement—I may be permitted to indicate in a final practical word what we teachers may expect from our own Educational Bureau. Its primary object would of course be the collecting of statistics

and facts for the purpose of showing in a concise and comparative form the progress of education in the several provinces. We want to know more of one another and our ways of doing things, since the civilization and patriotic pride we boast of as ours demands that we should provide ourselves and our children with the best of everything that is going. Why should the Nova Scotian system of schools be accredited, for long, with excellencies which ours of Quebec are said not to possess; or why should there be any deficiencies real or theoretic in the school systems of Prince Edward Island and British Columbia when brought into comparison with those of Ontario and Manitoba? Should educational progress among us know any provincial boundary line? Are the essentials of a good school system not the same for New Brunswick as for the North-western Territories? Is the science of education founded on the eternities or on the conventional? Are the principles of pedagogy qualified by climatic differences? Is there anything in the physical or intellectual build of the Nova Scotian teacher that unfits him to take charge of a school in Ontario? Let us endeavor to answer these queries, and through the answers discern the neglected nationalizing force which the organization of an Educational Bureau for Canada may revive amongst us, when once the genius of our common school education is turned in a large measure away from the narrowing influences of a provincial bias into the hands of the broad-minded Canadian teacher and educationist.

And yet there is a higher function for the Bureau of Education, as Dr. Harris's last report shows from his table of contents and scholarly articles. In that report there are to be found articles on Education in Great Britain and Ireland, in France, Nor-

way, Denmark and Central Europe ; Commercial Education in other countries ; the Teaching of Civics in Switzerland, France and England ; Education in Greece ; Sunday Schools ; the Curriculum of the Land-Grant Colleges ; the Legal Rights of Children ; the Study of Imitation ; Horace Mann and the Great Revival of the American Common School ; Henry Barnard ; Report of the Committee of Twelve ; Entrance Requirements for Engineering Colleges ; Early History of the Kindergarten ; some recent Contributions on Biology, Sociology, and Metallurgy of Colleges for the Benefit of Agriculture and Mechanical Arts. And, when you read that report for yourself or any of the previous reports, I venture to say that it will be pleasant for you to note that, in these articles and the investigations on which they have been founded, the faddist has been permitted to have no part. The object of such a collaboration is to give a knowledge of other systems, so that teachers and educationists, comparing their own experiences and deficiencies and fallacies with the experiences and investigations of others, may arrive at the highest of all knowledge which gives them the power to suggest and direct. Under the able direction of Dr. Harris, the pedagogic necessities are ever held paramount by the Washington Bureau. With it the true function of the school is ever kept in view. And we can hardly think otherwise than that our Canadian Bureau, when organized under like wise and benign counsels, will not only lead to the elimination of the deficiency in our school systems, and the

implanting of the efficient, but will tend to make of our teachers and our schools what they ought to become, more and more every day, agencies in developing that community of thought and feeling which has the minimum of a provincial *penchant* about it. In the longing which some have for a republic on the St. Lawrence there is no political significance in our times. Our children's children may not live to have it, if some of my friends on the platform here should have their way. But what is there to prevent us all from longing to hear of the organization of a Canadian institution which, while disturbing no provincial rights, nor even turning the hair of a provincial prejudice, will undoubtedly bring us as teachers nearer and nearer to a true recognition of educational eternities that make for the development of the higher intellectualities, and moralities and of the brotherhood in which the true patriotism lives and breathes and has its being. And, when the experiences of the ethical force thus to be inaugurated comes to be written off in the history of our coming national aggrandizement, not one but thousands of our poets will be able to sing with no inflation in words :

My birthright land a debt of song I pay,
 A debt of love that lieth on my soul,
 When memory draws the veil of bygone
 day,
 And olden music greets the lifting scroll ;
 A tribute to thy freedom's faith I bring,
 The piety that scents the globe I sing,
 Thy purple hills whose silver mists unroll
 The wavering gold of dawn, thy lowing
 plains
 And maple banks and braes where hamlet
 meekness reigns.

THE GRAVE-TREE.*

Let me have a scarlet maple
 For the grave-tree at my head,
 With the quiet sun behind it,
 In the years when I am dead.

