

## FEATURES OF EARTHQUAKES

SOME OF THE PHENOMENA THAT ATTEND NATURE'S CONVULSIONS—SPEED OF EARTH AND SEA WAVES—VOLCANOES ARE LARGELY RESPONSIBLE FOR QUAKE.

In view of the recent frightful convulsion of nature in Sicily and Italy. It may be of interest to our readers to know a few of the many phenomena which attend these seismic disturbances.

It may be said that every earthquake results from the passage of an earth-wave from the place where the shock is felt. The probable cause of these shocks is the action of central heat, but there is much diversity of opinion on the matter. Perhaps one reason is the sudden withdrawal of the molten or semi-molten matter, and the consequent falling of the rocks to fill the void; another may be the explosion of metals whose bases are alkalis, and metals which may be set on fire by contact with nitrogen gas, water at a very high temperature. The wave is of much the same nature as that which would be caused in the sea by a submarine explosion. In that case the water is first lifted perpendicularly into a dome-shaped mass over the site of the explosion, and then the falling of this dome, a system of circular rings is driven outward from it in all directions. In the same manner, in the case of an earthquake caused by some subterranean explosion, the ground is lifted vertically right over the site of the disturbance, and on its subsidence a system of earth-waves drives out from this centre.

But the waves travel in the direction of the rays of the circle, that is, in straight lines, and not in concentric circles, like waves on the surface of water. They do not retain their form and uniformity of direction, because the materials through which the waves pass are so very different in their nature. While they pass with great speed through solid masses of granite and similar compact rocks, the waves are much retarded by fissures, loose materials and clay rocks.

## PREPARATORY WARNINGS.

This fact causes some of the phenomena attending great earth shocks. Thus if a shock passes through a dyke of granite or greenstone running through loosely-compacted strata, it will traverse the dyke at a rate much greater than the rate at which it will pass through the loose strata before the principal wave reaches them, these lateral shocks often acting as preliminary warnings. In some cases the undulatory motion of the earth is quite perceptible to the eye, and the formation of rents is doubtless due to the extent of this motion, and the inability of the strata to accommodate themselves to the waves.

## SPEED OF EARTH WAVES.

In trying to determine the speed of the earth-wave many interesting experiments have been made, principally by exploding gunpowder in solid granite, in dislocated granite, and in sand. According to the experiments, the rate in solid granite is about 19 miles a minute, in dislocated granite, 15, and in loose sand, 9 or 10. But in the case of the great Lisbon earthquake, if estimated from the time it reached Corunna, the rate was about 23 miles a minute; if estimated from the time it reached Cork, the rate would be 30 miles; the coast of Barbary, 37 miles. Various rates are given in different places and for different earthquakes, and these rates vary from 11 to 40 miles a minute, in the case of the disturbance in South America, in 1868, the rate on land was between 14 and 15 miles a minute; but the great sea wave took 18 hours to traverse the Pacific to the shores of New Zealand, which was at the rate of 23 miles an hour, or about 6 miles a minute. Another wave passed from Hawaii to Oregon and Mexico in 1868, 5,000 miles, in about 6 hours, or nearly 17 miles a minute.

## THE SEA-WAVE.

Another interesting phenomenon connected with earthquakes is the great sea-wave, which is often felt on the land with such destructive effects. This wave is observed only when the origin of the shock is at the bottom of the sea. When the centre of the shock is on land, the earth-wave causes the sea to retreat, the water way, and then to return with considerable force, but seldom beyond the point at which it previously stood. The first retreat is caused by the rising of the beach with the water at the rate of 23 miles a minute; and the immediate subsidence, while the edge of the water is in turn elevated, causing the return wave. When the impulse acts from the bottom of the sea, the order of the phenomena is the same, but the retreat is greatly increased. The sea first retreats a long way from the beach, and then returns in a mighty wave of great height, which runs up far beyond the highest tide mark, and sweeps everything before it. Sometimes the first great wave is succeeded by several others, owing to a repetition of the impulse at the bottom of the sea. The retreat of the water in this case, before the arrival of the principal wave, is due in great measure to the formation of the dome-shaped mass, immediately over the seat of disturbance. The water is drawn away from the beach to supply the place of that which goes to form the liquid dome; and it is by the subsequent fall of this dome that the great rolling wave is raised. The first retreat is probably in part also due to the fact that the earth-wave along the bottom of the sea, and the wave on the surface, so that the beach itself is elevated and helps force back the tide. The greatest sea waves are produced when the centre of disturbance is near the shore, for when far removed only one or two large rollers rush forward toward the beach, and a previous retreat is imperceptible.

