

The Famous Eddystone Light-House.

There is a fascination in the study of light-houses, for these beneficent structures not only appeal to what is best in our hearts, but suggest something out of the common place. They have been the theme of many a writer, and about them songs have been sung and romances have been woven. But there is no fiction that can compare with the facts learned in a study of the buildings themselves or the events leading to their destruction and the legends that are attached to almost every one.

When it first dawned upon human intellect that man had mastery over the water, and men went out in their rude boats, they were guided by a knowledge of their own locality, and every tree, and rock and hill served as landmarks to guide the way. They did not think at first that they could go upon the water at night, but when they were detained until the shadows had gathered they found the way by the fires built upon the shores by wives and mothers at home.

It is a delightful study to trace coast illumination from the time of primitive man to that of our own day. In some countries it still consists of fires or the most simple lights, but nearly all civilized countries have an organized system of aids to navigation, and many light-houses are beautiful towers constructed and lighted upon the best principles. This has been accomplished by the services of some of the best engineers and greatest scientists the world has ever known.

Modern light-houses do not compare with the noted Pharos of Alexandria in size or in elaborate details, and perhaps not with some light-houses built at a little later period, but they are better suited to lighting the paths of the mariner.

THE EDDYSTONE.

The Eddystone is the most famous of all modern light-houses. The one now standing is the fourth that has been erected.

The Eddystone is a high rock, which lies fourteen miles southwest of Plymouth Harbor. It was the first light-house built in the English channel, where now many are maintained. It is in the line of all vessels coasting up and down the English channel and the attention of the English government was early attracted to the dangers of the place. But in an early day the light-houses of England were private property. In the year 1696 Henry Winstanley, a gentleman of Essex, England, began the erection of the first Eddystone light-house.

It took four years to complete it. It was very beautiful and highly ornamented, and Winstanley was very proud of it. He had great faith, also, in its stability, which had been questioned by some of his friends. He said he would like to be in it during the greatest storm that ever blew, and he had his wish gratified: at least he was there during a terrible tempest and the light-house was swept away and all within it perished.

Winstanley was a very eccentric person and many interesting stories are told of him and his home in Littlebury. In one room was a very luxurious chair, but if the visitor threw himself into it he would immediately be plunged into a cold bath. If he sat down in another he was clasped in the arms of a grinning skeleton, from which he could not escape. These contrivances for playing practical jokes did not endear him to his friends, but they illustrated his mechanical ingenuity.

A few years later Capt. Lovet obtained a ninety-nine year lease, and engaged as a builder an architect named Rudyerd. He was a strange person to employ for so important a work, as he was a silk mercer who kept a shop in London. But he proved to be well fitted for the undertaking and he built a fine and substantial light-house. It was constructed partly of wood and it was destroyed by fire after doing good service for forty-six years. It was lighted with candles, and when the keeper went to attend to the light he found the lanterns on fire. He awakened the other keepers and they tried to put it out, but as the water had to be carried up long flights of stairs they could not make much headway, and a curious accident happened to one of the men. As he looked up into the burning tower to watch the progress of the fire a quantity of melted lead fell upon him, and he thought that he had swallowed some of it. The men were rescued, but after twelve days, the one who had been injured by the lead died. The attending physician claimed that his stomach was opened and there was taken from it a solid piece of lead weighing more than seven ounces. He sent an account of it to the Royal Society which was received with derision. A great controversy arose among the members of the medical fraternity as to the possibility of a person living

after swallowing molten lead. But inasmuch as the man was 94 years old, it is probable that he would have died from the effect of the fright and exposure incident to the dreadful disaster, whether he had swallowed any lead or not.

The third Eddystone light-house—the most noted one—was erected by John Smeaton, a famous light-house engineer. It is celebrated on account of the difficulties of its construction and it is accepted as a type of all structures of the kind that have since been erected. He resolved that it should be built of stone and that it should be absolutely fireproof. It was built of solid blocks of stones dovetailed into the rock and into each other. Every ingenious precaution was taken to make it strong. In some of the upper courses a groove was cut round the upper surface of the stones, and in it was placed an immense iron chain, and melted lead was poured upon the chain until the cavity was filled. The combinations which Smeaton used in the methods of joining stones and his experiments with hydraulic mortar were very original and successful. The light-house was finished in 1759 and was lighted with wax candles, twenty-four being used, each weighing two and a half pounds. A system of reflectors was introduced in 1845, and they in their turn gave way to the Fresnel lens.

Mr. Smeaton, the builder, superintended every part of the work himself. He also wrote a stately folio, giving an elaborate account of its construction. It was dedicated to the king and was written in quaint and beautiful language.

