

THE MICROSCOPE IN BOTANY.

The microscope is constantly enlarging its field of usefulness, and is adding, day by day, new triumphs in the direction of original research. It has recently given to the world a new and more certain mode for determining the geological structure of rocks; and the fact is now announced of a discovery of equal importance in connection with the life and growth of plants. As, in the first case, many of the universally accepted theories of geologists were brushed aside, so, in the present instance, theories which botanists had supposed to be well established are completely overthrown. It appears that Prof. Prinsheim, of Berlin, has recently been studying the green coloring matter in the leaves of plants, known as chlorophyl, and the cells in which it is contained. Botanists have heretofore assigned to this substance the work of absorbing from the atmosphere, during the night, carbonic acid gas, retaining the carbon for the sustenance and growth of the plant, and returning the free oxygen to the air to make good the deterioration of that element through the respiration of the animal creation. Now Prof. Prinsheim has demonstrated, by the aid of the microscope, that chlorophyl does not perform that work, but that the carbon in the atmosphere is appropriated and assimilated through the medium of a balsam-like substance in the plant, heretofore unknown, to which he gives the name hypochlorine. This newly discovered substance, when under the influence of sunlight, has a strong affinity for carbonic acid; and it further appears that the heretofore supposed active chlorophyl is merely a passive agent—a sort of curtain, screening the hypochlorine from the direct or too powerful influence of the sun's rays, so that it may do its work with regularity and moderation. The Prof. has shown, by experiments, that if the intensity of the sun's rays is materially increased by any optical apparatus, the chlorophyl screen or regulator, is found too feeble to protect the hypochlorine in its proper work, and oxidation sets in so rapidly that both chlorophyl and hypochlorine are rendered inert, and the plant dies. This discovery opens an entirely new field for botanical research, and furnishes additional evidence that plants have a regulator of vital forces, corresponding more nearly than the simple chlorophyl to the heart and lungs of animals, and further proof is gained in the direction of a unity of life between the animal and vegetable kingdoms.

THE CIRCULATION OF HUMAN BLOOD MADE VISIBLE.—Dr. C. Huter, a German microscopist, has constructed a simple device by which the circulation of the blood is made visible in a human subject. His method is as follows: The head of the subject is placed in a frame, with which is also connected a microscope. The head and instrument are so placed that the lower lip may be slightly drawn out, and its inner portion fixed uppermost upon the stage of the microscope. A strong light is then thrown upon the surface of the lip, the light being intensified by use of a condenser. Thus arranged, the instrument is properly focused upon a small superficial blood-vessel, when the observer may plainly see the endless procession of blood corpuscles passing through the minute capillaries, the colorless ones being distinctly identified as little white specks, more or less thickly dotting the main body of the red stream of blood. This device may often prove of considerable importance to the medical practitioner, by enabling him to carefully note the variations in the blood flow, and the relative proportions of the white corpuscles in that fluid. This is the first instance where the flow of the vital fluid of one human being has been made visible to another. Observations as to the character of the blood have heretofore been made upon that fluid after it has been drawn from the subject, and, of course, under circumstances very unfavorable for accurate determinations.

THE HOMESTEAD BY THE SEA.

In the chalk bluff, more than 40 feet from high-water mark, is the vertebra of a whale distinctly outlined. This monarch of the seas selected his tomb with some reference to the fitness of things. The Egyptian monarchs built for themselves granite tombs; but the whale lay down on the ooze, and the infusoria of 5,000 years or more built around and above him. He was grandly mourned, and lifted up out of the sea by such a force as no living or dead Pharaoh could command. In the matter of royal sepulture, it is certain that the whale had an immense advantage. But after 3,000 or 4,000 years, the defunct monarchs of sea and land are mainly valuable for bone-dust, and are rather poor fertilizers at best. From the hill one may see whales gambol in the Bay of Monterey, in the early spring months. What a great laundry establishment these fellows might set up, if they only knew how to utilize their power! At present, these columns of spray blown into the horizon are only picturesque. There is a grave suspicion that the friend, whose Mongol servant blew the spray from his mouth into the sponge to be set for bread, would have much preferred that the whale had performed that office. Years ago, one of these monsters was seen floundering about in the bay all day long, as though in great distress. The following night he drifted ashore, dead. The great hulk had no mark of the sword-fish or the whaleman's lance. The sailors said that he was worried, teased, and, finally hunted to death, by a fish called a "bummer." How strikingly human-like was this experience of the dead mammal!

