

SEAQUAKES.

HOW THEY OCCUR. EFFECTS ON SHIPPING.

We speak of earthquakes, but there are probably more quakes on sea than on land. Human experience has made terra firma an illusion. The man who has experienced a genuine earthquake will no longer believe that he has solid ground beneath his feet. When he has felt the earth tremble and swell into waves and ridges moving along like water, when he has become conscious of nausea like seasickness and hears fateful, mysterious rumblings as if the globe were in pain, he becomes aware of his insignificance and helplessness and the instability of even the eternal rocks.

If an earthquake is accompanied by such unpleasant results, what must be the effect of a seaquake? First comes a deep rumbling sound, then a series of shocks, under which the ship trembles or seems suddenly to stop as if it had run aground. Perhaps after a number of shocks the ship appears to slide over a shoal and resume her course. On the morning of the San Francisco earthquake a ship some way off experienced heavy shocks as if she had struck bottom three times and then slipped over a shoal. The weather was quite calm and the sea perfectly smooth. In the same region and about the same time another steamer "seemed to jump clear out of the water, the engines raced fearfully, as though the shaft or wheel had gone, and then a violent trembling fore and aft and sideways, reminding me of running full speed against a wall of ice." That is how a chief engineer described his experience.

The misery and alarm of this kind of thing is that it is in such shrieking contradiction with appearances. The sea may be without a ripple and the surface smooth as glass when comes a shock severe enough to rouse the crew from sleep and send them rushing to the deck. In 1878 a British fleet was stationed in the Bosphorus, when an earthquake was felt on both the European and the Asiatic shores. A strange sound was heard and the ship began to tremble as though she were running on a sand-bank. Persons coming up the companion way were thrown over. The vibration continued for some seconds, and water bubbled up from beneath the ship, but the upper surface remained quite calm. Other reports described the water as rising up in a solid mass and forming a flat dome without ruffling its surface. One explanation is the familiar one of submarine volcanoes.

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of data relating to submarine earthquakes and eruptions, and his conclusions are briefly put thus:—

(1) Submarine earthquakes and eruptions occur in all depths of the sea, upon the submarine ridges, as well as in the regions of depression.

(2) The frequency and intensity of manifestation of the seismic and eruptive force are not dependent upon the distance from active or extinct volcanoes.

(3) There are habitual regions of shock, and portions of the ocean that are quite free from earthquakes; with the exception of the latter, seaquakes occur, also isolated and scattered over the ocean.

The areas within which seaquakes occur are those with sharp changes in steepness of the ocean floor. The movements are investigated through what happens to deep-sea cables, which lie stretched on the bottom of the ocean. On level plains the cables may last for twenty years or more, but when there are steep walls on the margins of the deeps the cables have a hard time, and are often fractured. They may be crushed or separated by abrasion, or get strained and frayed out at the end, or their suspension in the water is shown by a coating of shells or coral. There has been a sudden displacement of their bed, or they have been buried in material owing to some landslip from a neighboring slope. One cable was interrupted five times near the same point where it crossed a line marked at intervals by submerged volcanic peaks. At a place where at intervals of ten miles three trans-Atlantic cables run parallel all three were simultaneously fractured at points lying in a straight line.

At Zante, in Greece, there is a district famous for its great seismic activity and the irregularities of the sea bottom. Some of the submerged

precipices are from 3000 to 5000 feet high. It is not far from the bow to the stern of a repair ship, but even in that short distance a difference of 2000 feet has been recorded. In 1885 the cable between Zante and Crete was injured by the floor dropping suddenly from 700 to 10,000 feet. The cable was jammed under a mass of material.

The inference to be drawn from these data is that the changes in configuration of the sea bottom takes place by leaps and bounds, and are greater than any observed on the land. Last year the German research ship Meteor discovered three new ranges of mountains under the waters of the Atlantic, between Buenos Ayres and Capetown. One of the peaks rises to about the height of Mont Blanc, but before it could show itself above the surface of the water a Ben Nevis would need to be set on top of it. Surely a new version of Pelion upon Ossa! On the other hand,

top of it. Surely a new version of Pelion upon Ossa! On the other hand, well-known submarine mountains keep disappearing, and islands are occasionally being thrown up. One island which heaved up over 160 years ago -lipped down out of sight in 1868. One called Old Bogoslov rose in 1796, and its mate New Bogoslov rose near it in 1883. Then in 1906 surveyors announced that the two Bogoslovs had a baby, a little island some 56 feet high. They called the newcomer Perry Peak, but as there was no infant welfare centres convenient poor little Perry Peak suddenly died, and was buried in his native element.

It has been noted that earthquakes are frequently followed by destructive water waves rushing in from the sea and causing great destruction of life and property. Such a wave coming suddenly after a strong ebb tide destroyed thousands of Persian soldiers at Potidaea, and it may be that a similar wave, following upon a sea-quake, destroyed Pharaoh's army in the Red Sea. Professor Rudolf believed that such occurrences were due to an outbreak of some submarine volcano.

It is singular that the earliest instrument for determining the shock direction of an earthquake was made in China in the year 136 B.C. It was a hollow brass rod with a pendulum free to move in all directions. Many devices have been invented since then, but the order of the day is the self-registering instrument.

In olden times Poseidon, or Neptune, was worshipped as the earthquake god. His abode was Peloponnesus, and a chain of sanctuaries was erected in his honor. Other nations ascribed earthquakes to the movements of a great spider, a hog, a mole or a tortoise, but it is significant that Greeks made the sea god the author even of earthquakes.

An American earthquake prophet says the world is yet to witness a cataclysm comparable only to Noah's flood, that one-third of the surface of the earth will crumble under the sea, and a new continent rise in the South Seas, that Japan, China, the most of the countries of Europe and Northern Africa will be swallowed up. Well, this stupendous catastrophe would end many things and begin a new cycle of old problems. But the phenomena of seaquakes leave an uncanny feeling. Against these things the genius of man is helpless. This old globe of ours has not yet reached its final form. It groaneth and travaileth in pain until now.