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## SPEED OF THE WAVES.

The rate at which these tidal waves travel depends partly on the depth of water and partly on the breadth of the wave. The deeper the water and the broader the wave, the swifter will be the speed. Calculated from the time the speed of the wave caused by the Japanese earthquake of Dec. 23, 1854, at from 430 to 440 miles an hour, indicating an average depth of water of about two and a half miles. The speed of the waves from the time the earthquake of 1868, which was occupied by the waves in reaching the ports of San Francisco and San Diego, Cal., the waves having a breadth of 220 to 260 miles.

Owing to the great speed at which the earth-waves travel, it is evident that the duration of the shock must be very short. If the rate of propagation be 20 miles a minute, and the wave be one mile in length, the duration of the shock at any one place would not be more than three seconds. When shocks are said to last half a minute, there may have been a rapid succession of waves, or we may suspect an error of observation. Where the shock is very short and abrupt, as to be visible to the eye, a series of impulses seem to be the only explanation.

## FISSURES OR RENTS.

Fissures or rents are often made by the passage of the shock, for, owing to their rigidity, the strata are unable to accommodate themselves to the undulatory motion, and so become rent. The sudden opening and closing of such fissures seem to be the obvious result; but in some cases the disturbance may be so great, and the materials so unyielding, that permanent fissures are formed. In volcanic countries fissures pour forth noxious gases, and sulphurous vapors. The most common discharge from these clefts is water, sometimes pure, sometimes salt; mixed with sand or mud, hot or cold.

The space disturbed by the earthquake at Lisbon was 3,300 miles in length and 2,700 in breadth—9,000,000 square miles. The Syrian earthquake of 1759 extended over 90,000 square miles; the Calabrian earthquake of 1783 over 16,000; the Chilean, in 1822, 100,000; that of 1835 over 238,000.

## UNDERGROUND NOISES.

Earth shocks are usually accompanied by underground noises, but in some of the most violent shocks these are entirely absent. In the great earthquake of Riohamba (Ecuador), Feb. 4, 1797, there were no noises of any kind. The most common sounds resemble the rumbling of a train of heavy artillery, or the sound of a road, or through a tunnel. Sometimes they are like thunder, and at others like an explosion in a mine. Occasionally they are harsh and grating, as though the edges of the rocks were being ground together. More rarely, they resemble the clanking of chains, or clear and ringing like the breaking of glass. In point of intensity the sound varies from a low murmur to reports compared to the discharge of heavy artillery. In such cases it is suspected that an actual explosion takes place at a great depth in the earth. In most cases, however, the noise is probably due to the cracking and settling of the strata displaced by the earth-wave.

## DISTRIBUTION OF EARTHQUAKES.

As regards the distribution of earthquake, it may be generally stated that few parts of the earth can be regarded as exempt. Nevertheless, there are certain districts which are more liable than others to be visited by them, while some particular spots seem to be specially exposed to shocks of great severity. These lines follow for the most part the seacoast. Africa appears to be comparatively free from earthquakes, and also Australia, but the apparent exemption may be due to the cause of the absence of records. The western portion of South America is frequently and violently convulsed, while to the east of the Andes the country enjoys a wonderful immunity. Iceland, Portugal, Italy, Asia Minor, the East Indies, China, Japan, Hawaii, Mexico, Peru, Chile, the West Indies, the Azores and the Canaries are all countries of great disturbance, and are nearly all closely connected with active volcanoes. It is thus evident that between the earthquake and the volcano there is an intimate relation, though all earthquakes are not connected with volcanic disturbance, as in the recent disaster at Messina. At this time all the Mediterranean volcanoes are quiet, except Stromboli, which is nearly always in eruption.

