increased demand for them, it must be now *many years* before the necessary library can be provided, even if there is an unlimited grant of money provided for the purpose. In the meanwhile, how is the scientific work at South Kensington to be carried on? In the first place the "Banksian Library," as it is called, which originally came to the British Museum along with the natural history collections, should be transferred along with them bodily to South Kensington. This will provide a good set of the older publications on natural history for the new institution. In the second place for the modern publications, which are of still greater importance, we venture on a suggestion—which will, we fear, make the principal librarian's hair stand on end—namely, that all the works and periodicals habitually used in the four departments of natural history should be temporarily sent on loan to the new institution at South Kensington. They should be returned to the British Museum by degrees so soon as duplicates of them can be obtained by purchase out of a fund to be annually devoted to the purpose. In this way the work at South Kensington might be carried on without interruption, and the National Library at Bloomsbury would at the same time suffer no permanent loss. It would be no doubt an occasional inconvenience to the readers at Bloomsbury to find that some of the books they require for reference are at South Kensington. But this inconvenience will diminish year by year, as the new set of books is purchased, and by this plan alone, as far as we can see, can the whole of the important scientific work performed in the natural history departments be prevented from coming to a standstill. In point of economy also there can be no question of this plan being the best, as the attempt to purchase at once all the books required for the new Natural History Museum would raise the value of them twenty-fold. Convenience and economy are therefore alike on the side of our suggestion, although we fear that it will be bitterly opposed by the principal librarian and his satellites, who object strongly to see the Banksian Library being removed from the hallowed precincts of Bloomsbury.

THE FENLAND

The Fenland, Past and Present. By S. H. Miller and S. B. H. Skertchly. (Wisbeach: Leach and Son. London: Longmans, Green, and Co., 1878.)

THIS book is practically the joint production of several, many chapters being contributed by writers whose names do not appear on the title-page, though given at the head of their respective chapters. The work contains about 650 octavo pages and is therefore cumbrous; it is divided into fifteen chapters, very unequal both in length and merit, which embrace a wide range of subject, including, among others, dissertations on History, Geology, Botany, Zoology, Archæology, Biography, Engineering and Sanitary Problems, &c. The printing done at Wisbeach has not been carefully revised, as shown by a long list of corrections, which however call attention to but a very small proportion of the errors. Many of the illustrations are presented by patrons, and these are fairly good, except the chromo-lithographed frontispiece which is very inferior either in workmanship or drawing.

The book, whatever its excellence may be in other respects, is certainly objectionable in its treatment of those subjects on which discussion is far from closed among men of science. A vein of dogmatic infallibility is particularly apparent in dealing with geological problems. The book, including so wide a scope, is evidently intended to pass into the hands of readers the majority of whom are quite unacquainted with geology, and to bid for support in this manner from the general public, instead of appealing to those who from their own experience would be able to estimate its real value for views and claims not yet recognised by fellow-thinkers and workers, seems unworthy of science. When original work is laid before specialists, the theories built upon it may be stated boldly and decidedly; but in a popular book, intended for the general reader, that which is accepted as fact and that which is still under discussion or not yet argued, should be distinctly separated, and in the latter case the relative value of each kind of evidence should be clearly defined. Too frequently of late the result of others' work has been incorporated by writers and set forth as their own and in a positive manner not claimed by the discoverers themselves. In this case we have not an account of the geology of the Fens, but an exposition of the opinions of Mr. Skertchly and others on geological questions, introduced as undisputed fact. It is questionable whether the readers to whom the book appeals care for or expect individual opinion, but would not rather desire an easy "coach" to the ascertained facts of Fen-geology.

