

THE PHOTOGRAPH FOR 1882.

THORNWICK BAY, FLAMBOROUGH. BY G. W. LAMPLUGH.

THE Photograph for this year is an excellent view of THORNWICK BAY, a little inlet on the northern side of Flamborough Head. The spectator is standing under the shadow of the cliffs on the west side of the "Bay," and looks due east across to the opposite headland.

The height of this headland is 150 feet. As will be seen, it is thoroughly riddled with caves and gullies, there being no less than seven caverns within the limits seen in the photograph,—and two long deep gullies which were probably once arched caves like the others. They are generally excavated along master-joints.

It is low-tide, and the beach in the foreground is strewn with rough blocks of chalk from the cliffs, with a thin scattering of darker transported masses from the boulder-clay; all covered with a plenteous growth of sea-weed, except near high-water mark. The weed is chiefly, but by no means wholly, the common Bladder-wrack (*Fucus vesiculosus*).

The headland shows hard flinty chalk, capped with glacial drift of considerable thickness.

The Chalk contains much flint in irregular nodular layers; fossils are of rare occurrence,—here and there a large *Inoceramus* (*I. Cuvieri*?), an Echinoderm crushed beyond recognition, or a small *Terebratula*. The chalk dips gently south. The darker tint of the rock at the base of the cliff, within reach of the waves, is due to weathering and organic growth, and marks the limit of high tide.

The Drift is, as usual, complicated and variable, but the following section may be made out :—

- At the top, 1.—Red boulder-clay (about 10 feet).
 2.—Drift Gravel, very intermittent.
 3.—Thick greenish or greyish boulder-clay, full of small pebbles but with a few large stones: often showing indistinct bedding, and appearing to pass into the gravel above and below it: fragments of marine shells plentiful in places.
 4.—Drift gravel and sand; not seen on the headland, but well developed in the cliff near the middle of the bay.
 5.—Fine angular chalky gravel or "wash" (possibly pre-glacial).
 6.—Hard flinty chalk.

Though the beds above the chalk vary considerably both in thickness and composition, this section may be taken as a type of the geological structure of Flamborough Head.

I suppose the shape of The Head,—a blunted triangle, almost a cone, with its apex pointing due east, is known to all who will look on this picture. The cliff-line which forms its southern boundary, commencing near Bridlington and running east and east-north-east for five miles before the eastermost point is reached, pursues throughout a tolerably even course. But as soon as the projection is rounded and the coast faces north, a great and sudden change takes place, and the cliffs are indented and broken to such a degree, that from the Light-houses (which stand on the extremity) to the scene of the photograph, and for a little way beyond,—a distance in all of nearly three miles—the shore presents one long series of grand coast pictures, and we pass, step by step (where the tide allows), through caves and arches; into bays, and gullies, and nooks of ever-varying outline, with crannies and recesses innumerable; whilst here and there a massive rock-pillar stands sentinel-like apart. Add to this a clear and rollicking sea, dotted with many sail—one or two large steamers passing, no doubt, almost within hail—and occasional glimpses of the bold headlands of the coast-line stretching northward to Whitby—and you have, I think, as glorious a view as any on our Yorkshire coast.

Where the cliff is thus broken, its height nowhere exceeds 150

feet, but as we follow its course westward, it resumes its regularity, and rises somewhat swiftly to 250 feet, and then more slowly, till at Speeton, about five miles from Thornwick Bay, where the coast-line swerves northward and thus marks out the headland, the total height of the cliff is 444 feet.

The sudden change in the character of the coast at the easternmost point is not difficult to explain, and is due to more causes than one.

In the first place, the force of the sea is far greater on the exposed north than on the sheltered south side of the headland, and a violent tide-course also strikes it and is deflected eastward.

Then the upper flintless chalk,* which forms the cliffs between Bridlington and Flamborough, is soft and shattered, and yields readily to the waves all along the line ; but at the headland, flints put in an appearance, and the chalk becomes extremely hard and unyielding, and withstands the attack of the sea so well, that differences of resisting power have time to produce great results, and all the weak points, along joints, or where the beds are crumpled or shattered, are carved out.

