

THE GEOLOGICAL WORK OF HAYDEN SURVEY FOR THE PAST SUMMER.

The necessity of a careful examination of the various geological formations in the field, and a review, by a practical paleontologist, of the various districts that have from year to year been surveyed by the different geologists of this and other surveys, has been long felt. Such a work, indeed, was imperatively necessary, before a consistent and comprehensive classification of the formations could be established. This duty was assigned to Dr. C. A. White, the paleontologist of this survey; and he took the field at the beginning of the past season and continued his labors until its close. The special duty with which he was charged was to pursue such lines of travel as would enable him to make critical examination of the geological formations in succession as they are exposed to view on both sides of the Rocky mountain chain and also on both sides of the Uinta chain; to collect and study the fossils of these formations in such detail as to settle, as far as possible, the questions of the natural and proper vertical limits of the formations, their geographical range, their correlation with each other, and to define the paleontological characteristics of each.

He has pursued his researches with such success during the past season, as to demonstrate the necessity of continuing this class of investigations by various lines of travel, across what is generally known as the great Rocky mountain region; especially those portions of it that

it received careful investigation, yielding some of the most important results of the season's work. Crossing the ground between the two rivers named, to White River Indian Agency; thence down White river valley about 100 miles; thence to Green river, crossing it at the southern base of the Uinta mountains, making many detours on the way, he reviewed the geology of the region which he had surveyed during the previous season. This review brought out not only the important paleontological facts before referred to, but it also added materially to the elucidation of the geological structure of the region which lies between the eastern end of the Uinta mountain range on the west and the Park range on the east.

Beyond Green river he pursued his travels westward, studying the mesozoic and cenozoic strata that flank the Uinta range upon its south side, and making comparisons of both their lithological and paleontological characteristics. In this way he traversed the whole length of the Uinta range; crossing at its junction with the Wasatch range over into the valley of Great Salt Lake. Recrossing the Wasatch, to the north side of the Uinta range, he continued his examination of the cretaceous and tertiary strata into and entirely across the great Green river basin, leaving the field at the close of the season at Rawlin's station on the Union Pacific railroad.

A general statement of the results of the season's work have been given in a previous paragraph, but the following additional summary will make the statement somewhat clearer, being made after the route of the season's travel has been indicated. The formation of later mesozoic and earlier cenozoic ages, especially those to which Dr. White, in former publications, has applied the provisional designation of "post-cretaceous" have received particular attention. The extensive explorations of Dr. Hayden in former years, and the paleontological investiga-

tion of the region which lies adjacent to the southern base of the Uinta mountain range, and which is traversed by Lake Fork and the Dun Chesea river, not only the Uinta group but both the Green river, and Bridger groups also, are well developed, each possessing all its peculiar and usual characteristics as seen at the typical localities in the great Green river basin, north of the Uinta mountains. This added to the known existence of Bridger strata in White river valley, and the extensive area occupied by the Green river group, between White and Grand rivers, has added very largely to our knowledge of the southward extension of those formations.

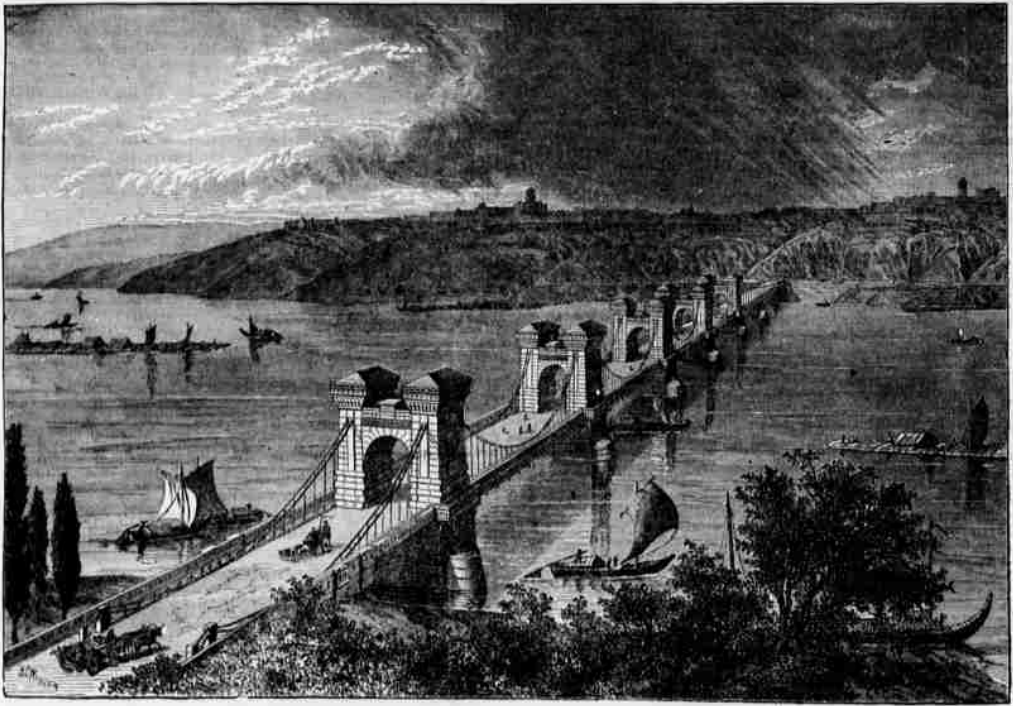
In all the comparative examinations of the formations or groups of strata that have just been indicated, he has paid special attention to their boundaries, or planes of demarcation; crossing and recrossing them wherever opportunity offered, noting carefully every change of both lithological and paleontological characters. While he has been able to recognize with satisfactory clearness the three principal groups of cretaceous strata, namely, the Dakota, Colorado and Fox hills, on both sides of the Rocky and Uinta mountains respectively, they evidently constitute an unbroken series, so far as their origin by continuous sedimentation is concerned. While each of the groups possesses its own peculiar paleontological characteristics, it is also true that certain species pass beyond the recognized boundaries of each within the series.

