

has led Th. Fischer to include Tunis in the lists of rising coasts, with Sicily, Sardinia, and South-Eastern France. Dr. J. Partsch, of Breslau, questions this conclusion, and alleges the cause to be delta growth in combination with wind action, by which sand has been blown inland from the shore (*Science*, vol. ii, p. 142). The position of Dr. Partsch seems refuted by the same arguments used by Reclus, in the case of Sicily and coasts of Italy, Greece, Malta, Rhodes, Cyprus, Crete, Asia Minor, Lisbon, Issa, Antissa, etc. In all these cases the silt carried by the rivers is entirely inadequate to explain the facts; it is necessary, therefore, to invoke either upheaval of the ground or recession of the sea (see "The Earth," p. 542).

"The Cimbric Deluge (submergence of Jutland) is supposed to have happened about three centuries before the Christian era" ("Principles," 9th ed., p. 331). A portion of the walls of the city of Utica washed by the sea at siege by Scipio Africanus about 205 B.C. (Livy, Book xxix, chap. 34). Sea now many miles distant. "Scipio was obliged to transfer his camp to an adjoining tongue of land (Ghella), then washed by the sea, but now far inland, which was known for centuries afterwards as the Castra Cornelia. So ended the year B.C. 204" ("Carthage and the Carthaginians," p. 296). Lake Mareotis in the time of Alexander the Great a large body of water navigable for the largest vessels, but now little more than a swamp (Professor Wheeler in *Century Mag.*, May, 1899, p. 28). In the time of Alexander great inundations in Aram (Arabia) compelled eight tribes to fly their dwellings in Yemen and migrate to other lands ("The Cottage Cyclopaedia," p. 61). Helice and Bura in Greece were swallowed up by the sea during an earthquake in 373 B.C. ("The International Atlas," p. 11). At the capture of Tarentum by Hannibal, about 213 B.C., the sea washed the greater part of the citadel (Livy, Book xxv, chap. 11).

#### NOTICES OF MEMOIRS.

I.—PETROLEUM IN CALIFORNIA. Professor E. W. CLAYPOLE: *The American Geologist*, vol. xxvii, pp. 150-159, March, 1901.

THE Californian oil-wells supplied the amount of 12,000 barrels in 1870; but a progressively larger quantity has been obtained, until in 1899 it was 2,665,709 barrels. It is remarkable that the wells are relatively shallow, and that none of the oil-bearing strata are older than the Cretaceous age: thus, at Stockton they are Quaternary; at Puente, Los Angeles, and Kern Co. they are Pliocene; at Ventura, Los Angeles, Kern Co., and Newhall they are Miocene; at Ventura, Fresno, and Kern Co., Eocene; at Colusa Co. and Sacramento Valley they are of Cretaceous age. The strata of California have been greatly disturbed in comparatively recent times. The final elevation of the Sierra Nevada and the Coast-range is apparently of not earlier date than the Pliocene period. The oil-bearing beds usually consist of sandstone interlaminated with

shale; and is chiefly stored in the former. Professor Claypole states that the anticlinal theory explained by Professor I. C. White in Pennsylvania holds good for California. —T. R. J.

II. — MARYLAND GEOLOGICAL SURVEY: ALLEGHANY COUNTY. (Baltimore, 1900, pp. 323.) — William Bullock Clarke and his staff have produced one of those interesting volumes we are so accustomed to see from the United States, and which are so well printed in comparison with those published by our own Government. The *Physiography*, by Cleveland Abbe, is illustrated by a photograph of a model of the county, from which the student can see at a glance the general features of the land, and thus clearly follow the descriptions of the author. Next comes the *Geology*, by C. C. O'Harra. This includes Silurian to Permian beds overlain by alluvial and other late deposits. The *Minerals, Soils, Climate, Hydrography, Magnetics, Forests, Flora, and Fauna* are all treated of in detail. The whole is illustrated in the usual manner by excellent reproductions from photographs, and a bibliography of 175 items is furnished. Among the maps provided are, one showing the wooded areas, another showing the magnetic declination, and a third showing structural sections. These latter are geological sections across the county at regular intervals, and give the reader a better idea of the features than pages of descriptive writing. A good index completes the volume.

