

STATE EDUCATION AND THE LABOR QUESTION.

There is every probability that these two subjects will occupy a large share of the attention of our legislative bodies for some time to come. Rudimentary education is free to all in this country, and the opportunity afforded to every one to acquire an education sufficient to read and write is a result of which we have some right, as a nation, to be proud. But technical education is sadly wanting in most of our States; and owing to this, and to the want of some good system of apprenticeship, the supply of native skilled labor does not keep pace with the demand, and the result is that our shops and manufactories are filled with mechanics and artisans from abroad, who bring with them the prejudices, existing among the laboring classes of the countries they come from which are antagonistic, in some respects, to our notions of free rights.

These truths are acknowledged by all our best thinkers and writers on the questions of labor and education, and recently Governor Washburn, of Massachusetts, in his inaugural address to the legislature of that State, has spoken candidly and sensibly on the subject. We are unable to give more than a few extracts from his excellent address; these are as follows:

"We shall not reach our highest development as a commonwealth until our elementary and classical schools are supplemented by institutions for instruction in the industries on which our prosperity so largely depends. Of our present population, probably two thirds are engaged in mechanical or manufacturing pursuits, or dependent upon those so engaged. The State has established an agricultural College for her farmers, and from the beginning of her history has dealt generously with such of her sons as aspired to knowledge of the higher branches of learning; but has done little for the education of her mechanics in their particular field of labor. Her duty to encourage and promote the special education of these classes rests upon two grounds; first, the welfare of the individuals directly concerned; and, second, the preservation of our manufacturing supremacy. A great part of the work of many manufacturing establishments is so dependent upon scientific attainment that it must ultimately take rank as a learned profession. Not only are a knowledge of chemistry and a somewhat extended acquaintance with mathematics highly desirable to the mechanic who aims at an advanced position in his trade; but skill in drawing is universally important and valuable, and it is with pleasure that I notice the introduction of teachers of drawing into some of our public schools."

On the subject of the condition of the working population, the Governor spoke to the following effect:

"I commend to your candid and cordial consideration the varied interests of those who are denominated the laboring portion of our citizens. The question of practical concern is not so much whether the condition of this class is better or worse here than in other sections of the country as whether that condition is satisfactory—whether it is what it might be made by honest and resolute endeavor, what it should be made by those who have the well being of the commonwealth deeply at heart. To this question I am sure no one will venture an affirmative reply. Neither is it of paramount importance to determine whether the situation of this large body of persons is better or worse than it was formerly. Our view should be forward and not backward. Many seem to hold the opinion that if the working men and working women, as they are commonly designated, receive constant employment and are adequately remunerated: if they gain the needful bread and meat in exchange for their labor, if they have comfortable homes and enough for the decent support of themselves and their families, it is their duty to be therewith content. But this is a narrow judgment of the matter in issue. They ought not only to perform their daily tasks faithfully, but be so circumstanced that they will perform them cheerfully. In so far as lies within our power, we ought to remove every just cause of complaint. Every human being should have higher and nobler aspirations than merely to provide food and clothing for the body. This should never content him. The head of a family ought to have time for study, thought, reading, recreation, innocent pleasure; he properly desires to give his children a better education than he had, and furnish them advantages superior to those he himself enjoyed.

The fact that there is unrest and dissatisfaction when man is confined to unremitting toil, is one of the brightest and most healthy omens of the times. It is an indication that his better nature is struggling for emancipation; it is a hopeful sign of finer and nobler manhood in the future. Such efforts for improvement should never be discouraged, but always encouraged. That there ever have been and ever will be grades of society, is true enough; the statesman should seek to diminish the distance between the extremes by elevating the lower. It has been said that as soon as the materials for the construction of society were brought together, they proceeded forthwith to arrange themselves in layers—the stronger, more nimble and more cunning of the living constituents climbing to the higher places, and forcing upon those below the office of upholding them in their elevation. As the pyramid was originally built, so it remains in its general design. Within the heaving mass of multitudinous life, individual atoms are constantly changing places, but without destroying, however much disturbing, the primitive distribution into layers. These are still disposed one above the other, in a gradually diminishing series.

Standing still is not the province of society; it must either advance or retrograde. Especially under such a government as ours, change is almost a normal condition and an inherent necessity. The pyramid continues to uplift itself as an entirety; but atoms in the bottom layer of to-day may be in

top layer of to-morrow. Hence one reason why it becomes us to fairly and honestly examine the conditions of the laboring classes, upon whom the whole superstructure of the social organism rests. Because they are a part of ourselves, it devolves upon us to relieve them, as far as possible, from the grievances to which they are subjected. Their existence is not separate from the existence of the State; what tends to their welfare is calculated to promote the general welfare; in the last analysis their interest is identical with the interest of the upper classes; the least addition to their comfort is a gain to the whole community; and if their case is considered in the right spirit, there is no good cause for antagonistic feeling.

