Scientific.

NECESSITY OF A KNOWLEDGE OF ABSTRACT SCIENCE IN ORDER TO ATTAIN PRACTICAL AND THOROUGH KNOWLEDGE.

A certain moderate degree of acquaintance with abstract science is highly desirable to every one who would make any considerable progress in physics. As the universe exists in time and place; and as motion, velocity, quantity, number, and order, are main elements of our knowledge of external things and their changes, an acquaintance with these, abstractedly considered, (that is to say, independent of any consideration of the particular things moved, measured, counted, or arranged,) must evidently be a useful preparation for the more complex study of nature. But there is yet another recommendation of such ciences as a preparation for the study of natural philosophy. Their objects are so definite, and our notions of them so distinct, that we can reason about them with an assurance, that the words and signs used in our reasonings are full and true representatives of the things signified; and, consequently, that when we use language or signs in argument, we neither, by their use, introduce extraneous notions, nor exclude any part of the case before us from consideration. For example: the words space, square, circle, a hundred, &c., convey to the mind notions so complete in themselves, and so distinct from everything else, that we are sure when we use them we know and have in view the whole of our own meaning. It is widely different with words expressing natural objects and mixed relations. Take, for instance, *iron*. Different persons attach very different ideas to this word. One who has never heard of magnetism has a widely different notion of *iron* from one in the contrary predicament. The vulgar, who regard this metal as incombustible, and the chemist, who sees it burn with the utmost fury, and who has other reasons for regarding it as one of the most combustible bodies in nature;—the poet, who uses it as an emblem of rigidity; and the smith and engineer, in whose hands it is plastic, and moulded like wax into every form;—the jailer, who prizes it as an obstruction, and the electrician, who sees in it only a channel of open communication by which that most impassable of obstacles, the air, may be traversed by his imprisoned fluid, have all different, and all imperfect, notions of the same word. The meaning of such a term is like a rainbow—everybody sees a different one, and all maintain it to be the same. So it is with nearly all our terms of sense. Some are indefinite, as hard or soft, light or heavy (terms which were at one time the sources of innumerable mistakes and controversies); some excessively complex, as man, life, instinct. But, what is worst of all, some, nay most, have two or three meanings; sufficiently distinct from each other to make a proposition true in one sense and false in another, or even false altogether; yet not distinct enough to keep us from confounding them in the process by which we arrived at it, or to enable us immediately to recognize the fallacy when led to it by a train of reasoning, each step of which we *think* we have examined and approved. Surely those who thus attach two senses to one word, or superadd a new meaning to an old one, act as absurdly as colonists who distribute themselves over the world, naming every place they come to by the names of those they have left, till all distinctions of geographical nomenclature are confounded, and till we are unable to decide whether an occurrence stated to have happened at Windsor took place in Europe, America, or Australia.

It is, in fact, in this double or incomplete sense of words that we must look for the origin of a very large portion of the errors into which we fall. Now, the study of the abstract sciences, such as arithmetic, geometry, algebra, &c., while they afford scope for the exercise of reasoning about objects that are, or, at least, may be conceived to be, external to us; yet, being free from these sources of error and mistake, accustom us to the strict use of language as an instrument of reason, and by familiarizing us in our progress towards truth to walk uprightly and straightforward on firm ground, give us that proper and dignified carriage of mind which could never be acquired by having always to pick our steps among obstructions and loose fragments, or to steady them in the reeling tempest of conflicting meanings.