The stratigraphical plane of demarcation between the Fox hills, the uppermost of the undoubted cretaceous groups and the Laramie group, the so-called post-cretaceous, is equally obscure; but the two groups are paleontologically very distinct, inasmuch as the former is of marine origin, while the latter, so far as is now known, contains only brackish water and fresh water invertebrate forms. He reports a similar obscurity or absence of a stratigraphical

THE ABUSE OF ATHLETICS.

We notice that English journals are wisely commencing the modern idea of athletic exercises, which consist of walking matches in public halls, etc. Such feats of pedestrianism and other similar extravagances in athletics are unnatural, and cannot fail to be more or less injurious, especially to those who have not been prepared for them by a long course of "training." Certain "professional" pedestrians and gymnasts may perhaps attempt these performances with comparative impunity; or if not, the world can well pardon the fools for shortening their useless or worse than useless career. Indeed, the sooner they kill themselves the better; for their example is pernicious in the extreme. Other people, who, but for the cheap notoriety gained by these muscular idiots, and the silly ambition to win similar "laurels" for themselves, would never think of attempting such preposterous feats, are carried away with the mania, and suffer irremediable injury to health.

We have been sorry, says the *Journal of Chemistry*, to see the newspaper eulogies of Miss Bertha von Hillern's pedestrian achievements. She is held up as an example of what women may do if they will, and is encouraged to go on to more extraordinary exploits in the same line. Now there can be no question that American women do not walk enough. In that respect, they are far behind their English sisters, who think nothing of a walk of five or ten miles, and who may often be seen doing their 15 or 20 miles a day in the Scotch highlands or in Switzerland. There is no better exercise than such "tramps" in the open air; they are wholesome alike for the body and for the mind, and it is a pity that Yankee girls do not readily take to them. But a treadmill round of so many miles in so many hours, in a public hall, with a crowd of idle gazers betting on the result as on



CHAIN BRIDGE OVER THE RIVER DNEIPEP, AT KIEFF, RUSSIA.]

have been surveyed, as well as those in which surveys are in progress.

Among other important results, he has shown the identity of the lignitic series of strata east of the Rocky mountains in Colorado, with the Fort Union group of the Upper Missouri river; and also its identity with the great Laramie group of the Green river basin and other portions of the region west of the Rocky mountains. He also finds the planes of demarcation between any of the mesozoic and cenozoic groups, that whatever catastrophic or secular changes took place elsewhere during all that time, sedimentation was probably continuous in what is now that part of the continent, from the earliest to the latest of the species just named. Other results and further details of the season's work will appear in the following paragraphs.

The general course of travel pursued by Dr. White during the season was as follows, not including the numerous detours, meanderings and side trips, which the work necessitated: Outfitting at Cheyenne he journeyed southward, traversing in various directions a portion of the great plains which he immediately adjacent to the eastern base of the Rocky mountains in Colorado. The most easterly point thus reached was some 60 miles east of the base of the mountains, and the most southerly point about 25 miles south of Denver. Returning to Denver to renew his outfit, he crossed the Rocky mountains by way of Boulder pass through Middle Park. After making certain comparative examinations of the mesozoic and cenozoic formations in Middle Park, he proceeded westward to the headwaters of the Yampa river, following that stream down to the western foothills of the Park range of mountains. Here resuming his comparative examinations of the mesozoic and cenozoic strata, he passed down to the valley of the Yampa as far as Yampa mountain, one of those peculiar and remarkable upthrusts of paleozoic rocks through mesozoic strata. In all this area, as well as that between the Yampa and White rivers, the Laramie group reaches a very great and characteristic development; and

tions of the late Mr. Meek, pointed strongly to the equivalency of the Fort Union beds of the upper Missouri river, with the lignitic formation as it exists along the base of the Rocky mountains in Colorado; and also to the equivalency of the latter with the Butter creek series, west of the Rocky mountains. The investigations of this year have fully confirmed these views by the discovery not merely of one or two doubtful species common to the strata of each of these regions, but by an identical molluscan fauna ranging through the whole series in each of the regions named.

