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EDITORIAL NOTES AND COMMENTS.

DO YOUR PUPILS GROW?

Nothing gladdens the heart of the world more than growth. This is true in all lines of activity and in all forms of nature. The teacher, too, as well as the missionary, who tries to develop the human soul, rejoices to see her pupils grow. To the genuine teacher, the intellectual growth of her pupils is of more value than all other considerations, and most of our teachers are genuine in this respect. There are a few ways in which we can note the growth of our pupils.

Their general interest in study for the sake of research; their tendency to think for themselves; their comprehension of general events; their readiness to accept the responsibilities of life and to prepare for a useful career, are all evidences of growth toward manhood and citizenship of the highest order.

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**NOTE TO TEACHERS** — To interest the senior pupils and provide them with profitable reading a few pages of interesting selections and original items will appear in each issue of the RECORD. Please call the pupils' attention to these pages and ask them to read such parts as they prefer.—EDITORS.

Let every recitation incite to thought, let all principles be fully understood, always dwell on the noble aspects of the daily lessons and lead your pupils to grow by their own volition and exertion in the performance of their daily tasks, and thus ensure that permanence that shall remain for eternity.

### JUST ONE MORE YEAR.

Who knows but this year may be his last at school! Were a pupil sure that this would be his last year at study, what serious reflections would occupy his mind. How careful and painstaking he would be to make the most of his opportunities, that he might fit himself for the active affairs of life. This disposition to apply himself would attract the sympathy and co-operation of his teacher, who would spare neither time nor patience to enable the pupil to realize his ideals before his last day at school.

When such relationship is established, genuine co-operation exists and permanent results are produced. Each year should be regarded by the teacher and her pupils as their last year together, and the same spirit of helpfulness should extend from one to the other, as if they were soon to separate. If this view were entertained by the teacher, she would find herself more sympathetic in the management of her pupils and less exacting in matters of discipline, yet she would have more ready and real obedience than by any other method. A heart full of sympathy is irresistible, and no creatures yield more readily to its influence than do boys and girls. Under such a beam of sympathy from the teacher, reflected again by her pupils, the school life becomes a real pleasure and the last year at school is often indefinitely postponed.

### REFLECTING THE LIGHT.

Reflecting the light of a pleasant spirit is a valuable qualification at all times. It is doubly valuable in the winning of children at school. In the story of the three little maidens, who went to town, the sparrows concluded that

the sweetest face at least would be the one which had never worn a frown. We have known teachers, whose pleasant spirit made their class room a "haven of rest below," where every task was assayed with zest, and every little soul was fortified for the battle of life.

### "WITH HONOR."

We often see lists of pupils headed by a few names, which are distinguished by the high record of success, which the pupils have earned. This is encouraging in many ways and is intended to incite everyone to greater effort, yet is it not possible to carry such mechanical encouragement too far?

(1) Is it not possible to induce a pupil to strive for some passing reward or renown to the exclusion of a love of knowledge for its own sake? The more a pupil strives for honors, prizes and medals, the less he delights in study for the pleasure afforded by knowledge. This is true of the lover of science in all branches of learning, for he labors for the pleasure of discovery, not for the title he sometimes receives. Those pupils do best who study hard for the pure love of discovery, and who welcome truth as its own reward. Such pupils are strong at school, resourceful in life and leaders in the nation's affairs.

(2) Does not the honor list contain those who are so situated as to give them undue advantage over others in the competition? If so, the honor of the few is the discouragement of the many, and the record is neither truthful nor complete. The only redress open to those pupils who fail, owing to handicaps, is to await the stern examination of life, where they may assert their manhood and their ability in a field without favors.

(3) Does not the pupil, who receives the applause of his companions, place too much value on such temporary distinctions, and then, missing such attention in later life, become discouraged? Truly, the poor fellow who plods along against hardships unknown, and overcomes against many odds, is better fitted for the lonely struggle and the disappointments of life than those at the head of the honor roll.

## THE RIGHT TO BE GLAD.

No person should be deprived of what he has a right to enjoy. Every child has a right to be glad and can only be happy when his surroundings are in harmony with child life.

Too often the duties of the school room are heavy and exacting, and overtax the limited energies of the teacher. This overtaxed condition begets a strenuous tension in the teacher's disposition, which manifests itself in stringent rules and study and conduct. Humanity at its best comes far short of perfection, much less does humanity in its infancy rejoice under restraint. We do not advocate the removal of restraint, but rather the admixture of more elasticity in the rules that govern school life.

The teacher who enacts a rigid set of rules for the government of her school, ties her own hands and compels herself to inflict many injustices on her pupils during the school year. These injustices do more to crush the joy and gladness out of her pupils than all else put together. If the teacher be strong to do right, brave to overcome wrong, hopeful for the success of all, and able to teach in a kind and cheerful manner, her pupils will rally around her in happy co-operation and support. In such a school rules are unnecessary, good conduct is at a premium, and the whole sentiment of the school room is against the transgressor.

In every case goodness is its own reward, and its twin sisters, joy and happiness, are soon the possession of every little heart in the school room, including the teacher herself, whose position is greater than all.

## THE WAY TO THE TOP.

How many "Tops" there are in life and how prone we are to seek these eminences by "short-cuts" and "by-ways." "In life's morning march, when our bosoms are young," we see the future with a hopeful view and everything seems possible. "Getting there," is often considered a justification for the questionable means used in reaching the **Top**. The pupil knows better, but he sees the public ready to

condone wrong, if it has wrought success, especially if the wrongdoer be of a generous disposition.

In school life the opinion of the teacher is regarded as worthy of confidence, and her view of right and wrong is generally accepted by her pupils. The way to the **Top** should be well learned at school, where there are so many opportunities to correct, advise, encourage and lead. Quality should always be preferred to quantity, a faithful effort should be recognized, sham should be lightly esteemed, good manners and a regard for the rights of others should always determine the relationship of the teacher and her pupils.

The teacher who starts her pupils aright on the way to the top shall never die while her pupils live. When she beholds them in later years battling forright on their way to the summit, and holding fast to the principles of their school days, she may be sure that she is remembered and rejoice that her pupils are strong because she was strong, in teaching them what was noble, true and good.

### NOON AND RECESS.

In every school there are some pupils who possess a greater sense of honor than is enjoyed by other pupils. These pupils of higher sentiments are a bulwark against the encroachment of evil in the school life and are an invaluable asset to the teacher and the community in which they dwell. God bless such boys and girls who can be men and women in nobility of thought and conduct even in the tender years of their childhood.

At the recesses of the school day the teacher should entrust much of the supervision to these pupils, who will readily report evil and encourage good among their companions.

### ARTICLES: ORIGINAL AND SELECTED.

#### FADS IN MODERN EDUCATION.

There is nothing new under the sun, says the Preacher. If he were to revisit the light among us with whom even steam is becoming something of an old story—if he were here in our age of automobiles, aeroplanes, electricity, and

radium, he would certainly open his eyes very wide indeed, and admit that his statement was a great deal too sweeping. But it is surely a curious illustration of the aspect of truth reflected, however one-sidedly, in his words, that this subject on which I am about to write, was treated two thousand three hundred and thirty-two years ago last March, in the Theatre of Dionysius at Athens, before the astonishingly modern people of that antique city, by the comic poet Aristophanes. The comedy called by him the "Clouds," produced in the year 423 B.C., might quite justly though much less imaginatively, have been entitled "Fads in Modern Education." It may be interesting to see what he made of the everlasting theme, still green and flourishing as the perennial folly of mankind.

The old-fashioned training of the Athenian people had been extremely simple—music, in which they included literature for the mind, and gymnastics for the body. Everybody in that town, every free man, that is, learned to read and write, and play the lyre and sing. That was considered to be just as indispensable and as much a matter of course as that everybody should learn to swim where Athene like Britannia ruled the seas.