III. — THE CARBONIFEROUS SYSTEM IN EASTERN CANADA.— Dr. H. M. Ami writes in the *Trans. Nova Scotia Inst. Sci.*, vol. x, on the subdivisions of the Carboniferous system in Eastern Canada, with special reference to the position of the Union and Riversdale formations of Nova Scotia, referred to the Devonian system by some Canadian geologists. He discusses the evidence afforded from a study of plant and animal life, and of the marine sediments. He has come to the conclusion that the two formations mentioned above belong properly to the earliest times of the Carboniferous, and proposes to include them in that system under the name of Eo-Carboniferous. Dr. Ami seems to have taken a good deal of trouble in arriving at his conclusions, and has submitted collections of the fauna and flora to certain specialists so as to get independent opinion as to their several ages.

IV. — EDINBURGH GEOLOGICAL SOCIETY. (Transactions, 1901, vol. viii, pt. 1.)—Petrology is to the fore in this part. Kynaston has a paper on contact metamorphism round the Cheviot Granite, and writes on Tuffs associated with the Andesite Lavas of Lorne. Mackie gives seventy analyses of rocks chiefly from the Moray area, and has a paper on differences in chemical composition between the central and marginal zones of granite veins, with further evidences of exchanges between such veins and the contact rocks. Hinxman describes spherulitic felsite from Glen Feshie. Stratigraphy is handled by Goodchild, who deals with recent exposures of rock in Edinburgh, one section being under the site of the new offices of

the *Scotsman*; by Wallace, who writes on the geology of Strathdearn; Kirkby, on Lower Carboniferous of Randerstone in Fife; and Cadell, on the geology of the oil shales of the Lothians. Jessen, of the Geological Survey of Denmark, has an interesting paper on the Pleistocene shell-bearing clays in Kintyre, clays which were investigated by a committee of the British Association in 1895-6. Palæontology is poorly represented: Kirkby deals with Ostracoda from the *Scotsman* section mentioned above, but nothing new is recorded; Simpson and Hepburn write on mammalian bones found during excavations at Hailes Quarry, near Edinburgh. These consist of fragments referable to red deer, horse, ox, goat, and field-vole. Mr. James Simpson, who died before the publication of his paper, receives a sympathetic notice from his colleague. Some notes on the distribution of erratics over Eastern Moray, by Mackie, concludes the contents of this part.

V.—JOURNAL OF THE GEOLOGICAL SOCIETY OF TOKYO: vol. viii, No. 89, Feb. 20th, 2561.—Things move fast in Japan; here we are still in the twentieth century. The publications of the Japanese Survey are too well known to require mention to the readers of the GEOLOGICAL MAGAZINE, but we may certainly call attention to the opening of the twelfth volume of the Journal of the Geological Society of Tokyo. The Journal, which, with the exception of the "Table of Contents" upon page 1 of the cover, is all printed in the usual Japanese characters, opens with "A Geological Disturbance near Handayama," by K. Inoue, but from the text we are uncertain whether or not it was of Old Red Sandstone age. Mr. Iki has a paper on the geology of the Middle Kiushiu, and Hirabayashi writes on the province Kian Si. The Shidara Tertiary Basin in Mikawa is continued from the last part by Ishikawa, and Yoshida contains his report on the southern part of Higo. Those suffering from Ammonititis will find a fascinating paper on the Genealogy of the Genera *Puzosia* and *Desmoceras* by H. Yabe. In this paper full justice is done to previous authors, the various species are discussed and grouped, and their development carefully considered. Perhaps to a Western eye the relationships of the various characters seem a little mixed, but they are very clearly printed.

VI.—GEOLOGY OF HAWAII.—As might be expected, the newly annexed Hawaiian Islands have been descended upon by United States geologists, and we have for notice a report by C. H. Hitchcock on the geology of Oahu. This was read before the Geological Society of America, August 22nd, 1899, and issued in the *Bulletin* February, 1901. The author can scarcely complain of hasty publication. Naturally the bulk of the geology is volcanic, but there is an interesting chapter on certain calcareous and tuffaceous beds near Diamond Head, by W. H. Dall. Dr. Dall considers the conditions to be incompatible with the reference of these fossiliferous beds to a period as late as the Pleistocene, but the fossils have every characteristic of those generally assigned to the Pliocene or Upper Miocene in their general aspect and state of fossilization. There is

