

capped; the rains descending on forest tracks, and hilly districts, and thence irrigating its plains and valleys, accompanying with a perpetual deluge the point of direct sunlight through the tropics, tempering the vertical heat, and ministering, there, to the boundless energies of vegetation.

The atmosphere has this quality, that, when pure and free from vapour it is wonderfully pervious to the rays of light and heat.* Very little indeed of the heat is, in a perfectly clear sky, absorbed in its transit through it. Thus readily allowing the radiation of rays to the earth's surface from the sun, the air lends itself with equal facility to the radiation of heat in the opposite direction from the earth's surface into space. That heat which the air actually receives appears principally to be derived from it, contact with the earth, and propagated by conduction from one part in it to the other. If it be asked, Why does not this heated air immediately depart from the surface of the earth, and ascend and heat its higher regions, and continually accumulate heat there, rendering them yet warmer than the lower air, which is notoriously contrary to the fact?—the answer at once meets us in the elasticity of the atmosphere; and the refraction in its decreasing density at higher elevations, by which, as in the case of the artificial globe, it is made to contain, as in a *cave*, a stratum of warm air, in close contact with the earth's surface, and to confine the heat around it.

The air of the higher regions, when freed from clouds, absorbs little or none of the heat radiated through it, either from the sun, or back from the earth, or from the subjacent atmosphere. Moreover, the air, heated by contact with the earth, and ascending to these, higher regions, loses its heat rapidly as it ascends by radiation and contact, and ascends but to that limited height assigned to it by the diminishing density of the surrounding air. All that remains to warm the higher regions of the air is the heat propagated to it by the contact of parts, as it is through solid bodies; and each stratum in succession, as it receives this heat, radiates a portion of it off into space, propagating only the remainder to the next stratum. Thus each successive stratum above us receives a diminished amount of heat, and the air grows colder and colder.† Here there is that marvellous provision for the assembling of a variety of climates nearly upon the same spot of the earth's surface, by which it comes to pass, that within the compass of a few miles may sometimes be seen congregated every characteristic form of vegetation, from the giant plants of the tropics to the lichens of the Arctic zone. In the valleys of the Andes, for instance, are growing palm-trees, and the banana, and the coffee-tree, and the sugar-cane, and the cow-tree, whose trunk being pierced yields a vegetable milk—the majestic forests, the juicy fruits, the gorgeous flowers of the tropics. You ascend them 4,000 or 5,000 feet, and you find yourself in the temperate zone; fields of European grain wave around you, and there are forests of oak and pine. Climb those lofty mountains yet higher, and beyond the

limits of 11,000 feet you are in a region where grow none but the Arctic lichens.

In like manner, on the sides of the Alps, the form of vegetation may be traced from the temperate zone to the region of perpetual snow, in the succession of forests of chestnuts, beeches, oaks, and pines, gradually becoming stunted and more scattered, until they disappear on the borders of the line of perpetual congelation.

By reason of the diminished temperature of mountain track, and the fertilizing influence of clouds, and dew, and rain, which the atmosphere accumulates upon them, they become, in sultry regions of the earth, the refuge of vegetation. It is with this allusion, that God, speaking by the mouth of Ezekiel, as the shepherd of his people, says, in the language of prophecy, "I will lead them in good pasture, and upon the high mountains of Israel shall they fold be: there shall they lie in a good fold, and in a fat pasture shall they feed upon the mountains of Israel" (Ezek. xxxiv. 14).

SUSPENSION BRIDGES AT THE WEST.—Mr. Ellet's success in throwing a wire suspension bridge over the Niagara river has given quite an impetus to the bridge-building spirit in the West. We learn from our western exchanges that Mr. Ellet has already contracted to construct a wire suspension bridge across the Licking river between Newport and Covington, Kentucky.—Bills have passed the Illinois and Missouri Legislatures incorporating a Company to construct a wire suspension bridge over the Mississippi from the Illinois shore to the Missouri shore at St. Louis. The flooring of this bridge, as fixed by the act of incorporation, is to be 112 feet above low water mark. Beside these, a suspension bridge is to be thrown across the Ohio at Wheeling, and another at Cincinnati. Mr. Ellet, it is said, has shown conclusively, that a bridge having a span of one thousand four hundred feet, can be constructed at Cincinnati, susceptible of bearing any weight that can be got on to the bridge. Such are some of the feats of modern science.

WETTING BRICKS.—Few people, except builders, are aware of the advantages of wetting bricks before laying them. A wall twelve inches thick, built up of good mortar, with brick well soaked, is stronger, in every respect, than one sixteen inches thick, built dry. The reason of this is, that if the bricks are saturated with water, they will not abstract from the mortar the moisture which is necessary to its crystallization, and, on the contrary, they will unite chemically with the mortar, and become as solid as a rock. On the other hand, if the bricks are put up dry, they immediately take all the moisture from the mortar, leave it too dry to harden; and the consequence is, that when a building of this description is taken down, or tumbles down of its own accord, the mortar falls from it like so much sand.—*New York Sun.*

MAKING AND USING GLUE.—The hotter glue is, the more force it will exert in keeping the two parts glued together; therefore, in all large or long joints, the glue should be applied immediately after boiling. Glue loses much of its strength by being often melted.

IS AMMONIA POISONOUS?—Unquestionably, if used in any considerable quantity, and doubtless also injurious if applied frequently in even small quantities. Dr. Christison says:—"Several cases of poisoning with ammonia or its carbonate have occurred in the human subject. Plenck has noticed shortly a case which proved fatal in four minutes, and which was caused by a little bottleful of ammonia having been poured into the mouth of a man who had been bitten by a mad dog. The symptoms are not mentioned, but it is probable, from the rapidity of the poisoning, that

* Bouguer has calculated that of 10,000 rays falling upon the atmosphere perpendicularly, 8,123 reach the earth's surface. There is, however, reason to believe that this is much below the true estimate.

† Guy Lussac ascended in a balloon to a height of 7,631 yards above the level of the sea, and found the temperature diminished by 72° of Fahrenheit's thermometer; or at the rate of about 165 yards for each degree. The depression of temperature at the same elevation is, however, different in different latitudes. Thus the height at which a perpetual frost commences is its reign, and at which snow is found all the year round on the tops of mountains, is different in different latitudes. Throughout a zone of the earth, extending 20° on either sides of the equator, it may be considered to vary from 16,000 to 17,000 feet, having the less elevation immediately beneath the equator, and the greatest at 20° from it. From this greatest elevation it appears to sink almost uniformly as the latitude increases, until under a latitude of 80° it touches the earth's surface.