

and the air above will stretch it and burst through it.

But we can actually weigh the air. Take a bent tube, three feet long, filled with quicksilver, and invert it. Why does the liquid metal stand 50 inches higher in one leg than in the other.—If the air were pressing on both ends alike, it would stand at a common level in both branches of the tube; the reason why it is standing so high here must be because there is something pressing on the surface which is not pressing on the other—the reason why it is standing so high in the one side is because the air is pressing only the other. The fact must be that the weight of the air pressing on the surface of the metal in the one leg of the tube is just the same as the weight of quicksilver above that level in the other. The air is supposed to be forty-five miles high, and I say that supposing this tube extended forty-five miles high to the outside of the atmosphere, this leg would contain the same weight of stuff in it as that, or else the balance would not be maintained. This is in fact a balance, weighing whatever is put into one leg of the tube by the height to which it will raise the quicksilver in the other; the air pressing here raises the quicksilver there to a height of 30 inches; that is, the weight of air pressing on every square inch of the earth's surface is the same as if 30 inches deep of quicksilver rested on every square inch. Now, 15 pounds' weight of the quicksilver would rest on every square inch, if it were covered 30 inches deep with it; therefore, 15 pounds of air rest on every square inch of the earth's surface. If I let the air in on this end again, you will see that the quicksilver, (now bearing an equal weight of air on both sides,) will regain the same level in each side; so that this is in fact a measure of the weight of the air.

When made in a more portable and elegant form, it is called a *barometer*, from two Greek words which signify a measure of weight; and the height of the quicksilver in the tube indicates the weight of the air, which presses it up; and as dry air weighs heavier than damp air, when the quicksilver sinks in the tube we anticipate wet weather, and so this tube becomes a weather glass, and when furnished with a float on the surface of the quicksilver, it pulls round an index figure on a dial plate, and points to rain, fair, stormy, and so on; and this is the principle on which your weather glasses act. Well then we have just the same weight of air around the globe as if the surface of it were covered thirty inches deep with quicksilver, and that is as heavy as twelve to twenty feet of soil would be; and if you were never astonished at the eight or ten inches of soil being able to grow repeated crops

of grass or corn or trees without wasting under the process, surely you ought not to be astonished at the air, which is twelve or twenty times as heavy, being able to do the same thing. The leaves of the tree do not indeed stretch through the whole air in search of food, as their roots do through the soil; but when the winds are continually mixing the particles of air up and bringing fresh ones to be fed upon by the foliage of the plants and the trees, so that ought to be no hindrance in the way of our believing what is really the truth, namely, that plants get everything in them which will burn up from the air, and only their incombustible part—their ashes, which will not burn away from the soil.

But now I will prove to you that the air really does contain, in the midst of it, the very particles of which wood is composed. I have here a piece of wood dried at a red heat, under circumstances which hindered it from taking fire; it is a piece of charcoal in fact, which is nearly all that remains of the wood after the water is driven out of it. Now, I say that the tree got this charcoal from the air; first, because it could not get it from the soil, which has not anything near enough of the stuff in it, and the air is the only other thing which the plant could get at to obtain it from.

The argument merely proves that all the carbon in vegetables came *originally* from the air. It does not determine what portion of any particular plant came from the air, nor what from the soil. In the early stages of its growth, the plant derives a good deal of its substance from the soil, and some of even the carbonic acid of the air it may absorb through its roots. To supply the land with organic matter, in the art of cultivation, it is necessary, not merely the mechanical effort thus exerted on its texture, but for its use as food in supplying the plant with a portion of its organic part.

Secondly, because the air is heavy enough—has matter enough in it to supply many such trees or whole forests, if they were wanted, from it—for it is many times heavier than the soil from which people generally think that such trees and plants do come. And, thirdly, I believe the tree gets its charcoal from the air, because the air is not only enough, but it contains the right things, too; it contains the charcoally particles of this black substance present in it, as I shall prove in my next lecture.

WASHING FLUID.—A friend gives us the following receipt for Washing fluid, assuring us it is good. Our lady readers can try it:—3-4 lb unslacked lime; 2 lbs soda; and 3 qts. water.