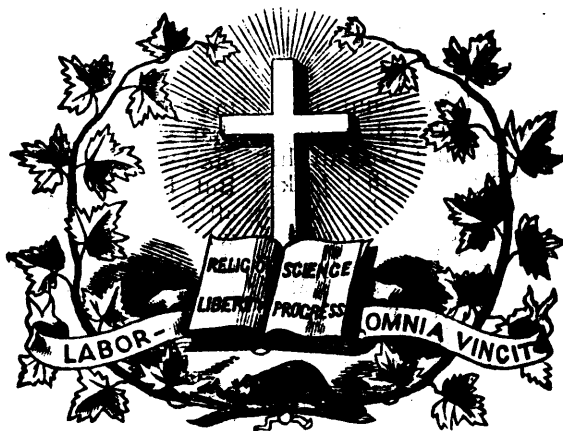


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THE

JOURNAL OF EDUCATION

Devoted to Education, Literature, Science, and the Arts.

Volume XXI.

Quebec, Province of Quebec, March, 1877.

No. 3

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The Unexamined Work of the Schoolmaster.

Paper read by Dr. WORMELL, M. A., Before the College of Preceptors, February 14, 1877.

In order to be in a position to divide our work into the two parts,—the Examined and the Unexamined,—we must first frame such a definition of it as shall include all.

The work of the schoolmaster, then, I define as all that is rightly called education. It is not mere instruction. This may be instrumental to the work, *not* the work itself. To see what the work is, we have but to glance at the objects of it,—at the materials on which we have to operate. We have to ask what are the needs of a child entering school, what preparation is required by a human being who has a living to earn and a future to provide for—what are the duties and responsibilities naturally belonging to the being who is “the heir of all the ages in the foremost files of time.” We find in him intellectual powers, emotional susceptibilities, and moral faculties,—we find mind, conscience, heart, and will. These are in every child,—they are the child. From whatever class of society the child may

spring, its capacities are the same, the need for culture the same. These remarks, I am aware, are not new to you, they are the veriest truisms of the moralist and the divine. But often, as in the question before us, it is precisely on the most obvious truisms that the deepest truths are found to rest.

To repeat, then ; there is in every child the power of thinking, reasoning, and imagining ; there are the susceptibilities of loving and hating, of hoping and fearing, of sorrowing and rejoicing : there are desires and will ; there is the susceptibility of self-accusation and self-approval.

It is our privilege, the privilege of the members of the profession to which we belong, to labour to bring all this out,—information and instruction being used as a means of enticement. The learning of facts cannot be education, for the child is not mere mind. Much more than these constitute education. A child is educated when the power of thought is so called out that the mind ceases to be dormant, when judgment is made to act in its proper sphere, when the feelings are taught to rise and fall under right influences, when desire for knowledge is constituted a constantly recurring appetite. Nothing below this deserves the name of education, for nothing less is the leading forth of what is in man. This is our work,—the extent to which we carry it should depend only on our opportunity and ability.

Now, it will be evident to all that those printed papers of questions, requiring answers of a technical kind on paper, the setting of which constitutes what we call an examination, refer to but a small part of the work. In one sense all our work is examined—it undergoes a kind of trial by ordeal, the every-day trial and test of power and character to which the objects of the work are subjected through life, and from which no man can escape. But for our purpose to-night, that work only will be called examined which is tested by means of definite questions answered on paper. Now, it must not be imagined that I am opposed to these examinations. I believe they are the soundest and fairest way of testing the possession of information. I have laboured to pass examinations, and I must frankly admit that I have been assisted in gradually climbing to my present position in

our profession by distinctions gained in examinations. Again, I have toiled at the task of carrying pupils through examinations, and still do so; but, with all this, I have frequently been filled with misgivings that, looked at in reference to the higher functions of the schoolmaster, some of this work has been as barren of permanent and desirable results as if the time had been spent in engraving volumes on the sand of the sea-shore. Mere examinations occupy now less and less of my thoughts; and, while I am still trying to secure what good may be got from them, I am always thinking how to counteract the evil consequences which they naturally produce.

It will at once be seen that there can be but little sympathy between men who share these views and the man who is known as the private "coach,"—the man who exists *through, for, and by* the examination system. Too frequently has this man usurped the place of the schoolmaster, and we believe, greatly to the injury of the community. The educator should be one who has "dipped into the future far as human eye can see," but the man whose whole time and thought, whose whole life is spent in cramming boys and youths with facts for production in an examination, has a vision so limited that its range sinks into insignificance compared with the extent of the work which the schoolmaster has to recognize. A person of this type is "not a desirable guide for man or beast."

In order to bring out the importance of the unexamined work of the schoolmaster, let us glance at some of the dangers and evils resulting from two exclusive attention to examinations.

In schools where this habit is found, a student is estimated solely by the rank he acquires in a table of marks and it is by the same criterion that he is apt to estimate himself. He at last gets to regard all his work as designed only to enable him to pass, and looks on it exclusively with an eye to the use he can make of it in examinations. He thinks only of how best to arrange and re-arrange, condense and re-condense, and make an affective display on paper. Knowledge comes to be regarded, not as something to be sought for and valued on account of its intrinsic worth, or as the means and instrument for the realization of lofty aims and noble purposes, but in a purely commercial spirit, a mercenary spirit, as a thing that *pays* in a certain specified competition. Hence he works like an isolated atom, as though he merely had certain selfish ends to attain—a habit which inevitably results in shutting up the scholar more and more in a world of ideas of a purely self-regarding nature. But the business of the schoolmaster is to enlarge the boy's sympathies, and to extend his vision, so that he may at length arrive at the perception of the fact that the happiness of the individuals of a community is best secured when in every man the well-being of the community and the well-being of himself live and operate together as motives of action. The welfare of each man is best achieved by securing the welfare of all. The contrary proposition, however, more nearly expresses to the natural mind what seems to be true. "The immediate gain lies before it—can be seen and handled; and the law which demands its sacrifice in order to arrive at a wider and more prolific result appears to contradict the senses, and to bring ruin and no benefit in its train."

In this business of "coaching," a natural weakness of the untrained mind is confirmed and deepened, until susceptibility to higher motives is deadened, and almost destroyed. Such work is not simply unworthy of the schoolmaster, it is the direct reversal of his true work.

The school where the master thinks and speaks of nothing but the examination, becomes sooner or later a mere "cramming" establishment. It may be necessary

to say, I do not apply this term as a compliment. I know that some distinguished, pains taking, and successful masters have recently spoken in favour of "cramming." But I feel persuaded that this fact arises from their attributing a different meaning to the term from that in which I accept it. It is not a word with so fixed a meaning that we understand the same thing by it. We get at its present use, I suppose, from the analogy between food and instruction. But the analogy is not complete. The Strasbourg goose is crammed up to his death, not so the examination competitor. The former is not expected, after having acquired an abnormal liver through being crammed, to strut about and perform all the functions of a goose; but the latter is expected to survive the cramming, and somehow or other, in spite of it, to become a useful member of society. Men have sometimes undergone a vicious system of training, and have become great in spite of it, and their success in life has prevented others from recognizing the evils of the system. It is easy, therefore, to understand how it is that teachers answer differently the questions, "What is cramming?" and "What are the results?" We have often to put into the memory—to cause to be learnt by heart—things which the people imperfectly understands. We all know, for instance, that a choice and pregnant passage from a good author, once learnt, will appear constantly in new connection and surrounded by new lights. To learn such an extract is not to "cram,"—provided the digestion of the passage commences from the moment of its being committed to the memory. The cramming which is so objectional, is the forcing down of facts in such a way that digestion of them is impossible. Such digestion, in fact, never commences, nor is ever intended to commence. The facts are piled upon one another, to be vomited wholesale with the last possible change.

A student at Oxford once complained to his tutor, that he could not understand some of his work; and the reply was, "Oh! never mind that! Nobody ever tries to understand it. *Cram* it."

Now let us further consider the condition of a school in which the examinations have wholly engrossed the master's thoughts. The desire to obtain scholars with that passive, receptive capacity which enable them to secure examination honours, leads the teachers to pass over the work which lies nearest to them,—the great object sought for being the winning of prizes.

A boy should enter school in order that he may be supplied, so to speak, with a map or plan of life. As a sea-captain about to go on a voyage inquires for charts of his course, so the lad requires to know where he may expect danger, and what courses are likely to lead to a prosperous voyage. Instead of these charts, he is supplied with an aid to run a short, race for a prize of contemptible value, with overloaded canvas, each sail of which is simply an advertisement sheet. The body is estimated solely by his prospect of getting advertisable honours. And so, in the school, the regular work of education is laid aside, and special preparation takes its place. The few clever or precocious lads who may possibly win, are trained and entered for the race. Those who could not be made to win pay for those who do win. A few great successes advertised bring together numbers whose fees will have built up a fortune before the hollowness of their training is discovered.

Meanwhile, a competition—a scramble—has arisen for the clever boys. Some Public Schools—and, I regret to say, some schools supported by City Companies—advertise scholarships to be competed for by outsiders. There would not be much objection to these prizes being given as an incentive to work in the school itself, where all the circumstances attending that work could be known; but

they are here offered in order to attract to the school a few ready-made good *examinees*.

A private schoolmaster now takes the hint, advertises in the *Times* that he offers two Scholarships of £100 a-year each, and two more of £50 a-year each for little boys preparing for scholarship examinations. It is worth an enterprising master's while to buy up a few clever boys to advertise as successful at the Entrance Examinations of the Public Schools.

I know from experience that good sound and wholesome results come from the giving of prizes as the recognition of merit in the school itself. I acknowledge that wealth available for scholarships may be judiciously applied. It will be so applied if it tends to establish that educational ladder which has for some years been a current figure of speech. I should like to see all the schools of the country arranging themselves in continuous order between the highest and lowest. If any one of them has funds to spend in scholarships, they should be expended either on the most needy and deserving of its own scholars, or should be placed at the disposal of lower schools. They will always be spent to advantage when they furnish education and professional training for future schoolmasters. The only purpose for which I have desired scholarships for our own school is to enable those boys who my experience tells me will make good teachers to obtain a more advanced education. The giving of scholarships to enable boys of ability to prolong their training beyond the time they could otherwise give to it, either in the school in which the scholarship is awarded or at one of a higher grade, may be productive of good; but the system of offering the prizes and scholarships of one school to draw off the cleverest boys from other schools on the same or a higher level is thoroughly bad,—an evil without a redeeming feature.

Let us now proceed to consider some branches of the unexamined work. The first refers to the efforts requisite to become acquainted with the character and circumstances of pupils. In these days of large schools the task is no light one. A medical man with a large practice has an advantage over one with a small practice, in being able to found his opinion on larger and broader experiences; but, having little time to give to each case, a greater concentration of attention is demanded of him. A similar remark applies to the master of a large school. Locke's plan of education by private tutors is bad, because it is only by comparing one boy with another, by watching boys together, that differences of temperament and mental character can be fully estimated. Nevertheless, it is not without exhausting application that a master of a large school gets to know his pupils. Unless he knows them he may easily minister what he sees and hears,—he cannot, for instance, distinguish between perplexity and obstinacy, between weariness and indifference. In some he has to remember that there is weakness of constitution in some seeds of disease. The dulness of some children and the irritability of others spring from such sources; and again, the precocity of boys is frequently traceable to bodily disease. The master has to know something of the individual circumstances and peculiar characteristics of his pupils, their tempers and dispositions, their talents and natural tendencies. This cannot be dispensed with, for we cannot deal with all alike. In one sense wholesale education is wholesale failure. In a large school, the most exhausting and most difficult task the master has to perform is to recognise and provide for individual peculiarities amongst such numbers.

Some boys are very sensitive. You cannot administer a rebuke to them in a direct way without being severer than you intend. Some have a knack of interpreting literally what was not intended to be so taken. Allow me to

refer, in illustration, to an incident which recently occurred at my own school. A boy, apparently in great trouble, enters the head master's room with the announcement that he has to report himself for being untidy in dress.