There is still another cause. It will be noticed in the photograph that the old chalk surface below the drifts slopes inland, so that while the chalk is 90 or 100 feet thick on the headland, it is not more than 8 or 10 feet in the recess, part of this decrease, however, being due to the rise of the beach. This is really the northern slope of a valley which, in pre-glacial times, has run almost parallel with, and at no great distance from, the present cliff-line. This valley, which has been filled with drift and nearly obliterated during the Glacial Period, follows the northern coast-line of The Head to its extremity, and there runs out, being cut across where the cliff swerves south-west for Bridlington. Lateral feeders seem to have run into it from the north-east ; indicating a wide extension of land in that direction.

This old valley causes some of the finest features of the coast,

* This upper chalk contains a fair number of fossils, chiefly sponges.

for when the sea tunnels back into its weathered slopes, they yield readily, and in two cases the waves have actually burst through into the drifts which fill the hollow, and as these have been of course readily scooped out, circular chasms—pot-holes in fact—have been formed in both cases, some little distance from the cliff. One of these is small enough to act as a “blow-hole” in rough weather, the sea choking up the vent till the imprisoned air bursts out with much noise, driving upward a cloud of spray.

There are a few lateral crevices, connected with caves, that “blow” in the same way. Goethe must have seen something like this :—

“*Und die langen Felsennasen*

Wie sie schnarchen, wie sie blasen !”*(*Walpurgisnacht*).

After all, I cannot tell which is the finer picture—the fantastic ruggedness of this part of the coast, or the simple grandeur of the precipice beyond, where the great grey cliffs hang in a straight unbroken wall above the waves that lap and lash far below.

There, in the spring and early summer, countless swarms of sea-birds take up their abode—guillemot, razorbill, puffin and kittiwake—and pass continually in and out, like bees to a hive.

Not always is this little bay so bright and pleasant as you see it here, for—

“Sometimes the sea takes a passionate tone
And roars and raves in an angry mood.”

Even while I write such a mood has come upon it, and this is what has taken place on the very spot :—

The schooner *Cheval de Troie*, of Guernsey, Captain Marriette, with a crew of six, bound for Shields from Dover, in ballast, was caught in the gale and snowstorm of December 6th, off Flamborough Head and driven unobserved on these rocks.† Her crew

* “The giant-snouted crags, ho! ho!

How they snort, and how they blow!”—*Shelley's Translation*.

† From the wreckage brought ashore she seems to have first struck close to where the boat is seen in the left foreground of the photograph, and afterward to have shifted a little further west.

having lost all reckoning and not being able to see a cables-length ahead, had already taken to the rigging when the vessel struck; and one, Nicholas Williams, who was above the others, was flung off into the sea by the shock. He lost consciousness, but was no doubt carried directly ashore. When he gained his feet and looked towards the ship, he saw that her masts had gone over the side, and her hull also immediately broke up, and disappeared. Of the rest of the crew he saw nothing. He was much bruised and exhausted, but made his way up the cliff and reached a farm house not far inland, carrying the first and only news of the disaster.

A little later in the day, the large collier steamer, *Black Diamond*, went ashore three miles further south. Her crew of sixteen were saved by the coast guards by means of the rocket-lines.

Such is an oft repeated chapter in the history of these pleasant cliffs.

ON SOME SECTIONS EXPOSED DURING THE FORMATION OF
THE LINE OF RAILWAY BETWEEN UPTON AND KIRK
SMEATON. BY JAMES W. DAVIS, F.G.S.

THE new line of railway at present in course of construction between Hull and Barnsley has exposed many sections of considerable geological interest. Amongst the most interesting is an exposure in the cuttings and tunnel near Kirk Smeaton, showing the junction of the coal measures with the superimposed magnesian limestone. The number of sections exhibiting the same arrangement are not very numerous. An instance occurs at Conisborough Castle where an outlier of sandstone forms a hill which is covered with Permian Limestone on which the castle is built. At Bramham Park, Knaresborough, and some other places, similar sections occur. In some sections the limestone rests on sandstone, and in others, on members of the coal measure series,