

depicted are apparently the head of an animal, probably some kind of goat or ibex, parts of the animal's carcass, and a trident essentially similar to those on the Yuz-gât seal. Mr. Ready is unable to tell me in what



FIG. L.—Seal with figures (enlarged).

collection this curious seal, which is very small, is to be found. So far as I am aware, it is not in the British Museum.

PRACTICAL EDUCATION.

PLAINLY speaking, it must be admitted that to an impartial observer the great problem of anthropology is this: Is the mind, or soul, a mysterious and supernatural, yet at the same time a definite limited quantity, with certain set "spiritual" functions, or is it, being of material growth, capable of infinite development? The former is the metaphysical view of the subject, the latter that of the evolutionary physiologist. Without deciding which is the true school, it may be remarked that the metaphysicians have long ceased to teach anything new, while physiology gives us, almost daily, facts of an astonishing nature. Here and there in the works of Darwin, Carpenter, Haeckel, Huxley, Bain, Maudsley, Spencer, and David Kay, we find what would have been "conclusions most forbidden," even to a Rosicrucian or Cabalist, in days of yore. And these are that man may develop his memory and other faculties in the simplest and most practical manner, as a bee builds its combs, grain by grain, until he shall far surpass what he has ever been. These discoveries as to man are in exact step with the stupendous revelations of the spectrum analysis, and the scientific reduction of the elements.

I recently published a work, the result of many years' labour, entitled "Practical Education," in which I endeavoured to give the results of experiments with nearly two thousand pupils, combined with the suggestions in the works of the writers above alluded to.¹ Having long been occupied with investigating the problem of technical education, I offered to the School Board of Philadelphia, in 1880, to devote myself entirely to the experiment of ascertaining *exactly what children could do*. That boys and girls from eight to fourteen years of age could *not* set type, make shoes, execute heavy carpenters' work, &c., had already been ascertained in Pennsylvania at a cost of about £200,000. I had, however, learned in Egypt, South Germany, and other places, that the very young can execute the decorative work which is known as that of the minor arts, and that so well that it had a market value.

Walter Smith, now of Bradford, had published a system by which design was taught at the same time with drawing. I had, two years before I met with Smith's system, which is now much employed in America, set forth the same idea in a work entitled "The Minor Arts." It soon became apparent that, by beginning with design, the youngest child developed—with invention—interest, attention, and intelligence. The results went far beyond my anticipation. It was found by the most careful inquiry that the pupils who attended the art classes had the highest "averages" in other studies, such as arithmetic,

geography, and composition. This fact is the more striking from this—that the School Board, having made inquiries unknown to me, found that among 110,000 pupils the 200 who attended the Industrial Art School were among the first in *everything*.

An immediate inference from this fact is that visual perception or eye-memory (as set forth by Francis Galton) and attention or interest (as explained by Dr. Maudsley) are also factors which enter into the training of the constructive faculty. These, as is clearly explained and very fully illustrated by David Kay in his admirable work on "Memory," lead us to the conclusion that memory, by a simple process of accretion and repetition, may be developed to an incredible extent even in children. Practically, this was nothing new. Before the invention of printing, men by millions, among Druids and Brahmins and Northmen, Red Indians and mediæval scholars, Chinese and Japanese, had shown that an individual could remember perfectly what is now represented by a library. Max Müller has proved this. I myself have known a graduate of Pekin who fully illustrated it.

Memory is not "mind" or intelligence. Yet the works of Homer, the "Mahabharata," and the great scientific grammar of Pānini, were taken down and preserved for centuries by memory alone. The great history of Japan, by Hirata Atsune, was composed without the author's taking a note, and written from recollection, without reference to an original work. What man has done man may do. The deduction from all this is as follows:—

Firstly, that memory may be trained in mere children, by an easy process of committing by heart and constant reviewing, to such an extent that, guided by attention or determination, anything once read or seen may be accurately recalled. A great collection of illustrations of this may be found in Kay's "Memory," and in my own work on "Practical Education."

Secondly, that to counterbalance mere memory the mind must be trained by exercises in quickness of perception. These, in the beginning, may be merely mechanical. There are steps from inducing an infant to notice an orange on the floor up to simple games, from games to mental arithmetic or mental geography and grammar, to problems requiring the highest intelligence. The process is like that in developing memory—*little by little with constant reviewing*. And, as is the case with memory, all this has been established by innumerable practical examples. But with the one, as with the other, there should be no endeavour to cultivate thought or intellect or imagination until *both* are fairly mastered.