They were in no hurry about it. They gave the boys plenty of time. The pupil sat opposite his teacher on a stool, as we can see in many of the vase-paintings, and repeated everything after him until he knew it by heart. In this way he came to have his mind stored with a great deal of excellent literature. A vast amount of epic and lyrical poetry, Homer and Simonides, gradually settled down by a painless process as a fixed possession of his mind. The result was that he became a very good judge of such things. I suppose there never was a whole people among whom a discriminating taste in literature has been so general as among the Athenians, and they had abundant occasion both to enlarge their knowledge and to exercise their critical faculties. The great dramatic poetry of Athens was made possible, and stimulated to the highest point of productivity and excellence, just by the fact that there was an audience there, consisting of the whole people, with sufficient training to appreciate it with discrimination. For the poets competed before them and they

were really, in the last resort, the judges who assigned the coveted places of honour. That was one excellent result of their extremely simple training. It was indeed a result the full significance of which it would be hard to over-estimate.

If human culture is worth anything, and at least we schoolmasters must be agreed that it is worth a very great deal indeed, and that man's life would be an unspeakably poor and beggarly thing without it, what an unparalleled educational achievement it was to produce in a little nook of the earth, and within the very moderate circuit of one small city's walls, an audience of some thirty thousand people who could sit for days from morning to nightfall on stone benches, listening with keen and critical delight to the masterpieces of the Attic stage, perhaps the most profound and serious poetry in the world, outside of the Hebrew Psalms and Dante's *Divina Comedia*. Aeschylus and Sophocles were immensely popular poets in their own day and in their own city. Else we should never have heard of them. Think of what that means and compare it with what popularity signifies with us! A musical comedy, namely, in this particular kind, no doubt the most brainless "crackling of thorns under a pot" for the most part that has ever been kindled by the friction of two imbecilities, the author's and his audience's. And for this highly creditable result the Athenians had to thank, to quite a considerable extent, the labours of those very poorly requited and very lightly-esteemed schoolmasters of theirs, who by dint of steady repetition filled their minds with models and standards of high excellence.

But there was another result of this training which we might be less prepared to expect. It not only nurtured a whole people of intelligent critics and an amazing number of poets, orators and artists. That would have been remarkable enough. But the strange thing is that some of the keenest intellects of the scientific order, men who will always rank as the pioneers of exact and systematic investigation, Thucydides, Socrates, Plato, Aristotle, were formed by this almost exclusively literary education. I think such a fact is highly significant. It involves an important principle which I dare say I may have occasion to

come back upon at a later stage, namely that there is fortunately no necessity to know beforehand what no one can possibly know, the special line of activity which the pupil is destined ultimately to make his own, or to steer straight for that from the very beginning. There are some things which he ought to know in his general capacity as a human being, and, if we give him a reasonable opportunity of growing into these, we may safely exercise a somewhat generous faith that Nature will contrive in the long run to guide him towards his own special business, on the one hand, and that on the other hand, when he does arrive there, he will find himself none the worse, but on the contrary much the stronger and more masterly, even within his own chosen limits, for what he picked up elsewhere.

Such then was the old-fashioned Athenian system of education and such were some of its fruits. But in the time of Aristophanes a new air had begun to stir. Men had ceased to be wholly satisfied with the poet's way of looking at the world. They had begun to suspect that the sun was not really a God who drove his fiery car daily up and down the sky and rose every morning refreshed from his bath in ocean, "like a strong man to run his race." An ingenious person called Anaxagoras declared positively that he was simply a large red-hot stone twice the size of Peloponnesus. The scientific temper was abroad and all kinds of questions were being asked about things which in the old days had been regarded as beyond all question. An impious inquisitiveness, as it seemed to old-fashioned people, began to ransack the hidden sanctuaries of Nature, the things in heaven above and the things beneath the earth and in the waters under the earth. The most plain divinities were having their noses impudently tweaked in the pincers of the physical philosophers.

These atheists did not refrain from prying into the secrets of "that orb'd maiden with white fire laden whom mortals call the Moon." Nothing was sacred to them. All things were open to discussion; even the fundamental teachings of religion and morals. A new kind of schoolmaster, the sophist, had come into fashion, who charged thumping fees, in return for which he undertook to qualify his pupils to discuss any question whatever, taking either

side alternately and victoriously maintaining it, proving to a demonstration, if need were, that black was white, and making the worse appear the better reason. To all this modernism Aristophanes is irreconcilably opposed. He is laudator temporis acti, an uncompromising champion of the old system which produced the men that fought at Marathon—a battle no less surely believed by him to have been won in the palaestra and the lyre-master's school than Waterloo, according to the Duke of Wellington, was won in the playing-fields of Eton. He rises to the very height of song when he praises the wholesome, modest, reverent young men with strong and beautiful bodies, and minds sane and pure whom one used, in the old days, to see in Athens, instead of the putty-faced, impudent chatterboxes of the present time, without reserve or reverence, who have been hatched in the sophistic incubators.

His point of view is much like that of Mr. Samuel Blake as set forth by him in a recent pamphlet. In this Mr. Blake unfolds a terrible picture of the untrammelled freedom with which the most delicate questions concerning the family and marriage and such high and holy things are discussed in the University lecture rooms of America, and that too before mixed classes of youths and maidens, often with a lead on the part of the professor or sophist to decidedly unconventional conclusions. Mr. Blake's own view is that all this license is due to the modern criticism of the Bible, while in turn the relaxation of the moral bonds which he sees gaining ground alarmingly in the doings of our age is the direct result in part of this derivative academic removing of the ancient land-marks. It is, however, scarcely necessary to say that Aristophanes maintains the thesis in a somewhat more sparkling manner than Mr. Blake, whom his worst enemy would not accuse of anything approaching levity.

The poet pours unlimited and often exquisite ridicule upon what he considers the modern educational fads of his time. What could be more comical for instance than his caricature of scientific method in the investigation of the weighty problem: "How far can a flea jump?" The creature, after biting Chaerephon on the eyebrow, had landed on the bald head of Socrates. His leaping power was measured with the utmost precision thus: Socrates

dipped the insect's feet in melted wax and let him jump, then measured the distance between the traces.—Q. E. F. The question was settled once for all with that quantitative accuracy which is the glory of exact science.

Now I think we cannot help sympathizing a good deal both with Mr. Blake and with Aristophanes, at least in the ultimate conviction or instinct which underlies their attachment to the past. Such men feel, and rightly feel, that there are certain high and immovable sanctities at the basis of human life giving it all its value and meaning. At any given moment these imperishable rock-foundations are represented at least for the great majority of men, and brought to bear upon their inward life and outward conduct in a more or less effective way, by forms and symbols, conventions and moralities and religiosities, myths and dogmas, so old and familiar as to seem inseparable from the inmost substance of the real things, the fundamental verities themselves; quite vital to them, bone of their bone and flesh of their flesh. It seems as if the inevitable expansion of man's mind by bursting through the one must disrupt and annihilate the other. But in fact it is not so. The symbols vanish. The new spirit breathes upon them and they melt away like a cloud. Not Mr. Blake nor Aristophanes himself, nor Mr. Chesterton either, can stop that, real as are the evils deplored by them, the wide-spread and often subtle unsettlement, the loosening even of the moral bonds that usually accompanies this painful and wasteful but quite indispensable process. The old symbols go, but the great realities which they stood for remain. Man cannot live without them. His instinct of self-preservation secures their hold upon him. He cannot lose them without losing his own soul. Though obscured for the moment, and seemingly dissolved in the general flux, they infallibly emerge again. What seemed their death was but a rebirth: "Like a child from the womb, like a ghost from the tomb they rise and upbuild" themselves larger and fitter embodiments for the exercise of their own imperishable life.