Let me have it for a signal,
 Where the long winds stream and stream,
 Clear across the dim blue distance,
 Like a horn blown in a dream.

Scarlet when the April vanguard
 Bugles up the laggard Spring,
 Scarlet when the bannered Autumn
 Marches by unwavering.

It will comfort me with honey
 When the shining rifts and showers
 Sweep across the purple valley
 And bring back the forest flowers.

It will be my leafy cabin,
 Large enough when June returns,
 And I hear the golden thrushes
 Flute and hesitate by turns.

And in fall, some yellow morning,
 When the stealthy frost has come,
 Leaf by leaf it will befriend me
 As with comrades going home.

Let me have the Silent Valley
 And the hill that fronts the east,
 So that I can watch the morning
 Redden and the stars released.

Leave me in the Great Lone Country,
 For I shall not be afraid
 With the shy moose and the beaver
 There within my scarlet shade.

I would sleep, but not too soundly,
 Where the sunning partridge drums,

Till the crickets hush before him
 When the Scarlet Hunter comes.

That will be in warm September,
 In the stillness of the year,
 When the river-blue is deepest,
 And the other world is near.

When the apples burn their reddest
 And the corn is in the sheaves,
 I shall stir and waken lightly
 At a footfall in the leaves.

It will be the Scarlet Hunter
 Come to tell me time is done ;
 On the idle hills forever
 There will stand the idle sun.

There the wind will stay to whisper
 Many wonders to the reeds :
 But I shall not fear to follow
 Where my Scarlet Hunter leads.

I shall know him in the darkling
 Murmur of the river bars,
 While his feet are on the mountains-
 Treading out the smouldering stars.

I shall know him in the sunshine
 Sleeping in my scarlet tree,
 Long before he halts beside it
 Stooping down to summon me.

Then fear not, my friends, to leave me
 In the boding autumn vast ;
 There are many things to think of
 When the roving days are past.

Leave me by the scarlet maple,
 When the journeying shadows fail,
 Waiting till the Scarlet Hunter
 Pass upon the endless trail.

EDITORIAL NOTES.

Deliver not the tasks of might
 To weakness, neither hide the ray
 From those, not blind, who wait for day,
 Tho' sitting girt with doubtful light.

“That from Discussion's lips may fall
 With Life, that, working strongly, binds—
 Set in all lights by many minds,
 So close the interests of all.”

The people of New Brunswick will be pleased to learn that the Freshman Class entering this year is the largest that has ever entered the University of New Brunswick.

The report is current that after the sub-examiners had finished their work of reading the answers of candidates in the arithmetic paper this year, at the mid-summer examination of the Edu-

*From "By the Aurelian Wall and Other Elegies." By Bliss Carman. Lamson, Wolfe & Co., Publishers. Price \$1.

cation Department, Ontario, and had plucked fifty-seven per cent. of the number of those who wrote for any part of the Junior Leaving Examination, the authorities of the Department took the report of the examiners, and passed anyone who obtained 25 per cent. on the arithmetic paper. Who the authority is the report does not say. We are informed that the sub-examiners were not consulted in regard to this mode of dealing with their report. This manner of dealing with such blunders is in a way of becoming historic. To remedy the evils caused by such papers, the Department has repeatedly adopted the convenient expedient, though a very misleading one, of lowering the usual percentage required to pass in the subject on which the paper was set. It is needless to say that the remedy is quite inadequate. To use a common phrase, we are "tired" referring to this unpleasant matter year after year. We are sure the people of Ontario, especially the teachers thereof, would be pleased to hear from the minister an explanation of this irritating phenomenon. Has he yet thought of calling to his aid the lady teachers of the province? Perhaps they by their skill and patience might be able in a short time to pull us out of this examination muddle. A word from the Minister on the repeated failures of securing reasonable and fair examination papers is in order. Mr. Coombs' article, in this issue, makes it plain that the same tendency to carelessness, or undue haste in the preparation of examination papers, is to be found among those responsible for the papers set for the Public School Leaving Examination. We feel ourselves compelled to ask "Are these men paid for their services?"

