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Contents.

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THE GEOLOGICAL IMPORTANCE OF OUR WESTERN EXPLORATIONS.

In no period of the world's history has there been a greater activity displayed in enterprises to increase the knowledge of our globe and its history than at the present day: as instances of which may be cited the explorations in Central Africa, those of the ruins of the cities of antiquity, such as Nineveh, the expeditions to the north pole, intended for settling the mystery of an open polar sea, the deep sea soundings in the Pacific Ocean, proving the existence of a sunken continent, and, last but not least, American explorations in the Great West, now in progress, which have already contributed to our knowledge of geology facts of greater importance than any obtained during the previous half century.

In Colorado, the erosion by the rivers produces cañons in the comparatively easily worn-out rock of thousands of feet in depth; while the aridity of the climate prevents the rain from destroying the results of the erosion, as is the case in countries where rainfall is of ordinary occurrence. If it is evident, therefore, that the arid regions around the Colorado river give specially favorable opportunities for studying the effects of erosion, and the recent researches in that country have resulted in classification of these effects, as 1, the erosion of water gaps, 2, the cliff erosion of cañons, 3, hogback erosion, and 4, hill and mountain erosion.

When another topographical feature is added, namely, the eruption and outpouring of molten matter from below, its overflow covering the eroded lands, and its subsequent erosion in its turn, a new field of investigation is opened, especially instructive in arid climates, where surface washings do not destroy the prominent points of interest. This makes the region of the Colorado particularly rich in peculiar features, such as cañons and cañon valleys, volcanic caves and volcanic mountains, cliffs and hogbacks, buttes and plateaux, naked rocks and drifting sand, bluffs, valleys, etc. All the mountain forms of this region are due to erosion, being

carved out by the running waters; but notwithstanding the aridity of the climate in many localities, beds hundreds of feet in thickness and hundreds of thousands of square miles in extent, beds of schist, granite, limestone, sandstone, shale, and lava, have slowly yielded to the unseen powers of the air, crumbled away into dust, and been washed away by the rivers. It is an illustration on a gigantic scale of the return of the lands to the ocean depths from which they once arose.

It appears, however, that the climate there has not always been so arid as it is now; so the basin of the Great Salt Lake, which is now so depressed that its waters have no outlet to the sea and are entirely disposed of by evaporation, leaving all dissolved matter behind, had once a moist climate and so much rain that the valley was filled with water to its brim, forming a large and deep fresh water lake, which had its outlet into the Columbia River. Mr. G. K. Gilbert, who studied the features of this outlet, considers its epoch identical with the glacial period; and from a further study of the deposited soils, he has proved that, before the glacial epoch, an arid climate prevailed there of many times longer duration than the present epoch of 100,000 years, which followed it.

The period of time required to form successive deposits of thousands of feet in thickness, which the erosion of the Colorado River has brought to light, in its deep cañons, are enormous, and we cannot suppose that here the erosion was less than that of other rivers, although in moist climates the evidences of this erosion have been destroyed; while in the arid climates of our West, they were preserved.

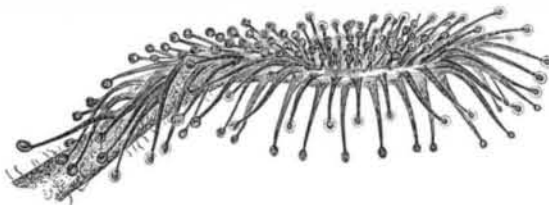
The evidences are that that region was lifted up from the ocean's bosom three times; that three times the rocks were fractured, that three times the lava poured out of the crevasses, and that three times the water carved out valleys in their course seawards. The first of these periods was after the formation of the granite rocks: the second succeeded the red sandstone formation; the third period is the present. The remnants of the first and second periods are buried; but we know that, unnumbered centuries ago in the past, the granites and schists, now on the bottom of the grand cañon, were formed as a sedimentary bed beneath the sea, that then an upheaval took place, after which thousands of feet of beds were washed away in the sea by rains; then a depression took place, sinking the whole region some 20,000 feet beneath the ocean's surface, and allowing the formation of sandstone, at least 10,000 feet in thickness, as a sediment; then a second upheaval came, changing it again into dry land; then the rains washed away channels in the sandstone 10,000 feet deep, requiring countless years of gentle but unrelenting energy. Again the sea rolled over the land, which became its bottom, and received a new deposit of more than 10,000 feet of rocky bed; and lastly, this ocean bed was again upheaved, and for 100,000 years the atmospheric influences and the running streams, gathered from the clouds in the highest mountain tops, have been making gorges, cañons, and valleys, and carrying the debris back to the sea, from whose bottom the material all came

We ask: Will the sea, at some future period, invade that land, by the sinking down of the latter, and will coral reefs be formed, and serve perhaps for the burial of the bones of the beings which shall then exist? Will the surrounding continents or islands be washed into that sea and form new beds of rock, which, when again upheaved, will form a new land, and cañons again be formed, and reveal in their walls, to another race of intelligent beings, some of the features of the time in which we live at present?

CARNIVOROUS PLANTS.