a breccia in the same locality, 25 feet thick, which is full of fossil land-shells, all such as have their representatives in the valleys of Oahu, though some of the species may be extinct. Professor Lyons, who first noticed these shells, concludes that "the fossils belong to a period previous to that of the receding of the ocean to its present level. That event may have been coetaneous with the change of level in the circumpolar area which marked the close of the great Glacial period, and the evidences that our climate was, previously to that time, more humid than at present, are confirmatory of that view." Towards the north there is a ledge of coral 79 feet above the sea, at Kahe, and 730 feet distant from the water, south of Puu o Hulu, he mentions another ledge 56 feet above the sea and a quarter of a mile inland. At the south end of the ridge, called Maililili, the limestone reaches the height of 81 feet; and at other localities on the coast, limited areas of the same substance more or less elevated have been observed. The volcanic areas are fully described and illustrated.

VII.—GLACIATION IN SOUTH AFRICA.—The Orange River Ground Moraine forms the subject of a communication to the Transactions of the Philosophical Society of South Africa (vol. xi, pt. 2, Sept., 1900), from the pen of A. W. Rogers and E. H. L. Schwarz. They give four excellent photographs. The deposit covers a wide area in the Prieska and Hope Town divisions of the Colony, and consists of a peculiar conglomerate, first noticed by Wyley in 1859. The authors arrive at the following conclusions:—"The appearances seen in the three localities, Jackal's Water, Klein Modder Fontein, and Vilet's Kuil, at considerable distances apart, can be satisfactorily explained only on the supposition that the country was traversed by land-ice; and the presence of the till-like variety of the conglomerate in the same district, probably about the same localities, confirms that explanation. Unfortunately the exact nature of the conglomerate at the three localities is unknown, that is, whether it is a true till or whether it is a stratified rock with glaciated pebbles. We only know that the rock contains numerous scratched pebbles and boulders; but this is a small point and does not affect the confirmation. It is evident that the country was depressed under water after the formation of the till of Prieska, and it is quite possible that sedimentary rocks were deposited on a floor consisting partly of till and partly of the floor from which the soft till had been removed, or on which no accumulation had taken place."

VIII.—GEOLOGY OF INDIA.—From the "General Report on the work carried on by the Geological Survey of India for the period from the 1st of April, 1899, to the 31st of March, 1900," we gather a favourable impression of progress. In the Museum the minerals have been rearranged and the rock collections put in stratigraphical order in accordance with the new edition of the "Manual of Indian Geology." A large amount of time was occupied by the preparation of the specimens for the Exposition at Paris, which were placed in the charge of Mr. T. R. Blyth. The palæontological work of the

year is as follows :—Dr. Noetling has finished the Miocene fossils of Burmah, a work which has proved that an intimate connection must have existed between the Eocene fauna of Europe and the Miocene of Burmah, a connection which can only be explained by the theory of a migration of species from west to east, which commenced with the Eocene period and lasted probably up to quite recent times. Dr. Noetling also made a magnificent collection of Permian and Triassic fossils from the Salt Range and from the Tertiary of Sind. Dr. Krafft made an examination of the Triassic fossils of the Himalayas. These consist for the greater part of Cephalopods, and include representatives of the whole series of the Trias. The chief stratigraphical result to which these palæontological researches have led is, that the *Otoceras* beds of the Himalayas do not, as was hitherto believed, correspond to the beds at the base of the lower Ceratite marls and the lower Ceratite sandstones, and very probably include also the lower Ceratite limestone; while, on the other hand, the upper division of the Lower Trias of the Himalayas (*'subrobustus* beds, Diener) does not correspond to the whole of the Ceratite sandstones, but merely to the two upper divisions of the same, viz. the *Stachella* beds and the *Flemingites flemingarius* beds. Large collections were made by La Touche, Smith, and Walker from the Kumaon Himalayas, and a quantity of Silurian or Devonian fossils were obtained from the Shan Hills, Burmah, by La Touche, Middlemiss, and Dutta. The economics consist of enquiries into the gold of Burmah and of Southern India, and for this purpose Dr. Hatch was specially appointed for one year on March 31st, 1900. Nothing important as regards coal was done last year, but it is noted that sufficient coal is in sight for the requirements of the Jodhpur-Bikanir Railway for a space of 15 years. Mr. Holland has suggested measures to prevent the occurrence of landslips in Darjeeling in the future, and a good deal of attention has been given to the important subject of irrigation. Reports of the progress made with the surveys of Burmah, the Madras Presidency, Central Provinces, Punjab, Himalayas, Sind, and Baluchistan are included; and special reports on the auriferous reefs of Wainad, by Hayden; the auriferous tract of Wuntho, by Stonier; the Rampur Coalfield, by Reader; Sohagpur Coalfield, by Reader; Geology of the Northern Shan States, by La Touche; Geology of the Mandalay-Kunlon Ferry Railway, by Datta; Southern Shan States, by Middlemiss; Ganjam District, by Smith; Jeypore Zemidari, Vizagapatam, by Walker; Spiti, by Hayden; Mesozoic Rocks of Spiti, by Krafft; and the relationship between the *Productus* Limestone and the Ceratite Formation of the Salt Range, by Noetling, complete this very interesting report.