Smeaton's light-house stood for 120 years and was still in a fair state of efficiency. It was, however, a period of time in the world's history when science had made very rapid progress. Men had acquired a more accurate knowledge of the laws which govern sea waves and many false notions had been corrected. Methods of illumination had been greatly improved and conveniences invented. The light-house was partly undermined and extensive repairs were needed, and in 1877 Mr. James N. Douglas, chief engineer of the Trinity House—as the light-house board of England was called—recommended to the board instead of repairing the structure a new one should be built in harmony with modern requirements and suited to the needs of commerce of to-day.

The board acted upon the suggestion and the following year work was begun under the supervision of Mr. Douglas. The top part of the tower, including the lantern and four rooms, was carefully removed, taken to Plymouth harbor and placed upon a granite foundation corresponding to the lower part of the tower. It is preserved in commemoration of this pioneer of great works in light-house engineering. The lower part of the tower was then removed by the use of drills, picks and other tools, no blasting being allowed for fear of injuring the rock. It was found that it was not the tower, but the reef below, that had weakened.

In the summer of 1879 the foundation stone was laid with appropriate ceremonies, similar to those used in laying the cornerstone of an important building on land. The formalities were conducted by the highest officials of the Trinity House assisted by H. R. H. Prince of Wales. The tower was finished in the summer of 1881. The new light-house stands 120 feet southeast of the old one, and it is constructed entirely of granite. The height of the focal plane of the old light-house was seventy-two feet above high water, while that of the new house is 133 feet. Smeaton's light-house was visible thirteen miles away, and the new tower can be seen at a distance of nearly eighteen miles.

The light shown at first was a temporary one, but the following year the fine optical apparatus especially prepared for it was installed, and the light-house formally opened with imposing ceremonies in the presence of 9,000 persons.

THE LONGSTONE LIGHT-HOUSE.

Upon the north shore of England stands an important sea-rock light-house, the Longstone. It is peculiar on account of its being protected by a high wall, and it has an interesting history.

In 1838 the steamship *Forfarshire* was wrecked near the Longstone, and of the sixty-three passengers only nine survived, and they were saved through the heroism of the keeper and his daughter, Grace Darling. To-day, the keepers of the light-house point out to you the window through which she first saw the wreck. A beautiful tomb is erected to her memory near by on the mainland.

THE SMALLS LIGHT-HOUSE.

On the west coast of Wales is the Small's Light-house, one that has attracted atten-

tion on account of the generosity of the founder. Mr. Phillips built and maintained it as a free gift to mankind. As he himself said, his compensation was to "serve and save humanity." However, when his descendants sold it to the government they received in payment £15,000. It was begun in 1772. The architect's name was Whiteside. He had been a manufacturer of musical instruments, but he displayed remarkable genius in his new work. When Whiteside with his workmen first landed upon the rock there came a dreadful storm which bore away the vessel that had brought them and left them exposed to the tempest, hanging to the bare rocks for two days and nights. At another time, when the tower was partly constructed, they were left in a critical condition. They sent out a cask containing a letter in a sealed bottle which fortunately reached land and was sent to those who went to their aid.

A very sad incident is told in connection with this light-house. At first only two keepers were kept at the tower. One winter was so stormy that for four months no one could land at the light-house. The light was shown every night, but when a landing was made only one keeper was left; the other had long been dead.

We can well believe that, looking daily for release, waiting night after night, week after week, with the body of his dead comrade as his sole companion, the survivor was so changed that his friends scarcely knew him. He said that the other keeper had died a natural death, and his word was believed, but it was decided that thereafter three men should always be kept at the light-house.

A similar incident is related in connection with Rudyerd's Eddystone.

THE ROTHERSAND LIGHT-HOUSE.

The light-houses mentioned are all among the important sea-rock light-houses of the world, and until recently there have been no light-house at a long distance from land except those built upon rocks. But it is now found possible to remove as much sand from under the water as it is needed to reach a solid foundation.

The Rotherstrand light-tower in the North Sea, off the coast of Germany, was finished in 1885. The history of this tower and account of its construction are as interesting as the study of the Eddystone.

Over 2,000 cubic yards of sand was removed by the sand blast, the depth of the excavation being seventy-three feet below low water. The tower is a conspicuous one and can be seen for twelve nautical miles. The base of the structure is painted black, and the tower above with alternate red and white bands fourteen feet wide. There are several lights in the tower, very ingeniously arranged adjusted to the needs of vessels at different distances from it. This light-house is about thirty miles from land, and it is connected with it by an electric cable. Not long after the completion of the Rotherstrand a similar structure was finished upon the coast in Delaware Bay.

The Flight of Bats.