Thirdly, memory and quickness of perception blend and are developed in the awakening of the constructive faculty or in design, and its application to modelling, embroidery, wood-carving, and similar easy arts. And to those who object that all this does not awaken the higher faculty of intelligence or thought, it may be replied that experience or experiment have demonstrated the contrary. It is true beyond denial that a boy or girl who remembers readily and perceives quickly, and who has been trained to invention by designing, *does* think. Call them, if we will, only the tools of the great trade of thought, and a training to their use, is there no difference between two children of equal capacity, brought into a shop, when one knows what everything around is meant for, and how to handle it, when the other is yet to be taught? But the fact is beyond all dispute that children, even if trained to design alone, begin to think in every way. The experience of the Philadelphia school, and more or less that of every well-conducted Kindergarten, prove it. The trouble is, according to the requirements of a late review, that people ask for genius at once from an infant. "Teaching children to remember is not training them to think." But it is the foundation-stone.

¹ "Practical Education" (London: Whittaker and Co., Paternoster Square).

It is the giving them the faculty to collect material to employ thought. Quickness of perception is the next stage of the building. It awakens a sense of the relations which things remembered bear to one another. But the most illiterate man would not deny that a boy with a good memory, who is "sharp to notice everything," is not far off from being clever. Does not this, indeed, constitute about all the cleverness which practical life requires? But it is most unfair that any man, who has not examined the evidence, or read the facts which have been accumulated to show that extraordinary quickness of perception of every kind can be induced by proper training, should at once declare it to be impossible. It is a question not for metaphysical *a priori* assumption, but for scientific research, experiment, and test.

To render what I have said clearer, I would add that, if we begin by memorizing *mere words*, and nothing else, without any special effort to attach meaning to them, or only just so much as will aid in the work, the pupil will, in a short time, acquire a mechanical faculty for remembering. As soon as this becomes habitual, easy lessons which, so to speak, explain themselves, are introduced, and so, step by step, with great care the learner is led to acquire that which involves intelligence. Now, the whole system lies in this: that what a boy or girl perfectly remembers is easier to understand than when it is only half grasped. As it is, we begin in teaching a language by requiring a child to learn all at once to remember words, to pronounce them, and to master their grammatical structure and relations. I never knew of but one instance in my life in which anybody over twenty-five years of age ever learned to speak French like a native. This was a lady, who, before learning the meaning of a word, passed several months in mastering the pronunciation. Schliemann, the excavator of Hissarlik, who for many years learned a language every six months, advocates this system. By learning one thing at a time, at first, we are far better able to acquire several things at once in a more advanced stage. In acquiring quickness of perception, as in memorizing, the processes are identical—they begin by the simplest mechanical methods, and advance to the most refined.

The same development in a commensurate manner is observed in teaching industrial art. To give a child, or even a dull adult, some idea of design, I would allow him or her to group cardboard leaves into a pattern, and trace round them with a pencil till the fingers became familiar with the implement. There are not many cases in which this is advisable, but, having tried it many times, I can assure those who have not that it does not in the least degree prevent beginners from acquiring the boldest freehand practice. The more pains we take with the rudiments of every kind of culture, the easier is the acquisition of advanced branches.

The age is now being called on to face a great problem. It is that of over-pressure. From every side we hear in every newspaper of a thousand things which everybody is assumed to know. A certain great thinker—or writer—was said to have tested in vain "the American mind," by asking everyone he met in the United States, "Have you read Obermann?" It was not true, but it was truthful because it might have been, and because it truly represents the current pedantry of requiring, as a proof of culture, a knowledge of every German, Swiss, or French introversion-transcendental- or sentimental-ist. It is as true of society as of the school. "Shall the meeting-house be moved away from the growing dung-hill, or the dung-hill from the meeting-house?" Such was the great problem which was discussed by a Yankee town council. Shall we go on increasing the branches of popular education, or reduce them? Why not try the experiment of ascertaining whether the pupil will not learn more by first acquiring the art of learning? That is the problem which we are

all bound to discuss sooner or later. It cannot be evaded. It is forcing itself upon us from every side. A perusal of all the London reviews or magazines for a month is enough to make any polyhistor—if such a man exists—feel like an ignoramus. It is becoming a clear case of *non possumus*, as the Chicago Professor declared when he recognized the impossibility of shooting two 'possums with only one ball. Either the capacities must be increased, or the contents diminished. And that the powers of memory, perceptiveness, and construction can, by a very easy system of rudimentary culture, be developed to what would seem to be miraculous, is in accordance with the teachings of the most advanced men of science, and is established by innumerable facts. All that is needed now is to combine into a single system the truths which have hitherto been scattered, and to make that a subject of general education which has been illustrated only by separate examples.

