

As an example of possible improvement, we may take the charts showing the fluctuations in the relative values of silver and gold. There are four such charts scattered in various parts of the book, without any apparent connecting-link.

The work is altogether so suggestive, that those who agree, as well as those who disagree, with the author's views, will find ample food for thought in reading it. The ground covered is so wide and the treatment so uniform, that it is scarcely possible to select one passage for comment rather than a score of others. It may be remarked, however, that the author's views of the ethical question involved in the monetary change of 1834 coincide more nearly with those of the advocates of free silver coinage at the present time, than we like to see. Up to 1834 our currency was on an almost pure silver basis, as the value of the gold in the gold dollar was a little greater than that of the silver in a silver dollar. In order to bring gold into circulation, it was necessary to change the ratio, which might be done either by increasing the weight of the silver dollar or diminishing that of the gold dollar. The latter course was adopted, on the ground, that, as silver was the standard at the time, the new coinage of gold should be accommodated to it. Professor Laughlin objects to this, that in reality the change in the marked ratio before 1834, which necessitated the new ratio, consisted in a depreciation of the value of silver; and that in consequence it was the silver dollar which should have been made heavier in order to bring it up to the old standard. This is the very argument on which the silver men now sustain their views. They claim that gold has appreciated in value, and that we should go back to the old silver dollar, the value of which they believe to have been more stable than that of the gold dollar. In either case, we think the sound view to be that the standard for the time being should be accepted rather than that of some past time.

#### GEOLOGY OF ARABIA AND PALESTINE.

IN 1883 the committee of the Palestine exploration fund wisely took advantage of an interruption of its regular work caused by the interference of the Turkish government to send Professor Hull, with a well-selected party, to explore some of the less-known districts of Arabia Petraea and southern Palestine,—regions of interest not merely geologically, but historically as well.

The route of the party extended through the Sinaitic peninsula, and thence into the Wady

Arabah and to the southern end of the Dead Sea, then over the Judean hills to Gaza, and from this place to Joppa, Jerusalem, and the Jordan valley. The intention to explore farther north was frustrated by the snow of an unusually severe winter. The exploration was thus somewhat limited in its range; but Professor Hull has supplemented it by references to the works of the numerous geologists who have at various times studied the rocks of the districts traversed, and of the adjacent regions around the eastern end of the Mediterranean, which have many points in common.

Geologically considered, the district in question is part of an extensive region of western Asia and northern Africa, characterized by the wide distribution of cretaceous and eocene marine limestones resting on old and for the most part crystalline rocks, and in part overlaid and margined by very recent deposits.

The old gneisses and schists penetrated by great dikes and masses of intrusive granite and diorite, which constitute the mass of the Sinaitic Mountains, and extend thence along the Gulf of Akabah and the Wady Arabah, are similar in mineral characters to the Laurentian rocks of this continent; and Hull agrees with Oscar Fraas and the writer of this notice in referring them and similar rocks of upper Egypt to that ancient system. Thus we have the interesting fact that the nucleus of the old historic lands of Egypt and Arabia is composed of the same venerable rocks which occupy a similar place in northern Europe and in North America. Flanking these oldest rocks, there seem to be in Arabia, as in Egypt, newer slates and schists and igneous rocks, probably of Huronian or old Cambrian date.

Here, however, there occurs a great gap in the sequence, and we find nothing to represent the Siluro-Cambrian, Silurian, or Devonian systems; the next rocks in ascending order being sandstones, conglomerates, and limestones, the 'desert sandstone' of our author, which hold carboniferous fossils. These beds are not of great thickness or horizontal extent, but afford unequivocal evidence of their age in the fossils of the genera *Zaphrentes*, *Productus*, *Orthis*, etc., which they have afforded. A true lepidodendron has also been obtained from the sandstone.

Until recently these carboniferous rocks were confounded with an overlying sandstone of somewhat similar character, but of much greater thickness,—the Nubian sandstone, which is probably of lower cretaceous age, though it is by no means certain that it may not represent the Jurassic or even the trias. The relations of these sandstones, both in Arabia and Egypt, are somewhat perplex-

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ing, as they cannot be distinguished by mineral characters; and both are usually at low angles of inclination, while fossils are rare. It would seem probable that the conditions of deposit which prevailed in the carboniferous recurred at the commencement of the cretaceous, after a long continental interval.