There was a strange fascination about two wrecked vessels, whose timber heads could be seen above the sand. Sometimes, in a storm, they would get adrift. So weird-like and mysteriously did they rise and fall on the surging sea, appearing and disappearing, thrusting their timbers out like arms imploring help, that one might fancy they were the spirits of these lost vessels coming back to protest against this broken rest. How strangely they accented the storm! When it subsided they would bring up at the old place, and the sand would bury them again. There was an odd genius in the town who claimed these wrecks by pre-emption. When his finances were low, and creditors pressed for small bills, he made his payments conditioned, as to time, on the coming of the next storm which would unbury the wrecks. Providence saved him a deal of hard shoveling, by raising the wind for him. Then he drew out copper bolts enough from the wreck to liquidate his bills, but gathered no surplus. Hath not many a mine been exhausted by indiscreet development! As long as that copper lasted, "Bob" paid his debts periodically. If he has not yet drawn his last copper bolt, he is still entitled to the financial confidence of this trading and huckstering world.—*W. C. Bartlett in California for July.*

AVOIDANCE OF VIBRATION WITH MACHINERY. Mr. W. H. Delano, in a paper read before the British Institution of Civil Engineers, suggests the use of asphalt for the foundation of machinery, notably for those running at high speeds, the asphalt having the valuable quality of absorbing vibration. This was instanced in the case of a Carr disintegrator, which, being mounted in a pit lined with bituminous concrete, was worked at 500 revolutions per minute without sensible tremor, whereas with the former wooden mountings on an ordinary concrete base, the vibration was excessive and extended over a radius of 25 yards. In the Paris exhibition of 1878 there was shown a block of bituminous concrete, weighing 46 tons, forming the foundation of a Carr disintegrator used as a flour mill, and making 1,400 revolutions a minute, a speed which would have been impracticable on an ordinary foundation. Extensive applications of the material for this purpose are made in France, especially in connection with steam engines and steam hammers.

THE MYSTERY OF EXCHANGE.

We presume that most of our readers are aware that the quotation of foreign exchange represents a premium considerably in excess of the actual fact; but we doubt whether all of them know precisely what is the difference. By the usage of bankers, the old Spanish dollar is assumed as the par of exchange, £1 sterling being equal to 4 4-9 of these dollars. In point of fact, however, in the established moneys of Great Britain and the United States, £1 sterling contained as much gold as \$4.87 of U. S. money; and this is the true par of exchange or rate which must be used in converting the money of one country into that of another. For instance, if anything costs £100 in Great Britain, its true value expressed in the money of the United States is \$487. Accordingly, it is a fact, familiar to all bankers, that when exchange is quoted at 109, there is no real premium, but the true par has been attained; because, if we multiply \$4.44 4-9, which is the nominal par, by 109, which is then the quoted rate, we get \$4.87, which is the true par. We need scarcely add that it is owing to this circumstance that the exports of gold from the United States are not larger. If there really existed such a heavy premium on bills of exchange, as many persons suppose, it would be immensely profitable to export gold to Great Britain. In point of fact, in view of the necessary expenses of freight, insurance, and loss of interest, the margin does not more than cover the risk. The U. S. half-eagle, it may be added, contains 116 grains of pure gold, equivalent to \$5; the British sovereign, or pound sterling, 113 grains, equivalent to \$4.87 of United States money.—*The Economist.*

EXILE MINING IN SIBERIA.—The popular idea of the fate of prisoners sentenced to hard labor in the mines of Siberia is a somewhat exaggerated one. It is generally believed that a man condemned to work in the Siberian mines is virtually condemned to death; that when he descends into the mines he says good-bye to the light of heaven forever, being kept underground until he dies; and that living as he thus does, amid unhealthy fumes, death is not long in coming. A correspondent of the London *Times*, having heard these statements before he went to Siberia, appears to have taken some trouble to ascertain whether they are true or not, and, after many inquiries, "common fairness," he writes, "compels me to say that every one denied that there was any foundation for them." "Even," he continues, "the few Poles who spoke so bitterly of the Government did not bring this to their charge; nor did I meet any of the convicts who said as much." On the contrary, the silver mines were, so far as he could learn, worked on the 12, and sometimes even on the 8-hour system; while in the gold mines, which he himself visited, the men worked in summer from 6 in the morning till 7 at night, with intervals of rest for meals. In the coal mines, also, the men only worked for 12 hours a day, and an officer informed the writer that the amount of worked allotted to each man per day ought to be got through by an energetic workman in about two hours. On the other hand, it appears that flogging is not infrequently inflicted in a barbarous manner in Siberia. At three stations, but apparently at three stations only—at Kara-Nicolaievsk and Saghalien—an instrument called the "troichatka," or plait, is used. From 20 to 50 stripes are usually administered, though the number may be made a 100; and the writer adds that "when heavy numbers are inflicted, the punishment must be little short of an execution. Sometimes, in fact, the convicts do not recover from its effects."

STRUCK BY LIGHTNING WHILE UNDER WATER. At Halifax, N. S., May 29th, while divers were at work at Cole Harbor dike a storm came upon them, and the lightning striking an air pump passed down to a diver under the water. When brought up he was insensible, but his injuries are not serious.