

It is pleasant to meet with such lovers of nature. They are generally keen observers, and enthusiastic in their admiration of the objects which they collect and study. I have known several of these philosophers in humble life; and I had the privilege of stumbling on one of the Lancashire naturalists several years ago. I had arranged to meet Mr. Gibson—a blacksmith in Todmorden Vale, and a naturalist of great attainments. By mistake, I was set down at the wrong station, and I had not time to rectify the blunder. I was, however, directed to a friend of his, whom I found in a cotton mill, covered with dust and begrimed with smoke. He gave me a hearty welcome, and took me immediately to his house—a single roomed cottage, from which we ascended by a ladder through a trap-door to a small loft above, where he kept his geological treasures. I found that this weaver had examined all the rocks in his neighbourhood, exhumed the fossils, discovered some which were new, and that one of them had been named after himself.

One more example of science in humble life I shall refer to, because "he does a little in my way." He is a mechanic, living in a town near the borders, and he has for many years been a practical geologist. He usually takes a week or a fortnight's holiday yearly, for the purpose of examining some district in his neighbourhood. On one of these occasions, he traversed on foot the greater part of Roxburghshire and Northumberland, exploring—hammer, compass, and map in hand—the course of a basaltic dike, which, after crossing both counties, runs into the sea near Bondicar. His survey is referred to in Milne's *Memoir on the Geology of Roxburghshire*. Now, my friend sometimes lectures on Geology. His first lecture was remarkable and amusing. He had facts in abundance to communicate, and he understood the principles of his science; but not being what is conventionally called a scholar, as he advanced in his lecture he became afraid of his pronunciation. He was about to describe the *Ichthyosaurus*: "Now," said he, "this strange creature combines the characters of 'the crocodile with that of the fish! it's called by a very hard jaw-breaking name, and I am doubting if I pronounce it you will not understand me, I'll therefore spell it—I-c-h-t-h-y-o-s-a-u-r-u-s." This passage electrified his audience—attention was excited, and he has since been popular as a lecturer. He has, however, got past the spelling-book, and his last lecture, delivered a few months ago, on the *Distribution of Gold*, part of which has been printed, is both ingenious and interesting.

My friend was much sneered at by his fellow-workmen for wasting his time on hobbies, as scientific pursuits are occasionally but vulgarly designated. His reply teaches important truth: "Reckon up," said he, "the hours and days wasted by you, week after week, in the 'public-house; add to that, the days you are thereby unfitted for 'your employment, and you will find that you spend more time in 'folly than I do in these excursions. I take my enjoyment in the 'lump, and I return from my rambles with my mind instructed and 'with my feelings more deeply impressed by the greatness and goodness of my Maker, as seen in his works; and with both body and 'mind re-invigorated, I am better able to endure toil, and to grapple 'with the trials and difficulties of life."

Sometimes it has been charged against scientific attainments that they make men proud and vain. Doubtless, this result may occasionally happen. It is not, however, the legitimate effect of knowledge, but arises rather from the imperfection of human nature, and may more readily be produced by the more questionable advantages of birth—of wealth—of personal accomplishments—and even of tasteful dress. It is not, however, contrary to reason, fairly to estimate and appreciate any advantage we may have gained especially through our own efforts. Less commendable, certainly, is that spirit of envy and detraction which those indulge in, who, unable to rise themselves, would reduce others to their own low level.

While the boundless views of creation which science opens out may well cause the loftiest human intellect to bow in profound humility before the Supreme Being, to whom all things are open and naked; yet, at the same time, the achievements of the human mind in expounding the mechanism of the heavens and the phenomena of nature, have an ennobling influence on the character; and of themselves raise the hope and longing for immortality. Who feels not elevated when he hears of the marvellous calculations and predictions of the astronomer?