The most important formation in Palestine is the great cretaceous limestone, overlying the Nubian sandstone, and constituting the mass of the hills of Judea, Samaria, and Galilee, while it extends northward into the Lebanon, and spreads itself on the south in the plateau of the Tih. This great calcareous formation corresponds in age to the chalk of Europe, and must be at least two thousand feet in thickness. Some difficulty has occurred in separating it from the Jurassic beds which underlie it in Hermon and Anti-Libanus, and from the eocene limestones which rest upon it in some parts of Palestine, and more extensively in Egypt. Our author does not deal very definitely with these questions, and indeed the sphere of his explorations was too limited to render this possible, except in the way of collating authorities.

The later tertiary deposits are not conspicuous in Palestine. Our author regards the calcareous sandstones of Philistia as being probably upper eocene; but the evidence which he adduces is not at all conclusive, and there seems quite as much reason to believe them to be a continuation of the miocene beds of the Isthmus of Suez, or probably of the still later isthmian series of that district. The evidence of fossils is wanting; and I am not aware of any miocene fossils in Syria, except perhaps in the conglomerates resting on the cretaceous in the vicinity of Tahleh in the Lebanon. On the whole, there can be little doubt that, as Hull believes, the miocene tertiary was in this region a time of shallowing water and of prevailing land conditions. This is well illustrated by the sandstones of Jebel Ahmar, near Cairo, and their petrified forests.

A number of interesting questions connect themselves with the great submergence of northern Africa and western Asia in the early pleistocene age, when Asia and Africa were separated by a wide channel, the valley of the Nile was an arm of the sea, the coast districts of Palestine were submerged, and a great lake or inlet occupied the Jordan valley. Hull illustrates this with a map showing the probable geography of this period. It is equally certain that this submergence was succeeded in the later pleistocene or post-glacial period by an elevation of the land, when an inland lake receiving the waters of the Nile seems to have existed on the present isthmus. It is this second continental period which is con-

nected with the first appearance of remains of man, — a subject in regard to which nothing new seems to have been observed. Other points of interest, and which Hull discusses at some length, are the great Jordan valley fault, throwing down the basin of the Dead Sea to a depth of 1,290 feet below the Mediterranean. The remarkable geographical features resulting from this great dislocation, the old marginal deposits of the Dead Sea, the hot springs on its borders, the salinity of its water, its climatic conditions, and its historical associations would open a field so large, that another article would be required for their discussion, more especially as there are points on which some difference of opinion may well exist.

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THE collections made in the Bahama Islands by the naturalists of the fish-commission steamer Albatross contain several new species of birds and reptiles. There are two new woodpeckers of the genus *Centurus*, from the islands of Abaco and Watlings, or San Salvador, and two new warblers of the genus *Geothlypis* from Abaco and New Providence, while there are possibly some new races to be described also. Kirtland's warbler (*Dendroeca Kirtlandi*) was found on Watlings, Abaco, and Green Cay. Probably not more than half a dozen specimens of this species have hitherto been known. Another rarity was the Bahama cuckoo (*Saurathera bahamensis*), of which four specimens were obtained on New Providence Island. An apparently new species of blind worm (a peculiar family of snakes resembling worms, and covered with fish-like scales) is interesting as coming from a more northerly latitude than animals of this kind have yet been found in, having never before been taken in the Bahamas. The iguana was found in limited numbers on San Salvador. It is not known to exist on any other islands of this group except Andross. There are several valuable snakes in the collection, one being a very rare boa five or six feet long, from New Providence. There are many new species of lizards from Abaco and elsewhere. These shore collections were gathered at such times as the vessel anchored at suitable places, and are quite distinct from the dredging of fishes and marine invertebrates, the usual work of the vessel. There is the usual variety of undescribed and interesting material of the latter class, which appears to be inexhaustible. The winter cruises of the Albatross are undertaken with the co-operation of the fish commission and the hydrographic office, on account of the extensive series of deep-sea soundings that are taken for the latter department, and have proved of great value to this service.