"What is the matter, then," asks the master.

"I have my playing clothes on."

"How is that?"

"My mother thought it so wet and muddy that better clothes would be spoilt."

"Is it wet and muddy in school?"

"No, sir."

"Then your mother had better send another suit for school when she provides you with the untidy clothes for use in the wet streets."

A few days later the same boy came at 9.30 to the master's room again having walked a couple of miles with a large brown paper parcel under his arm.

"Please, sir, where am I to change my clothes?"

What was the master to say? Was it an easy thing to decide? The lad was so serious that the master dared not smile. He simply said,

"Well, I will retire while you put yourself straight here." In the evening, of course, the toilette performance was repeated.

A few days afterwards, however, the master observed the boy entering school and looking at him strangely and significantly. The cause was apparent at a glance.

"Why, you have a new waterproof coat this morning!"

"Yes, sir, my mother thought, after all, it was less trouble to buy me a new macintosh."

The boy seemed to lift his head considerably above his ordinary stature when the master replied, "Your mother is the most sensible woman I have heard of to-day."

Look, again, at the work of observation and discrimination required to discover the *kinds* of study and of work which will enlist his sympathies and arouse his faculties. Consider how invaluable is that experience, that judgment, which enables a teacher to say to a pupil,—“Though you would fail in one department of study or in one kind of pursuit, there are more gateways of knowledge than one, there are yet occupations in which you are capable of achieving honourable success by the aid of such powers of mind and of body as you are well able to develop.”

Had young Macaulay been under the counsels and guidance of a master with this insight into natural aptitude and the natural bent of genius, he might have been spared days and weeks of torture spent over mathematical studies, which he abhorred, and over which he nearly ruined his health, only in the end to find himself ignominiously “gulfed” at the examination.

Another illustration of the absence of this division of the unexamined work of the schoolmaster is afforded by the case of Thomas Edwards, the Scotch naturalist, the story of whose life has but just been told by Mr. Smiles. In his case a whole career was marred for the want of that timely appreciation of natural genius. Edwards' real character, instead of having been divined by a master or teacher, was left to be discovered and appreciated by his biographer. We now know him to have been a youth with whom the love of nature was almost a passion; it was, at least, a propensity so strong that not all the discouragements and rebuffs he met with—and they were by no means slight—availed to repress it. It did not, it is true, always manifest itself in a form which recommended it to others. In fact, as a boy, with his collections of newts, horseleeches, beetles, frogs, sticklebacks, moles, birds, rats, crabs, and hedgehogs, he was considered by his neighbours as an unmitigated nuisance, since his “venomous beasts,” as they called the lad's

favourites, would, from time to time, stray from the roof of their protector and turn up unexpectedly in the bedrooms and parlours and kitchens of the adjoining houses. Even his parents could not look with favour on the irrepressible propensity of a son who, ere he had reached his fifth year, on one occasion brought a wasps' nest, wrapped up in a shirt, into the bosom of his family. They spared no pains, but resorted to the severest measures, to cure the boy of such dangerous tendencies: they applied the rod, they tied him to the table, they bound him hand and foot, they even took away his clothes. But all to no purpose; he disentangled himself from his bonds, and, attired in the first article that came to hand, he was soon with the snails and worms and centipedes. So at last they sent him to school, and he took his "beasts" with him. In the course of a few months he was turned out of three schools successively: from the first, for bringing in a jackdaw, which "cawed" at prayers; from the second, because his horseleeches, which were probably inadequately fed, crept out of the bottle, and began to draw the blood of the nearest pupils; and from the third, because on a desk a centipede or Maggie Monyfoot was found, which Thomas was falsely accused of introducing into the school. For denying the charge he was caned and expelled. "Go home," said the master of the third establishment to the wretched boy, "go home and tell your father to get you on board a man-of-war, as that is the best school for irreclaimables such as you."

Now, it is far from difficult to picture to ourselves a school-master who, discovering the secret of such a propensity, should not only prevent its becoming a nuisance, but should direct it to the attainment of high, useful, and even noble results. Some men, like Faraday, have been brought by accident into contact with men who could perceive and direct the natural bent of their genius; others, like Edwards, have it discovered too late for it to be made much use of; no doubt, in some cases it is never discovered, that is to say, there are men who have never been induced to develop the power that in early life was innate within them. But it would be easy to prove that, in hundreds of cases, the true worth of the men has been discovered, and their energies have been directed into profitable channels by the schoolmaster.

Again, there are the watchfulness and care requisite to keep in view the highest and best ideals,—to maintain what is called a high tone. The difficulty of governing boys and youths is always great enough; but what must be the labour it has cost the master of a school where admirable discipline is maintained with ease, where cordial relations exist between master and scholars, and where the majority of the pupils are characterized by a straightforward manly bearing, free from forwardness on the one hand, as from timidity on the other. These qualities are to be found in some schools, but in no schools where they are found do they come by accident. Assuredly, in ennobling and purifying what formerly was in many establishments an unhealthy moral atmosphere, the schoolmasters of our day have made no small contribution to the general welfare. This has been and is part of their unexamined work. Where they labour to produce breadth of view and mutual sympathy, their work will bear good fruit in the next generation, producing social harmony among different classes, amongst men of different occupations and devious if not conflicting interests. It is no easy matter to correct the little errors and faults of a boy at school by the application of principles which may with equal reason be applied to the corresponding errors and faults of the grown man, yet the work of the schoolmaster cannot be said to be well done until this is the case. To shape a boy's conduct in

life, to lead him to be industrious and thrifty, to respect property, and to be faithful in the performance of engagements, are certainly of not less importance than to supply him with information.

Further, there is the physical training necessary to give health, vigour, and activity to the youth committed to our care. This is an object not secured without thought and exertion on the part of the master. There is one kind of physical training which does not come under the head of unexamined work,—I refer to such trials of strength as we see in the Eton and Harrow Cricket Match, the Universities' Boat Race, Football contests, &c. All these exhibitions of strength and skill are exposed to the same danger as that we have pointed out in the examined work of the schoolmaster,—I mean, that they are liable to be pushed too far; instead of being subservient to the purposes of a complete and perfect education, they sometimes tend to usurp its place. The development of the body either aids or impedes the development of the mind. To give power to the muscle and suppleness to the limb, to promote animal health and vigour, to secure purity of bodily habit, is to assist education. But to spend the whole of the energies of youth in the attainment of animal attributes, is to rival the brute and the savage. It is therefore another difficult task of the schoolmaster to secure the fit and proper care of bodily health, while at the same time restraining within proper bounds the admiration for physical training. Corporeal health must receive attention, for mental vigour cannot exist long without it. The roots of a tree must be respected for the sake of the tree. If the roots fails, the tree will fall.

As we proceed, the field of inquiry so enlarges that we cannot see where it ends. Many are the topics which might be embraced under our title, some of which the schoolmaster mentions only with hesitation and bated breath. For instance, who will examine the work involved in managing the parent,—Herculean task involving great labour for small results. Mr. Lake, in a humorous paper read at one of the Education Conferences, classified parents under many heads—careless, busy, fidgetty, wavering, anxious, fond, sanguine, earnest, sensible, and so on; but nearly all alike were unreasonable. I have heard a schoolmaster say—and I believe the opinion is shared in by many teachers—that children are often reasonable, but parents never. The only consolation I can offer on this point is, that when the unexamined work of the schoolmaster is well done, we shall give to the next generation a better legacy than we received from the past; and the parents of that generation will assist rather than impede the educator.

I can imagine some of my hearers saying, "Surely you have taken too wide a view of our work. If we could do all this with children, they would indeed be well trained and equipped for the crusade of life; then every duty would be conscientiously fulfilled, every difficulty and danger would be surmounted, and there would be no height of virtue or intelligence which would be inaccessible. But see how little of what we attempt can be accomplished,—look at the hindrances we encounter on every hand. If your description of our work be correct, then it is to be feared it is beyond the power of anyone of us adequately to execute it."

Now, in reply to such comments, I have to admit that it is probably beyond our power fully to work out the problem we have to solve; but I believe at the same time, that we shall all succeed in proportion as we take a wide view and a high aim. By keeping the true goal in view, we shall be able to draw nearer to it. There are, fortunately, both men and women in this vocation who do not need to be cautioned against narrowness of

view. There are men and women whose work, though it is sometimes impeded by the trammels of prescription and tradition, we cannot contemplate without desiring to emulate it. There are amongst us, labouring to educate the youth of this country and this generation, men and women of sound intellect, enlightened conscience, untiring energy, and noble aim. Let honour be given where honour is due. Such men and such women have warm hearts and generous natures,—they are ever ready to sympathise with and give counsel to others. When our work is heaviest and our days are darkest, we may take counsel together; we may obtain help from one another and from these leaders of our ranks, and so renew our courage; but, even in the day of our deepest discouragement and despondency, let us do all that it is possible for those in our positions to do, and come what may, let us never lower the standard at which we aim, nor permit the ideal we have set before us to be degraded.

Those, however, who are not in the profession may likewise say,—“You are estimating the importance of the teacher's work too highly; you are forgetting its natural limits and ignoring the demands of the ordinary work-a-day life of the world. Schoolmasters, like all other men, are liable to fall into the error of the leather-seller in the fable, and you have fallen into it.”

In reply, it matters very little how lightly the profession to which we belong may be esteemed by the outer world compared with the question—“What estimate of it have the teachers themselves?” To raise this estimate was the object I had in view when, in response to a request from your secretary, I set about writing this paper four days ago. I believe I have succeeded as regards myself, for I have resolved to pay greater attention to some of the duties to which I have referred their importance having grown upon me during the performance of my task. If you share with me this feeling, my labour will not be thrown away.

The Chairman (H. W. Eve, Esq., M. A.) mentioned four points which suggested themselves for discussion—(1) The duty of the schoolmaster in regard to ascertaining the bent of character and the conditions of life of individual boys; (2) What the schoolmaster could do in the way of laying out the pupil's life for him; (3) The necessity of attention to details and constant watchfulness, in maintaining a high tone in the school; and (4) Physical training. The problem was difficult in the case of boarding schools, where the action of the master was not fettered by influences from without; and was, of course more difficult still in the case of day schools.

Dr. Oppler said that examinations served rather to show the work of the pupil than that of the schoolmaster, to whom the results of examinations often did not do justice. An examination of his *method* would be a fairer test of the master's work. In very large schools it was impossible for the head master to obtain such an intimate acquaintance with his pupils as to enable him to influence to any appreciable extent their moral training. A large school should have a sufficiently large teaching staff to enable each assistant master to have full control of his class; and the head master should be, as far as possible, free from details and from personal instruction, and able to give his mind to the working of the instruction as a whole. But moral training was the main topic, and here lay the real unexamined work of the schoolmaster. As to the exceptional instance that had been given by the lecturer of the danger of the suppression of genius for want of discernment on the part of the teacher, he could not see that the schoolmaster was to blame. Circumstances would in the great majority of cases, as in the one in question, bring genius to light.

Mr. Marsh would have liked to hear some definition of the word “cramming,” which had been referred to in the lecture. It was, he thought, important to come to some understanding on this point, in considering the question of the supposed pernicious effects of examinations. If it meant the forcing a child to learn that for which he had little or no natural liking, he was afraid that the great majority of teachers could not escape the charge of “cramming.”

Mr. Mast defined “cramming” to be the attempt to force

down what was mentally *indigestible* in the way in which it was put before the pupil. Much, no doubt, must be learnt by heart; but everything could and should be explained beforehand. The example of the Government in their system of paying the elementary teachers by the results of examinations was at the bottom of the present extension of the system in every direction, of true education was neglected in the endeavour to produce something for show. In regard to eccentric geniuses, he agreed with a former speaker that the schoolmaster was not bound to give special attention to them. The pupil who had a special talent was only too ready to indulge it on every possible occasion; and, both in regard to the pupil himself and to his school fellows, it would be found necessary, not indeed to quench it, but to keep the propensity within bounds. The schoolmaster must not expect to see at every step the results of his efforts; but must persevere, convinced that they would bear fruit in after life.