In the discussions that appear in the pages of THE CANADA EDUCATIONAL MONTHLY from month to month on the subject of school examina-

tions, it is remarkable how few of our prominent teachers care to take open part in the consideration of such an important topic, notwithstanding the fact that our columns are always free to them. In the address of the Minister of Education, which we published last month, a direct reference is made to the study of arithmetic as a home task, and there is surely no teacher in the land who will not commend it as a point well taken, when every phase of the question has been carefully examined. The teacher who requires a pupil to commit to memory anything which he does not understand is one who has failed to catch even a glimpse of what the true education means, and a teacher who confronts a pupil with discredit marks because he has failed to solve a problem all by himself, after hours of labor, has surely something of the unthinking task-master about him. But when the examiner, the gentleman who prepares the annual examination papers, attempts to puzzle children with problems that come within his sphere of what "may be just a little difficult," he certainly may safely be ranked as one who does not know his business. The cry against the arithmetical puzzles prepared for pupils on their way to the university is not confined to the Province of Ontario, though the other provinces, it would seem, found their grievance upon the inclination they notice in their school examiners to imitate the arithmeticians of Ontario. The example they say has been set by Ontario, and, unless the arithmetic papers of Ontario come to be modified at an early date, it is all but certain that the "problem craze" will run its impracticable course from Halifax to Vancouver, like an epidemic that leaves its victims behind it as it passes from district to district. Difficult problems, Dr. Ross has wisely said, should never be assigned for home study, and, were he only to say further that puzzling problems should

never have place in an examination paper set for children, he would not fail to raise a shout of applause from thousands of parents and teachers. Practice in speed and accuracy in the elementary rules are quite defensible, says the Minister, but had he used the word "indispensable" and emphasized it he would have been nearer the truth and possibly nearer his own wish in the matter. There is hardly a week in which some poor, luckless youth does not find the arithmetical puzzles of the text-books of no service to him in his daily counting-house work—not a day in which he does not wish his teacher had given more attention to a ready manipulation of figures and less to the arithmetical equation about which there is such a ridiculous lack of an everyday look. Ontario has gone too far in this direction, and the other provinces are fast following in her wake. Are the teachers going to say halt, or have they become as infatuated with the craze as the examiners?

Last month we made space for Dr. Harrison, and, while it is pleasant to learn that the New Brunswick University is making some progress, we regret that its president has thought it prudent to impugn our motives in referring to the history of the institution over which he presides. What we said about the New Brunswick University was no "old woman's fable," but common hearsay in that province at the time of the writing of our articles, as President Harrison may find out by perusing the newspapers and periodicals of St. John and Fredericton. We are glad to notice that it is the intention of Dr. Harrison to bring the institution more in touch with the general educational system of the province through his own personality, and that was all we pleaded for. If the doctor will go a step further, and bring his institution more in touch with Canadian affairs, he will then certainly

do all that any one could expect of him. We wish the institution every success under the policy that has just been inaugurated, and hope to hear that New Brunswick University has at length recognized that there are distinguished Canadians outside of New Brunswick who would do honor to the university were their sympathies enlisted in its behalf.

Prince Edward Island has a Teachers' Association of its own and its annual convention is being held this month. The history of the educational movement in the little province in the Gulf is full of interest, and it is our intention to give some attention to its affairs as we obtain the necessary information. We shall be glad to hear from correspondents in that section of our wide extending country.

The echoes from the Halifax convention are still being heard from various parts. Dr. MacCabe's idea of assimilation of examination standards was a fitting corollary to the address of Dr. Harper in behalf of a Federal Bureau of Education. We publish Dr. Harper's address this month, and expect to present some of the other papers read at the convention from month to month. The question of a Bureau of Education is being carefully considered by the newspapers, and there seems to be growing a general verdict in its favor. Our readers would do well to examine the terms on which it is proposed to organize such a sub-department, and the beneficial results that may naturally be expected to arise from it. Some have raised minor issues, such as the expense of the work, and the difficulties that would lie in its way, but no useful organization has ever run its course without meeting difficulties in its way, and, in our opinion, the expense would be money expended in the highest and

noblest works in which, as Canadians, we could be engaged—in the consolidation of our country as one people and one nation.