Old fogeys like myself then, who are strongly attached to the time-honoured educational methods and subjects, will do well to take warning from the example of the first, and by far the most brilliant, assailant upon Fads in Mod-

ern Education. The physical studies on which Aristophanes emptied his inexhaustible quiver, the inquisitive attitude of mind so repulsive to him as to many other poets, Campbell<sup>1</sup> and Wordsworth<sup>2</sup> for instance, all this had a great future before it. Perhaps, after all, the most distinctive claim of his people upon the admiration of posterity, the most important and original contribution they made to civilisation, was just that they were the pioneers in this cold, dissecting way of looking at the world; the first who dared to see things as they are in their own nature without disturbing reflections from the altogether different nature and subjectivity of the observer. Aristophanes did not find it difficult to make people laugh at the new studies. We are always apt to see something rather ludicrous in what we are not accustomed to, and of course all new-born things must stumble about in a very comical way at first until they have learned to walk. At this distance we can see quite plainly that the future belonged to that ungainly movement so inimitably and immortally jeered at. "The whirligig of time has brought in his revenges," and now the laugh is rather on the prince of jesters himself. One must be wary then in stamping any single novelty as a fad. The reason why it seems so to us may happen to be far from complimentary to ourselves. It may well be because we have become ossified in a dull routine. Or, perhaps, the unfamiliar claimant represents a very real, though hitherto neglected, aspect in the very complex environment, ever growing more and more complex as thought expands, wherewith it is our business as teachers to help bring our charges into a living responsive interaction, an aspect which we have somehow contrived to ignore without physical extinction, which therefore seems negligible or even non-existent to us.

Huxley spent a good deal of the spare time left over from hammering the theologians in pressing and illustrating the educational value of biological science. It was easy enough to make fun of his "fad." What could be the

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1 "I ask not proud Philosophy to teach me what thou art."

2 "Philosopher! a fingering slave,  
One that would peer and botanise  
Upon his mother's grave."

virtue as a mental discipline of cutting up beetles and crayfish? That sort of messing was precisely on the same level as the Aristophanic flea and gnat investigations. So the old fogeys would have said and did say. And yet in this short time biology has already taken its firm place in all the universities that count, and even in many schools. Very few subjects, indeed, have proved so interesting to undergraduates. And, more than that, it is universally recognized, except among the incurable, that a grasp of the principle of development, such as may best and most convincingly be rubbed in by fooling with the inwards of bugs and guinea-pigs, is an absolutely essential part in the equipment of every educated man, quite indispensable to fruitful study in almost every single department of human knowledge, nature, history, ethics or religion. Physics and chemistry used to be called "stinks" in Cambridge even, the more hospitable to innovations of the two great English universities. The name reflected admirably the prevailing contempt for these studies as compared with the classics and mathematics. They were at best a side-show. To take to them branded a man with inferiority somewhat as if in athletics he chose to devote himself to bicycling rather than to foot-ball, cricket, or rowing. Now-a-days, I fancy Oxford itself, and even the Provost of Oriel, would scarcely venture to indulge the traditional Olympian sniff at the world-transforming researches of such men as J. J. Thompson and our own Rutherford, men whom Lucretius and Vergil would have celebrated with honours not far short of divine. We must walk softly then, we gentlemen of the classics and antiquities. We must diligently guard against over-haste in stigmatising all novelties as fads. It may easily happen to us in doing so to write ourselves down in conspicuous capitals—by the letters of a highly undesirable but, according to the poet Burns<sup>1</sup>, most characteristically academical degree.

Still there are such things as Fads in Education. And though it is a hazardous undertaking, I will proceed tentatively and modestly, taking my life in my hand as it were, to point out three of them, out of a great many more which

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1 "They gang in stirks, and come oot asses."

seem to me to deserve the name: *Kuhn ist dast Muhen, Herrlich der Lohn*. Sobered, as we may well be, by our review of past precipitancies, shall we employ the word consecrated by the usage of my ingenious friend, the editor of this Magazine, and call them "fallacies," rather, a term perhaps a little less insolent if not less cockshure? If I understand him aright, he contends that the educational value of a subject lies in its very uselessness, and that classical studies being the most useless are therefore the best.

The first to which I should like to call attention, the first which occurs on the Aristotelian principle of transition by contraries, is the Fallacy of the Innovator whose cause I might seem to have just been pleading. It does not consist in the fact that he seeks to gain a footing for a new subject. Care has been taken to admit unreservedly that he is often perfectly justified by the event in doing so much. But as he must usually fight for the recognition of the new with the "beati possidentes," the representatives of the old, his human weakness is very prone to be pushed into a one-sidedness no less unjust than theirs, so as unduly to depreciate and sweep away into the rubbish heap all that competes with his own enthusiasms. This is the vice of the anti-classical iconoclasts. It is very amusing for a teacher of classics like myself, the subject so long identified with a somewhat arrogant attitude towards most other things, to have this ancient arrogance revenged upon my own quite innocent person in a certain tone of quite ingenuous commiseration which sometimes slips out in remarks addressed to me by the representatives of what seem to themselves to be the really "live subjects."

Such persons do quite sincerely grieve to see any man, for whom they still retain some modicum of regard, tied to the oar in such an antiquated galley. But you will find that we gerund-grinders, as Carlyle very unkindly called us, are not at all sorry for ourselves. We have, it is true—at least most of us—come to admit that we are not so exclusively indispensable as we once fondly imagined. But we still continue in a modest way to magnify our office, to think that it affords scope for all, and more than all, such faculties as we possess, and gives us plenty of opportunity to do work of the highest usefulness. We do not think

either that our function is to be mere vendors of pretty things. We have seen distinctly virile qualities develop under the discipline which our Greek and Latin abundantly supply. We no longer claim, I think, that every boy, whether his nature has the stuff adapted for manufacture into silk purses or not, should be forced to learn Greek. But we do claim that a fair proportion of the best boys should have, what they have not in Canada, an opportunity and some encouragement to learn it. We maintain that it is a matter of some considerable importance for any people, who are at all ambitious of taking a respectable place in the ranks of civilised humanity, that there should be among them a remnant and a leaven of really cultivated people such as can read at a pinch Homer and the New Testament in the original. It will be generally admitted that at least the latter of these two books has a fairly strong claim, so far as we can yet see, upon the permanent attention of mankind. There have been times, it is true, just before the French Revolution for instance, when some extremely clever little men thought the world would soon make a shift to get along without it. This forecast, however, was destined to receive a somewhat striking falsification; and to-day it is well known to everyone who knows anything at all about such things, that there are very few lines of inquiry which are quite so much alive as the study of this old Greek book, as there are none at all more intimately bound up with our deepest and most pressing interests. Whatever may be our views or our surmises about religion, it is certain that we have here the very central knot and ganglion, as it were, of human history of which every educated man, every one who wishes to have an intelligent hold of the inward side of the world he lives in, and hates to grope about in it in the mere darkness, must necessarily seek to have some clear understanding.

Now the astonishing thing is that this book, though diligently read for centuries, used by countless thousands as the very staff and lamp of their life, has only quite recently within the last hundred years, that is, begun to be subjected to an entirely free and systematic examination. At present new light is being thrown upon it every day. Only a few years ago some of its most important single words

even, to say nothing of still more momentous advances, were for the very first time fully explained by Deissmann, by means of the Greek papyri found at Oxyrrhyncus in Egypt. Are we going to leave all the first-hand work in this field to the Germans? Is Canada not to take even the first step to prepare herself for making any real contribution to what all white people, everywhere else in the world, know to be one of the most characteristically modern departures of intelligent activity? We are ready enough to admire the Germans for what they have done in the matter of aerial navigation both as regards discovery and practical application of their discoveries to commercial enterprise. Everybody knows the name of Count Zeppelin. In a short time they will have several lines going for the transport of passengers, and perhaps for military purposes. But we do not see that all this, though significant enough, is a mere trifle compared with the way in which they are influencing the world by their New Testament studies; and still less can we be brought to understand that, wide apparently as is the distance between the two fields of achievement, there is really a very close and obvious connexion between success in the one and eminence in the other.

A people who are sufficiently alive, whose activities are sufficiently well organized and supported by the general level of intelligence to produce a Deissmann or a Johannes Weiss, or half-a-dozen others who could easily be named can throw off a score of Zeppelins, without turning a hair. That, however, is what our "practical" people can never be expected to admit or understand, I suppose. At any rate, every one will surely see that it would at least raise us in our own and other men's esteem if we should ever produce New Testament scholars of the type I have mentioned. When shall we do so? When we become what, I think it was Curtius who said we Canadians are not, and that for the curious reason, as some will think, that we knew no Greek—a scientific people. When we are really permeated from the Atlantic to the Pacific by a love of knowledge for its own sake; when a very small minority of us, small but sufficient to tell, at last have our eyes opened to divine something of the great spiritual horizon of our race, and can see the luminaries of that sky in some-

thing like their relative magnitudes. When we do so it may be confidently predicted that this one great steadfast star which has shone upon the world for near two thousand years will once more again irresistibly fix our gaze. We shall care enough about it to seek to know about it all that can be known. We shall use all the telescopes and spectroscopes that can be brought to bear, or see that there are those among us who can use them and give us authentic news of it—nay perhaps invent new and improved instruments of our own Canadian make. And then there will be no more illiterate talk about Greek being an antiquated subject with no bearing on our actual life. Only persons who know Greek and know it very well can do for us this specifically modern and indispensable service, can lift us to a place among the elect, in the van of the procession of the nations, or even follow intelligently and give us reliable reports of what is being done by the real leaders of humanity elsewhere.

