

and durability, with other public edifices, instead of standing in repulsive and disgraceful contrast with them. Every school-house should be a temple, consecrated in prayer to the physical, intellectual, and moral culture of every child in the community, and be associated in every heart with the earliest and strongest impressions of truth, justice, patriotism, and religion.

The school-house should be constructed throughout in a workmanlike manner. No public edifice more deserves, or will better repay, the skill, labor, and expense, which may be necessary to attain this object, for here the health, tastes, manners, minds, and morals of each successive generation of children will be, in a great measure, determined for time and eternity.

## 2. SIZE.

In determining the size of a school-house, due regard must be had to the following particulars:—

First.—A separate entry, or lobby, for each sex, furnished with scraper, mat, hooks or shelves, sink, basin and towels. A separate entry thus furnished, will prevent much confusion, rudeness, and impropriety, and promote the health, refinement, and orderly habits of children.

Second.—A room, or rooms, large enough to allow, 1st, each occupant a suitable quantity of pure air, i. e. at least 150 cubic feet; 2nd, to go to and from his seat without disturbing any one else; 3d, to sit comfortably in his seat, and engage in his various studies with unrestricted freedom of motion; and, 4th, to enable the teacher to approach each scholar in his seat, pass conveniently to any part of the room, supervise the whole school, and conduct the readings and recitation of the several classes properly arranged.

Third.—One or more rooms for recitation, apparatus, library, and other purposes.

## 3. LIGHT.

The arrangements for light should be such as to admit an abundance to every part of the room, and prevent the inconvenience and danger of any excess, glare, or reflection, or of cross-light. A dome, or sky-light, or windows set high, admit and distribute the light most steadily and equally, and with the least interruption from shadows. Light from the north is less variable, and imparts less of cheerfulness and warmth than from other directions. Windows should be inserted only on two sides of the room, at least three and a half or four feet from the floor, and should be higher and larger, and fewer in number than is now common. There should be no windows directly back of the teacher, or on the side towards which the scholars face, unless the light is modified by curtains or by ground glass. Every window should be suspended with weights, and furnished with blinds and curtains; and if in a much frequented street, the lower sash should be glazed with ground glass.

## 4. VENTILATION.

Every school-room should be provided with means of ventilation, or of renewing the vital portions of the atmosphere which are constantly absorbed, and of removing impurities which at the same time are generated, by the breathing and insensible perspiration of teacher and pupils, and by burning fires and lights.

The importance of some arrangements, to effect a constant supply of pure air in school-rooms, where fires or lights are kept burning, has been strangely overlooked, to the inevitable sacrifice of health, comfort, and all cheerful and successful labor. We practically defeat the beautiful arrangements of our Creator by which the purity of the air would otherwise be preserved by its own constant renewal. We voluntarily stint ourselves in the quantity and quality of an article, which is more necessary to our growth, health and comfort, than food or drink, and which our beneficent Father has furnished pure to our very lips, and so abundantly that we are, or should be if we did not prevent it, literally immersed in it all our lives long.

The atmosphere which surrounds our earth to the height of forty-five miles, is composed mainly of two ingredients, oxygen and nitrogen, with a slight admixture of carbonic acid. The first is called the vital principle, because by forming and purifying the blood it alone sustains life, and supports combustion. But to sustain these processes, there is a constant consumption of this ingredient going on, and, as will be seen by the facts in the case, the formation and accumulation of another ingredient, carbonic acid, which is deadly hostile to animal life and combustion. This gas

is sometimes found in wells, and will there extinguish a lighted candle if lowered into it, and is not an uncommon cause of death in such places. It is almost always present in deep mines and at the bottom of caverns. Near Naples there is one of this description, called the Grotto del Cane, or the Grotto of the Dog, because the guides who accompany strangers to the interesting spots in the vicinity of Naples, usually take a dog along with them to show the effects of this gas upon animal life. Being heavier than common air it flows along the bottom of the cavern, and although it does not reach as high as the mouth or nostrils of a grown man, no sooner does a dog venture into it, than the animal is seized with convulsions, gasps and would die if not dragged out of it into the pure air. When recovered, the dog shows no more disposition to return to the cavern, than children do to go to some schools, where experiments almost as cruel are daily and hourly tried. But this gas, bad as it is in reference to animal life and fires, is the essential agent by which our earth is clothed with the beauty of vegetation, foliage, and flowers, and in their growth and development, helps to create or rather to manufacture the oxygen, which every breathing creature and burning fire must consume. The problem to be solved how shall we least mar the beautiful arrangement of Providence, and appropriate to our own use as little as possible of that, which though death to us, is the breath and the life-blood of vegetation.

The air which we breathe, if pure, when taken into the mouth and nostrils, is composed in every one hundred parts, of 21 oxygen, 78 nitrogen, and one of carbonic acid. After traversing the innumerable cells into which the lungs are divided and subdivided, and there coming into close contact with the blood, these proportions are essentially changed, and when breathed out, the same quantity of air contains 8 per cent. less of oxygen, and 8 per cent. more of carbonic acid. If in this condition (without being renewed,) it is breathed again, it is deprived of another quantity of oxygen, and loaded with the same amount of carbonic acid. Each successive act of breathing reduces in this way, and in this proportion, the vital principle of the air, and increases in the same proportion that which destroys life. But in the mean time what has been going on in the lungs with regard to the blood? This fluid, after traversing the whole frame, from the heart to the extremities, parting all along with its heat, and ministering its nourishing particles to the growth and preservation of the body, returns to the heart changed in color, deprived somewhat of its vitality, and loaded with impurities. In this condition, for the purpose of renewing its color, its vitality and its purity, it makes the circuit of the lungs, where by means of innumerable little vessels, inclosing like a delicate net-work each individual air-cell, every one of its finest particles comes into close contact with the air which has been breathed. If this air has its due proportion of oxygen, the color of the blood changes from a dark purple to a bright scarlet; its vital warmth is restored, and its impurities, by the union of the oxygen of the air with the carbon of blood, of which these impurities are made up, are thrown off in the form of carbonic acid. Thus vitalized and purified, it enters the heart to be sent out again through the system on its errand of life and beneficence, to build up and repair the solid frame work of the body, give tone and vigor to its muscles and restraining all its nerves to vibrate in unison with the glorious sights and thrilling sounds of nature, and the sad, still music of humanity.

But in case the air with which the blood comes in contact, through the thin membranes, that constitute the cells of the lungs, does not contain its due proportion of oxygen, viz. 20 or 21 per cent., then the blood returns to the heart, loaded with carbon and other impurities which unfit it for the purposes of nourishment, the repair, and maintenance of the vigorous actions of all the parts, and especially of the brain, and spinal column, the great fountains of nervous power. If this process be long continued, even though the air be but slightly deteriorated, the effects will be evident in the languid and feeble action of the muscles, the sunken eye, the squalid hue of the skin, the unnatural irritability of the nervous system, a disinclination to all mental and bodily exertion, and a tendency to stupor, headache and fainting. If the air is very impure, i. e. has but little or no oxygen and much of carbonic acid, then the imperfect and poisoned blood will act with a peculiar and malignant energy on the whole system, and especially on the brain, and convulsions, apoplexy, and death must ensue.