But there is yet another point of view under which some acquaintance with abstract science may be regarded as highly desirable in general education, if not indispensably necessary, to impress on us the distinction between strict and vague reasoning, to show us what demonstration really *is*, and to give us thereby a full and intimate sense of the nature and strength of the evidence on which our knowledge of the actual system of nature, and the laws of natural phenomena, rests. For this purpose, however, a very moderate acquaintance with the mere elementary branches of mathematics may suffice. The chain is laid before us, and every link is submitted to our unreserved examination, if we have patience and inclination to enter on such detail. Hundreds have gone through it, and will continue to do so; but, for the generality of mankind, it is enough to satisfy themselves of the solidity and adamantine texture of its materials, and the unreserved exposure of its weakest, as well as its strongest parts. If, however, we content ourselves with this general view of the matter, we must be content also to take on trust, that is, on the authority of those who have examined deeper, every conclusion which cannot be made apparent to our senses. Now, among these there are many so very surprising, indeed apparently so extravagant, that it is quite impossible for any inquiring mind to rest contented with a mere hearsay statement of them,—we feel irresistibly impelled to inquire further into their truth. What mere assertion will make any man believe, that in one second of time, in one beat of the pendulum of a clock, a ray of light travels over 92,000 miles, and would therefore perform the tour of the world in about the same time that it requires to wink with our eyelids, and in much less than a swift runner occupies in taking a single stride? What mortal can be made to believe, without demonstration, that the sun is almost a million times larger than the earth? and that, although so remote from us, that a cannon ball shot directly towards it, and maintaining its full speed, would be twenty years in reaching it, it yet affects the earth by its attraction in an inappreciable instant of time?—a closeness of union of which we can form but a feeble, and totally inadequate idea, by comparing it to any material connection; since the communication of an impulse to such a distance, by any solid intermedium we are acquainted with, would require, not moments, but whole years. And when, with pain and difficulty, we have strained our imagination to conceive a distance so vast, a force so intense and penetrating, if we are told that the one dwindles to an insensible point, and the other is unfelt at the nearest of the fixed stars, from the mere effect of their remoteness, while among those very stars are some whose actual splendor exceeds by many hundred times that of the sun itself, although we may not deny the truth of the assertion, we cannot but feel the keenest curiosity to know *how* such things were ever made out.

The foregoing are among those results of scientific research which, by their magnitude, seem to transcend our powers of conception. There are others, again, which, from their minuteness, would appear to elude the grasp of thought, much more of distinct and accurate measurement. Who would not ask for demonstration, when told that a gnat's wing, in its ordinary flight, beats many hundred times in a second? or that there exist animated and regularly organized beings, many thousands of whose bodies laid close together would not extend an inch? But what are these to the astonishing truths which modern optical inquiries have disclosed, which teach us that every point of a medium through which a ray of light passes is affected with a succession of periodical movements, regularly recurring at equal intervals, no less than five hundred millions of millions of times in a single second! that it is by such movements, communicated to the nerves of our eyes, that we see—nay more, that it is the *difference* in the frequency of their recurrence which affects us with the sense of the diversity of color; that, for instance, in acquiring the sensation of redness our eyes are affected four hundred and eighty-two millions of millions of times; of yellowness, five hundred and forty-two millions of millions of times; and of violet, seven hundred and seven millions of millions of times per second.

To Emboss Letters on Marble.

Take some rosin varnish, and with a hair pencil draw the letters, &c., on the marble, (which should be previously well polished,) and also cover with the varnish every part of the face of the marble that is to remain plain. Lay the marble in a horizontal position, and make a border of oil putty round it, and then pour muriatic acid to the depth of half an inch on the marble. When ebullition ceases the acid may be drained off, and the work examined; and if the letters are not sufficiently prominent, a fresh quantity of the acid may be added. When the work has been thus corroded to the depth required, the varnish may be washed off with spirits of turpentine. The acid that has been thus employed, need not be lost, for a muriate of lime being thus formed, may be crystalized by a slight evaporation, and preserved for other purposes; or by the addition of a small quantity of sulphuric acid, a sulphate of lime is precipitated, and the muriate may be poured off and be used again for the same or a similar purpose.

Novel Application of Galvanic Action.

In the *Madras Spectator*, of September 18th, it is stated that a person in that town has discovered a substance which he calls *fibre* (what it is remains a secret), which, under galvanic action, contracts suddenly to one-fourth of its length, "its power being equal to 100 lb. on every square inch of its sectional surface." The inventor has constructed a model engine to show the application of the new motive power. A reciprocating beam attached to an ordinary crank, with fly-wheel of about four feet in diameter, is fitted at each end with a cylindrical piece of the fibre, insulated by a plate of glass. Near the frame is a small galvanic battery. Operations are begun by giving a shock from this battery to one of the pieces of *fibre*, which immediately and violently contracts, drawing the beam down on that side, and of course communicating motion to the crank and fly-wheel. So soon as the centre has been turned, another shock given to the opposite piece of *fibre* continues the motion; and the shocks being alternately repeated, the fly-wheel soon gains an enormous speed.—*Architect.*

The Farm.

Butter Making.

We gather from several sources the following remarks pertaining to this subject, which may be of service to our readers.

The most essential point in making butter that will keep, is to free it entirely from milk. Milk after churning or when separated from the oil it contains, possesses a strong affinity for Oxygen, and will sour more rapidly than it would before; and then by uniting with certain properties of the butter produces a strong rancid taste which makes it unfit for use. This may be in some degree retarded but cannot be prevented by salting.