Do not suppose either that this sort of scholar can confine himself to what is called New Testament Greek. We have found there is no such thing. You cannot so conveniently limit the cerebral disturbance necessary to make our country great. What used to be called New Testament Greek is simply, speaking broadly, the Greek in use among the Hellenized peoples of Egypt and the East. The very language of our most vital book can only be understood in its larger setting, in the light of what was called the "common tongue," and still more its world of thought can only come clear and stand out in full relief against the background of that whole ancient world differing *toto coelo* from our own. Our New Testament scholar must know among many other things, the Stoics, and these will take him back to Aristotle and Plato, to the Greek tragedians and to Homer. In short he will not be a "live" man or do his work in this place and moment unless he lives over again and inwardly retraverses the whole course of the spiritual development of that great Greek people whose stamp is once and for all indelibly impressed upon all the inward history of our race. As to the necessity of keeping alive the study of Latin I need not say one word. There are very few even among the most fanatical oppo-

nents of the classics who do not recognize the obvious indispensableness of Latin for at least the majority of those who would claim to be liberally educated, and those few are neither capable of enlightenment by words nor worth attention.

The second fad or fallacy on which I wish to say a word is what may be called the Utilitarian fallacy. Perhaps a sufficient exposure of it has already been indicated. The people who wish their education to be immediately convertible into dollars and cents are numerous, like most other classes of foolish people. It is quite true that we cannot get on without some dollars and cents; though I think one excellent result of a more wide-spread and vital education among us would be the sincere conviction, that popular superstition exaggerates enormously the amount necessary for any really serious purposes: and another excellent result, that we should be able to make a little go a much longer way. A great part of the reason why we are such slaves of Mammon, and have gone astray after so many hollow and heartless admirations, is just that so many of us are dependent for all the excitement we can get out of the world on those primitive stimulations which are at once the most worthless and also the most expensive to procure. Whereas, if we were a really educated people we could find many ways of amusing ourselves that cost very little. We should be much more independent and prouder than we are. We should not care to call the king, or even a railway magnate, our cousin, if we could enter into that inner inalienable kingdom which consists simply in the vigorous working of our own, too often, rusty powers. Good books are cheap; the newspapers—those inexhaustible mines of raw material for reflection—cost only one cent; a man can always shut his eyes and think, if there is anything at all in his head, and get no end of fun out of it. "I have been happy thinking," says the ploughman poet; pencils and paint brushes and paper or canvas are within a moderate compass; even a decent piano or violin can be come by readily; a hammer or spud for pottering away with rocks and plants, in the way of some mild geologising or botanising, can be begged, bought, or stolen; a walk on the mountain is free to all. Good music and good plays

are also cheap in civilised countries. They will be, some day, with us. I do not mean, of course, that everybody will be able to do, or will care to do, all these things; but I do mean that in the boundless riches of the world without and within, very inadequately represented by the above examples, in tanta copia rerum, every human being who is not absolutely maimed by nature or stopped up by a criminal and acquired dullness beyond nature and contrary to her, should be able to find a playground and a kingdom.

And I will never believe that there is a single workman in Montreal, whose day's wages are so scanty or whose day's labour is so exhausting as to close all these doors upon him; if only we could keep him at school till he is fourteen years of age, as we most certainly could do, and shall one day do, and arrange our dealings with him there so as really to make something of that miraculous body and mind of his. The great fallacy in the utilitarian view is, on the one hand, that it fails to take account of a remarkable fact which the thoughtful have often occasion to observe—the fact that your frontal attack is usually the very worst possible kind of tactics. There are many things in themselves quite desirable to secure, wealth is one of them, happiness is another, popularity is a third, the favour of the fair sex is a fourth, and there are many others like fame and eloquence and wit and artistic effect generally—including even the red pepper of paradox—which cannot best be gained, or most surely by driving straight at them. They are all essentially bye-products. Take them in flank and they are likeliest to fall to you. Go your ways steering by the upper lights with your eye on the solid objects of which all these are but reflections, and they will come of themselves. Or if some of them don't, you can do very well without them. If possible, never think of them. If there were no other consideration, that is the most cunning way to catch them. Leave them for the left hand which your right ignores, being too much and too profitably employed elsewhere. For a hot, direct pursuit is the surest plan to scare them away. The shy fugacious goddess of luck whose grace is all important here, eludes the hobnailed tread, flat foot, and stifling hug of her too robustious Cyclops of a wooer. "Farewell, she cries and

waves her lily hand." Whereas, being female, she will often come more than half way to meet the swain who does not seem to see her.

There is no region in which a premature and covetous concentration upon mere lucre is so absurdly out of place and so certain to defeat even its own narrow ends (especially if you take the larger point of view of a whole people's interests) as in the matter of education. To make a people industrially effective you must make them intelligent. And they will never be intelligent unless a considerable number of them seek and love wisdom for her own sake, and not merely as the dray-horse for their provision carts. "Seek first the kingdom and all these things shall be added unto you." It is from the spiritual sky that the fertilising rain must come to bring all foison and plenty down here on earth: that heaven is the source of all our light, and, therefore, of all our heat and power as well. To make even your baggage waggon go, you must "hitch it to a star."

In the second place (which is only, perhaps, one aspect of the other over again) this utilitarianism forgets that a man is not a beaver whose business in life is to lay logs. He is, in plain fact, an unspeakably complex creature with multiform relations to an infinite universe of intelligences and things. And the puzzling but obvious fact is that since all the parts of this universe are nothing in themselves except in their place as parts, that is, as implying and implied in the whole which lives in them and gives them all their life and meaning, he won't make much of any one thing unless he achieves the seemingly impossible task of getting in some sense or other the hang of all. The ultimate task to which society will set him, the particular service in payment for which he is destined to be provided with his bread and butter, may be an almost infinitesimal one. He may be intended one day to be employed in a shoe factory; contributing his small fraction along with the great number of others, more than a hundred I am told, among whom the modern division of labour apportioned the various roles in the production of a pair of boots. His compass of bread-winning labour may be much more restricted than a beaver's, and incomparably more so than

a Polynesian Islander's. But he is a man all the same. He may, it is to be hoped he will, go far afield from his boot-pegs. Spinoza, the spectator of all time and existence, supported himself by grinding optical glasses. Charles Lamb was a clerk in the Indian Office, John and James Mill also were officials there. Many more such cases might be cited.

Our workman is not very likely to range so widely, but it will infallibly be a bad business both for him and other people if he does not range at all. For what Carlyle says of him is literally true, he is an infinite shoe-black. He has in him potencies in height and depth, heavenwards and hellwards, that are not less than boundless and terrific. If you doom him to dullness and vacuity, if the better part of him be stunted and atrophied, you let loose a great many more than seven devils. There is a slumbering volcano in him, not to be guarded against by the cunningest machinery of external repression, by no conceivable number of policemen, fleets and armies sitting on the lid, but capable in spite of all such dampers of breaking out in widespread and conspicuous devastation. It was just this sort of man who made the French Revolution. Woe to the society whose arrangements would make an ant of him, without taking steps to secure the ant's stinglessness, his convenient and enviable monasticism, the modesty of his claims and his immunity from desires.