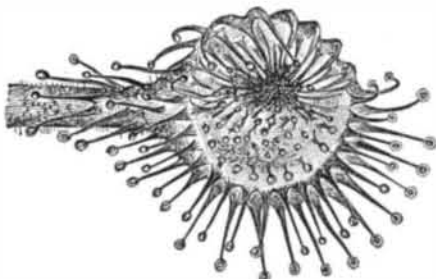
Mr. Darwin has recently added to the literature of modern botanical discovery a valuable work on "Insectivorous Plants." Without reciting the history of the researches into

Fig. 1.



this interesting subject, which has already been fully treated in our columns, we will simply state the author's broad proposition, which, coming from such an undoubted authority, must be considered as a final settlement of theories which were, till recently, still undergoing investigation. This proposition is that certain plants, chiefly the *Drosera* or sundews, devour insects in the ordinary acceptance

Fig. 2.

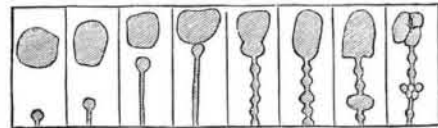


of the term, that is, they kill, swallow, digest them, and absorb and assimilate their juices. Some (such as the *Drosera phylla*) secrete and exude a viscid fluid, to which insects adhere as they do to the buds of the horse chestnut and the corollas of the Cape heaths; but these are not insectivorous.

But the *Drosera rotundifolia* shows a higher organization, being endowed with sensitive tentacles, of which we give a representation in Fig. 1. Each of these tentacles terminates in a knob, from which issues a glittering secretion, on account of which the plant has been called the sundew; and each tentacle can bend over towards its prey, either independently of or conjointly with the adjacent tentacles. Fig. 2 shows one half of the tentacles bent over and the other half erect. Almost any kind of interference with the tentacles, such as lightly touching them, placing inorganic substances upon them, or especially putting organic matters (particularly such as are nitrogenous) on them, will set the sundew in motion; and the more soluble the matter enfolded by the tentacles, the longer do they remain inflected over it.

In our third engraving are shown the magnified cells of the tentacles, exhibiting the various forms assumed by the

Fig. 3.



protoplasm. Mr. Darwin says: "If a tentacle is examined some hours after the gland has been excited by repeated touches or by inorganic or organic particles placed on it, or by the absorption of certain fluids, it presents a wholly changed appearance. The cells, instead of being filled with homogeneous purple fluid, now contain various shaped masses of purple matter, suspended in a colorless or almost colorless fluid; and shortly after the tentacles have re-expanded, the little masses of protoplasm are all re-dissolved, and the purple fluid within the cells becomes as homogeneous and transparent as it was at first."

Mr. Darwin's investigation also comprised an elaborate study of the digestive apparatus of the plants, and of the secreted fluids, which, beyond any doubt, perform the functions of the gastric juice and of a kind of pepsin, the latter being necessary to the complete direct assimilation of animal matter to a vegetable body.

THE FAIR OF THE AMERICAN INSTITUTE.

There is an ingenious device in a rather out-of-the-way corner of the fair, which will prove interesting to owners of horses, inasmuch as its object is to benefit the animals in a variety of ways, and principally by protecting them from negligence on the part of stable men. It is

AN AUTOMATIC HORSE FEEDER,

consisting of a simple clock, the works of which are connected by a cord with the hinged bottom of a grain hopper or water receptacle. At certain hours to which the clock mechanism is adjusted, the cord is slackened, and the bottom of the hopper or water vessel falls, allowing of the escape of the contents into the manger. This escape takes place for a certain time, regulated by suitable mechanism, so that a certain quantity of material is measured out, and then the bottom shuts, preventing a further supply. The horse is thus fed at exact hours and given a previously determined amount of food and water, without the intervention of the stable people, or requiring any other care than the timely winding of the clock.

BURGLAR ALARMS

in great variety are exhibited. The simplest is one which travelers can carry in their trunks or even pockets, and which will be found an excellent protection against the entry of thieves into an hotel room. It is a small wedge-shaped case of metal, containing a gong, the hammer of which is actuated by clockwork. The latter is wound, and the device is placed on the floor with the edge of the wedge just in front of the door. When the door is opened, however gently, from the outside, it strikes against the wedge, and suitable mechanism therein frees the spring of the clock train so that the gong is loudly and continuously sounded. The noise is sufficient to arouse the soundest sleeper. The invention might easily be adapted for windows as well as doors.

A NEW INDUSTRY

bids fair to be set on foot, through the utilization of the fir and pine tree leaves. Mr. Charles Fulton has devised a process by which the coherent parts, such as resin, wood, tannin, etc., from the fibers of the needles or acicular leaves, are dissolved and removed by boiling in suitable chemicals. The result is a substance resembling cotton, or perhaps more nearly wool, of a dark greenish brown color. It is prepared in four qualities, adapted for stuffing mattresses, pillows, etc., and for weaving. For the latter purpose, the fibers of the material are separated and treated in machines similar to fulling mills. Other processes follow, which result in the production of an excellent thread, which can be woven alone or mixed with wool, cotton, silk, or other fibers. Cloth of very close and fine texture is exhibited, made of the thread. It is soft and pliable, and resembles a fair quality of flannel. There is an enormous amount of raw material for this manufacture in the country, which now is of no value, and which can be obtained at simply the cost of transportation. By the process above described, it is rendered available both for textile and for paper industries, and hence may form a new and valuable supply.

The needs of dwellers in the narrow quarters of our city flats must be uppermost in the minds of inventors, if we may judge from the quantity of

COMBINATION FURNITURE

that is displayed. We spent an amused half hour in watching agile exhibitors put bedsteads and couches through astonishing transmutations, and departed as much entertained