Miss Bailey remarked on the influence of the head-teacher's personal character in developing an *esprit de corps* in the school, both among the pupils and the assistant teachers. Where such a spirit prevailed in a school it availed much to help the teacher beyond the limits of the school room, and parents would often find in their children the eager champions of the teacher's views and acts. Young people were quick to appreciate thoroughness and earnestness, and the parents would draw their own conclusions. How important was the influence of high aims and force of character in winning the sympathy of subordinates was shown in the case of the late Miss Doreck, whose spirit still survived in the school she had established. She (Miss Baily) did not think it well that the principal should give up teaching; the example of her superior method and experience could not fail to stimulate her assistants to exertion and emulation.

Mr. Mitcherson drew attention to the fact, that it was not in the naturally quick boy, who came to the front at examinations, that the teacher's work could be fairly appreciated. Credit was rather due to him for the patience and labour spent on the dull and backward boy, who, after all, could barely be brought up to the passing point.

Mr. Ellis could not speak from experience, not being a professional teacher, though it had been his early desire to become a schoolmaster. He thought that the principle, that a child must understand fully everything he was set to learn, could not be maintained. There were many things of which it must be said by the teacher, “You must learn this now, which you will understand better afterwards.” Grammatical paradigms must be “crammed,” so must the “multiplication table,” if we narrow the definition of the word “cram” to that which is learned by rote without present understanding of its *rationale* and bearing. But the unexamined work of the schoolmaster lay outside all this. No examination could show to what an extent the master had toiled in the case of pupils wanting in natural endowments and opportunities. It was not to be expected that the head master of a large school could be like the shepherd, knowing the face of all his sheep. His influence would be felt chiefly in the selection of his assistants and keeping *them* up to the mark. His participation to any great extent in the actual work of teaching must interfere with this. If he did teach, it should, he (Mr. Ellis) thought, be such subjects as his assistants could not or did not teach, and which gave token of his principalship in the eyes of his pupils. He instanced the almost superstitious veneration with which some great scholars, heads of public schools, were regarded by the boys.

Mr. Hooper said that he once thought it possible to teach anything so that it might be digested; but he had been obliged to modify his opinion. There were some things which could not be made plain to the immature intelligence, and much must be taken on trust. But he had great faith in the latent force of knowledge; it could not be assumed that anything was absolutely forgotten. In education, as in business, it was, “Like master, like man;” and energies and earnestness in the head called forth the same qualities in his assistants. It was natural for a master to take pains with a pupil whose willingness to learn and natural ability showed at once the fruits of instruction and did credit to his teacher in the eyes of others; but too frequently he found his clever boy taken away from him to grace the honour list of some more famous establishment which had scholarships to offer. He thought that the extra strain which such bright pupils were subjected to by the stimulus of valuable rewards was often disastrous in its results on their bodily and mental health.

Mr. Newcombe thought that the discussion had gone away somewhat from the main subject of the lecture. The "crammers" for special examinations were not schoolmasters in the proper sense of the world. He was of opinion that examination work could be carried on with a due regard to the unexamined work. He did not understand the views of certain theorists and amateurs in education in regard to examinations. The plea formerly put forward for the necessity of examination was the low level of instruction in middle class schools. Now the examinations themselves seemed to be looked upon as an evil, as impeding the real work of education, by fostering "cramming," &c. He had early adopted public examinations, and had regularly sent in a large proportion of his pupils to the College of Preceptors and the University Locals; and he was persuaded that the advantages to be derived from such examinations were most important, while the drawbacks were insignificant. He confessed that he was glad to get hold of a clever boy, and to keep him if he could. The clever boy was a stimulus to his fellows, and helped not a little to raise the tone of the school. He heartily sympathised with the last speaker, and confessed to a feeling of soreness at seeing gifted and well trained pupils attracted away from his school by the hope of rewards advertised by large and richly-endowed foundations. That the head-master even in large schools could exert a vast amount of personal influence, both through his assistants and also by direct contact with the boys, was shown in the case of Arnold. It was in the unexamined work—the thought, and anxiety, and patience that were demanded to train up dull and immoral and ill conditioned boys—that the faithfulness and honesty of the master were put to the test. And it could not be denied that the private schoolmaster had by far the greater share of this unexamined work, for which he got but little credit.

Mr. Thornton said that there seemed to him too little of doubtful matter, in the paper they had listened to, to leave room for much discussion. The question of the advantages and disadvantages of examinations was not the main issue. The paper was for the most part, an earnest exhortation to schoolmasters to do their duty. What the lecturer in substance said was, "Be as good men as you can, and as far as possible strong men;" for there was no calling more wearing than that of the schoolmaster, especially in regard to the treatment of dull minds and perverse dispositions.

The Chairman, in proposing vote of thanks to the lecturer for the paper they had all listened to with so much attention, took occasion to remark that there was not, in fact, in large public as compared with private schools, that difference, in regard to personal contact of master with pupils, which had been assumed by some of speakers. Eton had been described as a collection of private schools, the boy's tutor being the directing influence; and in well-organised large school each assistant master was very much in the position of the head of a smaller establishment.

After a few remarks from Dr. Wormell in reply to the points raised in the discussion, a vote of thanks to the lecturer brought the proceedings to a close.—(*The Educational Times.*)

Nice Tastes

It was the opinion of our forefathers that when a youth was singularly deficient both in mind and body he was "only fit to be a parson." Somewhat on the same principle, a weak and lazy lad in our own day is usually said to have "nice tastes." Show us a boy who while idle and useless, has not the strength and energy to be vicious, and we will show you a boy whose female relatives will declare that he has nice tastes. There does not exist the art or the science to the horns of whose altars hordes of useless drones are clinging for sanctuary from the real work of the world.

A delicate lad is taken away from school. This is often the foundation of a wasted life. An evil spirit being thus raised, employment has to be provided for him. The very cause of his absence from school implies insufficiency of strength for boisterous amusements. He is encouraged to occupy his time with the study of botany,

geology, chemistry, or drawing. When he has learned a few technical names out of the most elementary of handbooks, and worn out his clothes or ruined the furniture in the pursuit of his science, he is discovered by his family to be a genius. Foolish remarks about his abilities are made within his hearing, and the seed which shall surely grow into the perfect prig is sown in the fertile soil of his own ignorance. Yet he is actually wasting his time in that which is worse than absolute idleness. If the boy were given a task to perform, were it ever so light, in the study of any science or art, and judiciously punished if he failed to perform it, the result might be highly satisfactory; but unfortunately in such studies the pupil is frequently his own master; or even if he be under a preceptor, such exalted labors are conventionally supposed to be utterly beyond the pale of discipline. And the young Raffaele soon becomes dissatisfied with his master's style, and either dispenses entirely with the services of an instructor, or demands a fresh one. Mozart II, discovers that his teacher thumps or that he plays without the least feeling—*Roma locuta est*: the dismissal of the master is sealed. What should we think of an urchin of the same age desiring a change of school because he doubted his tutor's rendering of a passage in Homer? One of the most charming traits in the character of the embryo dilettante is the versatility of his genius. He has scarcely begun botany when he plunges into entomology; wearied of the latter science, and embarking in mineralogy, he is seized with a craze for music; but, believing that after all science is his true forte, he rushes into chemistry. Yet he has only destroyed one carpet and thrice nearly succeeded in burning the house down, when we find him engaged on a great work of art, surrounded by various pigments and brushes and mediums of pungent and nauseating odours. If he happens to take up physiology and anatomy, the frogs in his immediate neighbourhood have a bad time of it. He reads of some interesting experiments which may be performed on live frogs. Dear boy, he has such nice tastes. Surely such dispositions ought to be encouraged.

Other boys may be engaged in giving each other black eyes, or blaspheming, or committing any of the other iniquities enumerated by Dr. Watts; but our pattern child is walking steadily in the straight and narrow way of his æsthetic pursuits. As his mamma says, the sweetest point in his character is that he is, "so pure." There is perhaps a slight drawback to his fond parents' satisfaction in the matter of his religion; for as he passes through the latter half of his teens the young student probably dips into the neologistic works of a certain school of scientific men of the present day. If this be the case, it will be lucky if he contents himself with tracing his descent to the wigged worthies whose portraits adorn his father's walls, and does not claim his ancestry among apes, jelly-fish, or molecules. Nay, it is far from impossible that he may astonish his parents by observing that "prayer is an absurdity, as there is no God having any personal sympathy with us." He prefers worshipping the "unknowable in the temple of nature, with the firmament as its roof, the scents of flowers as its incense, and the winged songsters as its choir, to accompanying the rest of his family to the parish church, which, as he very truly remarks, is "made with hands." Here the British matron, as a rule, makes a stand; but there are some glorious exceptions who consider their sons' hearts so sincere, and their ideas so beautiful, that, while regretting their eccentricities, they yield to their vagaries. The exclusive use of a room for the experiments, and to contain the collections and apparatus of the young genius, is of course a necessity, and a museum situated on a

picturesque spot in the pleasure grounds in a nice thing for him. In London it is very desirable that a coach house should be fitted up as his studio or laboratory.

Our student scorns such pursuits so mercantile business and the law. He is too unorthodox to be a proper candidate for holy orders, and too feeble in body for the army, while his mental capabilities scarcely fit him to undergo the studies necessary to enable him to pass the examinations requisite for either profession. Travelling is a *sine qua non* for the gratification of his tastes. Armed with Murray, Kugler, and Mrs. Jamieson, Childe Harold starts on his pilgrimage, and having made himself a nuisance at the tables-d'hôte of the principal cities of Europe, he returns to his home an even greater prig than he left it. His unhappy friends have to endure hearing him "talk abroad," until some of them in their hearts devoutly wish that he had never returned to his native land. He now considers that he has seen so much of life, of men and of manners, that he probably takes up politics and social economy, though, needless to say, in the most superficial way. Likely enough he soon appears at meetings of various Associations, including the Social Science Congress. If he has been to any far distant country, he soon becomes a member of the Geographical Society. If he is a stay-at-home, he is a member of an Archæological Society.

In due course the æsthetic young man meets the æsthetic young woman. We have not space at present to treat of the latter. Sufficient be it to say that she is severe-looking but rather pretty, that she wears her waist at a different elevation from the rest of woman-kind, and that she generally carries a pair of spectacles in her pocket, which she puts on to examine works of art. We will pass over the love-making of the intellectual turtledoves. If they can make a romance and difficulty, when no opposition is raised to their marriage, they will do so. The great advantage of married life to the man of nice tastes is the opportunity of displaying them which is offered by the necessity of furnishing a house. Happy the artistic couple whose tastes lie in the same "period." Woe to them if the masculine affection be for Gothic furniture and the feminine for Renaissance—if Mr. be Louis Quatorze, while Mrs is the Queen Anne. Heavy is the drain on the parental purse-strings. Artistic furniture is not to be had for nothing. And, talking of expenditure, our friend has a habit of "picking up" things, which acts much in the same manner as a hole in a pocket. He likes the principal picture and china dealers to come up and speak to him at Christie and Manson's. Now their friendship has to be purchased with solid gold. Sometimes men with nice tastes regard the purchase of works of art as an investment. This investment does not invariably turn out an El Dorado, for the amateur usually buys that which is the most fashionable thing, instead of that which probably will become fashionable. So, when he has gone on inverting and picking up until the æsthetic purse has run low, a realization becoming necessary, he is astonished to find that his valuables not only fail to pay any interest, but even to restore the very capital itself. If the sale is apparently a good one, it has probably been entrusted to the hands of a distinguished dealer, when the nature of the arrangement that he makes diverts the lion's share of the profits from the pockets of the vendor. In a financial point of view, the old-fashioned "clever man" who "kept up his classics" had an advantage over the man of nice tastes. The former did not cost much, whilst the latter frequently lead, directly or indirectly, to ruin. In our forefathers' times the sedentary men, as a rule, laid by substantial savings. If he did waste any money, it was either on

electioneering or the purchase of rare old editions of books; but for the study of his classics a small room with ugly mahogany furniture and a leather-covered arm-chair was all that he required.

