

acid, and this obtains entrance to our rooms in many ways, through the cracks in stoves, and defective stove-pipes; or when the carbonic acid of the air comes in contact with a very hot stove and is converted into carbonic oxide. The dust of the air may on a hot stove be burned to produce it: or it may flow out from our gas pipes when the gas is not perfectly consumed.

8. Another form of air injury is the dust of a fungus growth which fills the air in damp or warm places. We call it miasma from a want of a true knowledge of its character.

9. Accidental vapours are the crowning source of air poisoning. These are tobacco smoke, kitchen vapour, wash room vapours, and the like.

10. When we heat our school-houses and close them from outside air, the heat turns the mixture into a vile mess unfit for breathing. The only remedy is ventilation.

Query.—How large should a school room be for 30 pupils?

Ans.—30 feet square and 12 feet high. The entire air of such a room should be warmed and changed five times an hour to keep the carbonic acid down to the proper amount, nothing short of this will keep the air sufficiently sweet. At the end of every hour the room should be flushed from every direction to still further purify it.

An adult requires 2,000 cubic feet of air per hour. Think of the amount necessary for a room full of children. Keep the air of a school-room pure and comfortable, and foul breaths in most cases disappear.

If a teacher has a bad breath it is a sign that he has poor health, and he should at once take to out-of-door life, and let some healthy person take his place, or he should if this is not desirable, go out of doors more to take exercise and attend to personal hygiene.

If a pupil has a bad breath he should be turned out of doors more frequently, and be encouraged to take gymnastic exercise and sports, and in this way improve his breath. Good health is the cure for bad breath.

Every person should consider it a duty to keep the body pure and healthy, as well as the mind, and a bad breath should be no more tolerated in a school-room than bad grammar.

2. SANITARY EFFECT OF SHADE-TREES.

The London *Medical Examiner*, alluding to the sanitary effect of trees, says:—"Apart from the sense of relief and coolness which they impart, their value as purifiers of the atmosphere is almost incredible. It has been calculated that a good-sized elm, plane or lime tree will produce 7,000,000 leaves, having a united area of 200,000 square feet. The influence of such a large surface in the absorption of deleterious gases and the exhalation of oxygen must therefore be of immense benefit in overcrowded and unhealthy districts. It is now well known that the plane and other deciduous trees of the same family are the most suitable, as they not only expose a large leaf surface to the atmosphere, but by shedding their bark annually, throw off the result of smoke, acids, and other poisonous fumes which by accumulation would be fatal to the oak or other trees of slower growth and apparently more hardy nature."

3. INDUSTRIAL ELEMENT NEEDED IN SCHOOLS.

Public education should conform to the common needs; should change as these needs change, neither exceeding their requirements, nor falling below them. When public schools first became fairly organized in this country, they met, at that time and for many years, the common needs of the people much better than the present public schools meet the common needs of to-day; for in spite of the great progress which these schools have made in some directions, they have not kept abreast with the times—with the multiplying educational needs of the people as a whole.

If we go back sixty years, we find that reading, spelling, writing and arithmetic were the only things of a purely intellectual character that were then taught in all of the common, or public schools. Grammar and geography were not fully recognised. How is it to-day? In the larger part of these schools but little or nothing more is now taught, all outcries to the contrary notwithstanding.

High schools we do not regard in this connection as common schools; for though they are public, though they are free, yet so slight a percentage of scholars attend them that they can hardly be called common.

But even if we count the high schools, we cannot count them as clear gain, for it is probable that the proportion of American youth who receive a good secondary education now, is not greater than it was two generations ago.

The public education is better, absolutely, than it was fifty or sixty years ago, but much worse, relatively, if we consider the re-

quirements of the varied occupations to which the boys and girls leaving school must devote themselves. This is the truth of the matter. Examine the course of study in these public schools, country or city, which are really common, you find the difference between now and the past is, with slight exception, a difference in the quantity, and not in the character of what is taught. Now it is more reading, more spelling, more arithmetic, more geography, more grammar, and thus the increased time devoted to school life is consumed.

The studies give no intimation that the boys and girls are expected to do anything after they leave school. There is no industrial element. Good, say those who think it is the business of the public schools to "make men, not workmen," as they phrase it, forgetting that to make a good workman is to make a man, not to spoil one.

We venture to say that, when the foundations of the public school system were laid in this country, if the conditions of life had been such as they are now, the legislators of that day would have made the course of instruction much broader than they did; they would have put into it a marked industrial element in the form of science and art, theoretical and applied. Such an element was not then needed; and because it was not then needed, the conservative thinks it cannot possibly be needed to-day.

Sixty years ago the agricultural John Smith stood in no particular need of chemistry, or botany, for example, as none of his neighbours had such knowledge, and his only competitors were these neighbours. By following the traditional practice of "rule of thumb," he was enabled to hold his own in the community. This is all changed now, and in the cultivation of the soil, brain counts for more than brawn.

Sixty years ago, St. Crispin, like the schoolmaster, boarded around. He went from house to house making shoes and boots for the inmates. He had little need to trouble himself about the beauty of his work, but there must be no lack of durability. Some thirty years ago we began to hear of shoe and boot factories; the itinerant workman gradually disappeared; and taste as well as durability is now demanded by the consumer of leather products.

Sixty years ago almost everybody clothed himself in homespun. Then there were domestic spinning-wheels, looms, and dyeing-pots in the land. The textile products were not of the most artistic kind; but they would keep one warm when enough could be had.

There has been a revolution here in taste, and in processes of manufacture. If any Rip Van Winkle doubts it, let him go to the Centennial Exposition and study the subject, and learn that quality now counts for more than quantity in textile fabrics.

Sixty years ago there was almost no American iron-worker besides the cross-roads and village blacksmiths, who could shoe a horse or mend a plough—with here and there a rude foundry. Many of these solitary forges have now expanded into immense establishments, each giving employment to hundreds in the manufacture of objects that demand a knowledge of chemistry, geometry, and art.

Sixty years ago the carpenter built houses, very few or none of which anybody is now anxious to preserve, since they lack both comfort and beauty. Here and there are seen indications of better architectural things to come. We believe the future homes of the working people of America are to be vastly better than anything of the kind the world has yet seen. We know what the homes of many of the rich have already become. The clumsy workman of the past, without taste, without a knowledge of drawing, cannot meet the requirements of such building construction.

Sixty years ago the ship-building industry was as rude as any other. Science and art have revolutionized that. Not long ago one of the most successful ship-builders of Bath, Me., said: "Once we built vessels without the aid of the draughtsman. Relying upon the eye alone, we put up the ends of the vessel, and then filled in between as best we could. A few years before the Crimean War, a graduate of West Point came to Bath, and taught us how to draught vessels. We have kept that art alive among us, and for years every part of a vessel has been made from a drawing. To draughting was largely due the fine quality of our ships, which make the name of Bath so well known in almost every port of the world." Not less, but greater knowledge of science and art is every day demanded of those engaged in ship-building.

If to the few industries already named we add pottery, plough and waggon-making, tanning, brick-making, and grist-grinding, we shall have nearly catalogued the industries of sixty years ago. Not only were they few, but exceedingly rude. The founders of the common school system did not need to take them into consideration. Now they are almost beyond numbers, while they have so changed in character, and competition has become so intense, that they cannot be successfully prosecuted without the aid of science and art. Technically educated heads to direct, and techni-