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(Illustrated articles are marked with an asterisk.)

THE USES OF SULPHUROUS ACID.

This acid has assumed a great importance in the arts, and we find the best method for its production the frequent subject of discussion in our works on technology. It is employed as a gas, as a solution in water, and in combination with bases under the name of sulphites. There are numerous ways of making the gas, some of which it may be well to recapitulate before proceeding to speak of the applications.

One of the best methods is that proposed by Stolba, to heat in suitable retorts one part of sulphur and four parts of common sulphate of iron. Other manufacturers simply burn sulphur in atmospheric air, or deoxidize sulphuric acid by means of charcoal or some metal. In some instances, sulphurous acid is an incidental product, and is not allowed to go to waste. We do not, however, purpose to speak of the manufacture and properties of the acid, but of its uses.

In Belgium, sulphurous acid, obtained by roasting sulphur, is conducted through heaps of alum slates, arranged on floors, and, in this way, the yield of alum is greatly increased. Under the old process, sixty-eight parts of slate were required to make one part of alum. By employing sulphurous acid, it is said that eight parts of slate will yield one of alum.

In the manufacture of phosphorus from bones, the bones, previously freed from fat, are digested in aqueous sulphurous acid, by which the bone phosphate is dissolved. By boiling the solution, all of the sulphurous acid can be expelled and condensed in coke towers, to be used again. The bones thus extracted can subsequently be treated for glue. In the preservation of meat, sulphurous acid appears destined to play an important part. The meat is suspended in large boxes or chambers and sulphurous acid gas admitted. To prevent the formation of sulphuric acid, it is necessary to have something to absorb the free oxygen, such as the sulphate of iron, in the bottom of the vessel.

In the Paris Exhibition of 1855, we saw specimens of meat exhibited by Laury, which had been kept fresh in this way for five and ten years. Many of the modern processes for the preservation of meat are founded upon the use of sulphurous acid, either alone or in combination with other agents.

In the purification and refining of sugar sulphurous acid plays a most important part. Its effect is not only to clarify the molasses, but also to prevent the fermentation, by which the yield of the sugar is largely increased.

For the extraction of purpurine and alizarine from madder, Kopp proposes to treat the madder with sulphurous acid, and afterwards, with sulphuric acid. The two coloring matters are in this way separated, and the labor of extraction facilitated.

Oils and fats are purified by sulphurous acid. The fat is heated to 500° Fah., and gaseous acid passed through it for about four hours, and, afterwards, the sulphurous acid is removed by steam and water. In the refining of petroleum sulphuric acid is employed, which is partially deoxidized into sulphurous acid, and thus accomplishes the purification of the crude oil.

The preservation of hops, by impregnating them with sulphurous acid, was an important discovery, and, we believe, was chiefly due to the researches of Liebig. The gas destroys the lower forms of insect life and prevents any change in the properties of the hops.

Glue is made from leather refuse by soaking the scraps in running water and afterwards digesting them in strong sulphurous acid, and occasionally changing the water. The colorless jelly thus obtained is afterwards converted into glue.

The value of sulphurous acid, in obtaining iodine from Chili saltpeter is explained in another place. It is capable of a similar application in the treatment of copper ore, also, of the ores of many of the rare metals. Very poor copper ores are capable of being profitably worked by the sulphurous acid process.

In the manufacture of alcohol and spirits from malt, sulphurous acid has been advantageously employed. In the manufacture of sulphuric acid, and for the bleaching of straw goods, sulphurous acid has long been known. In medicine it is a valuable remedy, and rapidly attaining the first rank. For the preservation of wines and cider; to prevent the rusting of instruments; to destroy vermin; and as a disinfectant, we often hear of this acid, and the more we become familiar with its properties, the further will its uses be extended. It is one of the most important agents at the disposal of the chemist.

EFFECT OF ASSOCIATION UPON MENTAL DEVELOPMENT.

Young men, and young women, are generally ignorant of one of the most valuable as well as the most accessible and most cheap of all educating forces—the power of association on mind. This power is not commonly discovered and appreciated till experience teaches it, and when many valuable years have passed. The associations of young people here are mostly formed for the furtherance of pleasurable pursuits and without regard to mental ability or acquirements. No greater mistake can be made by a youth desirous of rising to eminence in any profession. To secure rapid mental growth, one's associates should, if possible, be chosen from those of greater mental power, wider experience, and more varied acquirements, than he himself possesses.

The profession of teaching affords many instances of the effect of constant association with inferior minds. In this profession, unless special care is taken to avoid mental contraction by occupying the mind with topics out of the usual routine, and which call into play all the faculties of the mind, men become dwarfed in intellect, and find themselves at an age when the mind should have attained its fullest vigor, less able to grapple with difficult and original trains of thought than at the outset of their professional career. It is chiefly because of the educating power of association that schools are more efficient than private instruction for youth. A young man entering college goes there not alone to learn Greek, Latin, and the sciences, but to learn human nature, to acquire self-control, to rub his wits against other wits, to encounter and resist the temptations which will beset him in after life.

All this constitutes a sharp discipline which some do not escape from unhurt. Those who do, however, are men who, having been educated by association, know the peculiarities of men in general, and are able to penetrate and understand the motions which influence action. They are not likely to fall an easy prey to deception or to over-estimate the men they encounter in active life.

This view of association as an educational force has an important bearing on the subject of schools for both sexes. Perhaps no single educational topic has given rise to more widely divergent opinion than the question of educating the sexes together or apart. So far as those who approve the mixing of the sexes in schools base their opinion upon this alleged comparative inefficiency, the admission of the power of association to educate seems to us to completely refute such an allegation. Even if it be admitted (we are by no means prepared to make such an admission, however) that these schools show at their examinations less progress made in book studies, we believe that important ends of education are subserved, which more than compensate for such deficiencies.