Before youth begins to verge on middle age the possessor of nice tastes generally shows signs of failing health. Want of exercise and *ennui* make life burdensome to him. The most celebrated physicians in vain prescribe tonics and amusements. The patient rapidly becomes the most troublesome of all invalids, an æsthetic hypochondriac. The least thing frets and worries him. If a cretonne fades, he is not content until it is renewed. A crack in the varnish of a picture drives him wild. He is in a fever until he possesses a specimen of the works of all the most eminent masters of his favourite school. Nothing is more wholesome than the honest study of an art or science. But more discipline is necessary in the schools of art and science than in any others. To succeed thoroughly in either, the work must be hard. This is good. On the other hand, to take up art or science as play, the work need not be hard. This also is good. But woe to him who mistakes play for work. An extravagant demand for artistic produce has always been a sign of a nation verging on decay. Of course this great demand may call forth many real artists who would otherwise be engaged in some other employment, and thus many beautiful things may be the result, which would otherwise never have existed. But this does not alter the fact that when art becomes a mere luxury and an amusement for idleness, it produces an enervating and most pernicious effect. Real, genuine, and wholesome art or science ought ever to be encouraged, but a sensual and lazy love of either should be stamped out as the rinderpest.—*Saturday Review*.

Causes of Rain.

There are a number of causes co-operating in the production of rain. 1. The rising of heated air from the earth, and the rarefaction, which produces cold. On the summits of lofty mountains clouds and mists settle or remain stationary, while the currents of the wind below striking the side of the mountain, rise upward and cause a lower temperature—and rain is the effect. 2. Cold and hot currents, heavy with vapour, mixing together, become of one temperature and cannot hold the same quantity of moisture. 3. The wind or air in motion, when it comes in contact with the earth, causes the condensation of vapour and precipitates rain. In the winter season the temperature is often 34 degrees, and when this is the case, a south-west wind will cause it to rise 20 degrees in thirty-six or forty-eight hours. This air, saturated with humidity, at 54 degrees will produce rain. Prof. Graham gives the following illustration:—Tension of vapour at 54 degrees, .429 inches; tension at 34 degrees, .214; condensed, .215. Prof. Brocklesby illustrates thus:—Four thousand cubic inches of air, at the temperature of 86 degrees Fahrenheit, can contain no more than 31½ grains of moisture and an equal volume at 32 degrees only 7½ grains. Now, if the two volumes are mingled together their average temperature will be 59 degrees, and the weight of moisture they unitedly possess will be 39½ grains. But at this temperature 31½ grains are all the moisture that 8,000 cubic inches of air can possibly retain, since the first portion by its union with the second diminishes its capacity one-half, while that of the latter is only doubled. The excess therefore of 7½ grains will be condensed in the form of water.

This is the effect of a law of nature. The capacity of

the air to receive moisture increases at a greater ratio than the temperature; the temperature advances arithmetically; the capacity of the air for moisture by geometrical progression. Winds being the natural agents which combine cold and warm currents of air, rain will fall more frequently where winds are shifting or variable. The constant winds moving over the deserts of Sahara cannot bring rain till they meet with an obstruction, as a mountain, the effect of which will change the current and mix the cold and hot air together. After a general rainfall the air is clear, because it has a little vapour in it; there is less heat generated and the atmosphere is cooler; but as evaporation increases the temperature rises, and the quantity of vapour becomes greater. A cold and warm current of air mingling will at first produce fog or clouds only, but when the quantity of moisture in the air amounts nearly to saturation the overplus of the two currents will be converted into rain because they are not capable of holding the same quantity of humidity when they are united. A vast amount of vapour rises from the surface of the oceans, and being distributed by the winds to the different parts of the globe, becomes the fountains of rain over the various continents. The hot air which ascends at the equator becomes saturated with vapor as it passes over the northern and southern oceans, and as it rises and spreads over the temperate zones, it falls as rain over the earth.

The quantity of rain-fall in the tropics is greater than it is towards the poles, because as the air increases in temperature its quantity of vapor also increases. The record of rain-fall at Grenada, 12 degrees north of the equator, ending at Uleaburg, 65 degrees north latitude indicated a gradual decline of the quantity of rain. But there are great differences in the quantity of rain-fall in the same latitude, from local causes. At the first station it was 126 inches, at the next 120, then respectively 81, 39, 25, 15, and at the last 13½ inches. But local causes produce great differences in the quantity of rain-fall in the same latitude. At San Louis, Maranham, 2 degrees 30 minutes south latitude, the annual fall of rain has been known to be 280 inches, while at Vera Cruz, Mexico, 278 inches were known to have fallen in one year.

The greatest quantity of rain-fall on record at the Himalaya mountains was 660 inches in depth in one year.

Dr. Pendleton says that the average rain-fall at Athens, Ga., for 5 years (the record being kept by Prof. McCay), was 37.53 inches. Dr. Pendleton thinks this difference is caused in part by the lower altitude of Augusta, it being 160 feet above tide water, and Athens 752 feet. Sparta, Ga., is 550 feet altitude, and the average rain-fall for five years, ending in 1869 was 57.49 inches. The greatest quantity of rain of those five years was 78.32, and the next year it was only 37.43 inches—not half so much as in the previous year. The heaviest fall was for one month of the five years which was in Aug., 1866, being 17.15 inches.

A Talk about the Stars.

It is very pleasant to know the stars—to be able, like, Milton's hermit, to

"Sit and rightly spell
Of every star that heaven doth show."

And it is not at all difficult to learn all the chief star-groups,—or constellations, as they are called,—if only the learner goes properly to work. Perhaps I ought rather to say, if the teacher goes properly to work. I remember, when I was a boy about twelve years old, being very much perplexed by the books of astronomy,

and the star-charts, from which I tried to learn the stars. There was 'Bonny-castle's Astronomy,' with a very pretty picture of one constellation,—Andromeda,—in which if one looked very carefully, one could perceive stars, though these were nearly lost in the carefully shaded picture of the Chained Lady herself. Another book which I found in my father's library showed a series of neat pictures of all the chief constellations, but gave no clear information as to their whereabouts. And the charts which I found were not at all easy to understand, being, in fact, the usual star-charts, which give no information whatever of the places of star-groups *on the sky*, of any place or at any time. So that it was only by working my way from the Great Bear to constellations close by it, then to others close by these, and so on, that I slowly learned the chief star-groups.

Now the ancients, when they called a group of stars by any name, really imagined some resemblance between the star-group and the figure after which they named it. I have heard it said that the liveliest imagination cannot form figures of familiar objects out of the stars; but this is certainly a mistake, for I know that when I was a lad, and before I had learned to associate the stars with the constellations at present in use, I used to imagine among the stars the figures of such objects as I was most familiar with. In the constellation of the Swan, I saw a capital kite (it is there to this day.) In the Great Bear, I saw the figure of a toy very common at that time in England, representing a monkey that passed over the top of the pole. The three stars forming the handle of the Dipper made the tail of the monkey; and if you look at the Dipper in the position it now occupies in the early evening you will readily see the figure of a climbing monkey. In Perseus I could see a garland of flowers such as my sisters used to make. Orion saw a climbing giant when rising, but took the attitude of a giant going down hill as he passed over to the west. In the Serpent Bearer and Serpent I saw a monstrous sword, shaped like the curved sabre which Saladin wielded; and so forth. No doubt, in the infancy of astronomy, or perhaps of the world itself, men were fanciful in the same way, and the figures they assigned to the star-groups really seemed pictured in the sky. The idea of separating the constellations one from another was a much later one than that of merely naming the more remarkable star-groups. If one set of stars seemed to resemble any object, I think the corresponding names would have been given even though some stars of one set were included within the other set. In fact, I think this very constellation of the Dragon seems to me to show that our modern constellation figures have been largely reduced in extent.

You may, perhaps, think it matters very little what figures the ancients really imagined among the stars. But you will be disposed to think differently when I mention that the supposed want of resemblance *now* between the star-groups and the figures assigned to them, have led some to form the bold idea that there was *once* a strong resemblance, but some stars have gone out, others have shone forth more strongly or are altogether new, and that thus the resemblance has been destroyed. When we remember that our sun is only one among the vast number of suns, it becomes rather a serious matter for the inhabitants of the earth, if so many suns have really changed. For, in that case, our sun may soon change in his turn, and either broil us up with excess of heat, or leave us to perish miserably from extremity of cold. However, I think the explanation which I have given shows that the resemblance formerly imagined still remains, and that it is only because modern astronomy has docked the dimensions of the old figures that they no longer correspond with their names.—Prof. R. A. Proctor, *St. Nicholas* for January.

Hints to Young Teachers.

Geography is so easy for children to acquire, and generally so well taught, at the present day, that I fancy very few hints on this subject will be necessary. In teaching geography, depend very much upon the eye to assist the memory. I know a very successful teacher who, with only a pan of sand, a small stick, and a supply of water, gave to his class representations of seas, lakes, rivers, peninsulas, continents, islands, and all the numberless objects which so often slip through a child's memory, as mere words entirely unconnected with ideas. A pool of water in a bed of sand is something definite to him, and when you name it a lake he understands it; but "a body of fresh water surrounded by land," suggests but very little, if anything to his mind.

Accustom the children early to drawing maps of the things immediately around them, such as the school-house and yard, and have them do this upon a certain scale; in this way they will form a much better idea of sizes and distances. When you take up the study of any country, if there is anything brought from that country which they use, either for food or clothing, make the fact prominent, as, beside the information gained, it will make the country seem more real and tangible. How many of the children, or even the grown people, could tell us where the things are produced which we see around us every day? and yet without such knowledge we are certainly ignorant.

I scarcely need say, when they are sufficiently advanced, have them draw on the blackboard a map of each country as they pass over it.

GRAMMAR.

I do not believe in trying to teach young children the intricate relations, or subtleties, of language. I think that children usually begin parsing and analyzing far too early, and often fail utterly, simply because their minds are not sufficiently mature to grasp the subject. As I hinted in my remarks on general exercises, much may be done towards teaching them the names of the parts of speech, and their simpler relations, by object lessons: and better in this way than any other. Use the blackboard freely, writing simple sentences, and asking the scholars to name the various parts of speech, until they can do it both quickly and correctly.

Then make them see clearly the distinction between subject and object, before you go a step further. I believe that, at present, grammar is the best abused science taught in our schools. Young children are often required to commit to memory abstract propositions whose meaning they do not and cannot comprehend; and, by the time they get through the grammar, it is all a hopeless muddle. I speak from sad experience. Always correct your scholars when they use ungrammatical expressions, in their common conversation. It is of far more importance, at present, that they should acquire right habits of speech, than that they should know how to parse their sentences. We all know persons of culture and liberal education who must continually watch themselves, or make blunders which annoy and mortify them: while others, far inferior in knowledge, always speak correctly by mere force of association and habit. I know a very scholarly man who, when he gets very much excited, uses the double negative, which cools him off immediately.

There are some mistakes which children almost invariably make. After you have corrected these a few times, ask one of the most heedless ones to notice, through the day, if any make the same mistake, and

report to you at night. A few days of this practice will cure that one, and then you can take up another. In such a school as I suppose you are teaching, they ought not go too far in grammar, so I will give no more hints.

MISCELLANEOUS.