## NOTABLE RESULTS OF EARTHQUAKES.

Colossus of Rhodes thrown down by an earthquake in B.C. 224.  
Antioch nearly destroyed in A.D. 552.  
Pharos of Alexandria destroyed in A.D. 744.  
100,000 perished in Iraq, Persia, 1027—50,000 perished at Tabriz, Persia.  
1139—Gausana, Persia; 100,000 died.  
1170—Catania, Sicily; 15,000 lost.  
1180—Naples; 60,000 lost.  
1802—Fort Royal, Jamaica.  
1803—Sicily and Calabria; 93,000 perished.  
1808—Eruption of Etna.  
1703—Yeddo, Japan; 200,000.  
1755—Lisbon; 60,000.  
1783—Sicily; 40,000 from the shock; 20,000 from privation, exposure and disease.  
1793—Riohamba; 40,000.  
1812—Caracas; 10,000.

## TELLING CHARACTER BY EYES.

If eyes are placed too close together, the owner is jealous and critical. If eyes are far apart, the owner has a fine memory and broad intelligence. Deep-set eyes show melancholy and moodiness. Protruding eyes show self-indulgence. Wide open, round eyes mark a mind that is not developed, is credulous and serious about small gossip. The owners have no self-control. If the eye is very oval, almost almond shape, with the outward curve shaped to a point, look out for a

## THE CHAMPION FAT MAN

GREAT BRITAIN'S "JOLLY JUMBO" HOTEL-KEEPER AND TRAINER OF FIGHTERS.

England's champion fat man, a 400-pounder, who is one of the leading sporting celebrities on the continent, is William Thomas Eccleston, better known as "Jolly Jumbo." It is his boast that he is the biggest human being on the face of the earth.

He has a carriage, chair and bed specially built for him, and a heavy dray horse, which he drives himself. If he could have his weight in gold he would be able to salt away £20,000. But with all his avocations, Jolly Jumbo can move around as lively on his feet as a featherweight.

In telling how he got his nickname he says he once helped to put P. T. Barnum's famous elephant Jumbo aboard a ship at Liverpool, and that he rendered so much valuable assistance that the bystanders dubbed him Jumbo without further ceremony. His jovial disposition, he says, caused Jolly to be tackled on

the big man soon went into the hotel business, and opened a sporting resort which has been made the headquarters of many famous pugilists. A few years ago Jolly Jumbo learned so much about boxing that he became an expert trainer of pugilists.

"One of the most valuable qualities a trainer can possess," he said, recently, "is that of inspiring confidence in his pupils. When I was a boy, and when I am at the ringside my lad is sure to win. Everybody knows this is so, and one day up in Sheffield a rival patron was boasting when I came up to the ring that I shall never forget. The old remark arranged that turnstiles should be placed at every entrance to the hall, and of course when I came up the pugilist, much less over, no my lad was fearfully dejected by my moral support. I found I couldn't get into the ring, so that it ended happily, after all."

"My enormity has led me into some pretty pickles, I can tell you. I weigh 400 lbs., with chest 5 feet 1 inch, thighs 34 inches, arm 23½ inches, pound 5 feet 2½ inches, arm 23 inches and foot 9½ inches long. Once when I was going to Coventry I found I couldn't get into the carriage, and when I asked the guard to put me in his van he blankly refused."

"So I had to travel as luggage in the luggage van, and when the porter saw me he said 'Which side up?' because I'm further around than side up and down, and he wanted to know may pay excess luggage on my side."

