

tracing out of the folds and undulations of an apparently unimportant stratum, and the minute examination of fossils, are still looked upon as of no practical use. Men cannot perceive, that the one gives the only means of inferring, from what is laid bare to our sight, in a limited space, the nature of the rock existing in other parts, which we cannot examine; and that fossils, totally independently of their interest to the Naturalist as links in the great chain of creation, are often the only means we have of distinguishing between rocks which are lithologically similar, but belonging to very different formations. Without a knowledge of fossils we should still be searching for coal in the Silurian rocks of the Oneida group, and for lead in the Niagara limestone. Our people at large have not yet recognized the fact, that there is hardly a walk in life that is not more or less affected by every advance in science; hardly a trade or manufacture, which does not owe its greatest triumphs to some application of what, in its day, has been looked upon as learned trifling—and our politicians are slow to perceive that, looking upon it merely as a money investment, the providing for the country a sound scientific culture is the surest way of enabling it to respond to the demands of the Finance Minister.

If on the one hand we lament that the people undervalue all scientific investigations, which do not evidently and immediately lead to some practical use, on the other hand I am afraid that in many of our higher educational institutions there is a tendency to underrate the physical sciences for an opposite reason. From their practical value it is thought that they may safely be left to take care of themselves, whilst as a means of mental training they are considered inferior to the old time-honored subjects of academical education, the moral and mental sciences, and the study of the ancient languages—Mathematics forming a sort of debatable land, between the two systems, being a purely mental operation on the one hand and of inexhaustible practical application on the other. As we are not an institution whose proper business is education, it may appear superfluous in me to interfere upon the present occasion in the vexed question of the relative merits of the two systems, but as one of the main objects of our society is the advancement of the sciences, it will not be altogether out of place if I say a few words upon that most obvious way of promoting them—the making them prominent subjects of study in our higher Seminaries of learning.

As to the mental sciences I will say nothing. I do not feel competent to speak of their merits as a means of mental training, and I should lay myself open to the same censure which I have applied to others, if I undervalued what I am myself unable to appreciate. Their advocates, however, will admit that they are not very progressive branches of learning, (which may indeed arise from their having, unlike all other human things, already arrived at perfection); but whilst the physical sciences have been advancing with such giant strides that it is almost impossible to keep pace with their progress, the mental sciences, after engaging the acutest intellects for centuries, remain substantially where they were two thousand years ago. I hope I shall not very much shock any metaphysician present, if I say that, as in the case of the celebrated combat between Gymnast and Captain Tripet, I am very much of Corporal Trim's opinion, that one good home-thrust of a bayonet is worth the whole of it.

Far be it from me to disparage in the slightest degree the cultivation of the languages of Greece and Rome. I cannot imagine a more interesting, or more appropriate study for man, than that of the laws of language, which principally distinguishes him from the brute creation, and the laws of thought as evidenced and tangibly embodied in its structure; and totally apart from the merits of the literature, an ancient language is the best, and indeed the only basis, upon which the study can be properly founded. Greek and Latin contain moreover a literature of such value and beauty, and the languages themselves are capable of such a felicity of expression, that they ever have been, and ever will be, considered an essential portion of a liberal education. So many of their words also are embodied, either by direct adoption or by the intervention of other languages in one element of our own mother tongue, and they are so closely related collaterally to the other element, that no man can be said to be thoroughly master of his English who has not a competent knowledge of Greek and Latin; and the structure of our whole scientific nomenclature having the same origin, is another reason for becoming familiar with them. But these are the useful results of the knowledge when acquired, whereas the argument in their favor is on account of the intellectual training from the manner in which they are studied. It is impossible entirely to dissociate the two views, although, as in most controversies, the ablest advocates of one course are apt to ignore

the possible value of the other. As the Volunteer movement is becoming popular amongst us, I may be allowed to take an illustration from military matters. One of the objects of drill is to teach habits of punctuality, order, quickness, and precision of movement, and the abstraction of the mind from everything except attention to the commands which may be received, so that the officer may be able to depend upon handling his men with as much accuracy and certainty, as if they formed a machine; but this might be attained by a system of drill having no relation to the soldiers' future duties. This, however, is not all the object. It is required at the same time, so to habituate them to the actual operations they have to perform, that in moments of emergency, they may go through them with precision, as by an artificially induced instinct. So it is in education: we wish to teach habits of thought which will be of useful application in after life; but we also wish to practice the students in the application of those habits to the purposes for which they are to be exercised. The Utilitarians and the Disciplinarians are both right, but both are mistaken if they think they can stand alone, and both in practice really act upon the doctrine of the other. Mr. Marsh, who in his late work on the English language takes the purely Utilitarian view, says that "the student of language, who ends with the linguistics of Bopp and Grimm, had better never have begun; for grammar has but a value, not a worth; it is a means not an end, it teaches but half-truths, and except as an introduction to literature and that which literature embodies, it is a melancholy heap of leached ashes, marrowless bones, and empty oyster-shells." But Mr. Marsh shows infinite diligence in collecting and illustrating the bones and oyster-shells which he affects to despise; and the Disciplinarian, who considers the literature as a secondary consideration to the mental training, is yet influenced by the literature in selecting the language to form the basis of the study. Had it been otherwise, there is no doubt, that it would not have been Latin and Greek, but Sanscrit, which would have formed the text of academical lectures. It is their literary merits, and their intimate association with the daily business of our lives, with our habits of thought and forms of expression, and the constant allusions to, and illustrations from them, occurring in our own literature, which causes the former to maintain their position.

So far then the classical languages and the physical sciences are upon a par, and both are brought to the test of the practical utility of the substance which we acquire. If we look simply to the beneficial effects of the *method* of acquisition, I am unable to see any marked superiority in either. The mental processes appear to be much the same. It must be highly instructive, under able guidance, to follow the gradual development of language, and to trace back the later words and terminations to their rudimentary forms; to watch the transformations of the same element as it appears in cognate languages, and to determine the laws which guide all these changes. But there are closely analogous points to which the scientific botanist and the comparative physiologist call the attention of his pupils. There too we trace a gradual development, a constant transformation and modification of parts as they appear in species more or less allied, till by successive steps you can follow an organ through all its metamorphisms, and detect its identity after it has entirely changed its outward appearance, and the character of the functions which it performs; just as in two languages, you recognize the same word, though there may not be a single letter in common, and the meaning of it may have greatly changed. Nay, if you investigate one class of facts to the exclusion of the other, you miss the full force of the crowning lesson—that not only in the material universe, but even in the realms of thought and in the modes of expressing it, one system pervades the whole creation—everywhere constant change and development with the preservation of the same typical analogies; everywhere infinite variety and complexity in the detail, with uniformity and simplicity in the plan; everywhere endless differences, but one law, and one lawgiver.

The habits of mind which are engendered in either case are the same, whether the study be that of a language or of a physical science—patient analysis of the facts as they present themselves; an aptitude to detect resemblances and to distinguish differences; caution in forming a judgment, not taking a thing for granted from the first plausible suggestion to your mind, but tracing it through all its analogies and relationships; and the power of generalizing the facts thus carefully ascertained, of separating them into groups, and binding them together by general laws. I will even go a step farther, and without assigning any superiority to the one study over the other, I will maintain, that in these important qualities the sciences had the precedence in point of time. The study of language has followed in the footsteps of that of the material world.