There are some things which seem to come under no particular head, and yet which I did not quite like to omit, so I have concluded to mix them all together in one dish, as was the custom in olden times, let each one dip in, and help herself to what she needs. If you do not like old customs and mixed dishes, leave this letter for your neighbor.

You find your school-house with none of the luxuries, and, as we should think, few of the necessaries of teaching. Do not be content to let it remain so, if you can avoid it. Interest the parents in your school if possible. Have the children learn some little songs and calisthenic exercises; let John Smith speak a piece, and Kate Jones have a short recitation—anything which will please and attract the parents—and then invite them all in. When you get them there, lay before them your needs, and if they are not able to supply them, they may help you in other ways.

A few years ago there was, at the West, a school destitute of almost every convenience, and into this school went a New-England teacher from one of our city schools.

At first she looked around her in dismay; but not being one of the despairing sort, she proposed to the people, if they were not able to make the house comfortable, to get up a festival in which the children should do their part, the housewives providing refreshments for sale. In the country, where they have few entertainments, such a thing is always well patronized; and though this was in a thinly settled region, they cleared over fifty dollars. From that time, the parents seemed to feel a double interest in the school, and went in very often to see the things used which they had helped to buy. Many little things can be improved by your own exertions; for boys and girls love to work if the teacher will work with them, and are very proud of the results of their labor. If possible, have some pictures, or flowers, or something else pleasant, where the scholars can see them every day, that their love for the beautiful may grow with their knowledge.

Be careful of the manners of your pupils. Some of them, probably, come from rude, coarse homes, where they have no training, and all they will ever receive must come from you. Require them to be polite to each other, as well as to you, and they will, in time, learn to be ashamed of coarseness and rudeness. It will take time and patience, but if some of these neglected ones shall learn from you to be gentle-mannered, respecting themselves and others, you will be repaid. Do not neglect or despair of the most unpromising material, for you can never know what treasures may be hidden beneath a coarse, uncouth exterior. As much as possible, infuse your own individuality into the school. If you are teaching geography, tell the children something you have known or read yourself about those countries. They will be far more interested in it than in anything the book can tell them. Vitalize all the knowledge you impart. Do not confine yourself to any one method or routine, but try to make a variety; and when they tire of one way, and their attention flags, try something else. Invent methods of your own. I do not claim that those I have suggested are the best possible, but they are a few among many good ones, and may help you till your experience teaches you better ones.

Finally, my young friend, you will find teaching no flowery path ; but it is one of the paths which, if rightly followed, leads upward. In this humble position, you may be moulding the minds which shall mould the next generation. The responsibility is a weighty one, and should not be lightly undertaken. Be patient and gentle, but ever firm ; govern yourself first, and most strictly of all ; seek, not popularity, but the highest good of your pupils ; and, in time, you shall gather sheaves which you will not be ashamed to lay at the Master's feet. If you wish above all for fame, or reward, or even appreciation, you are in the wrong position ; but if you wish to be useful and helpful to your generation, you can find no better place, and may say, with the poet :

Not myself, but the truth that in life I have spoken,
Not myself, but the seed that in life I have sown,
Shall pass on to ages—all about me forgotten
Save the truth I have spoken, the things I have done.

—N. E. *Journal of Education.*

How shall we teach Science ?

How did we learn what little we know of science ? How came we to have any sciences to teach ? Lord Bacon, to whom Inductive Science owes so much, has somewhere said that scientific knowledge should be insinuated into the minds of learners in the same way or order that it at first became known to men. This seems to be sensible. By science in this connection, we do not mean mathematical or metaphysical, but physical science. We mean well-arranged knowledge of material objects. Such knowledge is obtained through the senses. Such knowledge " cometh by observation " of the learner, or through the evidence of the testimony of persons who have observed.

Socrates sought to elicit the latent knowledge of those who did not know, and to make them know, by judicious questioning. Plato relates that he said, concerning a boy whom he was teaching how to make one square twice the size of another square, and with whom he fully succeeded, " I do not tell him *my* opinion, but I get at *his*." The method of Socrates was admirable in teaching Geometry, but it will not do for Chemistry of Natural Philosophy, until the mind of the learner is well supplied with the results of somebody's observation, of which some part must be his own. How long would the Socratic teacher have to question by the " drawing-out process," to enable a boy, who had never seen nor heard of a piece of sugar, to know what change it would undergo in a cup of tea ?

Primarily science means knowledge, and a science is the embodiment or complement of observed phenomena, pertaining to kindred subjects and duly classified, so as to illustrate general principles and truths. The acts of Deity so observed as to give some idea of the thoughts or plan of Deity, is human science.

The very term, teaching science, or as it is more commonly used in England, science-teaching, sufficiently indicates the method which should be pursued by the teacher. That science or knowledge comes to the mind through the senses, that is, through somebody's senses, will hardly be disputed. To *know* is to perceive through the organs of sense, and principally the eye, as is evident from the etymology of the word. In Anglo-Saxon *cunnan*, and in the Old English, German, and Danish, *kennen* is to see or know by sight. As late as in Queen Anne's reign, Addison wrote " *We ken* them from afar." While the writer has no wish to impart the odor of the lamp to this brief article, he can not help calling the attention of

his fellow-teachers to the lessons they may learn from the study of the words they use. Why did the discriminating Greeks use the verb *eidó* (Latin *video*) in certain tenses meaning exclusively, *to see*, and in other tenses, meaning exclusively, *to know* ? In the perfect tense the word *oida* instead of meaning *I have seen*, means *I know*. The difference is apparent, rather than real. How often do children say *I know it*, because *I have seen it*. So said the Greeks of old in a single word, and that word, though in the perfect, is used as if it were the present. Of the seven hundred times nearly, that the word is used in the Greek New Testament, it is translated *know* about three hundred times.

Teaching is something more than drawing out, or pouring in. It is, in addition to these process, a pointing out or showing. Its equivalent in ancient and modern languages means primarily *showing*. The Anglo-Saxon *tæan*, and such words of the Gothic stock, as *tooghen*, *tigen*, *zeigen*, etc., are allied to the Latin *docere*, and the Greek *deiknumi*, all pointing back to the old Sanscrit root *die*, meaning to show or point out. *Indicare*, *index*, *dexter* (the right hand) *dedzia* (the right hand) *digitus* and *dactulos* (finger) with many similar words, in-dic-ate the in-dic-ative meaning of their cousin, *teacher*.

If knowledge results from observation, and if teaching implies showing, the inference is plain that the *Object Method* of teaching is the true method. Teach boys, says Ruskin, to *see*, rather than to *say* something. The old theory that vision results from something going from the eye to the object seen, instead of the modern view that it is a sensation caused by motion or vibration coming to the eye, corresponds to the theory of teaching without showing.

Prof. Guyot has well said that the study of every science implies three stages, the *perceptive*, the *analytic*, and the *synthetic*. From necessity the perceptive must be first. A certain amount of knowledge must come to the mind of the learner by his own observation before he can comprehend or receive the results of the observation of others. The unknown must be imparted by comparison with the known.

How can we reason but from what we know ?

The King of Siam distrusted the veracity of the European traveler who told him that in Europe the rivers and lakes were sometimes so solid that an elephant might walk over them. Had his Siamese Majesty ever seen, in boyhood or in manhood, any of the processes of freezing water described in our elementary text-books, and performed by most teachers having an air-pump or cryophorus, he would have known better what to believe. The habit of observation and consequent strengthening of the perceptive faculties can best be acquired in childhood. How early in life do children begin to inquire *how* and *why* kites rise, apples fall, and innumerable other actions occur. But these queries, the beginning of the study of science, must be preceded by the observation of the occurrence.

Pharaoh's daughter saw a queer-looking basket in the rushes of the Nile. She investigated the novel appearance and found Moses. Moses saw a bush burning in the wilderness ; turning aside to investigate the phenomenon, he found the Great I AM. So

" Could we but open and intend our eye,
We all, like Moses, should espy
In every bush the radiant Deity."

How did the Great Teacher teach his disciples spiritual truths but by comparing them to natural truths, evident from ordinary observation ? " Without a parable spake he not unto them." He compared the unknown with the known. So must we, fellow-teachers, when we teach

what is beyond the possibility of observation by our pupils; but we should point out all accessible means and objects, for them to see and know for themselves as much as possible, that we may have a thrifty stock into which we may engraft the scions of other knowledge.

PROF. N. B. WEBSTER.

Norfolk, Va.

POETRY.

Squandering Lives.

By BAYARD TAYLOR.

The fisherman wades in the surge,
The sailor sails over the seas,
The soldier steps bravely to battle;
The woodman lays axe to the trees.

They are each of the breed of heroes,
The manhood attempted in strife;
Strong hands that go lightly to labour,
True hearts that take comfort in strife.

In each is the seed to replenish
The world with the vigour it needs—
The centre of honest affections,
The impulse to generous deeds.

But the shark drinks the blood of the fisher;
The sailor is dropped in the sea,
The soldier lies cold by his cannon,
The woodman is crushed by his tree.

Each prodigal life that is wasted
In many achievements unseen,
But lengthens the days of the coward,
And strengthens the crafty and mean.

The blood of the noble is lavished
That the selfish a profit may find;
God sees the lives that are squandered
And we to his wisdom are blind.

A Lawyer's will.

Poetical wills are certainly legal curiosities, and the following specimen printed in *Notes and Queries*, and made by the late John Cooper Grocott, a Liverpool solicitor, worthy of preservation:

"A LAWYER'S WILL.

26th of January, 1835.

This is my last Will and Testament;
Read it according to my intent.

My gracious God to me hath giv'n
Store of good things that, under heav'n,
Are giv'n to those 'that love the Lord,
And hear and do His sacred Word;
I therefore give to my dear Wife
All my Estates to keep for life,
Real and Personal, Profits, Rents,
Messuages, Lands, and Tenements;
After her death, I give the whole
Unto my children, one and all,
To take as 'Tenants in Common' do
Not as 'Joint Tenants,' *per mie—per tout*.
May God Almighty bless His Word,
To all my 'presents from the Lord,'
May He His blessings on them shed
When down in sleep they lay, their head.

I give all my 'Trust Estates' in fee
To Charlotte my wife and Devisee.
To hold to her, on Trust, the same,
As I now hold them in my name;
I give her power to convey the fee,
As fully as though 'twere done by me.
And here declare that from all 'charges,'
My Wife's 'Receipts are good *dis*-charges,'
And now, my Wife, my hopes I fix
On thee, my Sole Executrix—
My truest; best and to the end
My faithful Partner, 'Crown,' and friend.

In Witness whereof, I hereunto
My Hand and Seal have set,
In presence of those whose names below
Subscribe and witness it.

J. C. G. (L.S.)

This will was published, sealed and signed,
By the Testator in his right mind,
In presence of us, who, at his request,
Have written our names these facts to attest.

J. G. D.; J. M.; D. E."

OFFICIAL NOTICES.



Department of Public Instruction.

APPOINTMENTS.

ERECTING SCHOOL MUNICIPALITIES.

His Excellency the Lieutenant Governor has been pleased by order in council dated the 23rd of February last (1877), and in virtue of the powers conferred on him by the 30th clauses of chap 15 of the Consolidated Statutes of Lower Canada.

1. To detach from the municipality of Grand River, in the county of Gaspé, the territory known as the "East side of Little Pabos River"; bounded on the north east by the property of James Candy exclusively, on the south west partly by the Gulf of Saint Lawrence, and partly running along the Little Pabos River, to the unconceded lands, and to erect it into a school municipality under the name of Little Pabos.