But surely it should not be necessary to dwell on the mischief which Satan finds for idle and empty heads to do; the kindlier aspect is enough. It is sufficient to say that you do not exhaustively describe the poor fellow whose case is before us, in terms of his bread-winning labour, as when you call him the *n*th fraction of a shoemaker. He is a citizen who will have a vote; he must according to the ineluctable decree of nature go courting some day, and write love letters, and be called upon like birds in spring for some ingenious turns and trills in the way of more or less lyrical expression. When the time comes, too, it will make an enormous difference whether he can acquit himself creditably of his share with the nestlings, who cannot in this case be pushed out of the nest after a month's worms, but must be tended for years and go to school in

their turn, and are not likely to do much there unless the parent-bird shows some interest in what they are doing. He will also, it may be hoped, go to church, and if he is to avoid becoming a Christian Scientist or something equally preposterous, he will have need to be prepared for the large and intricate problems which confront every man who is going to prove himself a man in this trial-wilderness of our modern life, after a much sounder fashion than many highly educated people so-called. One part of that sound preparation will be to get off by heart, after Athenian fashion, some really good pieces of our own literature, including a few chapters of the English Bible. The prophylactic virtue of such a course cannot easily be exaggerated. I can scarcely imagine any one who has undergone it, sitting in a gorgeous temple and listening with long and solemn ears to scripture lessons drawn from the lucubrations of Mary Baker Eddy as a substitute for Isaiah. The utilitarian proclaims as his great principle that the object of education is to fit the boy for the battle of life. Yes, of course it is. But the battle of life is not a mere battle for a living. It is a much wider thing than that. The whole extent of it is not adequately expressed in any formula short of the magnificent declaration of the Westminster Catechism, that man's chief end is to glorify God and to enjoy him forever; and that that is the crown of his battle. There is really very little fear about a living. Anybody with two legs and arms, at least in our country, can be confidently counted on to make a living. He can do that with one hand. The great fear is that he will never enter into anything at all that deserves to be called life. If I could read my son's horoscope with unerring certainty, and knew beyond question that he was doomed to some such narrow lot as to be plumber or professor, do you think I would make him play with gas pipes, or start thumping a desk from his tenderest years? Heaven forbid that I should take the sure way to make him a drudge or a prig. I should hope that the food he assimilated would be convertible into some surplus energy, beyond what was needed for his daily pull upon his collar in the mill-round. My foreknowledge would surely make me most anxious to fit the poor young fellow out with the means of turning his

spare time, his holidays, and Sundays to some account—perhaps by the practice of plumbing if I knew he was going to be a professor, and with some of the material of professing, if I knew he was to be a plumber.

But this utilitarian fallacy is only one side, the rather sordidly actuated side of a wider phenomenon—the modern tendency to excessive or at least premature specialism, which is extensively prevalent among the learned as well as among the vulgar. The range of things knowable has expanded so enormously in our day, and at the same time our demand for precision and completeness in every single line has become exacting, that a division of labour scarcely less minute and soul-destroying than the kind that obtains in the factories, has established itself even in many universities, especially, I think, in the United States. Many ingenious persons there devote their whole lives not only to one department of study, but to some inconsiderable fragment of one department, living and moving and having their being, for all the world, like mites in a corner of a cheese. Slaves of the microscope, coral insects of research, they pride themselves on knowing one thing and knowing it well. As if you could know the hand, and if it were a hand at all, without your knowing something, and without its being part of the whole body; as if science were a mere inventory, a catalogue, not *raisonné* of dead bits and *disjecta membra*; the scientific effort a mere registration of atomic facts and details. Of course we must have the facts. They cannot be too clearly scanned and sifted. And perhaps such myopic investigators may accumulate useful materials. Perhaps it may be said of them, “*Es muss auch solche Kauze geben,*” “Minerva hath need even of such blinking owls.”

But they will certainly not go far. If they play the part of the harmless, necessary dictionary, and are good to turn up—if they are useful, they are not admirable. It would be a mournful thing indeed if efficiency had to be purchased by such mutilation, if the final shape of human society should turn out after all to be a sort of beehive where one has only a choice between being a neuter or a drone. For my own part, I will not believe that the nature of things forces upon us any such dismal alternative. There

was no real reason why so great a man as Darwin even, a nature so large, simple, and candid should have had his comfortless confession to make, that his absorption in exact science, the inveteracy of that austere, cold, analytic habit of mind which intense and life-long labour had bred in him, should have quite dried up in his heart the springs of poetry and faith. I believe he was mistaken about himself; he accepted as authoritative a too narrow view of both poetry and faith, and his analysis of his own mind (he was no psychologist) was incorrect. Surely Keats is right and profoundly right: "Beauty is Truth, Truth Beauty. That is all we know and all we need to know." Surely these two supreme divine things are not incompatible but only two aspects of the one identity, neither of them fully itself without the other. The fact must be that beauty, which includes both love and reverence in it, is just the glow and music of perfected truth, as Aristotle says finely that, in the body, it is the supervening charm, the flower of perfect health. Truth is not quite itself until it sing for us. We will not part till much further notice with the noble Greek ideal of culture; a harmoniously developed manhood, the stature and the breadth of a four-square humanity, sound in wind and limb without; and inwardly capable of responding tunefully and flexibly to all the main strokes of this brave and various world. In spite of the stifling, manifold knowledge which threatens like Frankenstein's monster to overwhelm the mind which has created it, in the teeth too of Juggernaut, the god of this lower world and his harsh demands, we will still hold up our heads and claim our undiminished birthright.

We will do our very best, then to avoid the fallacy of the specialist, and not that only, but also the other vicious extreme, the last fallacy, out of a large remaining list of still remaining possibles, which I can overtake at present, namely, what may be called the Polymathic one. This consists in the superstition of the half-baked, that man's intellectual wealth consists in the abundance of the separate things he knows, his fighting power in the weight and multifariousness of his panoply. It is what my colleague, Professor Dale, called the other day, the rag-bag theory.

Just this seems to me to be at the bottom of a good deal of the inefficiency of our Canadian, more particularly the Ontario, system of education. People think that if there is anything which it is desirable to know, and of course the real trouble is that there is nothing which is not, then we ought to make that thing part and parcel of our express system of instruction; make haste to include it in our school curriculum. I remember once finding in my boy's hands, when he was nine years of age, a book called "History Notes." It began in fine systematic style, like Euclid, with solemn definitions of the various concepts necessary to the proper understanding of history. Such indispensable notions as political economy, excise, import duties, government, administration were elaborately expiscated for the benefit of this suckling, in such precise and abstract terms as it took me all my time to make head or tail of. The poor young wretch was supposed "to get them off by heart." As if he needed at that age of innocence to be told what excise and import duty was! As if all that could not safely wait till it came by the practical method of the immortal Squeers, till the time when, by the inevitable development of his own natural corruptions, he had made his first essays in running the cutter into the port of Montreal. There is a vast amount which a wholesome young person with ears and eyes picks up for himself, Heaven knows how, in old Mr. Weller's University, by grazing at large as it were. We are not dependent, thank goodness, upon the school, for any considerable proportion of which we know. The school does very well indeed if it does not "interrupt our education," if it arouses in us, or increases the desire to know, and shows us something of the right way to go about it. The mind is not a box, a sensorium, in which things are mechanically piled up, or even put into docketts. It is a living organ, a muscle, a lung, a stomach. When I made a plea a moment ago for some variety of pabulum for it, I did not mean that it was to be stuffed with all sorts of miscellaneous feeding like a Strassburg goose nailed to the floor for the manufacture of paté de foie gras. The great thing, almost the one thing, is to get it going on almost any thing at all. It learns by doing, not by suffering. If only it begins to work spontaneously with a zest, the

problem is solved. It will go on then by its own inner impulse—ponderibus librata suis—and find its own pet pastures for itself. The world is all before it where to choose. There is nothing impenetrable to it, indigestible by it. The whole universe belongs to it, for the substance of the universe is, as I believe with Hegel—else how could the mind move one step?—just such stuffs as itself is made of, namely, reason. Our practical problem then is to choose out certain subjects, and not too many of them at any one time, which will be as nearly as possible perfect foods, bringing to bear and exercising all its digestive machinery, the whole gamut of its energies.