We have known butter, made by the following process, that was perfectly sweet and pleasantly flavored, when it had been kept a year. Work it with butter ladles until the milk ceases to come out, then set it in a cool cellar. Mix three parts of the purest ground rock salt, one part saltpetre and one part of clean white sugar thoroughly. After the butter has remained one day in the cellar, work in one ounce and a half of this mixture, to every pound of butter. Pack it into a clean firkin, and lay over it a linen cloth, wet in salted water, and cover it closely.

Clover Hay for Horses.

I have frequently heard it observed, that horses fed for any considerable length of time on clover hay, are liable to be attacked by cough. It is also asserted that this kind of feed greatly aggravates, if it does not occasion the heaves. Now there are two remedies for this, either of which, if applied judiciously, will prove entirely effectual. One is to feed from a manger, instead of the common horse rack. The common method of curing clover hay, renders the foliage so dry and crisp, that it crumbles in being forcibly drawn through the slats or rounds of the rack, occasioning a fine, almost impalpable dust, which, on being inhaled, irritates the lungs, and occasions coughs, &c. Another and more economical method is to cure clover hay in the proper way. By curing it in the cock, its foliage will wilt and dry without being deprived of its sweetness or elasticity, and will not crumble. This I hold to be the most economical, as it not only enables us to save much trouble in the busy season of haying, but obviates the serious loss from the breaking and falling off of the finest and most valuable parts.—*Germantown Telegraph.*

Hints to Farmers.

Whoever will apply an ointment made of gunpowder, brimstone and common grease, behind the necks of their lambs, will be sure of having them preserved from all kinds of vermin. The quantity necessary to be made use of is so small that a sixpenny worth is sufficient to dress upward of two hundred lambs. The better animals can be fed, and the more comfortable they can be kept, the more profitable they are, and all farmers work for profit. What ought to be done to-day, do it, for to-morrow it may rain or snow. A horse may be cured of founder in half an hour by rubbing his leg from the fetlock joint to the hoof with water, heated as hot as the hand will bear, and a little melted lard. It has been tried with success.

The Scales on a Chicken's Bill.

Every one who has noticed a chicken just hatched has seen a kind of scale on the point of the bill, which appears to be a useless appendage. It is not so, but a very convenient contrivance for assisting the chicken to break the egg-shell when it is hatched.

Brown, in his work recently published on domestic fowls, says this scale is much harder than the beak itself. Had it been tipped with iron to force the shell open, it would not have been a stronger proof of creative design, than is this minute speck, which acts as so necessary an instrument.

In a few days after birth, when it is no longer wanted, this scale disappears; not by falling off, which would be a waste of valuable material, but by being absorbed and becoming serviceable in strengthening the bony structure, minute as the portion of earthly substance is.—*Maine Farmer.*

A CURIOUS FACT.—A letter from Minnesota says:—"It is a singular fact, that the ordinary field birds and songsters, so common in old settlements, and also the honey bee, unknown here before, have migrated hither with civilized man. The Indians say, that the rattle snakes follow in his wake also. Be that as it may, while they are numerous farther down the Mississippi, they have not yet made their debut into this locality. In the neighbourhood of Sauk Rapids, however, some have been killed, where, it is said, they were never seen till recently."

Usefulness of Swallows.

While visiting a friend in the country, a few weeks since, we noticed, under the eaves of a barn, near the dwelling, about fifty swallows' nests. The bird was the *Hirundo fulva*, or Cliff-swallow, of ornithologists. In most of the nests there were young, and the old birds were very assiduous in providing them with food. We observed them at different times in the day, and not a minute elapsed in which one or more birds did not return to the nests with something for the young. Their food consisted of winged insects taken in the air; and the numbers which were thus destroyed by this colony of swallows, must have amounted to thousands, each day. We were informed that no flies, or very few, were to be seen around the house or barn—the family and the domestic animals of the farm being thus freed from a disagreeable annoyance.

Fruit.

A cultivator of fruit, whose good example is referred to in the New England Farmer, keeps a circle of several feet around the roots of every tree clear of grass, and enriches it with cheap manure, bones, ashes, and several other kinds of fertilizing substances. He has very large crops of most excellent fruit, which he states, brings him more money than any of the neighboring farmers obtain for all their crops.

To make Preserves Keep.

The secret of preserving them from change is to exclude the air. The easiest way to do this is, to brush over a sheet of paper with the white of an egg, and cover the jar, pressing it down around the edges while moist, and it will cement perfectly tight.—It is cheaper, neater, and better than sealing up the mouth of the jar with wax, or covering it with a bladder.

In all sciences the error precedes the truths; and it is better they should go first than last.—[Walpole.

Asparagus is strongly recommended in affections of the chest and lungs.