3. To detach from the township of Hunterstown, in the county of Maskinongé the new parish of Saint Alexis, in the same county, and to erect it into a school municipality under the said name and with the same limits as those assigned to it as a parish for civil and religious purposes, to wit: bounded on the south east by the north western limit of Saint Paulin, being a line crossing the township of Hunterstown from north east to south west in the fourth range of said township, and leaving Jean Collard's, lot on the north east side of Grand River du Loup, and the property of Antoine Lafrenière, on the west side of the same river, in the parish of Saint Paulin, on the south west side by the prolongation in a straight line of the line separating the parishes of Saint Ursule and Saint Paulin, for a distance of about six miles in the township of Calonne, on the north west by a line drawn from the extremity of the one just described to the south west line of township Caxton, or its prolongation in a straight line, on the north east by the line of separation between the said townships of Hunterstown and Caxton, or its prolongation in a straight line.

3. To detach from the municipality of the parish of Saint Germain de Rimouski, in the county of Rimouski, the new parish of Notre Dame du Sacré Cœur, with the same limits as those assigned to it as such.

4. To divide into two the municipality of Saint Celestin, in the county of Nicolet, the municipality No. one to comprise that portion of the parish of which is in the fiefs Godfroy and Rocquetallade, and the municipality No. two to comprise the remainder of the parish, (the division line between the two municipalities being cadastral lots Nos. 172, 335, 336, 337).

SCHOOL COMMISSIONERS.

His Excellency the Lieutenant-Governor has been pleased by order in council of the 28th February last, (1877), and in virtue of the powers conferred upon him by 48th and 136th clauses of chap. 15 of the Consolidated Statutes of Lower Canada, to make the following appointments of school commissioners, to wit:

County of Drummond, Grantham.—Mr. Joseph Senneville, *vice* Mr. Isaie Grangé, who has definitely left the municipality and not replaced by election.

County of Drummond, Wendover and Simpson.—Mr. Arsène Brassard, *vice* Mr. Alexandre Côté, who has definitely left the municipality and not replaced by election.

County of Gaspé, l'Étite Pabos.—Messrs. William Sutton, Richard Sutton, John Kyse, Daniel McNeil and William Garrett. New municipality.

County of Rimouski, Notre-Dame du Sacré Cœur.—The Reverend Mr. Charles Guay and Messrs. Pascal Parent, Pierre Parent, Joseph Pineau, son, and François-Xavier Pineau. This appointment had already been made on the seventeenth of August last, but the municipality was not then legally constituted, and it is proper to renew the same.

County of Vaudreuil, Saint Lazare.—The Revd. Mr. Thomas Brassard and Messrs. Louis Campeau, Ephrem Montpetit, Cyprien Gastonguay and Joseph Montpelier. New municipality.

School-Room Crowding—Brown's Dream.

At the close of a March day, Dr. Toby was returning from his round of visits. His patients that day were mostly children. Scarlet fever, measles, diphtheria, ophthalmia in various forms, had taxed his skill and touched his sympathies. His way lay past Brown's, and he determined to call. He hoped to bear Brown's lively comments on the events of the day, and so succeed in driving away the recollections of the scenes of suffering he had witnessed—scenes doubly distressing to him because, he believed them to be, in a great measure preventable.

Contrary to expectation, he found Brown taciturn, sober, blue. He rallied him on his gloominess, when Brown exclaimed; "Now, doctor, I know you'll laugh and tell me to avoid late suppers; but the fact is, I have had a dream and cannot shake off the impression it has made. It has set me thinking," and Brown thrust his hands into his pockets, dropped his chin upon his chest, and gazed steadily at the fire in the grate.

"It wants an hour to dinner, and I have no engagement, so let me hear the wonderful dream," said the doctor. Brown seized the poker, stirred the fire until it glowed, and thus began;

"It seemed that I stood before the gate of the Golden City and knocked for admission; a voice cried out, 'Who's there?' 'Brown,' said I. 'Too indefinite;' and the form of St. Peter appeared above the gate with a large book in this hand, in which he seemed to search. 'Occupation?' he asked. 'Merchant,' I replied. 'Brown merchant;' said the good saint, running his finger down the page; 'not here,' and he seemed about to close the book. 'School trustee,' I added, in a hesitating tone. He turned again to the book. Running his finger down the page, he said, 'Brown, Trustee of P. S. No. 505.' 'That's it,' said I, suddenly brightening up, for if my name was there, I thought I had only to walk up to the cashier's desk and draw my dividend. 'Well! what good have you done down there?' said the saint, nodding in the direction of the world. This dampened my ardor. I remembered that I had received on one occasion, three votes for deacon of our church: that I was a director in a horse-railroad; that I put my name on to all subscription papers presented; but none of these seemed to suit the atmosphere of the country in which I was, and so I ventured to say that I had got a school-house built in my ward. The good saint, who had been gazing intently upon a group of children playing on a sunny bank, suddenly turned to me and said, 'What kind of a one?' I wished that I had with me some of the plans we have in our board. They look so fine upon paper, and so confoundedly like a rope walk, or tenement house, when put into brick and mortar. I described P. S. No. 55 to the best of my ability. 'Nothing like it in these parts,' said he: 'how many do you put in a school?' 'That depends,' said I. 'Depends on what?

said he, in a tone of voice that made my knees tremble. 'Upon how many want to come,' I replied. 'What do you do when the rooms are full?' he then asked. 'Make additional ones out of the play-rooms' I answered. 'Where do the children then play?' he inquired, in a tone I didn't like; but I plucked up courage and answered, 'They don't come to school to play but to learn.' I said 'this all the bolder because it wasn't original with me.

"When these are full, what do you do then?' he asked, in tone that indicated that he thought me cornered. 'Put them in wardrobes and under the stairs,' said I quite readily. 'What then?' said he, with a sternness that made me wish I hadn't been quite so fluent with my answers; but I remembered that I had never advocated putting children in the coal hole or astride of the ridgepole, so I answered. 'Put them in church basements;' and I emphasized the word church, hoping to turn his thoughts from school-houses, that are used five days in the week, to churches, that are used but one day in the week. But I didn't succeed. 'What then?' said he, impatiently. 'We promote and fill up again.' The good saint made a gesture of despair. 'What kind of teachers do you give these little ones, crowded into dark basements, huddled into wardrobes, stifled under stairways? Good ones, I hope; those with judgment and experience, and full of love for them.' I was sorry that he touched on this subject, for I thought he would pardon my sins in the school houses, for I was but one out of many. But in the matter of teachers I feared that I had not so much to plead in excuse, so I answered: 'Your reverence, when I go to Boston and am asked this question, I say yes, but as your city doesn't lie in that latitude, I may as well confess that I do no such thing. I put in young girls sixteen years of age, who can't define judgment, much less possess it, with no experience; pupils themselves yesterday, teachers to-day, with the destinies of eighty or a hundred little children in their hands; heads so filled with balls, parties and novels, that there is little room for love of children—these are they to whom I commit the children in dark basements, crowded wardrobes and stifled closets!' and, doctor, I dared not look the good saint in the face, but stood with bowed head before him. Presently he said 'Look!' I looked, and beheld a great multitude of children whom no man could number, sporting on the plains of the Golden City. 'There are they whom scarlet fever, diphtheria, pneumonia have taken from your ill ventilated, fever-breeding school-rooms, under the charge of children themselves. Think how many desolated homes, blighted hopes, those children represent. These are the children you have helped to—' There was a crash, the golden gate vanished, and in letters of fire I read these words: 'Inasmuch as ye did it not unto the least of these, ye did it not unto me.' I awoke; Mrs. Brown was opening the shutters, and the rays of the morning sun fell on my face. Doctor, I have seen those children all day long, and did not dare to go the school this morning;' and Brown fixed his gaze intently on the fire.

There was silence for some moments, broken at last by the doctor, who said, "You have seen the children released from their bodily sufferings; I to-day have seen them writhing under their pains. Ill ventilated and overcrowded school-rooms are the remote causes of a large amount of this suffering. Both public and private schools are equally guilty. We wonder at the stupidity of our fathers, who provided seats without backs for their children, but gave them plenty of fresh air and of room. Posterity will condemn us, who provide comfortable seats, and deprive our children of air and of room. Your plan of putting six or eight children on a bench, so closely seated that they can hardly move, is horrible. Itch, lice and sore eyes travel along the whole line." "No such children are allowed in my school," said Brown. "Nothing but a minute daily examination can determine that," continued the doctor. "And have your young and inexperienced teachers, who, with a fatal blindness, are placed over them, the time, tact and judgement to make this examination?" Brown did not reply, and the doctor went on. "As a citizen of this commonwealth, each child has a right to his individuality; to a separate and distinct seat; to at least six square feet of space, over which he is master and for which he is responsible. Citizens of a republic can be made in no other way. All this abominable arrangement of settees, galleries and extra seats must be relegated to the dark ages." "Doctor, you are crazy. On this plan P. S. No. 505, with its two thousand pupils, would become a one-horse affair of about five hundred," said Brown: "and from being chairman of the first school in the city, I should

come down to the level of Jones, who is chairman of a little primary in the suburb's. I never would consent to that. A Frenchman, in my presence, boasted of his famous schools, with a beggarly two or three hundred. When I told him that mine had over two thousand, you should have seen him open his eyes. Think of the cost. Pour school to the work of P. S. 505!" "Not all the work, Brown," replied the doctor; "they couldn't fill the cemetery so fast. There is money for jails, almshouses and prisons when overcrowded—why not for schools?" "We don't get half of the money now for which we ask," objected Brown. "If the class is full, refuse them," answered the doctor; "refuse them in justice to those already there, in justice to themselves."

"But is not half a loaf better than no bread?" queried Brown. "Not if the half offered contain the seeds of ill health and premature decay," replied the doctor. Brown said nothing, and the doctor continued: "Medical men have written volumes upon the evils of overcrowding the schools. Again and again have they demonstrated the least space a child should have; the lasting evils of foul air; the eye destroying power of ill-arranged barracks are continually repeated. THE SANITARIAN has laid siege against these murderous barracks and the newspapers occasionally fire a shot; but the blind, who will not see, persist in comparing themselves with themselves when they were children, and so keep up a stout resistance. Continuous bombardments, and by the whole power of the press, will alone do effectual work; and, Brown, it is coming. We cannot hold our own with the schools of other nations, unless there be great improvement, both in their physical and mental conditions. The editors did not go through the great Exposition with their eyes shut. With our wonderful physical and mechanical prosperity our schools have not kept pace. In the next ten years the press will hold every school trustee to a strict account of his stewardship. Brown, take a step in advance to better the physical condition of P. S. No. 505. Reduce your grammar classes to forty pupils, your primary classes to fifty; give each pupil a separate desk, put over him a man or a woman for a teacher, not a girl, who still ought to be in the academic class or normal school; and then, when you approach, in reality, the gate of the Golden City, no pupil of P. S. No. 505 will be there to accuse you of crowding him out of life." "Toby, there's my hand; I'll do it!" said Brown, and the good doctor went home with the happy consciousness that that resolve meant life, and wealth to many a child, for Brown was a man of his word.

Gentlemen of the Educational Boards in the cities of our fair land, will you not follow Brown's example?—*The Sanitarian*.

PHILO.

Juvet's Time-Globe.

We have to acknowledge the receipt of several photographs, accompanied with printed descriptions, of a remarkable invention, named by the inventor "*The Time-Globe*". This instrument was exhibited at the late Centennial Exhibition at Philadelphia, where it attracted much attention and unqualified praise.

Apart from its extraordinary merit as a piece of mechanism, its novelty, and its usefulness as an universal indicator of time, the lovers of Educational progress will welcome it as a most valuable improvement and adjunct to the ordinary appliances of the School-room for teaching Geography and for making plain to the comprehension of the young quite a number of important considerations comprised in that branch of study—and which teachers usually find it impossible, however essential, to elucidate in a manner satisfactory to themselves or to their pupils.

Without the aid of a suitable diagram it would scarcely be possible to give a clear explanation of the construction and uses of "*The Time-Globe*"; but we expect shortly to be in possession of an electrotype cut, and we hope, in the next issue of the Journal to present our readers with an intelligible and detailed description of this wonderful instrument regarded as an Educational appliance.