To illustrate, we select first the treatment of Prehistoric Man. We are told that the "Old Stone Folk"—the term is preferred in the book to Palæolithic—are concluded to be related to the living Esquimaux, and that Prof. Boyd Dawkins is of opinion that they are lineal descendants. This inference, based as it is on very slender grounds—is the only foundation for the following positive assertion, made a few pages further on:—"The Old Stone Folk, on the other hand, belong to the Mongoloid class of *Leiotrichi*, of whom the Lapps and Eskimos are modern examples; hence we see that even in the Old Stone age there were no signs of the fusion of the crisp-haired *Ulotrichi* and smooth-haired *Leiotrichi;* and it is from such striking facts that we are justified in ascribing to mankind an antiquity far greater than that of the earliest relics at present known." It is needless to point out that so far from there being any reason to suppose that Palæolithic man was differentiated, the sameness of type—differing only where different material is used—of all the oldest stone implements is evidence against it. Where so much is predicated of the "Old Stone Folk," it is not surprising to find the "Newer Stone Folk" are minutely described even to their complexion and eyes as if they were still a living tribe. They are termed Iberian, which, as explained not to mean a people indigenous to or even coming directly from the Iberian peninsula, is a misleading term, and has no advantage over that of Black Kelt. The Basque people may be descendants of Neolithic man, but Neolithic men were not Basques. To say that they were a Turanian people means nothing more than that they were not Aryan.

The third chapter, by Mr. Miller, is devoted to a historic sketch of the Fenland people from the time of the Kelts

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to the reign of Henry III., and is written on naturally surer ground and the interest is better sustained. The stories of the Saxon and Danish conquests are well told according to the most modern versions, and introduce the newest approved spelling of historical names. We can almost follow the exact steps by which the Normans took possession of the Fenland and how they kept it by building fortress dwellings, simply massive round or square towers, which the more civilised Saxon noble would never have made his home. This chapter is illustrated with engravings of coins and of one of the rare British circular bronze shields.

Chapter IV., on Language, and Chapter V., on the Dissolution of Monasteries, are also by Mr. Miller. Chapter VI., by Mr. Skertchly, treats of the attempts made to drain the fens, a subject well worked out by Sedgwick and his scientific assistants. The author's views, although probably correct, are put very decidedly, and in places plentifully sprinkled with notes of exclamation. The following from p. 158 will serve to illustrate the style :—

"How can it be shown that these districts on the same level, with interweaving watercourses and co-equal desiderata, were so distinct that they should be set at variance like a trio of mongrels over a meat biscuit? Yet such has been the disastrous result."

It appears to be Mr. Skertchly's opinion that the one essential to an engineer who undertakes drainage works is to understand "Mr. Tylor's laws" (Mr. Alfred Tylor, F.G.S.). In Chapter VII., a continuation of the last, the writer goes out of his way to object to the *absurdity* of the use of the time-honoured expression, "lands watered by rivers." Yet the term is right, for a land of many rivers is more moist and watered than a land without, and rivers do literally *water* the lands through which they flow. They do it by percolation, overflow, and mist. For instance, not only does the Nile, but rivers all over the world, the Thames itself among them, water their level lands by flood at certain seasons, by mist at night.

The Wash, a subject on which we naturally looked for a good deal of information, is too briefly disposed of in a chapter of only five pages. The next, on Meteorology, is sixty-seven pages long, and bristles with tables which in a popular work would have found a more appropriate place in the Appendix, since their presence in the middle of the work cuts it in two. The botanical sketch by Mr. W. Marshall would have been more welcome had it been longer, and we should have been glad to have seen more of the Fen rarities illustrated. The history of the spread of Anacharis is likely enough to be the correct one, but why is the name of the plant in the illustration *Elodia canadensis*, and *Anacharis alsinastrum* in the text. The Fungi, although not very numerous, have appropriately a section to themselves. It is strange that the writer should speak doubtingly of the occurrence of any fungi in the Carboniferous, since their presence there is now a well known fact. The eleventh chapter treats of the prehistoric fauna of the Fenland, and is so full of errors that it is to be regretted that, as in other instances, a specialist was not intrusted to write it. Space will only permit to notice a few of the inaccuracies. At p. 326, Hipparion is said to be "a horse-like animal with antlers like a stag," and this is the whole description. The table, p. 327, is not a complete list, and we know on the authority of Prof. Boyd Dawkins, that it contains besides, a number of species which have not hitherto been found in the beds to which they are ascribed; it separates *Ursus ferox* and *priscus* which are synonyms, and persists, which is the case throughout the book, in calling Lemmus, "Lemnus." The table at p. 328 is a marvel of careless spellings, none of which are included in the list of corrections at the beginning of the book, which we are "earnestly requested" to make with pen and ink. In another table *Bos brachyceros* is said to be "a variety" of *B. longifrons*, although these are admittedly synonyms.