But above all not too much at a time. Above all some approach to the priceless simplicity of the Athenians! The most fatal thing of all is that this living member, so exquisitely capable of torture, should be bewildered and paralysed, chased from pillar to post after the unspeakable way of racing through Europe and the picture galleries. The net result of that methods is, of course, nothing or worse, mere dyspepsia of mind and body, a dizzy blur, a dull sense of powerlessness and persecution. There is really no hurry; Die Zeit ist unendlich lang. Give the young shoots plenty of time to throw out those miraculous tendrils of theirs; time to grow naturally into what they will twine around of themselves, if you do not vainly seek to tie them or nail them to it; and so most likely kill them. Give their minds a chance to play freely about what you wish them to learn, to gain in some degree the unspeakably encouraging and quickening sense of mastery. Bring them at least within divining distance, on Pisgah as it were, of that feeling which is the beginning of all education and the teacher's highest triumph to awaken the dawning suspicion that this uncanny think on the black board or in the book, which they incline first to shy at like young horses, is not after all something hostile, external or alien, but in reality their very own—a half-covered treasure, to be digged for indeed but not hopelessly inaccessible, in the boy's or girl's own deepest self; a permanent possibility of sensation, an enlargement and heightening of life.

The problem of combining a reasonable and necessary variety with simplicity is not an insoluble one. Neither, to

go back for one last moment, is it a chimera to reconcile the far sight and the sharp close vision. The larger horizon need not be incompatible with facility in the use of the microscope. The non omnes omnia possumus is true alas! We must clip our wings and confine ourselves to some one field, if we are to accomplish anything considerable. No one can be an admirable Crichton nowadays. Entbehren sollst du sollst entbehren—thou must renounce, renounce. That is the stern and wholesome law of life, that pinches some of us nowhere more than in the unavoidable self-restriction here, to some things or thing, where all are so fascinatingly interesting. It is on one main side the tragedy of our imperfection and of the brevity of man's days, and I think one of the chief arguments for immortality. I had a dear old friend, Dr. Williamson, the brother-in-law of Sir John Macdonald, another not unlike himself, except that Sir John had had his nature, like the dyer's hand, subdued somewhat to what it worked in. The old gentleman had studied most things. He had taught classics, physics, New Testament and astronomy in the University. He was a preacher and theologian, and one of the best botanists in Canada. He had learned French in Edinburgh in his youth from some noble emigrés of the Revolution, their lovely language and their fair manners. He also spoke Italian beautifully. He died over ninety years of age and had, just before, begun seriously for the first time the study of philosophy. That, I believe, is what he is doing now. Few indeed can be like him, because few can have his child-like heart. But in a world where all things are so closely related together, the infinite variety and embarrassing riches of which is only after all an endless series of exquisite variations on a few simple fundamental themes, constantly repeated in thin disguises, kaleidoscopically illustrated as it were, it should be possible, in such a world of system, law and unity, to extract from a quite compassable range of studies something not altogether undeserving the name of a grasp of the whole at least in its essential substance. Even in our day we need not altogether despair, I think, of the Aristotelian ideal—the universally cultivated man. It was said of Goethe, who certainly did not know everything, having, as he undoubtedly had,

among other things, a poor head for the mathematics, that if the work of creation had stopped on the fourth day, he could have furnished the ground plan for the other two, including, I may add, the song sung by the Sons of Morning, which last indeed he has actually contributed in the opening lines of "Faust." The Stoics said that the wise man must be a shoe-maker, physician, philosopher and king. I cannot see that at bottom they were asking anything much out of the way. It should be possible, nay I think it has in large part already been done, without breaking anybody's back, by the Germans, to arrange our High School and University courses in such a way that, when a man finally settles down to his little part, he shall be able to do it not like a mole but like a being of large discourse of reason, in the light of the whole, to see the whole in it with some tolerable fulness as one sees the stars out of the smallest sky-light, shall be able to stand on the heights of his time, in the places of large vision, and emerge into the wide sunshine, following with intelligent sympathy what is being done by other people as well as by his fellow-ants and insects of the den.—John Macnaughton, in the University Magazine.

## MCGILL UNIVERSITY.

### REPORT OF MATHEMATICAL DEPARTMENT ON SYLLABUS OF REQUIREMENTS IN GEOMETRY.

(Submitted at a meeting of Matriculation Board, December 1st, 1909.)

Your Committee begs to submit the following report:

It seems desirable, in view of the far-reaching importance of a change in the geometrical requirements at McGill University, to state fully the most cogent reasons for the changes proposed.

1. Throughout the last century the continent of Europe and the United States had discarded Euclid's Elements for teaching purposes and the feeling against their retention in England dates back many decades. It was felt that geometrical teaching was showing an ever increasing tendency to become stereotyped. A distinguished living mathematician, Mr. J. W. L. Glaisher, in a school

report as far back as 1872, stated that he had strongly animadverted on some of the Euclid papers examined by him, from the conviction that a work on Geometry, written 2,000 years ago, and representing the state of knowledge of the subject of that time, was not a fit text-book for the students of our day, and added that the Euclid papers in all schools are disgraceful.

The movement for reform in Geometrical teaching in England was, till recently, one which aimed mainly at the improvement of formal demonstrative methods and at the inclusion of many important theorems, previously omitted from the current text-books.

Latterly the demands for reform in the theoretical presentation have been accompanied by further demands that the subject of Geometry should not be divorced from practical applications.

2. The proposed changes in both directions—Theory and Practice—have been accepted by the chief Universities and Examining Bodies of England and by the University of Toronto in Canada. The syllabus for entrance Geometry at Cambridge University is in very close agreement with that in use at Toronto University. According to the Cambridge regulations the paper in Geometry shall contain questions on Practical and Theoretical Geometry and every candidate shall be expected to answer questions in both branches of the subject.

In view of the difficulties certain to arise from the use of a great variety of text-books, it was provided that all questions on Practical Geometry should be set on the constructions contained in a schedule (Schedule A), together with easy extensions of them, and that all questions on Theoretical Geometry should consist of theorems contained in a second schedule (Schedule B), together with questions on these theorems, deductions from them, and arithmetical illustrations.

As the text-books studied by the candidates were certain to differ as to the order in which the subject matter of the two schedules was taken up, and as these variations of sequence must necessarily add greatly to the difficulties of examining papers, more especially in the parts associated with Schedule B, Examiners were directed to accept

as valid any proof which seems to them to form part of a systematic treatment of the subject. The order of the theorems in Schedule B might therefore be altered by instructors and candidates without affecting the marks, provided the modified order was consistent with a consecutive and logical development of these theorems.

3. Text-Books. To cover the ground of the Cambridge and Toronto Schedules there is a large variety of available text-books. In respect to Theoretical Geometry many of the Geometries published in the United States would answer the requirements admirably, but they would not be suitable for an examination paper containing questions in Practical Geometry. This limits the field to those published to meet the requirements of English Examining Bodies and those of Toronto University. Many of these are excellent, and it is difficult to pronounce definitely that one is better, *per se*, than another. But bearing in mind the needs of the teachers in the Province of Quebec, it is desirable that the order of presentation and ground covered should differ as little as is possible, consistent with modern requirements, from those hitherto demanded by McGill. A text-book at present in use at Macdonald College answers these requirements, viz., the Elementary Geometry of Godfrey and Siddons. If adopted it could be retained safely for several years to come. Among its merits may be mentioned the following:—

Its attractive style; the abundance of graduated examples; its success in bringing home both to beginners and older students the fact that Mathematical studies have a practical as well as a theoretical side; the attention given to logical precision in the theoretical parts; the omission of a considerable number of theorems of doubtful value. The treatment of parallel straight lines seems the only really weak part; the same criticism, however, applied to Euclid's treatment, at least as it is expressed in school texts.

#### RECOMMENDATIONS.

1. That Schedules A and B of the Cambridge University system be adopted for Part I Geometry at McGill, and that Godfrey and Siddon's Elementary Geometry, Practical and Theoretical, be studied as the accompanying text-

book, on the grounds of its merits, and because it is in sufficiently close agreement with the Toronto Syllabus and the Ontario text-books to prevent perplexity on the part of teachers or students should they move from Ontario to Quebec Province.

