

## Chapter 14

The next day, the 16th of April, and Easter Sunday, the settlers issued from the Chimneys at daybreak, and proceeded to wash their linen. The engineer intended to manufacture soap as soon as he could procure the necessary materials—soda or pot-ash, fat or oil. The important question of renewing their wardrobe would be treated of in the proper time and place. At any rate their clothes would last at least six months longer, for they were strong, and could resist the wear of manual labor. But all would depend on the situation of the island with regard to inhabited land. This would be settled to-day if the weather permitted.

The sun rising above a clear horizon, announced a magnificent day, one of those beautiful autumn days which are like the last farewells of the warm season.

It was now necessary to complete the observations of the evening before by measuring the height of the cliff above the level of the sea.

"Shall you not need an instrument similar to the one which you used yesterday?" said Herbert to the engineer.

"No, my boy," replied the latter, "we are going to proceed differently, but in as precise a way."

Herbert, wishing to learn everything he could, followed the engineer to the beach. Pencroft, Neb, and the reporter remained behind and occupied themselves in different ways.

Cyrus Harding had provided himself with a straight stick, twelve feet long, which he had measured as exactly as possible by comparing it with his own height, which he knew to a hair. Herbert carried a plumb-line which Harding had given him, that is to say, a simple stone fastened to the end of a flexible fiber. Having reached a spot about twenty feet from the edge of the beach, and nearly five hundred feet from the cliff, which rose perpendicularly, Harding thrust the pole two feet into the sand, and wedging it up carefully, he managed, by means of the

plumb-line, to erect it perpendicularly with the plane of the horizon.

That done, he retired the necessary distance, when, lying on the sand, his eye glanced at the same time at the top of the pole and the crest of the cliff. He carefully marked the place with a little stick.

Then addressing Herbert—"Do you know the first principles of geometry?" he asked.

"Slightly, captain," replied Herbert, who did not wish to put himself forward.

"You remember what are the properties of two similar triangles?"

"Yes," replied Herbert; "their homologous sides are proportional."

"Well, my boy, I have just constructed two similar right-angled triangles; the first, the smallest, has for its sides the perpendicular pole, the distance which separates the little stick from the foot of the pole and my visual ray for hypotenuse; the second has for its sides the perpendicular cliff, the height of which we wish to measure, the distance which separates the little stick from the bottom of the cliff, and my visual ray also forms its hypotenuse, which proves to be prolongation of that of the first triangle."

"Ah, captain, I understand!" cried Herbert. "As the distance from the stick to the pole is to the distance from the stick to the base of the cliff, so is the height of the pole to the height of the cliff."

"Just so, Herbert," replied the engineer; "and when we have measured the two first distances, knowing the height of the pole, we shall only have a sum in proportion to do, which will give us the height of the cliff, and will save us the trouble of measuring it directly."

The two horizontal distances were found out by means of the pole, whose length above the sand was exactly ten feet.

The first distance was fifteen feet between the stick and the place where the pole was thrust into the sand.

The second distance between the stick and the bottom of the cliff was five hundred feet.

These measurements finished, Cyrus Harding and the lad returned to the Chimneys.

The engineer then took a flat stone which he had brought back from one of his previous excursions, a sort of slate, on which it was easy to trace figures with a sharp shell. He then proved the following proportions:—

$$\begin{array}{r}
 15:500::10:x \\
 500 \times 10 = 5000 \\
 \hline
 5000 \\
 15 = 333.3
 \end{array}$$

From which it was proved that the granite cliff measured 333 feet in height.

Cyrus Harding then took the instrument which he had made the evening before, the space between its two legs giving the angular distance between the star Alpha and the horizon. He measured, very exactly, the opening of this angle on a circumference which he divided into 360 equal parts. Now, this angle by adding to it the twenty-seven degrees which separated Alpha from the antarctic pole, and by reducing to the level of the sea the height of the cliff on which the observation had been made, was found to be fifty-three degrees. These fifty-three degrees being subtracted from ninety degrees—the distance from the pole to the equator—there remained thirty-seven degrees. Cyrus Harding concluded, therefore, that Lincoln Island was situated on the thirty-seventh degree of the southern latitude, or taking into consideration through the imperfection of the performance, an error of five degrees, that it must be situated between the thirty-fifth and the fortieth parallel.

There was only the longitude to be obtained, and the position of the island would be determined. The engineer hoped to attempt this the same day, at twelve o'clock, at which moment the sun would pass the meridian.

It was decided that Sunday should be spent in a walk, or rather an exploring expedition, to that side of the island between the north of the lake and Shark Gulf, and if there was time they would push their discoveries to the northern side of Cape South Mandible. They would breakfast on the downs, and not return till evening.

At half-past eight the little band was following the edge of the channel. On the other side, on Safety Islet, numerous birds were gravely strutting. They were divers, easily recognized by their cry, which much resembles the braying of a donkey. Pencroft only considered them in an eatable point of view, and learnt with some satisfaction that their flesh, though blackish, is not bad food.

Great amphibious creatures could also be seen crawling on the sand; seals, doubtless, who appeared to have chosen the islet for a place of refuge. It was impossible to think of those animals in an alimentary point of view, for their oily flesh is detestable;

however, Cyrus Harding observed them attentively, and without making known his idea, he announced to his companions that very soon they would pay a visit to the islet. The beach was strewn with innumerable shells, some of which would have rejoiced the heart of a conchologist; there were, among others, the phasianella, the terebratula, etc. But what would be of more use, was the discovery, by Neb, at low tide, of a large oyster-bed among the rocks, nearly five miles from the Chimneys.

"Neb will not have lost his day," cried Pencroft, looking at the spacious oyster-bed.

"It is really a fortunate discovery," said the reporter, "and as it is said that each oyster produces yearly from fifty to sixty thousand eggs, we shall have an inexhaustible supply there."

"Only I believe that the oyster is not very nourishing," said Herbert.

"No," replied Harding. "The oyster contains very little nitrogen, and if a man lived exclusively on them, he would have to eat not less than fifteen to sixteen dozen a day."

"Capital!" replied Pencroft. "We might swallow dozens and dozens without exhausting the bed. Shall we take some for breakfast?"

And without waiting for a reply to this proposal, knowing that it would be approved of, the sailor and Neb detached a quantity of the molluscs. They put them in a sort of net of hibiscus fiber, which Neb had manufactured, and which already contained food; they then continued to climb the coast between the downs and the sea.

From time to time Harding consulted his watch, so as to be prepared in time for the solar observation, which had to be made exactly at midday.

All that part of the island was very barren as far as the point which closed Union Bay, and which had received the name of Cape South Mandible. Nothing could be seen there but sand and shells, mingled with debris of lava. A few sea-birds frequented this desolate coast, gulls, great albatrosses, as well as wild duck, for which Pencroft had a great fancy. He tried to knock some over with an arrow, but without result, for they seldom perched, and he could not hit them on the wing.

This led the sailor to repeat to the engineer,—

"You see, captain, so long as we have not one or two fowling-pieces, we shall never get anything!"

"Doubtless, Pencroft," replied the reporter, "but it depends on you. Procure us some iron for the barrels, steel for the hammers, saltpeter, coal and sulphur for powder, mercury and