This shows that the strata just referred to, all belong to one well marked period of geological time, to the strata of which Mr. King has applied the name of "Laramie group" (Point of Rocks group, of Powell). His investigations also show that the strata which, in former reports by himself and Prof. Powell, have been referred to the base of the Wasatch group, also belong to the Laramie group, and not to the Wasatch. He has reached this later conclusion not merely because there is a similarity of type in the fossils obtained from the various strata of the Laramie group with those that were before in question, but by the specific identity of many fossils that range from the base of the Laramie group up into and through the strata that were formerly referred to the base of the Wasatch. Furthermore, some of these species are found in the Laramie strata on both sides of the Rocky mountains. Thus the vertical range of some of these species is no less than 3,000 feet, and their present known geographical range more than 1,000 miles.

Besides the recognition of the unity of the widely distributed members of the formation of this great geological period; bounded by those of undoubted cretaceous age below and those of equally undoubted tertiary age above; his further observations have left comparatively little doubt that the "Lake Beds" of Dr. Hayden as seen in Middle Park, the "Brown's park group" of Prof. Powell and the "Uinta group" of Mr. King all belong to one and the same epoch, later than, and distinctly separate from the Bridger group. In that portion

plane of demarcation between the Laramie and Wasatch groups, although it is there that the final change from brackish to entirely fresh waters took place over that great region. Furthermore, he finds that while the three principal groups of the fresh water tertiary series, west of the Rocky mountains, namely, the Wasatch, Green river, and Bridger groups, have each peculiar characteristics, and are recognizable with satisfactory distinctness as general divisions, they really constitute a continuous series of strata, not separated by sharply defined planes of demarcation, either stratigraphical or paleontological.

During the process of the field work as above indicated, large and very valuable collections of fossils have been made, all of which will constitute standards of reference in the future progress of the work, and quite a large number of the species are new to science. These are now being investigated, and will be published in the usual paleontological reports of the survey.

A RUSSIAN BRIDGE.

The accompanying engraving is taken from "Knight's American Mechanical Dictionary." It represents a chain bridge over the River Dnieper, at Kieff, Russia. The structure is a very massive one, as the engraving shows, and is a type of this class of bridge. The river in its course passes through different climates. The most remarkable bridges are at Smolensk and Kieff. That at the latter place being the one shown in the engraving.

BLUING IRON AND STEEL BY BOILING.—If iron or steel articles be boiled in the following mixture they will take a fine blue tint: Dissolve four ounces hyposulphite of soda in one and one-half pints of water, and then add a solution of one ounce acetate of lead in one ounce of water.

a FERRI-FACE, is a very different thing from what we doubt whether it will stimulate more sensible women to better individual efforts of pedestrianism. It is likely rather to awaken a disgust for all exercises of the kind.

RESPECTABILITY OF AGRICULTURE.—A clergyman once said to me, "Will farming ever be considered more respectable than now?" My answer was, "No." Farming is highly honored, when we consider that from it flows all the calls for artisans of every name to supply the real or imaginary wants of all mankind. Heaven, as a state, whether it relates to the present or the hereafter, consists mainly in the beautiful. Adam was to dress the garden, which meant to make it look well, and at the same time it would be useful. How is it to-day? A beautiful garden attracts visitors from all the surrounding country. No less does an extensive farm, made beautiful by the diligent hand; by the products of the farm, man and beast survive. All other callings are supported by it; but to the question, "Is it more respectable than formerly or will it be?" I answered, "It has always had the precedence in respectability." God and good men in former time looked with pleasure and delight on seed time and harvest; so in this age, professional men extol the beauties of agriculture, and especially every one who is looking for a lucrative office from the people will shake a friendly hand with the honest yeoman, as much as to say, your calling is respectable.—Robert Mansfield, in N. E. Farmer.

The Southern Pacific railroad has made a reduction in its land rates, and announces that the charge on freight from the anchorage to Los Angeles will be \$2.50 per ton. The rate on corn in car-loads, from Los Angeles to San Francisco, has been reduced to \$3.50 per ton, and on broken lots to \$6.25. The aggregate reduction will amount to about 50% of the old schedule.