NOTES AND COMMENTS.

PROF. JOHN EARLE talks thus in *The Educational Review* of Madras, India, in the August number :

Those who recognize the importance of English grammar fall into two classes, according as they follow either the old scholastic tradition, or seek new lights in the modern development of philological learning. Both of these have missed the tree of philological learning. Both of these have missed profitable paths.

The man who sits down to make an English grammar has to face this practical question : Shall I furnish the student with a set of authorized phrases, shall I prescribe what to choose and what to avoid in diction, pronouncing *ex cathedra* upon all points of divergent practice, such as the split infinitive, pendant particle, and so forth? Or, shall I pass before him the whole grammatical movement, in all the length and continuity of its operation, and thus furnish him with the leading data for the exercise of his judgment and the cultivation of his taste?

In specific rules about diction there is not much to open the mind, not much of educational value ; and, if our current grammars are mostly concerned with such things, this has not come about as the result of a mature experience, but it is the natural consequence of certain casual antecedents, combined with the neglect of inquiring after a better system. The scholastic English grammars simply follow tradition, and, if we trace back the tradition to its source, we come to the Latin grammar, upon which our first English grammars were based. This was

necessary and unavoidable at the first ; but the influence of the model lasted too long, until it exercised a baneful restraint upon the development of a genuine English grammar. Latin is a dead language and English is a living language ; and this is a vital difference for the matter under discussion. The Latin declensions and conjugations are forever fixed. So are all the laws of Latin syntax, and the canons in classic taste in phraseology and composition, and, therefore, the Latin grammarian may safely deal in precepts, and prohibitions, because classic Latin cannot change, and a rule that was good in the sixteenth century is good now and always. But English lives and grows, and he who would teach English grammar must frame his operations accordingly. If he lays down many precise rules, his rules may be left behind by new and enterprising writers, like Thomas Carlyle and Matthew Arnold and Mr. Grant Allen. His business, then, is to inform and cultivate the grammatical instinct of the scholar, and exhibit the usage of good authors in such a manner as may best serve to exercise the judgment of the learner and develop a sound grammatical taste.

In education, the teacher of English is advised in the following kindly way by Samuel Thurber :

Give yourself no more compositions to read than you can read day by day. Learn the sorts of mistakes that your pupils make, and sometimes speak of these, if the pupils are old enough to care to listen to you. See individuals by themselves, and make sure that each is anxious to win your praise. You may praise very young

children without making them conceited; and, if you praise as often as possible, you provide yourself with a most formidable weapon of censure in simple abstinence from praise when it is not deserved.

It is of no use to correct young children's work in detail. Why should not the boy or the girl be allowed to write in the boyish or girlish way, as well as to speak in the boyish or girlish voice, or to move, to sing, to dance in the boyish or girlish way? The pedant corrects young compositions into mature forms—a ridiculous and useless labor. You will distinguish between things positive, like spelling, which are distinctly right or wrong, and things relative and elastic, like the choice of words and phrases, which are good or bad according to season and place. Spelling and punctuation and capitalization are as rigid as mathematics. It is ridiculous for a great boy or girl not to know how to distinguish "to" and "too," to put s's in "disappear" and "disappoint." But for precocious conventionality in style I have no praise. Be chary of correction. By correcting too much you may easily check spontaneity; and spontaneity in the child is to the teacher of English precious above all things else.

Lord Balfour visited Paisley on Wednesday. The principal object of his visit was to open a new grammar school, which has been erected for the burgh at a cost of £40,000, of which sum £15,000 was contributed by the trustees of the late Mr. W. B. Balfour, who was for many years the representative in Parliament of the constituency.