MISCELLANY.

How to deal with scandal.—What's the use of minding what "they say?" What's the use of lying awake of nights with the unkind remark of some false friend running through your brain like forked lightning? What's the use of getting into a worry and fret over gossip that has been set afloat to your disadvantage by some meddling busy-body who has more time than character? These things can't possibly injure you, unless, indeed, you take notice of them, and in combatting them give them character and standing. If what is said about you is true, set yourself right at once; if it is false, let it go for what it will fetch, until it dies of inherent weakness.

Macaulay and American Institutions.—Lord Macaulay once wrote several letters on American institutions to the late Mr. Henry S. Randall, and these letters now appear in *Harper's Magazine*. In one of them he says: "I have long been convinced that institutions purely democratic must, sooner or later, destroy liberty or civilization, or both. In Europe, where the population is dense, the effect of such institutions would be almost instantaneous. Your fate I believe to be certain, though it is deferred by a physical cause. As long as you have a boundless extent of fertile and unoccupied land, your labouring population will be far more at ease than the labouring population of the Old World, and, while that is the case, the Jefferson politics may continue to exist without causing any fatal calamity. But the time will come when New England will be as thickly peopled as old England. Wages will be as low and will fluctuate as much with you as with us. You will have your Manchesters and Birmingham, and in those Manchesters and Birmingham hundreds of thousands of artisans will assuredly be sometimes out of work. Then your institutions will be fairly brought to the test. Your Constitution is all sail and no anchor. Either some Cæsar or Napoleon will seize the reins of Government with a strong hand, or your Republic will be as fearfully plundered and laid waste by barbarians in the 20th century as the Roman Empire was in the 5th, with this difference, that the Huns and Vandals who ravaged the Roman Empire came from without, and that your Huns and Vandals will have been engendered within your own country by your own institutions."

Do not Face the Light when at Work.—Statistics kept by oculists employed in infirmaries for eye disease, have shown that the habit of some persons in facing a window from which the light falls directly in the eyes as well as on the work, injures the eyes in the end. The best way is to work with a side light, or if the work needs a strong illumination, so that it is necessary to have the working table before the window, the lower portion of the latter should be covered with a screen, so as to have a top light alone, which does not shine in the eyes when the head is slightly bent over and downward toward the work. In the schools in Germany this matter has already been attended to, and the rule adopted to have all the seats and tables so arranged that the pupils never face the windows, but only have side lights from the left; and as a light simultaneously thrown from two sides gives an interference of shadows it has been strictly forbidden to build school rooms with windows on both sides, such illumination having also proved to be injurious to the eyes of the pupils.

Antidote to poisoning by phosphorus.—Antidotes are of various kinds. Some act mechanically, such as emetics; others, acting physiologically, induce such a state of the patient's system as protects him from the effect of the drug; whilst a third kind, and as a rule by far the most effective and reliable, act chemically, or, in other words, form such a chemical compound with the poison taken that the nature of the latter is completely changed, and rendered inert and harmless. A successful antidote of this last class has been recently discovered by two French physicians to poisoning by phosphorus. The remedy consists in the slow and gradual injection of oxygen into the veins, and the *modus operandi* is as follows: Phosphorus has a great affinity for oxygen, and accordingly, when absorbed into the system, its injurious effect is due to the fact that it unites with the oxygen in the tissues, thus producing dangerous or

fatal symptoms. Accordingly, by the introduction of oxygen into the viens the phosphorus is thus oxidized and prevented from robbing the blood corpuscles of their oxygen, which would otherwise be the inevitable result. The operation of injecting the oxygen being inexpensive and presenting no difficulty to the medical practitioner, we may expect to see this remedial method generally adopted in cases of poisoning by phosphorus.

Analysis of human milk.—The question whether a sucking bottle is an efficient substitute for the milk of the mother can only be settled satisfactorily by a careful comparison of the chemical constituents of human and cow's milk respectively. We are, therefore, interested to learn that a great German chemist has recently submitted samples of woman's milk, and cow's milk to a series of careful analysis, though only for the more limited and specific purpose of determining the relative proportion of albumen in each. Every precaution was taken to assure favourable conditions, and the following is the result of the analysis:—Woman's milk (according to the average from eight analysis) contains 2.5 per cent of albumen, whilst cow's milk (according to four analysis) contains 3.5 per cent., or one per cent, more than woman's milk. In these observations the quantity of albumen was estimated from the amount of nitrogen present which was readily determined. We should add here that the author of these experiments states distinctly that woman's milk contains no substance except albumen, which contains nitrogen. When we reflect that albumen, (which is composed of the four cardinal elements, oxygen, hydrogen, carbon, and nitrogen) is the most sustaining and most readily assimilated of all animal compounds, the results of these, the latest investigations on the constituents of milk will not seem unimportant.

An artificial eye.—We have all heard of the ingenious person who constructed a model duck whose internal parts were contrived with so much mechanical nicety that a piece of food, on being inserted into the mouth was instantly swallowed and digested. This feat has lately been paralleled by Dr. William Siemens, who has devised an artificial eye which is sensitive to light. This wonderful invention, which is based upon the action of light upon the electric conductivity of selenium, may be described as follows: A hollow sphere, suitably supported, is provided with two openings, in one of which is placed a converging lens, and in the other a selenium plate, the latter in communication with an electric current and a galvanometer. The lens being covered with two movable screens, the whole is comparable to an eye, in which the screens represent the lids, and the selenium plate the retina. Whenever the screens are removed, the galvanometer is seen to deviate, and the degree of deviation depends on the colour of the light which converges upon the selenium. It is very slight if the light is blue, more if the light is red, and still more if white light be transmitted. The eye may be placed in communication with an electromagnet, which may automatically operate the screens, in manner similar to lids. "Here," says Dr. Siemens, "is an artificial eye, sensible to light and to difference in colour, which gives signs of fatigue when it is submitted to the prolonged action of light, which regains its strength after resting with closed lids," and which, by an electro magnet attachment, may be made to close itself, as does the human eye involuntarily, on the occurrence of a vivid flash.

New method of measuring distances.—The well known method of measuring the depth of a well or shaft by the time a stone is heard to reach the bottom may be improved upon by taking into account the time required for the sound to reach the ear from the bottom of the shaft, a correction only of any consequence when the shaft is very deep, as half a second is all the essential for the sound to pass over a distance of nearly five hundred and fifty feet. It, however, small fractions of seconds could be appreciated, it would then become possible to determine distances by sound with entire readiness and with the greatest possible degree of accuracy. This latter is what is now claimed to be accomplished by M. De Boulanger, a Belgian engineer and artillerist; that is, on seeing the flash or smoke of a gun, he touches one key of an instrument, and, the moment the sound is heard, the other key is touched—in the meantime, the clockwork of the instrument has been set in motion by touching the first key, while it has been stopped by the second key, and the space passed over gives the time within one-twentieth of a second, which answers to an accuracy

within fifty feet. The advantage of this in artillery, especially for coast defence against an attacking fleet, is expected to be very great, as it will enable the gunners to make the determination of the distance of hostile ship, the work of a moment merely.

Comet tails.—The well-known Italian astronomer, M. Schiaparelli, has made some interesting investigations concerning the formation of the tails of comets, and the nature of the repulsive force which contributes to that phenomenon. The actual existence of such a force is established by the accurate observations that have been made by different parties, and the results have been from time to time given in scientific journals. An examination has been made by M. Schiaparelli, of the various theories that have been put forth—the electrical theory proposed by Zellner, the molecular theory of Zenker, and the theory of Faye that repulsion is exerted by all incandescent surfaces, and that thereby the gaseous matters attending the comets are repelled from the surface of the solid nucleus—though the latter explanation is deemed of but slight weight. The conclusion to which M. Schiaparelli has come is that the repulsive force acting upon comets is a force exterior to the comet itself; and, since this force evidently operates in the direction of the radius drawn from the comet to the sun, it must consequently be regarded as having, for its origin, the sun or some medium surrounding the sun, and this he believes is about all that is at present known on the subject.

Cold and Drink.—Curious statistics of total abstinence in the Arctic regions.—Among other results of the Arctic Expedition some curious statistics have been obtained with reference to the question of total abstinence. The abstainers who went out with the expedition were six, viz. William Mallay, Adam Ayles, William Gore, Joiner and Self, of the Alert, and Henry Petty, of the Discovery. There were two or three other seamen who joined the temperance cause during the commission, and it is only fair to state that the novices suffered from scurvy like the rest of the crew. Mallay was not employed on any long journeys, but was repeatedly out with supporting parties. He states that the sleighing parties of the Alert suffered greater privations than those from the sister ship. They had pushed beyond the limit of animal life, and their supplies of reindeer and musk-ox were soon exhausted. They were consequently obliged to subsist entirely upon ship's stores, and this enforced abstinence from animal food made them in a special degree susceptible to scurvy. On the termination of the sleighing duties at the end of July, the abstainers found that they had surpassed the remainder of the Alert's crew in the number of days' sleighing performed. On this occasion Ayles had been out 110 days and Mallay 98, "and it is a remarkable fact," the latter remarks, "that neither of us was attacked by scurvy, but enjoyed good health, and were only weakened by our arduous duties in sledging work." Adam Ayles is a teetotaler of many years' standing. He was not only out for 110 days sledging, but on one occasion he was out no less than 84 days from the ship at a time. On this occasion scurvy had attacked the party, and had gained on them so suddenly that with the exception of Lieut. Aldrich and Ayles the whole of the men (seven in number) were in a helpless condition. Dolge and Mitchell still managed to struggle by the side of the sledge, but the other invalids, who had held out until the last moment, were obliged to be carried. We have already stated that of the two who were free from scurvy Adam Ayles was one. The other was Lieut. Aldrich, who, although not an abstainer, was next door to one, diluting his rum more than any other member of the expedition. During the whole of his sledge journeys Ayles ate and slept well, and bore the cold even better than those who were accustomed to take stimulants. The rest of the party had a double allowance of grog, forty-five above proof, before turning in. They also smoked a good deal, but for his part, Ayles says he neither drank nor smoked, and he took care that his allowance of grog was stopped on joining the ship. Twice a week there was beer served out, which was considered a great luxury, as it occupied much room in the travelling, and was dealt out very sparingly. He was never in better health in his life than at the present time.

Henry Petty, a teetotaler of 16 years standing, was the only total abstainer in the Discovery. He accompanied Capt. Stephenson in all his sledging excursions, and as it fell to his lot to act as cook while they were away from the ship, and he was thus obliged to get out into the cold for an hour and a half in the morning and for the same period in the evening, he

was most exposed to the frost of any man in the ship. He was sledging sixty days in all. On one occasion he accompanied the Captain to the Alert, a distance of some ninety miles, doing the journey in four days and eight hours, and returning in three days and a half. He had been medically examined on Tuesday by the doctor of the ship, with the rest of the crew, and he learnt that he had never been treated for scurvy. He had only suffered from a cut in the hand. He believed that his immunity from disease was entirely owing to his teetotalism. He had slept well throughout the campaign, and had relished his food. He had also escaped frostbite.

Gore, it seems, had been an abstainer until he was 21 years old, but in an unguarded moment while on the sledge journeys he succumbed to the temptation and persuasion of his companions and took to grog. Previous to breaking his pledge Gore states that he could eat as well as any one. In fact, after devouring his portion, he was in the habit of looking about for more; but no sooner had he taken to grog drinking than he found his appetite to fail, and he was deprived of the refreshing sleep which he had formerly enjoyed. He was the only Good Templar who joined the expedition that was attacked with scurvy, and for this he was no doubt indebted to his unfaithfulness. He gave stimulants, he remarks, a fair trial, and he is now convinced that it was the grog which did the mischief. It may be noticed that the testimony of the whole ship's companies—doctors and others included—is unanimous and conclusive against the serving out of stimulants during the day. They emphatically state that no work can be done upon the grog, but many of them seem to cling to the belief that a glass at night was a sovereign recuperative agent, and fitted them for the fatigues of the morning.