IX.—FORMER EXTENSION OF RHÆTIC STRATA OVER ARRAN. (Transactions of the Edinburgh Geological Society, vol. viii, pp. 1 and 2.)—Mr. Goodchild contributed a paper dealing with the hæmatite which occurs in the joints of the basalt on the summit and other elevated parts of Arthur's Seat, and gave reasons for regarding it as due to some cause which, in other parts of the Lothians and Fife, has locally stained the Carboniferous rocks various shades of Indian-red,

and has converted the limestones into dolomites. Such effects, he explained, could elsewhere be traced with certainty to ferruginous and magnesian infiltrations, which had soaked down from the New Red rocks into the strata upon which they might happen to lie. He was therefore disposed to refer the hæmatite in question to deposition from such a source, and to regard the summit of Arthur's Seat as the modified descendant of the surface over which, in past times, the New Red rocks had extended.

X.—ANCIENT VOLCANOS IN ARRAN.—On the Upland between Brodick and Drumadoor Bays, in the island of Arran, Messrs. B. N. Peach and W. Grinn, of the Geological Survey, have discovered the site and ruins of a very large volcano, covering an area of seven or eight square miles. It is represented by an accumulation of old scorïæ, broken rocks, and intrusive lavas, such as are usually found in similar basal wrecks of volcanos, whether of Jurassic, Cretaceous, or Tertiary age, in the Hebrides and Western Scotland. In this case, however, Mr. E. T. Newton has detected Rhætic fossils in some of the fragments embedded on the ruined volcano, and constituting the only record of strata once extending from Mull to Antrim. Thus they supply one proof of the enormous denudation which has taken place on the west coast of Scotland during the later part of the Tertiary era.

XI.—GEOLOGY OF INDIA. (Memoirs of the Geological Survey of India, vol. xxx, pt. 2, 1900; vol. xxxiii, pt. 1, 1901.)—The first of these memoirs contains Thomas H. Holland's Geology of the neighbourhood of Salem, Madras Presidency, with special reference to Leschenault de la Tour's observations. Leschenault collected petrological specimens from the district early in the last century (1816–1821), and it seemed desirable to obtain information concerning the geological relations and exact localities of his specimens. Lacroix described the rocks, which are preserved in Paris. They may be divided into (1) fundamental biotite-gneisses, (2) schists, (3) pyroxene-granulites (charnockites), (4) younger igneous intrusions. The exact localities have been traced and the specimens identified. A map accompanies the paper. The second memoir is by F. H. Hatch, and deals with the Kolar Goldfield, with a description of quartz mining and gold recovery as practised in India. The field bears a striking resemblance to the gold districts of Rhodesia. It consists of a belt of schists containing quartz-veins, and is part of the Transition Rocks, separated by Bruce-Foote and given the name of 'Dharwar System.' There is an appendix on the petrology by T. H. Holland.

