

always frown at each other as they stand there in Rome, with the graves of two faiths between; one dying, one long since dead: he loved them both so well. Even the scars of barbarian swords upon the polished marble he half revered; they were honest arms which struck those blows.

This reverential seriousness of disposition was characteristic of him in literature, as in everything else. He never strove to please a pampered public. His genius was not the tool of his ambition, but his religion, his god. Nothing has so degraded modern literature as the desperate efforts of modern writers to captivate the public, their watching the variation of public taste, as a speculator watches the markets. When Orpheus sings popular ballads upon the street corners, he is a street singer, nothing more. The gates of hell do not open at his music any more, nor do the damned forget their pain in its melody. Carlyle went out alone into the solitude and wrestled with his great ideas, finding them difficult to express in words, so great, so ungainly were they. He little cared whether his books were popular, whether they were even read. He wrote only that which was in him and which must be written. In vain his publishers groaned over his "terrible earnestness;" he would not laugh for them. He was always down in the chamber of the fates, at the roots of Yggdrasil, the tree of life, which the Norns water day and night, one with honey and two with gall, and it was a terrible thing to him that it was so. Milton says that the lyric poet may drink wine and live generously, but the epic poet, who sings of the descent of the gods to men, must drink water out of a wooden bowl. He is the last poet who has thought so, and he is the last poet who has given us an epic.

Carlyle's was one of the most unhappy temperaments. He never saw things as others did; his wild fancy and bad digestion distorted everything. In writing, he does not willfully exaggerate; he only portrays things as they seemed to him. Like the old Anchorites of the Thebiad, he kept upon his knees within his narrow cell until the outside world looked supernatural to him. The little difficulties of his life were to him actual demons and powers of darkness sent to torment him. His dyspepsia was an actual Tophet. How far his ill health may have influenced his writings is not known. Certainly not so far as some critics claim, who assert that "Sartor Resartus" is but the result of a year of miserable health, the morbid fancies of a sick man. If so, it is a new and pleasing feature of bad gastronomy.

He was proud to the extreme, but his love was predominant even over his pride. He, himself, would suffer any privation rather than sacrifice an ideal; but for his brother's sake he wrote for money. It seemed to him like selling his own soul. He wrote article after article for reviews, and cut up his great thoughts to fit the pages of a magazine. No wonder he hated it; it was like hacking his own flesh, bit by bit, to feed those he loved.

Throughout his entire life he was tormented by interference. He was not the kind of a man to be popular, for he was unwise enough to stand aloof from all sects and all parties. None defended him. No one creed nor the doctrines of any one sect were broad enough to hold him. Like the lone survivor of some extinct species, the last of the mammoths, tortured and harassed beyond all endurance by the smaller, though perhaps more perfectly organized offspring of the world's maturer years, this great Titan, son of her passionate youth, a youth of volcanoes, and earthquakes, and great, unsystematized forces, rushed off into the desert to suffer alone.

He died as he lived. Proudly refusing a tomb in Westminster, as did one other great English writer, he was buried

out on the wild Scotch heath, where the cold winds of the North sea sing the chants of Ossian among the Druid pines. He lies there on that wild heath, the only thing in the British Isles with which he ever seemed to harmonize. He dreamed always in life great, wild, maddening dreams: perhaps he sleeps quietly now,—perhaps he wakes.

#### THE TRANSPIRATION OF PLANTS

OR THE LOSS OF WATER FROM PLANTS BY EVAPORATION.

For the last two hundred years scientific men have been engaged in trying to settle this apparently simple problem. Dr. Alfred Burgerstein has recently published in Germany an epitome of the literature of transpiration from 1672 to 1889. He cites 244 publications from sixteen different languages. Dr. Oscar Eberdt, in 1889, published in Germany a very excellent critical study of the subject. These two papers give a good idea of the present state of knowledge concerning the transpiration of plants.

While much has been written on this subject of the various phenomena observed, still there is great difference of opinion as to their meaning and cause.

The plant cell, like the animal cell, the unit of the organism, is by no means a simple affair. The cell-colony, or as Haeckel calls it for plants, "the cell-republic," is governed by just as well established laws as is the republic in which we form the units. The biologist, like the sociologist, must deal not only with the individual unit but also with the combinations of units into organisms.

A conception of the various minutely complicated problems that come to the historian as he tries to trace the evolution of nations from primitive men, and to the sociologist and political economist studying the relations of men to each other and to their environment, will give some idea of the problems which the biologist must solve. In view of the complexity of the subject it is not at all strange that two or three hundred years of study has failed to solve all the problems connected with the so called transpiration of plants.

One of the most important questions still to be settled is the effect of light on transpiration. It is indeed well known that the activity of transpiration is greatest in sun light, and decreases rapidly as the intensity of the light decreases, other conditions remaining constant. It is also known that different parts of the spectrum or elements of the solar ray have different effects on the various so called vital activities of the plant. The vibrations of ether known as light and heat are, however, so intimately associated in the solar ray that it is almost impossible to separate them. Whether, therefore, a given reaction in the plant is directly or indirectly caused by light or by heat, is still to be settled. When the cause is known then comes the question as to *how* one or both of these forces produces the given effect. It is known that certain rays are absorbed by the chlorophyll or green coloring matter in plants, other rays by the protoplasm at large. Probably the rays absorbed by the chlorophyll are represented in the plant by the manufacture of starch or its equivalent, and heat. But what effect have these absorbed rays on transpiration, if any, how is it brought about? The giving off of water may be an important direct or indirect vital activity of protoplasm and therefore of the plant, or it may be an unimportant accompaniment of some vital activity. Which it is must still remain a question.

The relation of the stomata or breathing pores to transpiration depends in a measure upon the solution of the problems mentioned above. The direct cause of the opening and closing of the stomata is yet a question. When this is settled