In opening the school, Lord Balfour first considered the work which lay before the Scottish Education Department when it first obtained a separate constitution in 1885, and said that during the last ten years the cast-iron rigidity of codes had been much relaxed, the initial step in that direction

having been taken by the Scottish Education Department. In 1888 payment on individual examination was entirely abolished for the lower half of Scottish schools. This rested upon a sound principle—that the individual test should be imposed at the end of a school career—and he claimed for it that it had been entirely successful. From that first step the Department had steadily advanced. Their latest action was set forth in a circular (223) issued on August 11th last, describing the new method to be followed in inspection, the greater responsibility to be placed on school authorities, and the inducements that were to be held out to pupils to aim, not at the minimum labor certificate, but at the merit certificate, as the goal of their school career. The introduction of the elementary education had undoubtedly created a sharper line of demarcation between elementary and secondary education, and had led to a general opinion that all the education which ought to be given at the public expense was that which was free, and that anything beyond was for a privileged class. Those were results which he greatly regretted. They had in late years done much in the way of making education free; some desired that they should go still further. He did not say it ought never to be so, but in the meantime he thought they had gone far enough, and that it was their primary duty, not to fritter away educational resources, but to do all they could to make the range of education wider and its standard higher. After referring to the recent history of Scottish secondary education, Lord Balfour said that in April, 1897, the responsibility for agricultural education, and this year science and art administration, had been transferred to the Scottish Education Department. The latter step could only be accomplished for England by legislation, and it was one of the chief features in a

bill which had been issued for the purpose of eliciting expressions of opinion, preparatory to more active steps next year. He would like to remind them of the field of operation which now lay before the Scottish Education Department. He was the more anxious to do this as there were signs that their position and efforts were attracting attention outside Scotland; a few days ago, for instance, there was a very appreciative notice of their work in the *Times* newspaper. It was evidently written by someone who had caught the spirit in which they wished to work, and it showed much knowledge of the problem that lay before them. Not only the supervision of all elementary education, but that of all secondary education, belonged to the Department. The Technical Education Acts were now administered by it, and all the grants for science and art came within its range. It was their duty to see how both art and science might enter into general education; how each might be developed as part of a sound educational curriculum; how they might be most usefully adapted to the varying requirements of each locality; and how, above all, they might enlist the interests of the leaders of various industries in advancing either the scientific or the artistic instruction that might help the community with which they were connected. They were not going to regard only a certain number of passes, in various branches of science or of art, as the things which they must encourage and pay for. They proposed to keep steadily in view two grades of schools—the elementary and the secondary. These could not assume one another's functions without mutual injury. They wished to make secondary schools available for all whose circumstances or whose talents made it expedient that they should take advantage of them. There was no difference of opinion as to the ends

amongst those who took an interest in the subject. But there was a difference as to the means. He was not prepared, either on behalf of himself or of the Government, to give his adhesion to the new doctrine of free secondary education. He thought it was best to keep the fees; but to provide free places and bursaries so far as there was a real requirement for them, and so far as it could be done without crippling the school. The first and most important thing was to have first-rate and well-equipped schools. Personally, he preferred the proposal of the original memorandum issued by the Department in 1892, which aimed at a moderate average fee. In secondary education one condition of a grant should be a limitation of fee to a sum which could fairly be faced by a middle-class parent. If a school provided for a class who could pay a higher fee, then it had the less need of State assistance. As regarded the elementary schools, they had now come to recognize that the school must be judged chiefly, not by the individual results in all its classes, but on what it could accomplish for its pupils before they left. The school authorities should arrange and classify as they thought best. The real aim was to be, not the labor certificate, which was only a loophole for those whose circumstances made longer attendance impossible, but the merit certificate, which opened the door of secondary education. They should discourage a long string of specific subjects. That might be a matter of cram. What they should ask was really a higher educational aim. As regarded the new grant of about £35,000, under the Local Taxation Account Act, he was asked to promise legislation and to postpone action until that legislation was passed. Without saying that legislation might not hereafter be expedient and even necessary, he had declined to tie his

hands by saying he should do nothing without it. The Department would proceed tentatively, careful that no vested interests be created. They would do all they could to proportion the shares of that grant to the amount of local effort which was made. But they had definite aims of much urgency which they were unwilling to delay. Agricultural institutions were claiming increased aid. Schools of navigation might be established on a wider basis. They had already offered grants to higher-grade science schools, and they were anxious to give some encouragement to schools of a similar grade which had a more directly commercial aim. Besides this, they would

like to recast the system under which specific subjects were taught. They had carried on the inspection of higher schools under severe difficulties and with narrow resources, because the cost had been defrayed from the money accruing under the Act of 1892. With the new sum available they hoped to be less hampered in the work and to make the leaving certificate examination include scientific subjects. He claimed that they were able to put forward a wide-reaching scheme, and to indicate pretty clearly how they meant to carry it out. If legislation should be necessary, he should not hesitate to propose it.—*School Guardian.*

CURRENT EVENTS.