It was seriously objected, when I for the first time undertook to make industrial art a regular branch of instruction in public schools, that the number of children who had any capacity or *gift* for such a study, or enough to make it advantageous, was so limited that it would not be worth while to try the experiment. The result of several years' teaching was that while among nearly two thousand pupils only one or two were found who had this "gift," there was not one single child who was not abundantly capable of learning decorative design, and mastering the minor arts. Precisely the same thing is being said as regards teaching memory and perception. "It will succeed with *geniuses*, but not with all." Now, it is an extraordinary thing, and one to be specially noted, that the antecedent proofs and probabilities that every child can become a clever artistic artisan were very few and far between compared to those which illustrate the truth that the other faculties in question may be as generally acquired. Secondly, it was urged against the one, as it is now being urged against the other, "Where will you find teachers?" They were speedily found in the art school, for we soon developed them from among our pupils, while I had in addition a class of grown-up ladies who were specially educated as instructors. But the great objection, and the one which to this day perplexes the majority of people, is, "What profit is there in teaching pattern drawing, modelling shoes or leaves, carving patterns or hammering brass? *Will it pay?* Can a boy make a living by it?" This is precisely the problem proposed by Sam Weller's school-boy, who had indeed learned the alphabet, but doubted whether it was worth while going through so much to learn so little. "Is it not better to teach *boys a trade?*" is heard on every side in answer to the assertion that boys and girls of tender age should be prepared to begin to study one. In exactly the same spirit a reviewer declares that "we shall do well to ask ourselves whether it is not more important to teach our children to *think* than to remember, and whether a great deal of the matter with which children are expected to load their memories is not lumber." This is quite equivalent to declaring that it is much more sensible to teach boys algebra than have them waste time in learning the numerals or simple arithmetic. If the writer in question had ever read even a little in physiology, he might have learned that it is estimated that there are from 600,000,000 to 1,200,000,000 of nerve-cells in the brain for the generation of nerve force, and the moulding and storing up of our ideas, each having a separate existence, while Prof. Bain gives the number of fibres which transmit impressions at about 5,000,000,000. Now, if any of the objectors to "overloading" the memory do so because they find they are themselves already perilously near to possessing one thousand two hundred million ideas, and really cannot hold any more, nothing remains to be said. Truly, it has been carefully calculated that for the most retentive and richly endowed minds there are only about 200,000

acquisitions of the assumed types, but the amount of genius which a reviewer must possess must far transcend this if he can prove that people should learn to think before they can remember anything.

Ten years ago the training of children to work while studying was deemed chimerical. "It had been tried," we were told, "and it had failed." But it had not been tried properly or sensibly. Ten years hence memory and quickness of perception will also be taught to classes of pupils as a preparation for thought. What man has been we all know, but what man may be no one can tell. This only is certain, that Science now holds in her hand, at last, the key to Nature, and that ere a decade shall pass there will be such revolutions as no supernaturalist ever dreamed of.

CHARLES G. LELAND.

TELEGRAPHS IN CHINA.

THE progress of China is by no means so rapid as some interested persons would have us believe, but beyond doubt the empire is at last moving in a direction favourable to the adoption of Western arts and sciences. The simple fact that telegraphs are being provided there is in itself evidence of the wonderful change which has taken place in the past few years in the attitude of the ruling body, and which not even the most sanguine among us could reasonably have anticipated, to go no farther back than the period of the Chefoo Convention in 1877.

When, however, we find it announced that a complete network, as it were, of telegraphic connections is in course of formation there, it may be worth our while to ascertain whether the foundation of this statement is sound and trustworthy; and in making an examination we shall find it convenient to refer to the substantial progress made and the elaborate system which exists, not merely upon paper, but in absolute perfection, no farther away from China than thirty-six hours' journey by steamer.