2. That the staff of the Mathematical Department be instructed to draw up a Schedule of Geometry, Part II., based on Godfrey and Siddon's, selecting for this part the more difficult parts of the book and matter not already covered adequately by Part I. This Schedule should be ready for issue in April.

3. That the changes in the character of the McGill examinations, with full particulars, shall be notified to teachers not later than April, but that two full years shall be allowed to elapse before the adoption of the new scheme; i.e., the first paper in the new style shall be set in June, 1911.

4. That no change shall be made in the present system unless it can be adopted at all schools throughout the Province, otherwise there will be a two-fold system of instruction in Geometry, introducing hopeless confusion, both among teachers and students, a confusion which would be highly detrimental to the teaching of Mathematics, both in McGill and in the Province.

5. That if the changes be made, the attention of teachers be called to the Cambridge Previous Examination Paper at the end of Godfrey and Siddon's as a guide to the kind of work expected. They should be given to understand, however, that the examination will be on Schedules A and B, and not on any text-book.

6. That as it has been found elsewhere that the gain in correctness due to the study of practical applications has often been attended by some loss in power of logical reasoning, precautions be taken against this as far as possible: among other ways by dividing the Geometry paper, Part I., sharply into two parts—Practical and Theoretical.

7. That in the schools a course of Practical Geometry, extending over not more than one year, should precede the course on formal demonstrative Geometry, if it is in any way possible to arrange such a course.

8. That candidates shall be clearly informed that it will be necessary for them not only to buy the text-books but also to purchase a set of drawing implements.

9. That the present Ontario Part I. papers be replaced by those set for McGill University.

Signed on behalf of the Mathematical Department.

J. HARKNESS.

McGILL UNIVERSITY.

PROPOSED REQUIREMENTS FOR GEOMETRY PART I. FOR  
MATRICULATION.

The paper in Geometry shall contain certain questions on Practical and on Theoretical Geometry. Every candidate shall be expected to answer questions in both branches of the subject.

The questions on Practical Geometry shall be set on the constructions contained in the annexed Schedule A, together with easy extensions of them. In cases where the validity of a construction is not obvious, the reasoning by which it is justified may be required. Every candidate shall provide himself with a ruler graduated in inches and tenths of an inch, and in centimetres and millimetres, a set square, a protractor, compasses and a hard pencil. All figures should be drawn accurately. Questions may be set in which the use of the set square or of the protractor is forbidden.

The questions on Theoretical Geometry shall consist of theorems contained in the annexed Schedule B, together with questions upon these theorems, easy deductions from them, and arithmetical illustrations. Any proof of a Proposition shall be accepted which appears to the Examiners to form part of a systematic treatment of the subject; the order in which the theorems are stated in Schedule B is not imposed as the sequence of their treatment.

In the proof of theorems and deductions from them, the use of hypothetical constructions shall be permitted. Proofs which are only applicable to commensurable magnitudes shall be accepted.

## SCHEDULE A.

Bisection of angles and of straight lines.

Construction of perpendiculars to straight lines.

Construction of an angle equal to a given angle.

Construction of parallels to a given straight line.

Simple cases of the construction from sufficient data of triangles and quadrilaterals.

Division of straight lines into a given number of equal parts or into parts in any given proportions.

Construction of a triangle equal in area to a given polygon.

Construction of tangents to a circle and of common tangents to two circles.

Simple cases of the construction of circles from sufficient data.

Construction of a fourth proportional to three given straight lines, and a mean proportional to two given straight lines.

Construction of regular figures of 3, 4, 6 or 8 sides in or about a given circle.

Construction of a square equal in area to a given polygon.

## SCHEDULE B.

**Angles at a Point.**

If a straight line stands on another straight line, the sum of the two angles so formed is equal to two right angles; and the converse.

If two straight lines intersect, the vertically opposite angles are equal.

**Parallel Straight Lines.**

When a straight line cuts two other straight lines, if  
( i ) a pair of alternate angles are equal, or  
( ii ) a pair of corresponding angles are equal, or  
( iii ) a pair of interior angles on the same side of the cutting line are together equal to two right angles, then the two straight lines are parallel; and the converse.

Straight lines which are parallel to the same straight line are parallel to one another.

The angle which an arc of a circle subtends at the centre is double that which it subtends at any point on the remaining part of the circumference.

Angles in the same segment of a circle are equal; and, if the line joining two points subtends equal angles at two other points on the same side of it, the four points lie on a circle.

The angle in a semicircle is a right angle; the angle in a segment greater than a semicircle is less than a right angle; and the angle in a segment less than a semicircle is greater than a right angle.

The opposite angles of any quadrilateral inscribed in a circle are supplementary; and the converse.

If a straight line touch a circle, and from the point of contact a chord be drawn, the angles which this chord makes with the tangent are equal to the angles in the alternate segments.

If two chords of a circle intersect either inside or outside the circle, the rectangle contained by the parts of the one is equal to the rectangle contained by the parts of the other.

#### Proportion: Similar Triangles.

If a straight line is drawn parallel to one side of a triangle, the other two sides are divided proportionally; and the converse.

If two triangles are equiangular their corresponding sides are proportional and the converse.

If two triangles have one angle of the one equal to one angle of the other, and the sides about these equal angles proportional, the triangles are similar.

The internal bisector of an angle of a triangle divides the opposite internally in the ratio of the sides containing the angle, and likewise the external bisector externally.

The ratio of the areas of similar triangles is equal to the ratio of the squares on corresponding sides.

Illustrations and explanations of the geometrical theorems corresponding to the following algebraical identities:

$$k(a+b+c\dots) = ka+kb+kc\dots,$$

$$(a+b)^2 = a^2 + 2ab + b^2,$$

$$(a-b)^2 = a^2 - 2ab + b^2,$$

$$(a^2 - b^2) = (a+b)(a-b).$$

The square on a side of a triangle is greater than, equal to, or less than the sum of the squares on the other two sides, according as the angle contained by those sides is obtuse, right, or acute. The difference in the cases of inequality is twice the rectangle contained by one of the two sides and the projection on it of the other.

#### Loci.

The locus of a point which is equidistant from two fixed points is the perpendicular bisector of the straight line joining the two fixed points.

The locus of a point which is equidistant from two intersecting straight lines consists of the part of straight lines which bisect the angles between the two given lines.

#### The Circle.

A straight line, drawn from the centre of a circle to bisect a chord which is not a diameter, is at right angles to the chord; conversely, the perpendicular to a chord from the centre bisects the chord.

There is one circle, and one only, which passes through three given points not in a straight line.

In equal circles (or, in the same circle) (i) if two arcs subtend equal angles at the centres, they are equal; (ii) conversely, if two arcs are equal, they subtend equal angles at the centres.

In equal circles (or, in the same circle) (i) if two chords are equal, they cut off equal arcs; (ii) conversely, if two arcs are equal, the chords of the arcs are equal.

Equal chords of a circle are equidistant from the centre; and the converse.

The tangent at any point of a circle and the radius through the point are perpendicular to one another.

If two circles touch, the point of contact lies on the straight line through the centres.

The sum of the angles of a triangle is equal to two right angles.

If the sides of a convex polygon are produced in order,

## Triangles and Rectangular Figures.

the sum of the angles  $\text{s}\bar{o}$  formed is equal to four right angles.

If two triangles have two sides of the one equal to two sides of the other, each to each, and also the angles contained by those sides equal, the triangles are congruent.

If two triangles have two angles of the one equal to two angles of the other, each to each, and also one side of the one equal to the corresponding side of the other, the triangles are congruent.

If two sides of a triangle are equal, the angles opposite to these sides are equal; and the converse.

If two triangles have the three sides of the one equal to the three sides of the other, each to each, the triangles are congruent.

If two right-angled triangles have their hypotenuses equal, and one side of the one equal to one side of the other, the triangles are congruent.

If two sides of a triangle are unequal, the greater side has the greater angle opposite to it; and the converse.

Of all the straight lines that can be drawn to a given straight line from a given point outside it, the perpendicular is the shortest.

The opposite sides and angles of a parallelogram are equal, each diagonal bisects the parallelogram, and the diagonals bisect one another.

