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From Chambers' Journal.

A MORNING SONG.

I wake this morn, and all my life
Is freshly mine to live;
The future with sweet promise rife,
And crowns of joy to give.

New words to speak, new thoughts to hear,
New love to give and take;
Perchance new burdens I may bear,
For love's own sweetest sake.

New hopes to open in the sun,
New efforts worth the will.
Or tasks with yesterday begun
More bravely to fulfill.

Fresh seeds for all the time to be,
Are in my hand to sow,
Whereby, for others and for me,
Undreamed of fruit may grow.

In each white daisy 'mid the grass
That turns my foot aside,
In each uncurling fern I pass,
Some sweetest joy may hide.

And if when eventide shall fall
In shade across my way,
It seems that nought my thoughts recall
But life of every day:

Yet if each step in shine or shower
Be where Thy footstep trod,
Then blessed is every happy hour
That leads me nearer God.

THE SUNSET.

Dedicated to Mrs. R. W. P.

It was on a winter's evening,
The sun was setting low;
And o'er the western heavens,
Was spred a crimson glow.

The little floating cloudlets
Were almost golden bright,
While e'en the frozen treetops
Were bathed in crimson light.

We stood before the window
Of a bright and pleasant room,
And looked upon the snowy scene,
Now rich in roseate bloom.

The mother stopped her sewing
Upon the scene to gaze,
While e'en the little children
To look, did stop their plays.

And there in awe-struck wonder
We watched the sun sink low;
While the silence was unbroken
Save by baby's happy crow.

But the glory had departed
As we gathered round the board,
But the mem'ry of that sunset
In every heart was stored.

OUR DWELLINGS AND SCHOOL BUILDINGS.

THEIR HEATING AND VENTILATION.

In a former article on "Suburban Architecture" I promised a dissertation on "Warming and Ventilation," as of necessity dependent upon each other to form a thorough system.

In a thorough built dwelling or school house great care is usually taken to make them tight against the ingress of cold. They not unfrequently put in tight air stoves or hot air furnaces to heat up with; and if the force of circumstances causes currents of cold air to rush through the crevices of doors and windows to supply the necessary oxygen for combustion, to say nothing about the necessities for respiration, then the rubber weather strip man is called in to apply his skill to close all crevices against fresh air. This having been accomplished, and no particular means of ventilation provided, the before mentioned system for warming then becomes the motor of ill-health.

If air in a room is heated over and over again without the requisite addition of moisture and fresh currents of air, its component parts become disturbed and it is at once deprived of its full life-giving effects, and this is the result of stove and furnace heated air without a system of ventilation and evaporation. A hot air furnace applied to heat a room without proper ventilation will accomplish the heating, if there is no ventilation, by making its own circulation.

Most persons who have had hot air furnaces have observed that at times the register would send forth a strong heat, not fresh, warm air, and then for a while no heat, but apparently sucking air down. This is nature's mode of supplying the want of a system of ventilation by working a circulation within itself, whilst the air in the apartments occupied is growing more and more vitiated and poisonous to inhale, in consequence of the increased abundance of carbonic acid in the air which the occupants of the room exhale and the watery vapor and animal matter thrown off by both the lungs and skin. The amount of watery, noxious vapor, given off by the lungs and skin has been variously estimated as from twenty to forty ounces in twenty-four hours. And this vapor contains animal matter which seems to putrify almost immediately upon its contact with the air.

Therefore the necessity of ventilation results from the nature of the respiratory and vapory process forming a narcotic poison. In the general atmosphere this poisonous element is constant but in a proportion of 1-2000 part, which is in that small proportion inoffensive and harmless; but when it is increased to 20 fold or one per cent. the air becomes depressing and injurious. From 5 to 8 per cent. of this deleterious atmosphere renders it dangerous to breathe. From 10 to 12 per cent. makes it speedily destructive of life.