XII.—FOSSIL FORAMINIFERA OF SERBIA. (Pavlovic, P. S. "Foraminiferi iz drugho-mediteranskikh slojeva u Srbiji paleontologhka studija." Spomenika (being the Trans. Acad. Sci. Belgrade), vol. xxxv, 1900, pp. 61–91.)—Professor Pavlovic is already known to us by a previous publication on the above subject, which appeared in *Ghlasa*, vol. lvi, 1898. This appears to be a report on the II Mediterranean beds, so far as relates to Serbia, and will be of

value for comparison with the fauna of those beds in Austria. Professor Pavlovic has carefully consulted previous authors, and thereby avoided the wholesale founding of new names; but unfortunately he does not figure his new species, and we are not sufficiently acquainted with his language to rightly comprehend his descriptions. We hope that in future he will be able to furnish a German, French, or English translation of the diagnosis of new forms, as otherwise his labours will be a closed book to most. The publications of the Servian Academy contain much important matter on the little-known geology and zoology of the country.

XIII.—GEOLOGY OF EGYPT. (Geological Survey Report, 1899, pt. ii. Survey Department, Public Works Ministry. Cairo, 1900.<sup>1</sup> "Kharga Oasis: its Topography and Geology." By John Ball. 116 pp., 19 maps and plates.)—This is the second of a series of reports on districts in Egypt, the first of which has not yet reached us. The district dealt with lies between the parallels of 26° and 24° north latitude, to the west of the Nile. The geological formations met with are the Cretaceous, represented by Nubian Sandstone and clays, *Exogyra Overwegi* series, 'Ash-grey Clays,' White Chalk with *Ananchytes ovata*; Eocene, represented by Esna shales, *Lucina thebaica* and *Operculina libyca* limestones, Upper Limestone; Pleistocene and Recent, calcareous tufa and sand dunes. The topography of the Oasis is described in chapters under the general headings of "The Limiting Escarpments," "The Hills within the Oasis," "The Floor of the Oasis, with its Villages and Wells," "Antiquities." Some twenty pages are devoted to the descriptive geology; the Cretaceous beds are correlated with the Senonian (?) and the Upper and Lower Danian; the Eocene beds seem to belong to the lowest fossiliferous beds of the system. Mr. Ball gives an interesting observation on the denuding power of the sand in windy weather: a piece of tin plate exposed for two days had all its tin coating removed, and a bottle was rendered quite dull in the same time by the scratching. Where objects are protected from the sand, as at Dush, where are inscriptions in red ochre on hard white chalk, painted some 1,400 years ago, they remain in perfectly fresh state; rain being unknown, and frost practically so. The maps and sections appear to be excellent, and the whole report is of much value to the geologist and Egyptologist. We trust that the whole of Egypt will be described in a like manner.

XIV.—SHORTER GEOLOGICAL NOTES.—MR. JAMES MANSERGH delivered an interesting Presidential Address to the Institution of Civil Engineers on November 6th, 1900. His subject was Water and Water Supply. After a capital sketch of the works of the ancients in this direction, especially those of the Romans, he dealt with the law of underground water, dowsing, typical city waterworks, etc. Mr. Mansergh approved of the Duke of Richmond's Commission for buying out the London Water Companies, which reported in 1869, and also considered the finding of Lord Llandaff's Commission of 1899 a workable scheme.

<sup>1</sup> This Report, though dated 1900, was not issued until April, 1901.

SIR JOHN EVANS, at the opening meeting of the 147th session of the Society of Arts, November 21, 1900, read an address on "The Origin, Development, and Aims of our Scientific Societies." Among other matters of interest, he mentioned that in England the Society of Antiquaries seems to be the oldest body which met for definite purposes of enquiry. About the year 1572 "divers gentlemen of London, studious in antiquities, formed themselves into a College or Society of Antiquaries." The address gave an excellent general account of the various London Societies.

DR. GREGORY'S "Plan of the Earth and its Causes" is appearing in the monthly numbers of the *American Geologist*. To the March number of this journal J. B. Hatcher contributes an exceedingly useful account of the Lake Systems of Southern Patagonia, with a map.

AMONG the recent publications of the Royal Dublin Society (*Sci. Proc.*, ix) will be found two papers of special interest to geologists by Professor Joly. One is on the inner mechanism of sedimentation, and deals with the fact that the presence of dissolved salts accelerates the precipitation of finely divided matter, such as clay, etc., suspended in water; the other concerns the theory of the order of formation of silicates in igneous rocks.