A much more sensible proposal, and one which found general support in the Synod (Anglican), outlines an improvement in the teaching done in Sunday Schools. Recognizing the improbability of introducing further religious teaching into the Public School system, all Protestant clergymen might with good results devote themselves to the improvement and extension of Sunday Schools. It is doubtful, however, if they will ever reach a high standard of efficiency until a paid manager or superintendent is employed. Take, for instance, the Anglican, Presbyterian, Methodist or Baptist Sunday Schools of Toronto, do they—though their mission is held by the churches to be much more important than secular education—compare either in teachers or in management with the day schools? Each of the bodies named is strong enough to employ a first-class superintendent to look after all the city schools of the denomination, and the burden would not be heavy if a thoroughly experienced teacher were paid to conduct each school. There is as good reason for

paying the manager of the Sunday School as there is for paying the pastor of the church, for one is as thoroughly a spiritual affair as the other. No one is permitted to teach in a Public School who has not obtained a certificate of qualification and received instruction in the art of teaching at a Normal or Model School. Why, then, should young people who seldom know much of religion and often nothing of teaching or disciplining a class be entrusted with the imparting of a knowledge of sacred things? If, as the Synod holds, it is so desirable that religion should be taught in the day schools, it is certainly still more desirable that it should be properly taught in the Sunday Schools. That it is properly taught or that anything is properly taught in the majority of the Sunday Schools is extremely doubtful. Moreover, a lack of appreciation of the instruction of children in religious matters is plainly shown by the carelessness and slipshod management of the Sunday Schools, and it cannot be hidden by the unctuous utterances of clergymen who demand that the Public

School teachers, irreligious though they may be, shall do properly that which is improperly done or left undone by the so-called religious people themselves. Before further demands are made for religious teaching in the Public Schools every denomination favoring such a change should prove that it means something besides shirking its own proper task.

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This can be proven by having Sunday Schools which mean something more than congregating the children together to hear a couple of prayers, sing two or three hymns, read or recite a few verses of Scripture, and after a noisy session scamper home. The accommodation provided is very often entirely unsuitable; the maps and materials to be used in teaching are either absent or utterly inadequate, the discipline lax, and indeed the power to punish an unruly child without expulsion almost entirely withheld. Many of the teachers take a class for the "fun of the thing"; it is not unusual for superintendents to be lacking in both piety and ability to teach or procure or direct good teaching. But all these deficiencies have been recognized and permitted to exist year after year, while many of the ministers, instead of devoting their energies in reforming the Sunday Schools, have satisfied their consciences and their congregations by occasionally clamoring for religion to be taught in the Public Schools.

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There would be no complaint from the taxpayers if the buildings used for the day schools were used on Sundays

by the religious denominations, singly or in unison, for the purpose of teaching religion and helping the ignorant, whether old or young, to learn to read the Sacred Book for themselves. If the denominations united they could employ first-class teachers for a trifle—indeed, many professional and business men who have been teachers would volunteer two or three hours service for the work if Sunday Schools were to be taken seriously—and in this way intelligent and approved methods would be employed in instilling into the youthful mind the necessary knowledge of the Bible, sacred history and the moral law. Instead of dragging children to church to hear sermons that they do not understand, they might be sent to such schools with the very best results. Now that the Synod has taken the matter up, other churches in their great gatherings should consider it also and see if they can excuse themselves for their inexcusable neglect in providing proper Sunday School facilities. It is useless to cry out that such Sunday Schools as I have outlined would be too much trouble; to Christians there cannot be too much trouble when souls are concerned and youthful education in sacred matters is to be imparted. Perhaps, if more money were spent on starting the children right, less would have to be expended on inducing people to act properly later in their lives; and, if children were gathered together on Sundays to hear simple lectures from the professors in the colleges and learned men of the Church, they would sooner recognize their responsibility to their Maker and to one another.—
Don, in Saturday Night.

