

When the light of a luminous gas-flame passes through a crystal of sulphate of didymium only 1 millimeter in thickness and then falls upon the slit of the spectroscope we obtain an absorption spectrum of extraordinary sharpness and beauty in which not less than 17 bands may be distinguished. The spectrum of a solution of didymium contains one line which is not found in the spectrum of the solid sulphate and this last contains one line not found in the spectrum of the solution. That this is not an error of observation is shown by producing the absorption spectrum of this crystal and then bringing a solution of didymium between the crystal and the source of light, when both bands appear. Hence it is clear that in the passage from the liquid to the solid state spectral lines may disappear and new ones may be produced. Bahr and Bunsen consider it certain that the spectra of erbia and didymia are due to the compounds of the metals and not to the metals themselves, which are not reduced by ignition. They remark that the absorption spectra are the same respectively for all the salts of the two metals. Ytria, as prepared in a state of purity forms a soft nearly white powder which, when ignited glows with a pure white light and gives no trace of an absorption or emission spectrum. The solutions are colorless and have an acid reaction and sweet astringent taste. The sulphate of yttria forms transparent colorless crystals which have the formula $3(\text{YO}, \text{SO}_3) + 8\text{aq.}$ The basic nitrate $2\text{YO}, \text{NO}_3 + 3\text{aq.}$ forms colorless needles; the oxalate is perfectly white and has the formula $\text{YO} \cdot \text{C}_2\text{O}_3 + \text{aq.}$ For the quantitative estimation of yttria and erbia the authors recommend the conversion of the weighed mixture of oxyds into sulphates. From the weight of acid the relative properties of the oxyds may be determined by the method of indirect analysis. In conclusion, an elaborate analysis of gadolinite is given leading very precisely to the formula $2\text{Y}_2\text{Si} + 3\text{Si}$ or more simply Si_2 , if glucina be considered a protoxyd.—*Ann. der Chemie und Pharm.*, cxxvii, 1, Jan. 1866.

W. G.

II. MINERALOGY AND GEOLOGY.

1. *Notes on Chalk and Cretaceous Deposits in Eastern Colorado*; by D. C. COLLIER, Editor of the "Daily (Colorado) Miner's Register."—In crossing the plains from Denver, Colorado, to Atchison, Kansas, last November, I was so fortunate as to make some geological and paleontological discoveries which may be of interest to the scientific public, an account of which, by request of Prof. James D. Dana, I herewith transmit for the Journal.

I first emigrated to Colorado in the year 1858. In passing up the Arkansas river I found, upon many of the nearly barren ridges and hills, about three hundred miles west of the Missouri river, fragments of indurated chalk intimately mixed with silex and containing nodules of flint. At that time I was travelling through an unknown region, with but five companions, and had no opportunity to examine the white bluffs to be seen in the distance. On approaching the base of the mountains we turned northward from the Arkansas, and crossed over the dividing ridge which separates the waters of that river from those of the Platte. In doing so I found a large portion of the rocks to consist of a white or whitish con-

AM. JOUR. SCI.—SECOND SERIES, VOL. XLI, No. 123.—MAY, 1866.

glomerate. They were composed of a fine-grained or rather grainless substance, chalk-like in appearance, combining water-worn pebbles of white quartz and flesh-colored feldspar, mostly the former. Wherever the strata of this rock remained horizontal, or nearly so, I found it usually covered with a thin stratum of hard clinking red ferruginous conglomerate. Wherever bluffs of the white conglomerate existed, they were thus overlaid, and were worn into an infinite variety of monumental and architectural forms, which gave them, in the distance, an appearance of being old ruins. From these, Monument Creek has since received its name.

Underlying the Cretaceous conglomerate I found immense strata of a green argillaceous shale or marl, which in appearance closely resembles the greensand of New Jersey, as I have seen it this winter. This green marl I afterwards found to be very abundant. In the black shales and slates, which are highly friable, and which appear to underlie the green marl, I found immense deposits of bituminous lignite or coal, in layers from a few inches to nine feet in thickness. Still lower down, geologically, I found extensive deposits of fossil shells, mostly *Baculites* and *Ammonites*. On one occasion, in the year 1861, at a point on the Platte river sixteen miles above Denver, I uncovered, in a space not more than six feet in diameter, the shells of eighteen *Baculites* which had been crushed flat but retained all their beauty of outline and brilliancy of color. After being exposed for a few minutes they crumbled to fragments. The longest of these was about four feet in length; the smallest but a few inches.

