

angular flints and broken flints. Such a deposit was evidently formed by a stream due to melting of the débris-laden ice, and its chalky constituents have been preserved owing to the protection afforded by the Boulder-clay, for as a rule the Glacial gravels are decalcified.

It is from beds of this nature in the Boulder-clay that supplies of water are sometimes met with by well-sinkers.

The cutting extended about 15 chains, and in its highest part was about 25 feet above the rails.

NOTICES OF MEMOIRS.

I.—THE GOLD FIELDS OF WAINAD, IN SOUTHERN INDIA. By H. H. HAYDEN, B.A., F.G.S., and F. H. HATCH, Ph.D., F.G.S. *Memoirs of the Geological Survey of India.* 8vo; vol. xxxiii, pp. 48, with seven plates. (Calcutta, 1901.)

THE Geological Survey of India have issued a memoir dealing with the goldfields of Wainad in the Malabar District. Mining operations having been recently abandoned as unproductive, and reports by previous experts on their value being conflicting, a more exhaustive mineral survey than any hitherto undertaken was made by Mr. H. H. Hayden and Dr. F. H. Hatch, the services of the latter as a mining specialist being temporarily secured by the Indian Government. Typical reefs having been selected, their systematic examination was proceeded with, and numerous specimens obtained at fixed intervals were analyzed at Calcutta. The results of the analyses, averaging about 2 dwt. of gold to the ton, are disappointing, and corroborate the opinion formed on the ground that the grade of ore is too low to justify the further exploitation of the district. The region furnishes a striking example of the unreliability of old native workings as a safe criterion of the existence of payable metal. With the employment of forced labour along surface outcrops and the use of primitive machinery the cost of production is necessarily reduced to a minimum, and the popular idea that the crude methods of the ancients necessitated the presence of high-grade ore is a fallacy that should be taken to heart by investors in other parts of the world at present under exploitation. J. B. H.

II.—PERIM ISLAND AND ITS RELATIONS TO THE AREA OF THE RED SEA. By CATHERINE A. RAISIN, D.Sc.¹

THIS paper describes briefly rock specimens from Perim Island collected and placed at the disposal of the authoress by Captain J. A. Rupert Jones, now stationed at Aden.

The island, as shown in the Admiralty chart, has somewhat of a horseshoe shape, enclosing a harbour opening to the south. Low plains, less than 12 feet above sea-level, extend in from the coast, especially at the north, and consist of raised beaches, but most of the southern and eastern parts are hilly, reaching 249 feet at the highest point.

¹ Read before the British Association, Section C (Geology), Glasgow, Sept., 1901.

The specimens sent are all from volcanic rocks. The surface, according to Captain Rupert Jones, is composed mostly, to a depth of about 7 feet, of loose blocks (4 feet or less in diameter), often imbedded in calcareous sand or mud. The underlying rock is exposed in cliffs and in quarries, and occurs generally in roughly horizontal layers. One mass *in situ* (near Balfe Point) is a not very basic basalt (almost an andesite) crowded with felspar microliths with marked fluidal orientation, and is probably a lava-flow. Another reddish rock with scattered rounded vesicles (from a cliff north-east of the harbour) approaches a microcrystalline basalt in character, and consists of much plagioclase, clear gum-like augite, some red-brown ferruginous olivine or pyroxene, and a little black speckled glassy base. In another spot (near Balfe Point) a whitish tuff or fine agglomerate is quarried, and consists largely of fragments of pumice with some broken felspar, augite, and other crystals.

The surface blocks in one or two examples consist of fragmental rocks. One is a red, more basic tuff, containing thin black streaks, apparently of a spherulitic glass. The blocks, however, are mostly scoriaceous and vesicular, petrologically generally basaltic, and similar to the underlying rocks described above, but with some variation, as if they might represent a broken lava crust. They are crossed by veins of calcite, and the ashy materials and other fragments are often cemented by calcareous deposits.

The history of Perim Island belongs mainly to the Tertiary era. We may infer that the Red Sea, from its general contours and the steep descent of the bed towards a central depression, forms part of the Great Rift Valley, extending from Lake Tanganyika to the Jordan, along which at so many places volcanic outbursts on a large scale have occurred. Both in Arabia and in Abyssinia extensive tracts of volcanic rocks are found of more than one period. The rocks of Perim belong probably to the later or so-called Aden group. The raised beaches of the island are an evidence of oscillations of level, which are proved by upraised and submerged coral reefs to have affected other parts of the Red Sea. Denudation and weathering of the surface took place, and calcareous sediment was deposited, while at different times coral reefs became established in the adjacent shallow seas.

R E V I E W S.

- I.—CATALOGUE OF THE FOSSIL FISHES IN THE BRITISH MUSEUM (NATURAL HISTORY). By ARTHUR SMITH WOODWARD, LL.D., F.R.S., F.G.S. Part IV: pp. xxxix, 636, with 19 Plates and 22 Figures. 8vo. (London, 1901.)

DR. A. SMITH WOODWARD and the British Museum are to be congratulated on the completion of this important memoir on Fossil Fishes, the fourth volume of which has been for long anxiously expected by all Ichthyologists. For those specially at work among the fossil forms, it will be a welcome and an indispensable