WITH the view of throwing further light on the strength and durability of slate as a roofing material, Messrs. Mellard Reade and Holland have compared the Phyllades of the Ardennes with the slates of North Wales in the *Proc. Liverpool Geol. Soc.*, 1899-1900. The object of the authors has been, "amongst other things, to discover, if possible, upon what composition or causes the perfection of slaty-cleavage depends, and furthermore, to find out to what qualities and composition the characteristics and enduring properties of roofing slates can be attributed."

MM. LOHEST and FORIE, in their study of the relative age of the rocks composing the Cambrian *massif* of Stavelot, have arrived at the conclusion that the *massif* is formed of a succession of sharp and reversed folds, becoming stronger towards the north, and consisting of Devillian, Revinian, and Salmian deposits, mainly quartzites and phyllades. The paper appeared in the *Bull. Sci. Assoc. Elèves Ecoles Special Liège*, 1900.

CAPTAIN HUTTON read before the Otago Institute a general but up-to-date account of the geology of New Zealand. The paper was published in the *Trans. New Zealand Inst.* for 1899. There are a few footnotes of critical value.

MRS. GORDON'S paper on "The Crust-Basins of Southern Europe" has appeared in English in the *Verh. VII Internat. Geogr.-Kongress. Berlin, 1899 (1900)*. In general terms Mrs. Gordon states that "Cross movements in the Earth's crust have as resultants a spiral movement in one sense, accompanied in a neighbouring region by a spiral movement in the opposite sense." The paper must be read to be understood; an abstract would be of little use to the student.

DR. HENRY M. AMI has published in the *Canadian Record of Science*, vol. viii, under the title of "Progress of Geological Work in



Canada during 1899," a list of papers, arranged alphabetically under authors, published in 1899.

THE Bulletin of the Natural History Society of New Brunswick, No. 19, 1901, contains papers on Cambrian Fossils from Cape Breton, by G. F. Matthew; on a new genus (*Acrothyra*) of Etcheminian Brachiopods, from the Eo-Palæozoic of Cape Breton, by the same—it is near *Acrotreta*; and on the physiographic origin of our Portage Routes, being a note on the physiography of New Brunswick, by W. F. Ganong.

SIR ARCHIBALD GEIKIE has recently issued a third edition of his well-known work on "Scenery in Scotland," viewed in connection with its Physical Geology.

ACCORDING to the Annual Report of the Yorkshire Philosophical Society, the York Museum has acquired a collection of rocks and minerals which belonged to the late Professor Piazzi Smyth. No new fossils were purchased during 1900.

FROM the Report of the Rugby School Natural History Society, we learn that Mr. Beeby Thompson has assisted in the arrangement of the collection of local fossils, and has presented a series found during the cutting of the Great Central Railway in that neighbourhood.

THE geology of the Isthmus of Panama forms the subject of a paper by O. H. Hershey in the Bull. Dept. Geol. Univ. California, vol. ii, No. 8, 1901. The author inclines to the belief that the earliest stratified rocks are of Jurassic age; the next, the Montijo conglomerate, seems to be of early Cretaceous age; while between this and the Tertiary basal conglomerate come the Santiago sandstone and shale. The fossils apparently are too poor to allow of exact determination at present. The Tertiaries and the Pleistocene seem well developed, and there has been a recent depression of the coastal land, especially on the Pacific side. A curious fact mentioned by the author is that about a third of the paving blocks in the town of Santiago, whose population is about 6,000, are silicified wood of pre-Pleistocene age. This paper is really a supplement to that published by R. T. Hill, in 1895, in Bull. Mus. Comp. Zool. Harvard, vol. xxviii.

THE Report of the Bristol Museum for 1890 notes the acquisition of a large number of fossils from the Great Oolite of Minchinhampton, and a cast of the *Archæopteryx*.

MR. R. A. BUDDICOM reprints from the *Border Counties Advertiser* for last December, a short article which states that the collections at the Shrewsbury Museum have been entirely remounted and rearranged by himself and Dr. Callaway. We are glad to hear it, and hope that Owen's type-specimen of *Rhynchosaurus* is now better cared for than it was a few years ago.

IN the Proc. Cotteswold Nat. Field Club, vol. xiii, pt. 3, S. S. Buckman reports the excursions for 1899 from the point of view of the features of rivers and their valleys; in part 4 (1901) the same author writes on Homœomorphy among Jurassic Brachiopoda, a paper we hope to notice in due course.