Japan may indeed lay claim to the possession of a network of telegraphs; and to obtain an idea of the work to be done in China before a similar claim can be established there, we need only reflect that taking mileage and population into consideration the whole of the Japanese Empire could conveniently be deposited within the boundaries of even one of the eighteen provinces of the Flowery Land. To arrive at a basis of calculation, therefore, we should have to multiply the total length of the existing Japanese telegraph lines at least ten times before any comparison could be instituted. If we were to contrast the East and West, which, however, would be scarcely fair, we should find that a telegraphic system as the term is understood in Europe means something yet immeasurably more extensive and intricate.

Casting aside, then, the extravagant impressions which are often conveyed by the brief telegraphic intelligence which reaches us periodically from the Far East, it is matter for congratulation that the outlying provinces of China are gradually being brought into communication with the capital by the aid of electricity. Yunnan, on the extreme south-western border, has recently been connected, and other equally remote provinces will doubtless be reached without loss of time. With millions of labourers ready to work, the guiding and controlling forces, if present in sufficient numbers, might carry on operations simultaneously, if necessary, in all the eighteen provinces. And undoubtedly there will be a decided advantage in throwing up the lines in almost any fashion so long as they can be made to convey a message, if even, as is most probable, the entire system has to be reconstructed at no distant date. The main object is to so familiarize the natives of the interior with the aspect of

these intrusive posts and wires, that they will combine to protect rather than destroy them. And here we are reminded of one point in which the Chinaman differs essentially from his near neighbour the Japanese. When first telegraphs were introduced in Japan, in 1871, the most violent opposition was encountered in the more remote regions at the hands of the agriculturists, who were by no means disposed to acquiesce in all the regenerative projects of the Government of "Benevolence and Light." In China the opposition emanated from the Government itself, inasmuch as considerable diplomatic pressure had to be brought to bear ere the introduction of a telegraph of any kind could be sanctioned, and it is tolerably safe to assume that in the peaceful interior of that vast empire nothing like strenuous objection will be raised to the formation of the line if only it be the aim of the engineers to wound the susceptibilities of the farmers as little as possible in selecting sites for the poles. In Japan the Government was very willing, but the people in many instances were not: in China it has been difficult to convince the Government, whilst the people are eminently docile.

The attitude of ready submission to law and order which characterizes the Chinese farming class affords reasonable ground for the belief that, unless there be a false step on the part of local officials, the telegraphs of China will enjoy an immunity from half the evils which have attended the introduction of the system into other lands. But something will certainly depend upon the policy pursued by the mandarins: it must be one of conciliation. Cultivated land is so exceedingly precious to the Chinese farmer that he can ill afford to have his property disturbed and partly occupied, even if it be to the extent of a square foot or two only, in order that posts may be planted to carry the wires. The system of farming adopted tends to the cultivation of a few acres merely by any one individual, but by diligence and attention a small plot is made to yield practically two and even three crops where one only would be raised in an equal space with us. This is the reason why the good will of the local residents, officials or farmers, will have to be secured.

When these initial difficulties have been overcome, a glorious field will await the development of the telegraphic system. Instead of following in the track of the railway, or journeying side by side therewith, the telegraph will be the forerunner and instigator of improved means of locomotion throughout this immense, almost unknown, region. Even if its effects were limited to the comparatively handy centres of the tea and silk trade there would, in a twelvemonth, be ample justification for its establishment.

It is one thing, however, to have erected a line of telegraph and another thing to provide adequately for its maintenance in efficient working order, without which it would be better not to construct it at all. When communications are interrupted for days together, as must inevitably occur in the absence of a thoroughly complete maintenance organization, the public confidence must be shaken anywhere, and certainly this will apply in full force to China. It is to this most important consideration that early attention should be directed, for the trouble begins the moment the lines are thrown open to the public. When once the merchant has experienced the sensation of being able to complete a bargain on the instant, he is apt to resent fiercely any curtailment of his privileges. It may not be out of place, therefore, to allude to the experience of the pioneers of telegraphy in Japan as evidence of the paramount necessity for establishing this branch of the service on the soundest basis possible. To begin with, testing stations ought never to be farther apart than a day's march on ordinary roads, and trained men are needed at these stations to be held in readiness to set out, on a word from head-quarters, with the necessary tools. Herein is