The question raised by them and in their behalf can never be adjusted by the two extremes—those anxious to secure the greatest possible amount of pay for the least possible work, and those anxious to obtain the greatest possible amount of work for the least possible pay. Nor will relief come with the determination how many hours shall constitute a legal day's work. For no period can be fixed which should be applicable alike to all. The ingenious, skilled laborer who uses mind as well as muscle cannot apply himself the same number of hours to his task as he who merely handles the hoe or shovel, holds the plow or drives the oxen, uses the trowel or weaves at the loom. The great desideratum is to determine what would be a fair division of profits between the employer and the employee. Settle the question as to compensation per hour, and there will be no serious difficulty about the number of hours. Let us not expect to adjust the issue confronting us by lecturing the laboring classes. We must be willing to meet them on their own ground and discuss the matter at stake from their point of view."

Artificial Milk.

M. Dubrunfant contends that milk is simply an emulsion of neutral fatty matter in a slightly alkaline liquid, such as can be artificially imitated; and that the process of churning consists in hastening the lactic fermentation, thereby acidifying the serum of the milk, and at the same time agglomerating the fatty matter which the acidity sets free from its emulsion. He further controverts the cellular theory, by showing that the fat globules of milk do not display any double refraction, as do all organized membranous tissues.

Having thus examined the theoretical constitution of milk, he proceeds to the practical method of imitating it, and gives the following directions: Add to half a pint of water, an ounce and a half of saccharine material (cane sugar, glucose, or sugar of milk), one ounce of dry albumen (made from white of eggs), and 20 or 30 grains of subcarbonate of soda. These are to be agitated with an ounce or more of olive oil or other comestible fatty matter until they form an emulsion. This may be done either with warm or cold water, but the temperature of from 50° to 60° C. is recommended. The result is a pasty liquid, which, by further admixture with its own bulk of water, assumes the consistency and general appearance of milk.

Luxuriously minded people, who prefer rich cream to ordinary milk, can obtain it by doubling the quantity of fatty matter, and substituting 30 or 40 grains of gelatin for the dry albumen. The researches of Dumas and Frémy having reinstated gelatin among the nitrogenous alimentary materials, M. Dubrunfant prefers gelatin to albumen; it is cheaper, more easily obtained, and the slight viscosity which it gives to the liquid materially assists the formation and maintenance of the emulsion. He especially recommends this in the manufacture of "siege milk" on account of the obviously numerous articles from which gelatin may be obtained.

The uses of artificial milk need not be limited to supplying the wants of the residents of besieged cities. As an ordinary element of the human breakfast table, it is not likely to supersede the product of the cow, but calves are suggested as being superior to vulgar human prejudices. In the ordinary course of rearing, these animals demand a large proportion of the milk of their mothers, and are commonly ill fed or prematurely sacrificed on that account. By feeding them luxuriously on artificial milk (which may be still further cheapened by using colza oil, which has been rendered tasteless and alimentary by the frying process), the milk, butter, and cheese of the cow may be considerably economized, and the supply of veal improved, both in quantity and quality, by keeping the calves a much longer time before they are killed.

I might make further suggestions in the direction of "dairy fed pork," etc., but this is unnecessary; the commercial instinct is sufficiently strong to avail itself of all such cheapening applications of science. Those who are professionally engaged in detecting the adulterations of food will do well to study the physical peculiarities by which M. Dubrunfant's milk may be distinguished from that of the cow, both in ordinary and condensed form. By substituting vegetable albumen for the white of egg or gelatin, the vegetarian may prepare for himself a milk that will satisfy his uttermost aspirations.—*Nature*.

The *Milk Journal*, commenting on the foregoing, says: Prejudice, *Nature* appears to think, would prevent this excellent concoction from being taken at breakfast times instead of the produce of the cow. But our contemporary believes that calves would rise superior to human prejudices, and accept it with thankfulness, or greediness which, in such cases, would be a calf's substitute for thankfulness.

Such of our readers as are familiar with the composition of milk will be amused with the expedient of substituting carbonate of soda for the phosphate of lime and salt, which form the mineral constituents of real milk, and will suspect that "the strictly scientific manner" which governed this

procedure consisted in falling into the vulgar error which was exposed in our pages some time ago. The albumen derived from white of egg is a very different thing from casein chemically considered, as we have pointed out, and as Hallsitz and Habermann have also shown still more recently. Butter fats, too, we think, may easily be distinguished from olive oil.