On this account we favor the tendency of the age to admit to colleges, seminaries, and schools, whether technical or otherwise, all students of both sexes who may desire such admission.

It is perhaps somewhat singular that in technical schools those devoted to medicine and surgery should be among the first to feel the demand of females for greater educational facilities, and to have acceded to this demand. So great a triumph over superstition and prejudice is an honor to the age. The questions of the equality of the sexes, or the mental peculiarities of each, have, in our opinion, nothing to do with the higher and more important one of equality of opportunities. Grant the latter equality, and the question of general equality will soon be settled.

WHO MAKE MISTAKES?

"Everybody," will be the reply from every one whose eye catches the above heading. A true answer, indeed. From Solomon, reputed wise, but often foolish, down to George Francis Train, often called foolish, but who not unfrequently speaks wisdom—everybody has made, and everybody will make mistakes. Adam and Eve could not live long in Eden without making a mistake, which the whole human family ought to deplore, if indeed their mistake was the cause of all the mischief in the world, which perhaps there is reason to doubt.

But who make the greatest mistakes and the most numerous? We answer those who know least, and those who are generally supposed to know most. Those who know least are those who suppose and act upon the supposition that books—the records of other men's thoughts and discoveries—are worthless, who believe in themselves as able to solve the profoundest problems without the help of previously acquired knowledge, and therefore cut and try upon questions which have long since found a thorough solution, and fritter away their time and energy to re-discover what has already been discovered. These men delight in styling themselves *practical* men, which in nine cases out of ten in which the term is used boastfully, means ignorant, obstinate men—men who never can accept an idea with relish unless they can be deceived into the belief that it emanated from their own stolid brains. How often have we seen such noodles cajoled into accepting a statement of fact, simply because some man of tact put it to them as "the same thing in another form," as some tom-fool's nonsense they had themselves uttered a few moments before. "It is only another way of putting it, you know," and, "You were entirely right in your mind about the matter," and you see them straighten up and assume the pride due to a sagacity they do not possess, and brains their skulls are too thick and too small to hold.

The mistakes of this class of men matter little to the world. It is not so, however, with the second class we have named. These are men who, having explored large areas in the field of human learning, give themselves up thereafter to profound speculation, and not content with muddling their own heads with metaphysics, print and publish their speculations to muddle others.

Among these we find the greatest and most hurtful blunders committed because their mistakes are too often accepted as truth by inferior minds.

The class of men who make the fewest mistakes, and even whose mistakes very often serve a useful purpose, lie wholly between these extremes. They are men who gratefully receiving the facts and formulæ discovered and wrought out for them by the illustrious line of workers whose labors have forever ceased, build thereon a sure structure of practical knowledge.

They are the true practical men who do not waste their time in useless original experiment unless they discover defects in the experiments, the results of which have been accepted as truth. Availing themselves thus of the store of knowledge contained in books, they make use of it in the conduct of new investigations or in the application of them to the useful arts.

They are, in whatever degree they thus avail themselves of stored-up knowledge, the true scientific men, who avoid vain speculation and test every proposition by its accord or discord with well-established fact.

They are thus matter-of-fact men, not in the ordinary sense, perhaps, for many of them, among the most brilliant of the class, as Tyndall, Huxley, Faraday, and a host of other brilliant names, have clothed their facts in such beautiful robes of fancy that their lectures are worth reading for their literary merit alone. But they are matter-of-fact in this, that whatever conclusion they adopt must have a solid substratum of fact. These men are at the present day making such a combined attack upon all that has not fact to support it, that superstition, which has long usurped reason, finds itself unable to maintain its ground, and slowly retires before their quiet but determined onslaught.

PEN STAMMERING.

Some time since we called attention to the great necessity of simplifying our present cumbrous system of penmanship We should not, at this time, return to the topic had not our attention been called to it by the perusal of a little work written by A. J. Graham, an expert in short-hand and phonetics, whose abilities have made him well known to all the reporting fraternity in this city.

There is much in this book which is valuable, and the system set forth therein would, if adopted, save much labor. It consists mainly in the use of abbreviations, and when carried out to its fullest extent, will save some forty per cent of the labor of ordinary penmanship. But it does not appear to us to meet the requirements of modern business, be it either commercial, editorial, or clerical. What is wanted, in our opinion, is something that may be easily acquired, and easily understood, yet which shall enable the writer to spell out all words accurately, to punctuate with precision, and yet not occupy more than one half the time employed in ordinary writing. This can only be accomplished by the adoption of more simple letters, not by word contractions.

The simple forms used in short-hand writing are perfect in simplicity and legibility, and, when written out in full, give as graceful combinations as need be desired. They can be so thoroughly learned in a short time that they can be read with equal, and even greater rapidity than common long-hand, and their use saves more than half the average labor of long-hand.

There are, however, many reasons why a jump from long to short-hand, for business use, cannot be tolerated. All sound reforms necessarily are of slow growth. It nevertheless seems to us possible to hasten the ultimate abandonment of our present clumsy system for short-hand, by requiring that the system of penmanship taught in our schools should constantly tend towards simplicity rather than complication. If one hundred years since, a proposition had been made to at once eliminate all the superfluous letters in English orthography struck from our lexicons since that date, the movement would have met with very serious opposition. This has been done gradually and written language is very much improved thereby.

A steady tendency towards reform in chirography would ultimately lead, naturally, towards short-hand, or it could, we think, be made to do so, would some genius like Mr. Graham take into consideration the best manner in which long-hand may be made to gradually approach short-hand.

We have not had time to elaborate any theory by which such a desirable result can be accomplished, but have thought