Dr. Colan, the senior medical officer on board the alert, speaks very favorably of total abstinence as exhibited during the expedition, and his forthcoming report will possess much interest—(*Times*).

The Big Brother.—There is nobody in the household who has so many chances to make the rest happy as the big brother. He is the pride and delight of his father and mother, and the younger children fairly worship him. His sisters are ready to do whatever he wishes, and unless he is very unkind and disobliging, they are quite right in this disposition; for the big brother is always supposed to be a manly, generous fellow, willing to help weaker people and ready to lend a hand to those who need it.

I remember one big brother whom I greatly admired. He was about eighteen years old, tall and broad-shouldered, with a faint shadow of moustache on his upper lip. He was studying hard for his profession, but there was not a moment when he would not lay his books aside to solve a difficulty for Lulu or Jennie, whose parsing troubled them, and he had never said an ungentle word to the little brother ten years his junior, who came to him with his kites and skate straps and broken toys to be mended. The manly big brother lost nothing by his kindness and suavity, and now that he is a physician, a little bald, and with boys of his own to bring up, the same gentleness of demeanor recommends him to patients and friends.

Some boys seem to think it very fine to affect rudeness and bluntness of manner at home. They take off their hats very gallantly to the young ladies who reside in the opposite house, but it is too much trouble to be courteous to their own sisters. They scorn the idea of encumbering themselves with a little brothers or cousin who wants to go and see a procession, or to accompany them on an excursion. It does involve some self-sacrifice to give up one's careless independence on a journey and be responsible for the safety of a child; but then, if all the world were looking out simply for itself, where would the happiness go to?

Believe me, boys, the people for whose opinion you really care, will value and honor you far more for your habitual tenderness, good nature, steadiness, and patience with those who are younger than yourselves, than for your most brilliant performance in the school-room. If you are tempted sometimes to be cross and petulant, to say sarcastic things to those who cannot easily answer them, and to snub your little sisters and brothers, ask yourself whether or not after all you do not love these home folks better than any others in the world? Are you not sure of their love for you? Then is it not worth while to be amiable and lovely to those whose love makes earth's sunshine, and whose absence would make earth dark indeed? I often think if we were all more careful to be kind

in little things, we would be repaid by the comfort we should have in our own consciences. It is very easy to say a gruff word, when a gentle word would be the right one, but to most boys there is apt to be a troublesome prick afterward. A kind and pleasant word even in the way of reproof costs no more than a gruff one, and is a hundred-fold better. If you doubt it try it.—*Margaret E. Sangster, in the Christian at Work.*

Sacredness of a Promise.—An eminent British statesman is said to have traced his own sense of the sacredness of a promise to a curious lesson he got from his father when he was a boy. When home for the holidays, and walking with his father in the garden, his father pointed to a wall in which he intended to have pulled down.

"Oh," said the boy, "I should so like to see a wall pulled down."

"Well, my boy, you shall," said his father.

The thing, however, escaped his memory, and during the boy's absence a number of improvements were being made, among others the pulling down of this wall and the building of a new one in its place.

When the boy came home and saw it, he said: "Oh, father, you promised to let me see that wall pulled down."

Instantly the father remembered his promise and was deeply pained to think that he had seemed careless about his plighted word.

"My boy," he said, "you are right. I did promise, and I ought not to have forgotten. It is too late now to do just what I said I would, but you wanted to see a wall pulled down, and so you shall."

And he actually ordered the masons up and made them pull down and rebuild the new wall, that as nearly as possible his promise might be made good.

"It cost me twenty pounds," he said to a friend who was bantering him about it, "but," he added solemnly, "if it had cost a hundred, I should have thought it a cheap way of impressing upon my boy's mind, as long as he lives, the importance a man of honor should attach to his plighted word."

—The London correspondent of the *Manchester Guardian* writes:—"The main portion of the Babylonian antiquities just received at the British Museum as the result of the last expedition of Mr. George Smith was found near Hillah, a town about three miles north from the site of Babylon. They are chiefly contract tablets, mortgage loans, promissory notes, records of the sale of lands, shares, and other commodities, representing, in fact, all the various commercial transactions of a Babylonian firm, who may be approximately described as Messrs. Gabi and Sons, bankers and financial agents. Many of the tablets represent the renewal of loans and mortgages, so that the documents referring to the first and the last of continuing transactions bear the dates of several different reigns. The dates thus extend from the fall of the Assyrian empire to the reign of Darius Hystaspes, including dates in the reigns of Nabopolassar, father of Nebuchadnezzar, Evil-Merodach, Cambyses, and the elder and the younger Cyrus. The dates of the tablets, therefore, furnish very important chronological landmarks, and they are in many respects subversive of the recent chronology. The rate of interest current in Babylon on loans was generally 10 per cent., and much light is thrown on the social life of the Babylonians from the circumstance that witnesses of deeds are always described by their trade or profession. One of the tablets is dated in the reign of Belshazzar as king, being the first time his name has been found in connection with the royal dignity, previous inscriptions having had reference to the time when he was described as the son of Nabonidus. There are a large number of mathematical tablets giving calculations of considerable intricacy. One curious and beautiful tablet presents a calendar for the entire Babylonian year—or would if a fragment had not been lost—and for every day in the year, distinguished the days as lucky or unlucky, whether for feasting, fasting, marriages, or the building of houses. The calendar further indicates in what respects the several days affect or influence person and property, health and fortune. Among the antiquities are some early Babylonian bricks, and fragments of statuary of a kind hitherto unknown in the city of Zergul, called at this day by the slightly varied form of Zergul. There are also specimens of pottery, and two small bronze statuettes of gods, with inscriptions. The whole series of tablets may be said to be, all things considered, in a fair condition as to their integrity."

ABSTRACT FOR THE MONTH OF FEBRUARY, 1877.

OF TRI-HOURLY METEOROLOGICAL OBSERVATIONS TAKEN AT MCGILL COLLEGE OBSERVATORY. HEIGHT ABOVE SEA LEVEL, 187 FEET.

Day.	THERMOMETER.				BAROMETER.				† Mean Pressure of Vapour.	‡ Mean Relative Humidity.	WIND.		SKY CLOUDED IN TENTHS			• Rain and Snow Melted.	Day.
	Mean.	Max.	Min.	Range.	Mean.	‡ Max.	‡ Min.	Range.			General direction	Mean Velocity in m. p. hour.	Mean.	Max.	Min.		
1	34.11	39.1	27.8	11.3	29.8775	29.958	29.800	.158	.1844	93.1	s. w.	14.5	10.0	10	10	0.15	1
2	35.88	37.7	34.4	3.3	30.0116	30.066	29.941	.125	.1842	88.0	s. w.	12.2	9.9	10	9	Inapp.	2
3	34.69	39.0	31.8	7.2	30.1171	30.225	30.066	.159	.1747	86.8	w.	9.4	10.0	10	10	0.05	3
4		33.2	24.5	8.7							w.	13.7					4
5	26.78	33.7	24.6	9.1	30.0029	30.140	29.869	.271	1290	89.0	s. w.	6.5	8.6	10	4		5
6	31.69	37.3	26.4	10.9	29.8930	29.963	29.800	.163	.1431	80.4	w.	15.5	7.4	10	1	Inapp.	6
7	34.00	36.7	27.5	9.2	29.7305	29.848	29.676	.172	.1646	83.3	s. w.	14.9	8.9	10	2	Inapp.	7
8	18.27	28.0	13.1	14.9	30.0744	30.143	29.924	.219	.0778	77.4	w.	16.9	0.3	1	0		8
9	21.07	33.0	13.5	19.5	30.0747	30.123	30.011	.112	.0879	77.5	w.	14.6	1.3	4	0		9
10	24.89	37.0	13.7	23.3	30.0482	30.100	29.983	.117	1074	78.9	s. w.	11.9	5.3	10	0		10
11		38.2	18.2	20.0							s. w.	10.9					11
12	29.94	39.3	16.3	23.0	29.8825	30.124	29.737	.387	1497	88.6	w.	22.3	8.4	10	5	0.19	12
13	12.06	23.8	2.1	21.7	30.4167	30.545	30.262	.293	.0471	60.6	n. w.	25.1	1.1	4	0	0.01	13
14	13.75	21.1	5.2	15.9	30.4750	30.565	30.365	.200	.0567	68.9	s. w.	17.4	3.0	10	0		14
15	23.88	31.8	14.6	17.2	30.2024	30.323	30.053	.270	.0921	70.8	s. w.	12.8	7.8	10	3		15
16	32.62	37.8	28.9	8.9	29.8635	29.983	29.774	.209	.1534	82.6	s. w.	13.8	8.8	10	3	0.29	16
17	19.16	31.9	12.7	19.2	29.7521	29.811	29.685	.126	.0789	74.5	w.	17.6	4.9	10	1	Inapp.	17
18		24.0	11.3	12.7							w.	26.4				Inapp.	18
19	13.50	24.0	5.6	15.4	29.7099	29.778	29.667	.111	.0558	68.9	n. w.	14.8	4.5	10	0		19
20	19.75	25.2	13.7	14.5	29.7668	29.834	29.614	.220	.0778	72.5	w.	18.0	9.4	10	8	Inapp.	20
21	31.06	39.0	25.0	14.0	29.6061	29.652	29.552	.099	.1376	79.2	s. w.	17.5	6.1	10	1		21
22	36.21	48.2	28.7	19.5	29.7675	29.903	29.656	.247	.1499	70.6	s. w.	14.0	2.5	5	0		22
23	32.69	39.0	26.7	13.2	29.9831	30.010	29.921	.088	.1529	82.9	n. e.	11.5	6.4	9	0		23
24	32.06	36.8	29.6	7.2	29.8658	29.971	29.777	.194	.1520	85.4	n. e.	23.7	9.5	10	6	0.01	24
25		35.3	29.4	5.9							n. e.	14.3				Inapp.	25
26	32.71	40.9	28.8	12.1	30.1141	30.256	30.001	.255	.1225	68.0	n.	7.5	5.8	10	0		26
27	23.95	34.4	18.2	16.2	30.2925	30.364	30.208	.156	.0793	61.9	8.7	0.6	4	0		27
28	24.31	36.5	13.0	23.5	30.0614	30.170	29.947	.223	.1026	77.6	w.	11.1	3.8	10	0		28
Means	26.62	34.24	20.15	14.09	29.9809			.1906	.11931	77.81		14.91	6.0				

Barometer readings reduced to sea-level and temperature of 32° Fahr. † Pressure of vapor in inches mercury. ‡ Humidity relative saturation being 100. Observed.

Mean temperature of month, 26.62. Mean of mean max. and min. temperature, 27.20. Greatest heat was 48.2 on the 22nd; greatest cold was 2.1 on the 13th,—giving a range of temperature for the month of 46.1 degrees. Greatest range of the thermometer in one day was 23.5, on the 28th; least range was 3.3 degrees on the 2nd. Mean range for the month was 14.01 degrees. Mean height of the barometer was 29.9829. Highest reading was 30.565 on the 14th; lowest reading was 29.552, on the 21st—giving a range of 1.031 inches. Mean elastic force of vapor in the atmosphere was equal to .11931 inches of mercury. Mean relative humidity was 77.08. Maximum relative humidity was 98 on the 3rd. Minimum relative humidity was 49, on the 13th. Mean velocity of the wind was 14.9 miles per hour; Greatest mileage in one hour was 35, on the 18th. Mean direction of the wind, W. Mean of sky clouded was 60 per cent.

Rain fell on 7 days. Snow fell on 13 days. Rain or snow fell on 13 days. Total rainfall, 0.34 inches. Total snowfall 3.6 inches equal to 0.36 in. water. Total precipitation in inches of water was 0.70.