But I know no greater—no more interesting achievement, than that of Cuvier. Paris, the scene of his labours, stands on the tertiary formation, in which are entombed the bones of extinct animals, a number of which had been collected and deposited in the Paris Museum. Here he found himself placed in a charnel house, wherein was a rude and unarranged heap of bones—"rudis indigestaque moles,"—many of them a considerable size and singular form. Now Cuvier had profoundly studied living organisms, and had arrived at the important generalisation that each animal was formed according to a definite plan, and that all the parts had a mutual relation to each other, so that it was possible from a few bones having their terminations entire, to construct the entire animal. This principle, derived from the living, he to applied the exposition of the dead. The result

was wonderful. The dry and mutilated bones became, as it were instinct with life:—to use his own language, "at the voice of Comparative Anatomy, every bone and fragment of a bone resumed its 'place,"—eventually the charnel house was converted into a menagerie. Strange forms were seen—the *Anoplotherium* was there, about the size of a dwarf ass, resembling a pig, and with a thick tail like that of an otter—the *Palæotherium* was there, as large as a rhinoceros, but with a snout like that of the tapir. For not only were the skeletons set up, but the accomplished naturalist also determined the nature of the dermal covering, their habits and mode of life, and even the physical conditions of the district, when these thick-skinned animals lived in the ancient swamps, swam over the lakes, and browsed upon the leaves and branches of the tropical shrubs and trees which grew along the borders.

Achievements such as these—the result of great labour and profound thought—evidence that the mind is a spark struck from Divinity, which, though it may be obscured, will never be extinguished.

And this conclusion derives force from the progress of knowledge. He who cultivates any department of science can claim kindred with the master spirits of the world, and can aid in the development of truth; for the larger generalisations which form the science of an age, arise out of the combined observations of many minds. The science of one generation becomes the heritage of that which succeeds, and forms the basis on which it rears its own superstructure. And thus is it that the domain of knowledge is ever enlarging, nor can any limits be drawn beyond which it may not extend. These views attest the dignity of the human mind—they raise it above cold materialism—they awaken high hopes and exalt strong desires for immortality, and at length impress us with the unfaltering belief that the faculties and powers which have already achieved so much, and which pant after higher attainments, will live on and prosecute in another state the researches begun here, and which, though but imperfect, illustrate the power, the wisdom, and goodness of Him who has made man after his own image.

## Papers on Practical Education.

### CANONS OF TEACHING.

1. Teachers of limited capacity, or whose command of language is limited, invariably teach best with text-books, or by the individual system of instruction.
2. Men of fervid imaginations, having a great command of language and enthusiasm of character, almost invariably become superior teachers.
3. Decision of character almost invariably forms an element in the qualifications of a superior teacher.
4. Men who are deficient in general knowledge and in enthusiasm of character are generally bad teachers even though they possess great technical acquirements.
5. An earnest man, imbued with the love of children, is rarely a bad teacher.
6. The love of teaching is generally associated with the capability for it; but the converse does not so frequently hold true.
7. A man of superior teaching-power teaches well by any rational method. But he will always teach best by that method which is suited to his peculiar capabilities.
8. Men generally teach badly when they attempt to teach too much, or when they do not duly prepare their lessons.
9. Presence of mind, and that self confidence which is based on self-knowledge, are essential elements in a good teacher's character.
10. Success in teaching is more dependent upon the capabilities of the master for teaching, than upon his technical acquirements. Teaching-power is not always associated with superior talents or great acquirements.—*From a Lecture by Mr. Thomas Tate, F.R.A.S., to the United Association of Schoolmasters of Great Britain.*

### SKETCH OF THE INSTRUMENTS OF MORAL EDUCATION IN AN ELEMENTARY SCHOOL.

In moral training, we must remember the following characteristics of children:—

- 1.—That they are influenced by example. So strong is the faculty of imitation, that they will certainly copy that which they see, especially in those somewhat older than themselves.
- 2.—They are strongly influenced by sympathy, that indefinable feeling, which binds lads together for good or evil.
- 3.—They are influenced by association. The circumstances in which they are placed have a powerful influence in forming character.
- 4.—That their nature being evil, they are more disposed to follow evil than good.
- 5.—That their judgment, not being mature, they are very liable to mistakes.