In the process of respiration a full grown man draws into his chest about 20 cubic inches of air; only one-fifth of this is oxygen, and nearly one-half of this oxygen is converted into carbonic acid. Allowing fifteen inspirations per minute for a man he will vitiate about 300 cubic inches, or nearly one-sixth of a cubic foot of atmospheric air, and this by mingling, as it escapes, with several times as much, renders, by various scientific calculations, an average of fifteen cubic feet of air unfit for respiration, which would vitiate in less than two hours the entire air in an ordinary sized sleeping room.

This theory and calculation applies to close, unventilated compartments. But fortunately the defective workmanship of the house-carpenter and mason, by leaving crevices in the window-frames and doors, frequently allows us to escape from suffocation, but not from its deleterious effects upon our system.

It is from this cause that persons frequently get up in the morning feeling unrefreshed from their sleep. How much disease and misery arises from this cause it would be difficult to state with any degree of accuracy, because the causes of bodily infirmity and misery are very complicated.

If what we have said holds good in a dwelling, how much more is its disastrous effects in an illy ventilated school house, where children and teachers are confined for successive hours.

As an illustration take an ordinary district school room, say 25 to 28 by 30 to 35 feet, and 12 feet high, with 50 to 60 scholars, and allowing say 10 cubic feet per minute for each scholar as a minimum supply. Fifty scholars would require 500 cubic feet per minute, of fresh air, or if you allow fifteen cubic feet per scholar it would require 750 cubic feet per minute. A room say 26 by 32 feet contains 9984 cubic feet of air space. If 50 scholars require 750 cubic feet each per minute, or 45,000 cubic feet per hour, thus requiring the renewal of the whole volume of the air a little more than four and a half times per hour, it will be observed that nothing short of a thorough system of heating and ventilation will accomplish the desired result, and any means of supplying fresh warm air must also provide for the removal of the foul air, and at the same time avoid unpleasant currents. A uniform diffusion is also very necessary and this can best be accomplished by a distributive system of the withdrawal of foul air, which must be positive and at the bottom of the room, and may be accomplished by means of natural laws without machinery, but by simple ducts, properly applied.

If the system of ventilation in a school room is not thorough, a well educated nose is one of the best detectors. Persons visiting a school from the fresh atmosphere can at once detect the want of ventilation, whilst the teacher and pupils may not be conscious of the putrid state of the air they breathe. Its effects are, however, developed by the irritability of the teachers and peevishness of scholars. Mental depression frequently overpowers both teacher and pupil, and results in a hectic flush of fever or perhaps a bilious or nervous attack. Such a routine of daily exposure, continued week after week during school hours, is, no doubt, to a large extent, the source from which the prevalence of scarlet fever, throat and lung diseases among children in our lage cities emanates, which, if not resulting fatally, not unfrequently weaken the lungs or constitution permanently.

Having considered the natural condition of the atmosphere, the necessity of maintaining its purity uncontaminated, in order to preserve our health, the question arises how can this be accomplished? I answer always by *indirect radiation*, either by steam or hot air furnace, I do not consider that it matters much which; although many persons have a great prejudice against a hot air furnace, on the ground that a red-hot fire-pot burns the vital oxygen of the air and renders it unfit to inhale.

In order to demonstrate that the air is not deprived of its oxygen by contact with the red-hot fire-pot, it is only necessary to understand that it requires combustion to extract the oxygen from the air. The atmosphere is composed essentially of two gasses in a state of mechanical mixture, named oxygen and nitrogen. Oxygen supports combustion and life, whilst nitrogen is inert; it supports neither life nor combustion. The proportions of which these two gaseous aerial bodies are mingled are one of oxygen to four of nitrogen.

Precisely what the effect of red-hot iron is upon air or persons is not fully determined. Authorities differ, and much is said with but little warrant, but as the effect is so slight it is of no practical importance. We must admit that the iron itself is in a state of combustion in order to unite with the oxygen, and it requires 32 parts of the oxygen to 82 of the iron to entirely consume a furnace of that weight of iron, or all the oxygen in 1800 cubic feet of air. Consequently a furnace of the above weight, if completely burned in 300 days, would consume six cubic feet of air per day, and it would require 19 such furnaces to burn the oxygen of the air as fast as a single pair of human lungs could do.