MAGAZINES.

Scribner's Magazine has been most successful in the past in securing artistic covers that have been characteristic not only of the season of publication but of the genius of the magazine. They have never been more successful than in the October issue. There is still little to be found in the more popular magazines beyond articles and stories of war; besides such provision we find in *Scribner's* an excellent instalment of *The Workers*, which, unfortunately, is nearing its conclusion, and an equally pleasing portion of *Red Rock*, a serial of unusual merit.

The Bookman, in its monthly issues, succeeds in commenting upon an extraordinary number of books and events. The September number is no exception to this rule. Prof. Peck himself brings the average up to an astonishing point, and he is assisted by such well-known writers as Beatrice

Harraden, who contributes an article on Mrs. Lynn Linton, Gelett Burgess, Brander Matthews and George Merriam Hyde, besides many other regular contributors. *John Splendid*, a novel by Neil Munro, which is attracting a considerable amount of attention, is at present running in *The Bookman*.

The Ladies' Home Journal publish in their October issue an exceedingly entertaining account of Mark Twain, with a number of illustrations, including portraits of the author's cats. There is also a most interesting article on the life of Richard Wagner, by Houston Stewart Chamberlain, the author of the *Biography of Richard Wagner*. There is an astonishing amount of advice to young women in this issue, and incidentally a good deal to young men. It is hoped both classes will profit by it.

ASTRONOMICAL NOTES.

THE announcement that a change has taken place in the great nebula in the constellation of Andromeda comes from a very reliable source, the Pulkowa observatory, where one of the three or four largest telescopes in the world is erected. If it turns out to be quite true, the importance of the discovery cannot be overestimated. Ever since La Place's time astronomers have asked themselves, is there any nebula in the heavens now that shows any stage of the process outlined by the nebular hypothesis? The objects of this class known to us are mostly very irregular in shape, and among those which are compact and round there is still no appearance of a central condensation. If, then, a single one of the nebulae shows this phenomenon it will be very

substantial evidence that the theory is correct. In some of the photographs of the Andromeda nebula there is the appearance of separation rings, but the centre has always been shown as a great mass of gaseous matter. We will hope that the announcement is correct, and that we have now evidence of the "cooling and condensing" demanded by La Place's famous hypothesis. Andromeda is now in good position for observation in the eastern evening sky, but, of course, small telescopes show the nebula only as a patch of hazy light.

Venus reaches her greatest brilliancy on Oct. 26th, and is then in the crescent phase, about one-quarter of the disc illuminated. The nearness to the earth much more than compensates for the part of the disc obscured as the

planet comes into "new moon" position. The disc is now forty-two seconds of arc in diameter, very much larger than that of Mars at his nearest. The observer at the telescope learns how tantalizing it is to look at Venus, remembering how close the planet is, and then finding it impossible to make out satisfactorily any clearly defined markings on the disc.

In the path of the October full moon lies the Pleiades group, observers in northern latitudes having an opportunity of seeing a beautiful series of occultations. Here the effect of parallax throws the moon too low. There will be an occultation of two of the stars in the constellation Pisces on the evening of October 25th, visible in Ontario, about eleven hours thirty minutes. The moon will be then ten days old, and consequently the stars disappear on the darkened limb, and, though of magnitude respectively of four and six, should be seen very well in a field glass.

Those interested in meteoric displays will be preparing to systematically observe the Leonid meteors due on November 13th; there will be no moon at that time, and, if we are favored with a clear, star-lit sky, the meteors will be better seen than in 1899, when the earth plunges into the thickest of the swarm. Of wandering meteors, astray, perhaps, from their companions, the most brilliant that has ever been noted in this country was seen on July 5th, as most of our readers are, no doubt, aware; it may be of interest to note that the president of the Astronomical Society has collected about one hundred reports of observation, and from a study of these hopes to be able to present a complete history of the object, having reference to point of entering the atmosphere, track pursued, size, degree of luminosity, and where it fell. If this can be done, and it is well worth trying, the record will be practically unique.

THOS. LINDSAY, Toronto.

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