

## THE BOSTON ADVOCATE, SATURDAY,

## A Short talk about Earthquakes.

For the Boston Advocate.

By R. K. POTTER.

Continued.

Obviously, until some definite conclusion is reached concerning the interior, scientists cannot agree in regard to volcanic and seismic phenomena. The first is already sometimes referred to as an "exploded theory," and of the two remaining, the force of argument is about as strong on one side as on the other.

Whatever statement may eventually prove to be correct, it will still be an undeniable fact, that the interior heat of the earth does, from time to time manifest itself at the surface in the form of volcanoes and other seismic movements.

Observations in regard to the time of the occurrence of several thousand earthquakes give some degree of probability to the following statements:—"Earthquakes are a little more frequent at the time of new and full moon than at half moon." "Earthquakes are a little more frequent when the moon is nearest the earth than when it is farthest from it." If these statements become established facts it would also seem to follow that the sun and moon assist in producing earthquakes, which, in turn, would help to establish the second theory, i. e., the fluid interior.

Although volcanoes and earthquakes may happen independently of each other, yet volcanic eruptions of an explosive nature are always preceded and accompanied by earthquakes.

It is a noticeable fact that earthquakes are more frequent in volcanic countries than elsewhere, and it also happens that a cessation of one of these forces is a signal for the outbreak of the other. Undoubtedly, therefore, there is close connection between them; or, in other words, volcanoes are the safety-valves of the forces which produce the earthquakes.

A study of the interior of the earth in connection with its mountain chains reveals the fact that the crust is not of uniform strength throughout its extent.

Mountains are the culminating points of the earth—the scenes of the greatest activity in the past and present. But we know little of their structure, origin or mode of formation. Such knowledge would form a key to many of the unsolved problems of the universe. In general terms, mountains are also results of internal action upon the crust. From the time of its formation the crust has been subjected to enormous lateral pressure from the interior substance, and has been affected by internal heat in a manner which may be illustrated by a baked apple. The crust or skin having cooled first has been acted upon by lateral pressure from within strong enough to crush the skin together and bulge it out along certain lines; the internal layers at the same time being variously flexed, folded, jointed and otherwise disarranged, in some places the interior has even forced its way through the crust. This is a brief explanation of the origin of mountain chains. Mountains consist usually of a granite axis or centre flanked on the sides by tilted stratified rocks. Granite is a very strong and durable rock compared with most forms of stratified rock, which, from the very nature of its formation, presents certain lines of

weakness must be referred to the action of the heated interior.

Speaking of the geologic formation of the Atlantic coast plain, according to Prof. McGee, an eminent geologist, a considerable portion of its area is as follows:—An upper layer of fine yellow sand or mottled clay reaching to a depth of from five to fifteen feet; beneath this a layer of fine clayey sand generally bluish in color, this stratum from thirty to forty feet thick; in the low grounds these sands are replaced by river alluvium, a fine blue clay called puff mud; beneath these deposits occur a soft kind of rocky material called marl (the softness of which you can easily determine, as it readily yields to the finger nail.) A succession of marl, clay and sand now extend to the depth of six hundred feet, these in turn being underlain by cretaceous or shell-like deposits to the depth of two thousand feet below the surface. Borings for artesian wells have been made to this depth.

The structure at a greater depth is not certainly known, but there is reason to believe that there is considerable depth of cretaceous deposit. Hence the Appalachian region affords a fine field for seismic disturbance, let there be but the least activity of internal forces. The lateral displacement of buildings and the formation of fissures in the crust during the shocks in Charleston seem to justify the statement that the event was in reality a landslide caused by lateral pressure.

The earthquake focus is always miles below the surface, and, as before stated, in the typical earthquake the motion is wave-like or undulatory; the waves apparently obeying laws similar to those governing waves of water or sound.

In order to study the earthquake with a view of practical results many things must be noted in connection with the waves or shocks, such as the exact time of occurrence, duration and intensity of shocks, kind of motion—whether it seems to come horizontally or vertically—accompanying sounds; effects on springs, rivers, wells, animals, on clocks and other timepieces; motions, or, direction of motion imparted to articles of furniture.

Scientific observers have already perfected several delicate instruments based upon the results of such observations in the past. The seismograph, a telegraphic apparatus by means of which the depth of the focus may be computed; the seismoscope, for determining the slightest tremors of the crust; and by means of this instrument it has been ascertained that the earth is always quaking at some point in its area. In countries which are frequently subjected to these movements certain precautions are taken in the construction of buildings. As a rule the motion of the most destructive earthquakes is from west to east, and the walls of buildings at right angles to the motion are more likely to be overthrown than those which are parallel to it. It is also true as shown in the recent movement that the point of greatest resistance is often the point of complete destruction. It follows that there may be two ways of constructing a building that shall be, in a measure, earthquake proof. The building may be weak and flexible so that it shall offer little resistance, and the shock may pass over it as the wind

everything in their path, completing the devastations of the earthquake and often far exceeding it in destructive effects.