The limits of a review, however, compel us to pass on at once to the chapter on Geology, with which especial fault is to be found. In the first place, from the nature of the book it is evident, as already intimated, that it is not intended to be specially consulted by geologists, and the fact that a survey memoir on this district, in which Mr. Skertchly was concerned, had already appeared, renders it quite unlikely that it would be. Mr. Skertchly recognises this by prefacing his subject with a perfectly elementary treatise on the science. Instead of this circumstance inducing him to guard his statements with more than ordinary care, he absolutely revels in the opportunity of airing his infallibility, as if without fear of contradiction. The theories of those whom he mentions as friends are everywhere brought in, those of his opponents mostly ignored. Thus Evans's "Ancient Stone Implements of Great Britain," a work in which implements from the Fenlands have been described, is not even alluded to, although the author appears to have made use of it. General readers should in fairness have been cautioned that Croll's theory is not supported by geological evidence, thousands and thousands of feet of consecutively deposited strata showing no trace of cold periods, much less of glaciation; that Geikie's theory of an ice sheet is not generally accepted by the Geological Society, as even this session's discussions show; that Tylor's Pluvial periods have but few adherents. By the way, the Pluvial period is here ingeniously reduced to local showers produced by the evaporation of melting snow and ice, although Mr. Tylor himself disclaims for it all connection with ice action, and claims on the contrary that it was of great intensity and long duration. Mr. Skertchly is so fully impressed with the correctness of the view he happens to take of things that he announces that his alleged discoveries have made the Brandon Beds of "surpassing interest" (a favourite term with him), "for ever setting at rest the question of whether man did or did not exist during the great cycle of the glacial period." This climax is worked up to by pages of *ex parte* reasoning which non-geological readers are not in a position to follow. Considering that this evidence has not yet been brought forward in any scientific publication, and that his repeated promises to bring it before the Geological Society have not yet been kept; that Professors Hughes and Bonney purposely went over part of the ground with him and have publicly thrown grave doubts on the value of the evidence; that Professors Prestwich, Boyd Dawkins, Mr. Evans and others do not admit its value, and that at the Conference held last summer on the Antiquity of Man, the weight of evidence was rather against his interglacial age in England,—it is little less than wantonness, whether

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the evidence, only known to himself, is or is not conclusive to him, to introduce it as undisputed fact in this manner in the present publication. After this we have not enough interest to read the remainder of the book, and besides it is so full of mistakes, as Urus for Ursus (p. 505), shorter for longer (p. 511), &c., that it is a wearying effort to understand in places what the author really means.

J. S. G.

AMERICAN GEOLOGICAL SURVEYS

Geological and Geographical Atlas of Colorado and Portions of Adjacent Territory. By F. V. Hayden, U.S., Geologist in Charge. (Washington: Published by the Department of the Interior, 1877.)

IN the magnificent Atlas just issued by the Department of the Interior we have the consummation and crown of all the labours which Dr. Hayden and his staff have carried on so triumphantly for the last five years, and of which they have already given us so much interesting and important information in a series of Annual Reports. Before examining the work from a scientific point of view, no reader can refrain from expressing his admiration of the style in which the Atlas has been produced by the United States Government. As a specimen of cartography, typography, and lithography, it is altogether worthy of the highest praise. For beauty and indeed sumptuousness of execution, it may be classed with those *livres de luxe* which from time to time have been issued from the National Imprimerie of France.

