

while, they would be gaining also in mental discipline. Their analytical powers would be brought into constant exercise. Now thoughts and experiences would inspire and inform their minds, and give a fresh glow to their whole life. They would go forth from their Alma Mater to be and to do good. They would live in a world of matchless beauty and truth, whence they would bring forth many things, new and old, to delight and instruct.

The special work to be done for the student, is to enable him to help himself. Without self effort, mind can no more thrive than a forest of oaks can grow crammed into a damp, cold cavern. How many going out from our institutions, make a perfect failure when they come to act for themselves! They have been carried thus far; the way has not been pointed out, and they forced to journey on themselves. They have been more ambitious to recite well than to think well. Hence many are smatterers, who would be philosophers if they had been correctly taught and encouraged. They judge themselves wise, because they have walked in the beaten track of some *litterateur*.

If a student can be induced early to bow and worship at nature's shrine, he will there learn the most important lessons of his life. He will soon discover how little he knows, and how much there is to be known. The world will be full of the mysterious; but the new, the beautiful, and true will attract him onward. There will fall into his bosom, like manna from heaven, thoughts, truths, and suggestions, which will point the way to a happy and useful life. By the time he has reached one height, he will have gained discipline and strength, so as to be ready to push on still higher. All the while he will be meek, humble, adoring, trusting. Thus it was with Humboldt, Miller, Hitchcock, and has been with every true scholar of nature.

Perhaps the strongest reason which can be urged in favor of devoting more time and attention to the natural sciences is that they tend to carry man out of himself and unite him in close relationship to God. By them he is convinced that the visible is a sure proof of the invisible, that the essence of things is spiritual, and that man, for the most part in this life, must walk by faith. The center of the great circle of sciences rests on faith in God. The student of nature can advance but a little way by sight. The chemist, with his crucible and lamp, may separate the compound into its simple elements, but he can not ascertain how, whence, or why the latter exist.

The botanist may dissect the tree—root, trunk, branch, stem, leaf, and flower; yet the life-principle he can not discover. How and why it grows he can not understand. The geologist may delve into the crust of the earth, discovering wonderful facts concerning its history and changes; yet he can not advance a great distance before he is involved in darkness and lost in mystery. Faith alone can light up his way, and speed him onward. The astronomer may soar and revel among the stars; he may see much to delight and astonish; but his physical sight soon fails him, and by the eye of faith only can he still gaze up among those infinite worlds, and at length see God. So it is with all who travel in nature's realm; they soon reach that point beyond which no mortal sense can penetrate. But by thus walking and exploring, they are prepared to believe. They can not rest satisfied until, from the plant, the stone, and the star, they mount by faith up to God. The more true science there is, the more faith. The greater the knowledge of the earth, the clearer the insight into heaven. The more the mind admires nature, the more the heart delights in revelation. The life of the divine Teacher is an illustration of this. His instruc-

tions show he had a passionate fondness for the works of nature. His sermons are replete with metaphors, similes, and illustrations drawn from the grass, the lily, the sparrow, the lake, and the mountain. He went into the wilderness to pray and to prepare himself for his great duties. He was baptized in the Jordan, taught by the Sea of Galilee, was transfigured on Tabor, and bade adieu to his disciples in the midst of the quiet and charming beauties of Ascension Mount.

The mind that is really in fellowship with nature, and understands her teachings; can not turn with indifference from the word of God. It will find no soil here sufficiently deep in which to grow and perfect the soul. The true and faithful student of natural history will willingly bow at the feet of Jesus, and learn of him. He will discover beauty and truth in the completeness of Luke, the brevity of Mark, the definiteness of Luke, the humanity of John, the earnestness of Peter, the devotion of James, and the logic of Paul. Sacred history is the completion of natural history. Let students become adepts in the latter, and they will be faithful disciples of the former. Let them become familiar with the natural, and they will become earnest seekers after the spiritual.

Agricultural Chemistry or Scientific Farming.

BY ANDREW KEEGAN.

(Read before the Teacher's Association in connection with the Jacques-Cartier Normal School, Montreal, May 26th, 1876.)

MR. PRESIDENT AND GENTLEMEN.—The subject I wish to bring under your notice is *Agricultural Chemistry or Scientific Farming*.

Agriculture is an honourable profession; the first man that ever lived upon the earth, was an Agriculturist, and Agriculture must exist till the last man leaves it.

The knowledge which an Agriculturist ought to possess, needs not extend very far. He should at least possess a thorough knowledge of those elements that form plants, the nature and combination of the soil in which they grow, and the kind and quantity of fertilizing manure he is to apply. It is upon this very knowledge that, practically speaking, the subsistence of the whole human race is dependent: the tiller of the soil is the purveyor for all mankind. To know this, the Agriculturist must have a knowledge of *Agricultural Chemistry*.

It is now well understood, that plants must be fed, and that every plant is fastidious, and will only receive its own particular and proper kind of food. The diet of plants is as much to be attended to for their health and maturity, as the diet of a child for its health and growth.

The primary object in cultivating the ground is to give nutritious food to the plant's growth. Their food must be of two kinds, *organic* and *inorganic*, and is derived from two sources, the *atmosphere* and the *soil* in which they are fixed.

The organic food of plants is derived, as it has been said, from the atmosphere and supplied by nature without human aid. It consists of four simple elements, namely: *Carbon, Oxygen, Hydrogen and Nitrogen*. The inorganic part of plants consists of ten or twelve simple elements, namely: *Potash, Soda, Lime, Silica, Phosphoric Acid, Sulphuric Acid*, and some other. The organic part of plants is vastly the greater, it forms from 90 to 99 per cent of almost all plants, as may be shown by burning a plant. That which passes away or disappears,