It seems extraordinary to observe a number of bats in the evening flying back and forth through the trees with remarkable rapidity, but without ever coming in contact with the branches or hurting themselves. Spallanzani, the Italian naturalist, placed a bat in a dark enclosure, across which were stretched a number of threads, crossing and recrossing each other. The bat flew rapidly back and forth trying to effect its escape, but avoided the threads with as much ease as if they had not been in its way in the least. Whether this curious power was the result of a sixth and unknown sense was a puzzle to naturalists. To decide this knotty point Spallanzani resorted to the cruel expedient of blinding a bat, and found that it still flew among the threads without being to all appearances, any more inconvenienced than if it still had its eyesight.

People having valued documents locked away in safes and secretaries are often out of temper and out of pocket at discovering that the writing thereon has faded almost completely when their use becomes important. It is very easy in these cases to restore the color to the ink by purchasing a little solution of ammonium sulphide and bathing the paper therein, or tracing over the letters with a camel's hair brush dipped in the fluid. If this remedy fails, gallic or tannic acid will generally bring out the words, no matter if they be completely illegible at first. After applying either solution the documents should be carefully rinsed and dried.

A new mineral named sanguinito, discovered in South America, has recently excited much interest.

A Wife's Duty.

Husbands in general are not *unselfish*, though they may think themselves kind and generous. A man does not often consider what his wife's existence is, in what proportion her work and pleasures lie, or what she gives in return for what she receives. Absorbed in their own ambitions, business cares or pleasures, how many men ask themselves what sort of a life their wife leads, whether she has strength enough for herself and the children she rears, hope enough to make life cheery, chances enough for development, share enough in the general ambition and success of the family as a whole?

We do not want to see women attempting to seize mastership, or growing quarrelsome about imaginary rights, but we do want them to see that the unselfishness which seems a virtue is practically the abandonment of their position. To claim the full rights and privileges of thinking, self-respecting, free human souls is to undermine a thousand wrongs and humiliations, to render themselves the more beloved for their apparent audacity, and to, at the same time, secure the best conditions for their children.

Women must learn that if they bear wrongs other women must bear the same; if they do not claim personal respect neither can their sisters. If they are weak or oppressed how can their children be strong or noble? This habitual self-effacement leads to all manner of weakness. A woman will tell lies to shield her husband, or perhaps to shield her own pride. If she is pinched, or bruised, or injured, if things are broken in a fit of temper, she will swear it was not he, it was the result of accident purely. If he insults her by boasting of his connection with other women she does not resent it; if he squanders the money she works the later and harder to replace it; if he drinks she hides the fact and shelters him with lies, and bears him dipsomaniac children. In time she does not own her own body or mind, and her only morality is to be faithful to the marriage contract.

The long suffering, patient, enduring temper of women under hardship only leads to hardship's continuance. They should have more trust in their own intuition of right, think more of their own lives and destiny, and of the lives they bequeath to the race. For it is often easier to endure than to act, and the true unselfishness is to be selfish for the good of others. They must think more of self, if self is to have more dignity and more worth; they must gain for themselves more liberty and more respect, that the children and the race may be stronger and nobler, inheriting less of passion and of vice, less of the weak and tired-out household drudge, more physical and intellectual strength, more mental and moral cleanliness. If women thus aim at the enhancement of their own individualism there will be no need to change the method of marriage relationships; and in time, by women's efforts to restore their side of the balance in the marriage scales, we may find married women a better treated class than those who are bound by no legal bond.

A New Dress Reform.

A complete revolution in the world of clothiers and the clothed may be expected when the views expounded by Dr. Jaeger in his book on "Health Culture" begin to be generally acted upon. He advises that all linen and cotton material should be discarded once and forever, whether in the shape of linings, or underclothing, or outer clothing, or even pockets, and that in bedding, too, linen and cotton are equally objectionable from a hygienic point of view. Linen collars are uncompromisingly condemned, and so are linen cuffs which are said to be entirely unnecessary and which in their chilling effect undoubtedly interfere with the proper circulation of the blood in the arms. For collars and cuffs as well as for all other articles of wearing apparel. Dr. Jaeger directs the use of flannel or some other woolen fabric. When the inevitable damage from shrinkage occurs he suggests consolingly that "in any case the owner of a sanitary woolen collar, which has shrunk from repeated washes to impractical dimensions, has the consolation that he has derived from it an important hygienic advantage; and although the collar may be of no further use to him, it may serve for the younger members of the family." And last, but not least, Dr. Jaeger asserts that handkerchiefs, too, should be made of woolen stuffs, and that whoever has once become accustomed to the warm, comfortable, wholesome woolen handkerchief, will never return to the use of its antithesis in linen.

The forest area of the United States is estimated at 481,764,598 acres.