"I eat anything I want except potatoes, and as for the diet of my pugilists, don't you believe in them at all. Exercise is the only thing for fat folks, and I recommend them all to try it."

## LLOYD-GEORGE FOOLED THE MOB

## HOW HE DELIVERED A SPEECH TO REPORTERS AT BIRMINGHAM.

Mr. Lloyd-George did, after all, manage to deliver his speech at the Albert Hall the other night, apparently without the preparation by means of which he defeated the people who would have silenced him on a notorious occasion at Birmingham. That night Mr. Lloyd-George had a speech of importance to deliver—its text was taken from Lord Rosebery's speech at Chesterfield—and he was prepared to deliver it. The Birmingham meeting should not be completely frustrated by the rowdies. Mr. Lloyd-George spent the two hours before the meeting in one of the ante-rooms of the Birmingham town hall. Outside a mob was shouting, "We'll chuck Lloyd-George out of the hall, and he'll never come to Birmingham more." Mr. Lloyd-George himself was quite calm, and occasionally, when the threatening chorus grew very turbulent, he laughed quietly. He had not prepared written speech, and it occurred to him while he waited that he would have been wiser to have done so. Very quickly a typist and a typewriter were found, and to the typist Mr. Lloyd-George, walking up and down the room, raising his voice sometimes in order to overpower the noise that came through the window, he dictated what he proposed to say on the political question of the moment.

When he took his seat on the platform, Mr. Lloyd-George had the typist's MS. in his hand. He began to speak without it, but the rowdies shouted uproariously. Then he beckoned to the reporters, and two or three of them stood on their table to get a better view of his words. The din grew louder, and at last Mr. Lloyd-George unfolded his paper, and, leaning down to the reporters till his face and theirs nearly touched, he read rapidly the words that he had dictated. It was while he was thus reading that the first stones were cast through the windows, and a minute or two after the stone-throwing there was the "rush" on the platform. Mr. Lloyd-George was spirited away to the ante-room and there disguised as a policeman. The speech was printed in some newspapers the next day with a curious introduction: "The following is the speech which Mr. Lloyd-George would have delivered, if, etc."

## CASTRO, TYRANT AND EXTORTIONER

VENEZUELA PRESIDENT WHO "PLUCKED" HIS COUNTRY AND IS NOW IN EUROPE—SAID TO HAVE SQUEEZED \$60,000,000 OUT OF VENEZUELA.

If Cipriano Castro, president of Venezuela, has really deceived his country, as is now suspected in some quarters, there will not be much regret on the part of the people over whom he has tyrannized, and whom he has impoverished. Since 1899, when, at the head of a revolutionary army, he drove his predecessor, President Andrade, from the capital and made himself absolute ruler of Venezuela, Castro seems to have had but one object in view, namely, to enrich himself. And in this he has succeeded to an amazing extent.

Naturally no person knows, nor can an estimate be made of the wealth which Castro has amassed at the expense of the poor and rich alike among the Venezuelans. It is pretty definitely known, however, that he has been sending vast sums of money to England, and this fact lends color to the belief that his departure to Europe, ostensibly to consult a noted physician concerning a serious malady, is in order to escape from the country which expects to see him no more.

Years ago Castro was practically unknown. Born of obscure parents in the Province of San Antonio in 1859, he grew up practically without education. He drifted to the Province of Zulia, and became a small cattle ranch near San Cristobal. He had the reputation of carrying on a smuggling business along the Colombian border, and one of his associates was a notorious bandit. His cattle was to drive them into Colombia, a territory where the tax collector came around.

He was the only one in the Andes who resorted to such measures, for the Government officials were merciless in their methods, and robbed the people to enrich themselves. A few years ago Castro was seized by the Government, and he was released on the condition that he should pay a fine of \$50,000. He was released, but he did not really belong to him.

As a tax dodger Castro was eminently successful, until one day the Venezuelan officials and the Colombian officials got together and Castro and others found themselves between two fires. Unable to pay the tax, Castro was seized by the Government, and he was released on the condition that he should pay a fine of \$50,000. He was released, but he did not really belong to him.

