

speed at which the latter was continually rising. The steadiness of the rise of the latter from early manhood to late years is very striking; it is almost in a straight line. I have not sufficient data to justify me to say when its curve culminates; I have closed it at 70 with a dotted line.

It is only necessary to add that the ledgers of Messrs. Berry are a quarry from which, with some labour, much further information of the kind just given might be drawn. Perhaps the publication of this paper will suggest methods of treating them that have not occurred to myself.

FRANCIS GALTON

THE ERUPTION OF KRAKATOA¹

"SIXTEEN volcanoes now working between the spot where Krakatoa was before and Sebesie." Such was one of the first reports which was sent by cable to Singapore, and which we heard at Pontianak. Never before had we been so longing for news from Java, for when H.M. ship *Hydrograaf* steamed into the Padang-Tikar River, we heard heavy detonations and explosions like far-off shots, so that we were alarmed about Java. As we expected, our ship was soon ordered to survey the Sunda Straits. This survey was finished at the end of October, and the reader will probably feel interested to know what really has happened there.

Krakatoa has not entirely disappeared, while, till now, no new volcanoes are visible in the neighbourhood. But the report that new islands were said to have

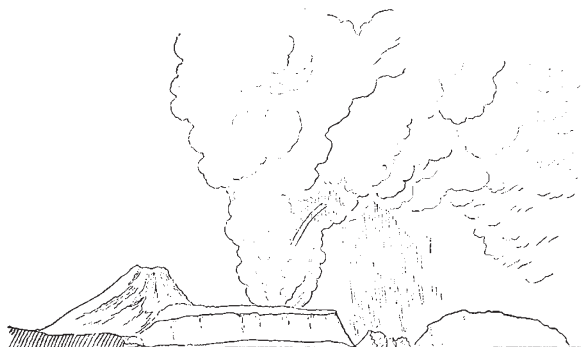


FIG. 1.—Krakatoa during the eruption in May, after a drawing of the Military Survey Bureau, Batavia.

arisen between Sebesie and Krakatoa is easily to be explained, for the new islands are like a mass of smoking and steaming rocks, and if seen from afar they may easily suggest the idea of a great number of working volcanoes. But, when looked at closely, it appeared that the masses of rock were composed of hot pumice-stone, mixed with eruptive masses. In them there were a great many cracks and splits, in which, by the heavy breakers, steam of water was continually generated.

The northern part of the island has entirely disappeared. At what is now the northern edge the peak rises nearly perpendicularly from the sea, and forms a crumbled and rugged wall, and shows a vertical cutting (which is more than 800 metres high) of Krakatoa.

Where was land before, there is now no bottom to be found; at least we could not fathom it with lines of 200 fathoms (360 metres) long. When we had quite calm weather, and steamed slowly and cautiously to and fro along the base of the peak, or had turned off steam and let the ship drift, and were busy in measuring the depth, we could distinctly see the different strata and rocks of the bare, opened mountain. Only here and there a slight trace of melted volcanic matter was to be seen, which,

¹ By M. C. van Doorn, officer in command of H.M. ship *Hydrograaf*. Translated (and partially abridged) by E. Metzger from *Eigen Haard*, 1883, No. 51.

after half of the mountain had crumbled away, had flowed over the wall, which is still there. What remains of the slopes is covered with a grayish-yellow stuff (which, as plainly appears, had been in a melted or fluid state), full of cracks or splits from which steam is continually coming out.

In the same way steam is also coming forth from the deeper cracks of the steep wall, which is still remaining. Sometimes this is accompanied by slight explosions; at that time clouds of brown dust fly up from the cracks, and stones roll down which are often so big as to disturb the sea around the entire base of the mountain. Our



FIG. 2.—Krakatoa after the eruption in May, after a drawing of the Military Survey Bureau, Batavia.

entire survey of the north of Krakatoa suggested the idea that we were above a crater which had been filled with water and quenched by it, and this idea was still strengthened on observing that the decrease of depth, south of Sebesie, had principally been caused by matters which were cast out and flung away.

Almost in every place here the lead came up from the bottom, filled with black sand or carbonised dust, sometimes mixed with pulverised pumice-stone and little black stones, which apparently had been in a red-hot or melted state. Moreover, the soundings were very different, and the new rocks resemble clods of substances which, when



FIG. 3.—Peak of Krakatoa after the eruption in August, by M. C. van Doorn.

in a melted or very hot state, had contact with water. Probably such a whimsical shape of the rocks above the sea-level suggests the state of the bottom of the sea in the neighbourhood. The stones were still too hot to allow us to discover whether massive stones are under the pumice-stone also. It was not difficult, it is true, to knock off large pieces of these rocks by a hatchet or a chopper, but when a big block fell unexpectedly down, the sailors had often to flee on account of the gases which suddenly arose. The knocked off pieces which were brought on board were still warm after they had been in the boat for an hour.



FIG. 4.—Peak of Sebesie and the volcanic rocks before it, by M. C. van Doorn.

As is to be seen from the map, a great part of the lost ground of Krakatoa is found again at the bottom of the sea, a few miles to the north at least, if we suppose that no undulations of the ground took place. After having passed the limits to which the matters were thrown out, one finds the same soundings as were found before, and the decrease of depth is so local that the idea of an upraised bottom is dissipated at once. If such an elevation had taken place, it certainly would be remarked over a far greater extent and be more regularly ascending and descending. The firmer and stronger part of the crater wall, the peak of Krakatoa, which is still there,

remained standing when the lower and feebler part dropped down, and the water found its way into the fearful boiling pool. We cannot wonder therefore that then a quantity of steam came forth (of which we are not able to form an idea), which caused a strong explosion. The movements of the sea which followed it caused tidal waves, the destroying force of which was experienced in such a fearful manner at the coast of Bantam and the Lampongs.