If there are three or more parallel straight lines, and the intercepts made by them on any straight line that cuts them are equal, then the corresponding intercepts on any other straight line that cuts them are also equal.

## Areas.

Parallelograms on the same or equal bases and of the same altitude are equal in area.

Triangles on the same or equal bases and of the same altitude are equal in area.

Equal triangles on the same or equal bases are of the same altitude.

The sub-committee on the course of study for Superior Schools has signified its approval of the proposed changes in regard to the teaching of Geometry as outlined herein. (Ed. Record.)

THE TEACHING OF GEOGRAPHY TO CHILDREN  
UNDER FIFTEEN.

The subject of geography is fascinating to pupils of all ages, though its educational value seems to me particularly adapted to the middle school, and it is with the teaching in these forms that I intend chiefly to deal. I have taught geography at times in all the forms of a large school, and shall endeavour to explain my method in the hope of procuring suggestions for its improvement.

The important points to bear in mind in approaching any subject are: (a) its educational value generally; (b) its suitability to the capacities of the learner at the several stages of mental development; (c) its practical utility. On the first and third aspects of geography I have nothing to add to what has recently appeared in this journal, but I would point out one distinction which marks out geography as a proper sequel of Nature study. Nature study may, at least in its earlier stages, be pursued simply as a practice in observation. In geography observation is almost inevitably correlated with imagination and reason. Visiting a hill after rain, the child observes the gutters, recognizes the method of their formation as the water trickles down, imagines the action during the height of the storm, and so connects what he sees and imagines with the permanent features of the landscape. The following remarks which came to my notice some time ago I think illustrate the results of not teaching and of teaching geography. (a) Child of eleven using a map during Scripture lesson: "I do not see how the children of Israel could possibly have walked across the Red Sea; it is not as wide as my finger, so there is not room even for one man's foot." (b) Child of eleven to younger brother: "I will draw you a picture of how Jack went to the Giant's Land (puts in cardinal points). This was his house (makes square). This was the sun (rays in east). These were the beanstalks; this the road, three miles. this was a hill; and this was the Giant's house, ten times bigger than Jack's, because he was ten times larger."

Reasoning power is cultivated by the perpetual tracing of cause to effect. A few simple observations and experi-

ments, of which the explanations are easily discoverable, lead to the recognition of the chief natural laws necessary at this period of study—the result of alterations in temperature on matters in different states, the action of water, ice, air, etc.—and the constant recognition of the manifestation of these laws exercises the reason in these directions.

Merely a scientific game, it may be said. Perhaps so; but, so long as it is scientific, there is some good in being a skilful player. The variety of interest and the obvious relation between cause and effect especially adapt this study to the development of backward or stupid children, as the frequent feeling of elation due to discovery stirs them to greater effort. I think this last point is of very great importance. The reasoning power of children from ten to thirteen or fourteen should be constantly exercised, but by problems they can solve easily with a little concentration. Mathematics are to some at this age purely mechanical, and may remain so unless aided by other subjects, amongst which is geography. The actual relation of numbers and names to spaces gives a real significance to figures.

Here I should like to protest against some examination papers. Last week I saw a question set for children of twelve or thirteen, requiring them to explain how the position of a ship could be ascertained in mid-ocean. No child ought to have been able to give an answer, for the explanation should not yet have been taken in the form. The reasoning required is far beyond the average intellectual development of the age stated; and the possible imperfect grasp of the topic, together with the superior importance and suitability of others, makes the time spent upon it absolute waste.

From the time-table of the lower school systematic geography should be absent. The observation of children from the ages of six to ten is especially adapted to simple objects, and the action should not involve much correlation. The form and colour of flowers, animals, etc., are never again so minutely observed or contemplated with equal pleasure. More complicated objects do not give such useful exercises, as they are too large for the mental scope. Subsidiary subjects may, however, be very profit-

ably undertaken. Mensuration is a most valuable occupation, and the description of peoples, customs, food, flora and fauna, prepares the mind for further correlation, widens the sympathies and gives much useful knowledge. The post-kindergarten method has sent up to me pupils most excellently prepared. The mistress, who in this case was a most able and artistic draughtswoman, prepared a typical picture—Japanese girl holding cup of tea, with playthings near; a story was told in explanation and the lesson reproduced at first by a memory drawing alone; later by a short description and memory drawing.

At eleven years of age the more systematic study of the subject may begin. Perhaps a rough syllabus for the study of the British Isles by children of eleven will make my method clear. (N.B.—Every lesson should be freely illustrated by maps and diagrams drawn at the time by the teacher, or, if this is not possible, prepared beforehand.)

#### First Year (Ten and Eleven-Year-Old Children.)

1. Observe the alteration in the position of the sun at different times of day in playground or on an expedition. Cardinal points determined.
2. Position in different parts of room determined.
3. Measurement of small pieces of paper and exact representation, with position.
4. Measurement of larger pieces of paper and representation to scale, with position.
5. Book placed on paper, plan drawn to scale, book shaded, and position shown.
6. Smaller book placed on top of last arrangement and exercise repeated, different heights of books shown by different shading.
7. Triangular block placed on last, whole exercise repeated, but block indicated by converging lines.
8. Plasticine arranged in a flat block on a tray and then represented on paper to scale.
9. Plasticine arranged on tray so as to form a hill. Rings of string placed round the hill at different levels. The whole drawn to scale as before, and the different ring-heights shown by different shading.
10. In the last make two rivers. Draw as before, and represent river valleys by diverging lines.

11. Repeat, placing mountains in different parts to show effect on rivers.

12. Make a flat heap of sand, place a few stones in it close to the edge; blow against the edge; note and explain what happens. Draw.

13. Maps dictated.

14. A rectangle is drawn, points are placed within it, and their exact position described. (N.B.—The children must draw their own rectangle, put in the points, and explain the position.)

15. Model of a globe made in paper, with some degrees shown.

16. Surface of model represented on the flat.

17. On a flat surface lines representing equator and degrees of latitude and longitude are drawn. Then places are marked in from dictation.

18. With models the position of the earth with regard to the sun at the four seasons is shown.

19. Models are made showing the position when England is (a) having summer, (b) having winter.

20. Diagrams are drawn to represent last exercise.

21. On a flat surface put in equator, lines of latitude and longitude, and place flat paper models of continents in positions dictated. Write on parts required the season.

22. Repeat last exercise and enter certain mountains and rivers from dictation.

23. The lines of latitude, longitude, and outline of world are drawn as a memory exercise by the children.

24. On the last are entered dictated journeys from England to various parts.

25. The approximate time required to travel through one degree is determined from the child's own knowledge of a railway journey in England; hence the approximate values of the degrees are determined.

26. With the models the difference in time is shown.

27. The lines of latitude and longitude for Great Britain are drawn. On each is written the time compared with school time and the relative temperature.

8. Rough diagrams are drawn to show how Great Britain was built up and short history given. (N.B.—This is, of course, entirely the teacher's work. Stones shown.)

29. Description of coast line. Explanation. Chief inlets. Representation on paper.
30. Outline, with lines of latitude and longitude, different heights shaded differently. Names of chief heights.
31. Experiments to show causes of evaporation and condensation.
32. Repeat exercise so to show rainfall.
33. Last repeated, with rivers inserted.
34. Outline maps with surface shaded, and principal kinds of soil in different colors.
35. Products of special soils explained.
36. Outline maps, with heights shaded, soils in different colours, and industries written on respective localities.
37. Separate maps of important river valleys.
38. Outline map, with surface shaded and rivers, showing railway lines.
39. Map showing routes of communication with rest of the world.
40. Short history of the counties and map.
41. Map with surface shaded, rivers, industrial localities coloured, and county outlines.

Relief plasticine maps are prepared at home and brought to school for examination, etc.

As regards homework, it must be remembered that this comes at the end of the day when the child is already tired and craves for recreation. No one produces his best at such a time. Work set, therefore, should be light and consist either of (a) the study of the day's lesson, or (b) its direct application to some easy problem. A more difficult problem, or questions in the next lesson, will show if the subject has been grasped.

All work must be careful and neat; no vagueness should be tolerated, for a little clear definite work is of infinitely more value than a long desultory essay.—The Journal of Education.