

and shingle, forming an undercliff carriage-way into Dover some thirty years back, has now entirely disappeared.

We may be asked to suggest a remedy, but this, perhaps, is beyond the province of this Memorandum; but as regards the old stereotyped plan of building a solid pier out from the shore, for communication therewith from vessels, or for protection of the outfall of a tidal river, it has been suggested that there are numerous cases, where a moving beach has to be crossed, that it would be better to commence the solid work altogether seaward of the shingle "fulls," and connect it with open piling to the shore, and so as to leave the littoral movement of beach uninterfered with.

As respects groynes, there is hardly a watering-place on our southern coast where they have not become a burning *vexata quæstio* of the day, and at most of them illustrate the suggestion made more than thirty years back, that groynes cut up a shore into a multitude of bays, with a repletion of material on one side and deep water on the other, and would have had a better substitute in a sea-wall that allowed the shingle to pass freely backwards and forwards along its face. Such was the experience with the frontage of Romney Marsh, defended by Dymchurch sea-wall, $3\frac{1}{4}$ miles in length, where the old system of groynes, which cut up the frontage into an interminable number of bays, was abandoned about forty years back in favour of the present stone slope.

The system of groynes at Brighton, for some isolated points, appeared to have answered well when the supply arriving at that town of shingle from the westward was uninterfered with, but a change occurs when the system was continued to Hove, or West Brighton, in thickening quantities. The material arriving was a constantly diminishing one, from the fact that the Shoreham Gas Works, erected under an Act of Parliament on the "live" beach between the harbour and the sea, were found to stand upon a somewhat unstable base, with a fickle sea defence, unless supplemented by artificial works. Groynes on an extended scale were erected, which treated West Brighton in the same ungenerous spirit entertained in former days for Rottingdean, for the sake of and advantage of Kemp Town. The encroachment of the sea to the leeward side of the groynes, on the esplanade lawns, has necessitated the erection of an esplanade wall.

NOTICES OF MEMOIRS.

Brief Notices of Papers Read before Section C. Geology, British Association Meeting, Aberdeen, 1885.

I.—THE CHASM CALLED THE BLACK ROCK OF KILTEARN.

By WILLIAM WATSON.

THIS is a narrow ravine in conglomerate: its length is about $1\frac{1}{4}$ mile; its depth varies from 100 to 130 feet; its breadth at the top varies from 12 to 15 to about 30 feet. The river which flows through the ravine is the Alt-Gránda; it drains Glen Glass (above the ravine); the water flows into Cromarty Firth.

The author refers to popular views held to explain the formation of the ravine—earthquakes and fracture—and shows that these are inadequate. The ravine has clearly been produced by erosion, of which the marks are still visible on the sides; the difficulty is to explain how erosion could have produced a gorge of this kind without weathering action and floods having denuded the sides.

Above the gorge in Glen Glass was once a lake. This had been silted up to the height of about 80 feet with sand, washed out of the Glacial *débris* of the glen. When the barrier that confined the lake gave way, the river flowed over the surface of the conglomerate, carrying with it much sand from the lake silt, and using this as a means of rapidly eroding the rock. When the chasm was deep enough to prevent the floods from overflowing the banks, the sides could not be widened to any great extent. The disproportion between the deepening and widening process has been maintained, thus causing the steep-sided narrow glen. The excavation now going on is small, whilst the weather has some effect on the sides; so that ultimately there will be produced an ordinary valley.

II.—NOTICE OF AN OUTLINE GEOLOGICAL MAP OF LOWER EGYPT, ARABIA PETRÆA, AND PALESTINE.

By Prof. EDWARD HULL, LL.D., F.R.S., F.G.S.

THE map exhibited was enlarged from that which accompanies the author's book "Mount Seir, Sinai, and Western Palestine," giving a narrative of the expedition sent out into these countries by the Palestine Exploration Society in 1883-84. It embraces a region extending from the valley of the Nile on the west to the table-land of Edom (Mount Seir) and Moab, including the Jordan, Arabah Valley, and the mountains of Sinai. Its northern limit is the Lebanon. The following formations and divisions are represented:—

RECENT.	{	1. Sandhills of Lower Egypt, the coast of Palestine, and Arabah Valley.
	{	2. Alluvial Deposits of the Nile, the Ghor, and Jordan Valley.
	{	3. Gravel of the Wâdy el Arabah.
RECENT AND POST-PLIOCENE TO PLIOCENE.	{	1. Raised Beaches bordering the Gulfs of Suez and Akabah, the Isthmus of Suez, and borders of Palestine.
	{	2. Ancient Deposits of the Salt Sea (Dead Sea).
	{	3. Old Lake-beds of the Sinaitic Peninsula and Arabah Valley.
EOCENE TO CRETACEOUS.	{	1. <i>Upper Eocene.</i> Calcareous Sandstone of Philistia.
	{	2. <i>Middle and Lower Eocene.</i> Nummulite Limestone.
	{	3. <i>Upper Cretaceous.</i> Cretaceous Limestone.
	{	4. <i>Cenomanian.</i> Nubian Sandstone.
LOWER CARBONIFEROUS.	{	1. Limestone of Wâdy Nasb.
	{	2. Desert Sandstone and Conglomerate.
METAMORPHIC ROCKS (Archaean?).	{	Granite, Gneiss, and various kinds of Schist.
MODERN VOLCANIC ROCKS.	{	Basalt, Dolerite, etc.
ANCIENT VOLCANIC OR PLUTONIC ROCKS.	{	Granite, Porphyry, Felstone, Diorite, etc.
	{	Beds of Tuff and Agglomerate of Wâdy Haroun and Jebel esh Shomrah.