In the fall of the year last mentioned, in company with other gentlemen, I examined cursorily the stratified rocks, from the point where they overlap the metamorphic granites of the mountain range where the Platte river issues out on the plains, and for a mile eastward. I found the rocks there tilted at an angle of fifty degrees, dipping from the mountains. They were composed first of micaceous shales, and then of strata of siliceous conglomerates, sandstone, limestone, a kind of red and white marble, gypsum, argillaceous shale containing alum, etc.

The inclination of the rocks we found to be about fifty degrees for a distance of fully two miles, wherever the outcrop was not so decomposed that we could not trace it, and where it was not concealed from view by soil. *Encrinites* and *Asterias* were often found in the upper deposits, as also fragments of petrified palm and other endogenous plants.

My residence being in Central City, surrounded on every side by granitic rocks, and business engrossing my entire attention, I was not able to devote any further attention to this subject till last November, when I crossed the plains on one of the coaches of the Butterfield line which then traversed what is known as the Smoky Hill route, down the Smoky Hill river, midway between the Arkansas and Platte rivers. For two hundred and fifty miles eastward from Denver we travelled day and night, and of course had little or no opportunity to examine rocks. After travelling that distance, fortunately for me, we came to a point where the Indians had driven off the stock, killing drivers, messengers and stock-tenders. This compelled slow travelling and frequent stoppages for our stock to rest. With my revolver cocked in my hand ready for an Indian

fray, I was able often to go half a mile from coach or camp among the bluffs. On one occasion, in company with a companion I was able to climb to the top of a bluff of pure chalk, so soft that I could cut and carve it with the knife I carried in my belt, and so fine that it covered my clothes as thoroughly as when in my college days a classmate wiped the blackboard with my back. On the summit I found the remains of immense shells, some of which were nearly four feet in diameter. Among others were remains of *Belemnites* in immense quantities, but these latter I oftener found closely connected with the green shales which I am inclined to believe underlie the chalk.

When in the midst of these Indian fiends, at a distance of half a mile from the coach, I found the fossil jaw of a *Mosasaurus*, which, though broken in fragments, appeared to have been about four feet in length. The teeth remained whole, and the front extremity of one of the jaws was also complete. This portion, about fourteen inches in length, and also a portion of the vertebrae I carried along on one arm, with my revolver cocked in the hand of the other, till I overtook the coach, leaving behind the other bones, which I greatly coveted. This appeared to have been deposited in connection with green shales, which were readily disintegrated into what closely resembled a marl, and which often contained nodules or accretions of sulphid of iron.

After travelling in this way for some distance we were supplied with a military escort, the commandant of which put an end to my wandering away from the road, and thus ended my geological research.

The chalk bluff extends for a distance of over one hundred and fifty miles east and west, and may be found first at a distance of about three hundred and fifty miles west from Leavenworth, Kansas.

As the coach was driven rapidly along I could see many fossils by the wayside, and in the bluffs, which seemed to be chalk, much higher than those I have mentioned, but we travelled with so much haste and were surrounded with so many enemies, that I was unable to decide the relative position of these interesting rocks. While in the midst of these localities, and when crossing the outcroppings of the coal deposits, we were attacked by Indians, who were repelled only after killing five of their number and after they had wounded one of ours. Our only stoppage by the way, after being joined by the military, was to bury the bones of white men who had been murdered by Indians and stripped of their flesh by wolves.

The fossils which I obtained on this trip are now in the Cabinet of Oberlin College, Ohio, to which I gave them.

Brooklyn, N. Y., April 4th, 1866.

2. *Volcanic eruption at Santorin, Grecian Archipelago, and the formation of a new island in the Bay.*—Translation of a letter from J. DECIKALA, dated Santorin, January 23, 1866, by Mr. Canfield, American consul at Athens, as published, with illustrations from photographic views, in *Harper's Weekly*, April 7.

A remarkable phenomenon has for several days occupied the attention of the inhabitants of Santorin. On the 18th instant a low rumbling sound was heard from time to time in New Kaimeni, and especially at the place called Vulcano, where are the mineral waters. At the same