In the recent earthquake a few forced waves were noticed on the Atlantic and shortly after the event, the water on the bar at Charleston was reported to have deepened from six inches to a foot.

Summing up the forces which act in producing earth movements we have among the best established causes the following:—

1st. Internal heat, 2nd. sudden evolution of gas or vapor caused by the admission of large masses of water through fissures in the crust; 3rd. faulty arrangement of the strata causing land slides accompanied by the usual earthquake phenomena.

R. K. P.

## THEY SAY

(Specials reported for the Advocate.)

—That it is well to remember that what you don't know may be of more interest to the world than what you do know.

—That Ex-President Arthur is worth about \$100,000.

—That the largest ship in the world is the Great Eastern. That it is 680 ft. long, 83 ft. broad and 60 ft. deep.

—That there is yet another brilliant, artistic light in the J. V. C.

—That this rising star is the fourth elocutionist in the J. V. C.

—That she is a pupil in the School of Expression.

—That he and she are both in the same class.

—That he says it is a shame that they should both be in the same class and yet not be able to speak to each other.

—That she says nothing but she smiles.

—That Mayor Grace of New York city issued a proclamation offering a reward of five hundred dollars for the apprehension and conviction of any person threatening, intimidating or bribing voters at the poles on election day.

—That a little girl of Alabama not 7 years old has started an infant school and teaches children their A. B. C's for ten cents a month.

—That Bert Isaw has "caught on," Augustus.

—That the number of marriages which will occur in Augusta this winter among professional gentleman and enviable young ladies is really extravagant.

—That Dr. Douglass's bill for attendance upon Gen. Grant was \$8,000.

—That Col. Fred Grant thinks it exorbitant. That everybody agrees with Col. Grant.

—That the public schools of the United States, employ over 300,000 teachers. That they are paid annually, \$62,000,000.

—That out of the 300,000 teachers, you can count the number of colored school teachers in the North.

—That out of the 300,000 teachers, there is not 1000 colored teachers in the South.

—That the Queen Regent of Spain, has signed a decree, freeing the slaves in Cuba from the remainder of their term of servitude.

—That the wind sings to the rich and growls at the poor.

—That the world is full of people that keep on climbing after they have reached the top of the ladder without noticing that they have started down on the other side.

—That at the reception for Mrs. President Cleveland at the residence of Mrs. Pres. Elliot on Monday, Mrs. George Grant, wife of Dr. George Grant, was among the guests present.

—That at a meeting of the Student Aid Society's sewing circle on Tuesday evening, each lady invited one gentle-

—That on a certain evening of a certain week after these certain persons were cooly seated in a certain theatre evidently enjoying a certain play.

—That the escort that accompanied two blushing maidens last Friday eve was truly in an enviable position.

—That somebody in Brooklyn has declared this column a "Yankee dodge."

—That it takes a "Yankee" to give you the "dodge."

—That the Advocate still increases in popularity. That the increase of papers continues steadily.

—That the interest in this column is not confined to Boston readers alone.

—That correspondents from cities miles away are letting us know that their readers like to know every week what "they say."

—That a rose is a great deal prettier than a pumpkin blossom, but where is she rose when the pumpkin pies are baking in the fall?

—That Col. Homer B. Sprague, ex-master of the Girls' High School who is now president of Mills' Seminary in California, has had a dispute with the trustees of that institution.

—That his resignation was requested. That he refused to comply with the demand. That the trustees then declared the office vacant.

—That Col. Sprague denied the legality of the action and refused to retire. That matters have gone to the courts for settlement.

—That every lassie has her laddie to whisper words of love. That every lassie has her daddy to knock on the floor above.

—That the G. K. G.'s and the J. V. C.'s are the boys and girls after all.

—That the "First Industrial Exhibition" of the colored citizens of the District of Columbia held at Bethel Church for several weeks was a very interesting exhibit.

—That many distinguished men and women of the city received new ideas of the culture, intelligence and ingenuity of the colored people of Washington from what they saw at the Exhibition.

—That specimens of the handwork of colored mechanics would have ranked with the best productions of white labor.

—That in almost every instance orders were obtained for work by the exhibitors.

—That the exhibit was rich in the work of women.

—That the exhibition seemed to embrace rather more of the results of intellectual than of industrial progress.

—That there was one young lady who is pretty well known, among the guests at the reception held at the residence of the rector of the Reformed Episcopal Church last Friday night.

—That this same young lady was nominated as editor of the proposed journal which the Young Society that was formed that night will probably bring out in January.

—That the refined and courteous young letter carrier of Worcester was seen in town this week at the Battle of Gettysburg with one of the members of that delightful club, the J. V. C.

—That they just caught a glimpse of the belle of Worcester as she disappeared in the railway carriage at the Eastern Depot, Monday noon, on her way to Newburyport.

—That Charles Monckney, the inventor of the Monckney wrench which is ignorantly called the monkey wrench, is living in poverty in Brooklyn.

—That he sold the patent for \$2,000, and that now millions are annually made out of the invention.

—That there will be no lack of friends

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