Marble Dressing and Carving Machine.

This machine consists in a tubular stock or case, containing a drill or carving tool capable of reciprocating or rotating, or both, jointed, to the end of a rod or shaft mounted in a tube pivoted in the top of a stand, so that it can oscillate, around the vertical axis of the stand and also on its own axis, while it can slide freely endwise.

This rod carries at one end a pulley and crank or eccentric shaft for actuating the drill for causing it to strike blows, while it is slowly turned by the hands of the attendant. Or the shaft may gear with the shaft of the drill by bevel gears, to give it a constant rotary motion while being held in contact with the work by the attendant; and motion is imparted to said shaft by a belt working from a driving pulley below, over a guide pulley in the top of the stand, under the rod, and thence in one direction to the pulley working the drill, and in the other direction on a guide pulley in the opposite end of the drill holding rod, in such manner that its action is not interfered with by the shifting of the drill holding rod endwise.

When this machine is run at a high speed—say two thousand strokes per minute—it is claimed to be very efficient in carving and sculpturing upon marble, being perfectly manageable and capable of having the drills pointed in any direction, and will do the cutting required in lettering marble as fast as the tool can be properly guided and directed on the surface by an expert.

The inventor and patentee is Mr. Greene V. Black, of Jacksonville, Ill.

Professor Tyndall and the Boys.

Professor Tyndall—the best of all living savans for making the truths of science familiar to the meanest understanding—signaled the Christmas anniversary in London by a talk to the boys. A correspondent says of him:

Dr. Tyndall, talking to boys, is more like an older and better informed boy than the others, chatting with them, than I thought it possible for a Professor to be; while his illustrations and asides take his address completely out of the dull and dry category, and put his young audience completely at their ease. Why, he lit a cigar in one of his experiments, and positively smoked it for a second or two; telling us all that when he did the same thing some years ago at Cambridge, he astonished the dons there very much. "I don't suppose any one had ventured to light a cigar in the Cambridge Senate house before," remarked the Professor, "and the great people assembled in it looked as if they thought I oughtn't to have taken the liberty." This said, while a cigar is being lit, and as a prelude to its being put between the professional lips and puffed at, delighted the boys and girls. One professor outraging the conventional susceptibilities of other professors, and telling the story as a good joke, is just the thing to hit boy nature, and if Dr. Tyndall had wanted volunteers for a desperately forlorn hope, my opinion is that he might have counted upon half the lads present.

Again, when explaining the process by which frost and snow had been produced on one of the vessels before him, and scraping the snow from its sides, the lecturer won all hearts. "There's more snow than I expected to find; enough, you see, to make a snowball; and if I were very wicked, I could actually (doing it) make a snowball out of what is here, and pelt Mr. Blank (the lecturer's assistant) with it." Professor Tyndall suited the action to the words, and having compressed the snow until it was hard and compact, took elaborate aim at the gentleman assisting him (whose back was turned), and sent the snowball spinning past him and within a foot of his head. It may be imagined how the boys roared at this; and though these illustrations were exceptional, the pleasant, friendly, and familiar manner and speech maintained throughout were equally noteworthy, as were the surprising pains taken to follow each chain of reasoning fairly out. The boys or girls who fail to master the principles of what is being put before them at the Royal Institution must be singularly obtuse.

The Air in Wells.

Mr. J. S. Kessler, of Allentown, Pa., writes as follows: "I was sent, to an ore bed in the vicinity, to examine or repair a pump in a well about 80 feet deep. The well was open, with a temporary shed over it; it was close to the engine house. The sky was cloudy, and the atmosphere very damp. On descending, the light was extinguished at about 20 feet from the surface; and a similar thing occurred on a second attempt, which was made after throwing several buckets of water into the well. As I did not feel inclined to go down, the engineer assured me that he had been down on several occasions under the like conditions; whereupon I agreed to see him go down. Finding him to be all right after an interval of a few minutes, I ventured down, having previously opened the roof directly over the well to admit the light. Nearly an hour was spent in repairing the pump, during which time the engineer made several attempts to strike a light, but had no success. I did not experience any inconvenience other than the very fast breathing caused by any physical exertion, and on coming out I felt as well as before. Being somewhat acquainted with natural philosophy, which teaches that air which does not support combustion cannot support animal life, I am puzzled at the apparent contradiction. What could have been the cause of it? I cannot entertain the opinion that it was carbonic acid gas."