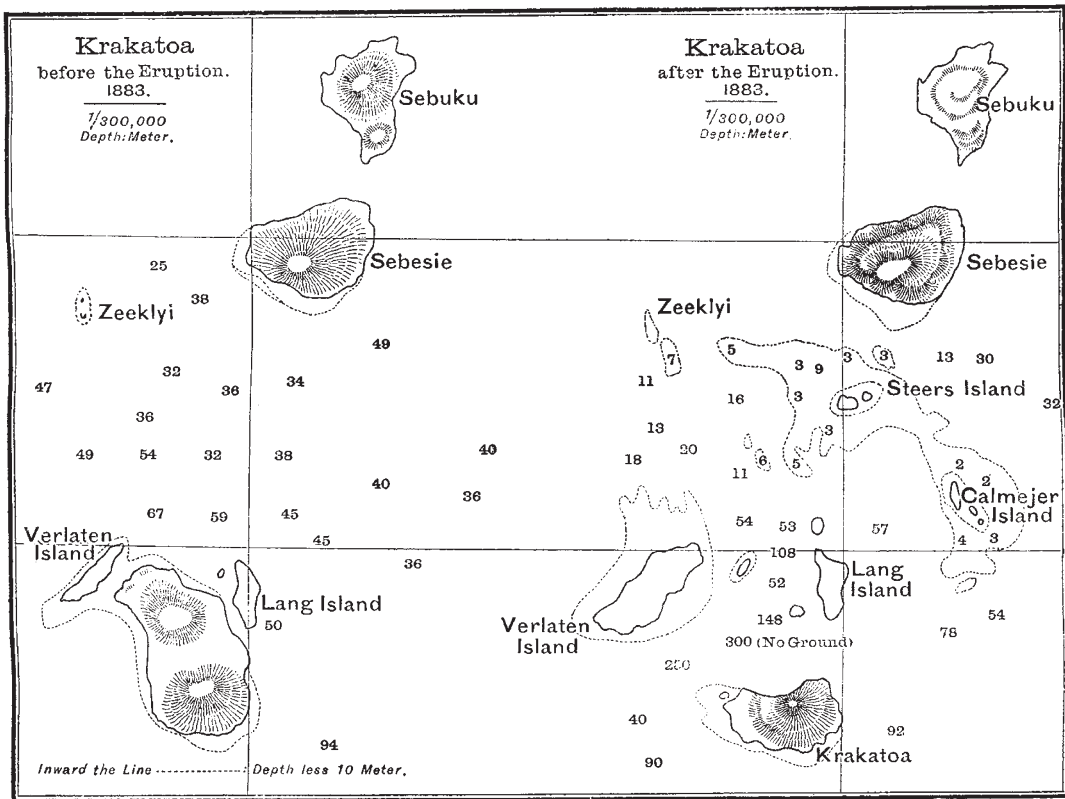
It is also worth mentioning that a change took place in the figure of Verlaten Island; the area is now triple what it was before, though it is plainly visible that large pieces of the beach were there knocked off a short time ago.

Lang Island, in size and formation, has remained almost unaltered. The sight of these islands, which were formerly covered by a luxurious vegetation, is now very

melancholy. They are now buried under a mass of pumice-stone, and appear like shapeless clods of burst clay (*i.e.* covered with cracks). After a torrent of rain, the coming forth of steam is sometimes so dense that these islands, when seen from afar, appear like hilly ground covered here and there with snow. If looking at these spots with the telescopes, one can plainly see that these white specks are formed by a great number of clouds, which issued like steam from the fissures.

Sebesie is also covered with ashes up to the top—859 metres—which appear like a grayish-yellow cloth. But it seems that the cover is already less thick here, for here and there one sees the stumps of dead trees peeping out from the crust.

Sebuku shows a dreadful scene of devastation. Perhaps all that lived here is not so completely destroyed as was the case on the southern islands, but the sight of the bare



Krakatoa and neighbouring islands before and after the eruption, from official surveys.

Typo. Etching Co. sc

fields of ashes, alternating with destroyed woods, the trees of which are all either dead or uprooted, gives one a still better idea of the destructive powers which were here at work. It is not until we come to the small islands northward of Sebuku that our eyes are gladdened by little specks of green.

I do not try to describe the scene of destruction and misery which we saw at Anjer and the villages along the coast. The papers have already reported the full particulars, and therefore I do not care to repeat melancholy facts which are already known.

It was a dreadful narrative which was related to us by a native, a lighthouse-keeper of Fourth Point, one of the few men at the lighthouse, who by a wonder was saved.

When the wave approached, all fled to the tower (the light was 46 metres above the sea), which, though shaking, resisted the violent waves for a long time. It

was a terrible moment, when at last an enormous rock, which was swept away by the stream, crushed the base of the tower, which then fell down. The man who was saved saw his wife and his children drowned before his eyes. He related this fact in the very resigned way of a Javanese, and considered it the most natural thing in the world that he was now obliged to light the interim light, which was erected as soon as possible.

It has been almost a month that we have been in the Sunda Straits, and even in this short period we could observe that the coasts of Bantam commence to revive. From many places from the heavy rain the ashes were washed down, and a fresh green appears again. Even on the beach young coconut trees and banana trees are shooting out between the chaos of dead trees, blocks of rocks, &c.

Off Batavia, October 23, 1883