The Atlas consists of two series of maps, the one of a general, the other of a detailed kind. The first series, on the scale of twelve miles to one inch, comprises four sheets, each embracing the whole State of Colorado and part of the neighbouring territory. The first of these illustrates the system of triangulation adopted in the survey; the second shows the drainage system of the area; the third by a simple and clear arrangement of colours, exhibits at a glance the economic features of the whole region—the agricultural land, pasturage, forests, and woodlands, sage and bad lands, mineral tracts, and the portions rising above the limit of timber-growth; the fourth contains a condensed and generalised geological map of the same territory. Nothing can surpass the lucidity of expression and artistic finish of these maps.

The second series—twelve in number—is on the scale of four miles to one inch, and consists of six topographical sheets and six identical sheets, coloured geologically. The topographical details, though numerous, are so selected as not to neutralise each other, or mar the broad, clear picture which the maps were designed to be. By means of contour-lines of 200 feet vertical distance, the surface-configuration of the whole region is depicted as in a model. We can follow the lines of the broad valleys, of the deep, narrow cañons, and of the hundreds of minor tributaries which have scarped out their courses on either side. Here we look down upon a vast table-land, deeply trenched by stream-channels; there upon a succession of bold escarpments or mesas which bound the table-land and hem in the neighbouring valley. Huge mountain-ranges rising out of the plateaus are so vividly drawn that they seem to stand out of the paper. Yet no shading is employed. All the effects of inequality are produced by contour-lines, so faithfully set down that a single line may be tracked in its sinuous course along the whole of a mountain front until it comes out upon the table-land beyond. When will our map-makers learn to use this, the only true method for expressing the surface of a country? The best of our atlases are disfigured by strips of shading running across the map like so many caterpillars, to represent mountain-ranges. Even our Ordnance maps, so admirable in most respects, are sometimes so loaded with shading, that a steep hill-side only a few hundred feet high is made as black as our highest mountains, and the topographical names can hardly be read, even with a magnifying-glass.

But, above all, welcome are these six geological maps. In the previously published maps and charts accompanying the Annual Reports, only small detached areas were represented, and even from the careful descriptions of the various geologists of the staff it was hardly possible to frame a satisfactory conception of the geology of Colorado as a whole. Ever since the marvels of its deep gorges and vividly painted cliffs were made known, that region has possessed a high interest to the geologist. He has now the means of gratifying his desire for further knowledge. With the help of these maps and the two accompanying sheets of sections he can realise most satisfactorily every great feature of Colorado geology. The ancient Archæan ridge—the nucleus or back-bone of the American continent—may be traced running north and south nearly along the present hydrographical axis of the country. Flanking that ridge comes a series of palæozoic deposits, the oldest of which have been identified palæontologically with Silurian formations. Rocks, regarded as of Devonian age, overlap the Silurian beds, and repose against the ancient crystalline ridge on the south-west side of the San Juan Mountains. They are soon buried under later accumulations, and they seem to be of but local development, since in most places where the rocks are found in juxtaposition, the Silurian are directly succeeded by Carboniferous strata. These last-named rocks cover large tracts of country, running as bands round the Archæan area, and lying in basins across it. Far to the west where the Grand River has so deeply trenched the Utah plateau, the flat Carboniferous beds appear from under the brilliant red Triassic strata. The difficulty of drawing any line between Triassic and Jurassic formations in that region is again acknowledged on these maps, the lower red series being doubtfully assigned to the older, and the upper variegated deposits to the later system. Cretaceous rocks are abundantly developed, and cover a vast extent of territory. In particular they spread over the wide plateaux between the San Juan and Gunnisen rivers, and form the platform on which the enormous volcanic outbursts have been piled up from the West Elk Mountains southward into New Mexico. It is more easy to trace on these maps, too, the area respectively occupied by the Laramie, Wahsatch, Green River, Bridger, and Uintah formations which represent post-cretaceous and tertiary times. Glacier moraines, lake-deposits, drifts, sand-dunes, and recent alluvia, all find adequate expression on the maps. Especial care, too, seems to have

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