Having no means of support, Castro raised the standard of revolt, gathering about him the mountain men, who, like him, were discontented with the Government. In three weeks he had captured the capital of the province, and with his army of 200 men he was in possession of the Government buildings. He was in possession of the Government buildings, and he was in possession of the Government buildings.

## TO TAX BRITISH BACHELORS

IT IS ALLEGED THAT HE DOES NOT PAY HIS SHARE OF EXPENSES.

There are strong reasons why in England renewed attention should be given to the subject of taxing bachelors, and the Government should consider the important is the crucial fact that the bachelor bears a most inadequate share of the public expenditure, local or national. The bachelor, it is alleged, has greatly increased in numbers. Last year there was a report that the number of bachelors in the United Kingdom was 1,000,000. It is alleged that the number of bachelors in the United Kingdom was 1,000,000. It is alleged that the number of bachelors in the United Kingdom was 1,000,000.

It will probably be conceded that the continued increase in the number of single men that has been witnessed of late years is not at all a good sign, and gives cause for disquiet. From the point of view of the strength and security of the state, bachelors should not be regarded with favor, either in the ancient or the modern world, and bachelors have not only been subjected to penalties but have been deprived of certain political rights.

In France, in 1785, the convention passed a vote excluding bachelors from the Council of State, which corresponded with the Senate of today. Our neighbors on the other side of the channel have among the National Alliance for the Protection of the Population of France. It frequently deplores the increase in the number of bachelors, and urges the adoption of certain measures which would place more political power in the hands of married men with families. For instance, the alliance proposes that a double vote should be given to fathers of more than two children.

In England bachelors have from time to time, when the national expenditures were above the normal, been subjected to special taxation. In the reign of William III, the tax varied from one shilling to 12 lbs. according to the bachelor's ability to pay. He had to pay from the age of 25. The impost was withdrawn in 1705. In 1785 bachelors' servants were taxed at the same rate as their masters. This being responsible for this discrimination. Five years later that statesman's graduation, the National Alliance for the Protection of the Population of France. It frequently deplores the increase in the number of bachelors, and urges the adoption of certain measures which would place more political power in the hands of married men with families. For instance, the alliance proposes that a double vote should be given to fathers of more than two children.

It is surely apparent that unmarried men do not bear their fair share of either the national or local burdens. How is this

## AT DEATH'S DOOR

Doctors had to give her Morphine to ease the Pain

## Five Boxes of "Fruit-a-tives" Cured Her

Enterprise, Ont.

Oct. 1, 1908.  
For seven years I suffered with what physicians called a Water Tumor. I would get so bad at times that I could hardly endure the pain. I could neither sit, stand nor lie down. Hypodermics of morphine had to be given me or I could never have borne the pain. Many physicians treated me, but my cure seemed hopeless, and my friends hourly expected my death. It was during one of these very bad spells that a family friend brought me a box of "Fruit-a-tives" to the house. After much persuasion I commenced to take them, but I was so bad that it was only when I had

taken nearly two boxes that I commenced to experience relief. I kept up the treatment, however, and after taking five boxes I was cured, and when I appeared on the street my friends said: "The dead has come to life." And this seemed literally true, because I certainly was at death's door. But now I can work almost as well as ever I could, and go camping and berry picking with the girls. I will be glad if you will publish this testimonial, it will further the interest of "Fruit-a-tives." They should be in every household. Yours truly,

MRS. JAMES FENWICK.

Through the whole country around Enterprise, Ont., people are talking about this wonderful cure. By their marvelous action on the kidneys, "Fruit-a-tives" cured Mrs. Fenwick when the doctors said she could not be operated on and was doomed to die.

"Fruit-a-tives" cured Mrs. Fenwick when all else failed. Try them for your trouble. 25c and 50c a box, at dealers or sent postpaid on receipt of price. Fruit-a-tives, Limited, Ottawa.

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