

interesting points will be deferred until I shall have been able to assemble more extensive and newer data.

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#### THE OVERSPUN STRING.

LOADING a string by 'overspinning' with wire, as is well known, causes it to produce a deeper tone without adding to its length. It, also, can be strung over a finger-board, where it may be 'stopped,' thus enabling a single string to produce an octave or more with its chromatic intervals, and to take the place of eight or more long open strings. So far as my information goes, the overspun string was introduced into France by St. Colombe about 1675. The chitarrone with its very long open bass strings dates from 1589 and was used in orchestras in 1607. I am desirous of ascertaining whether the superiority of the overspun string over the long open string for the deeper tones was known earlier than I have mentioned, and whether the chitarrone was used because the overspinning was unknown.

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#### NOTES ON THE JUDITH RIVER GROUP.

IN August, 1876, Mr. J. C. Isaac (who had been my assistant earlier in the season in the chalk of Kansas) and myself joined Professor E. D. Cope at Omaha, to go with him as his assistants to the Judith River region in Montana. From Franklin, Idaho, we made the journey of 600 miles to Fort Benton by stage. Here the professor purchased a wagon, four work horses and three saddle ponies, employed a cook (to act also as teamster) and a scout, who was to warn us of danger from Indians. Sitting Bull with his thousands of braves was south of our field, fighting the soldiers. We traveled down the Missouri River opposite Claggett, an Indian trading post, 120 miles below Fort Benton. Here we crossed the river, and went into camp on Dog Creek, a few miles east of the Judith River, and about ten miles from its mouth. The cañon of this creek was narrow. We were shut in by the

dark and desolate Bad-lands, which, as I remember, the professor estimated as over 1,000 feet high. The lower slopes were composed of beds of lignite, from a few inches to six feet in thickness, and black shale, the lignite layers not appearing in the great bed of shale in its upper part. Professor Cope made a sketch of the wonderful panorama, which I afterwards saw published. The shale disintegrated into dust on the surface, into which one sank to his knees in climbing some steep ascent. This formation, Cope assured me, belonged to the Fort Pierre group of the Cretaceous. We found many bones in it, of mosasaurs and fishes, similar to those I had already collected in western Kansas. After my return from Montana I felt sure the black shales then called Niobrara belonged to the Fort Pierre, on account of their faunal and stratigraphical resemblances to those on Dog Creek. It was years, however, before this view was generally accepted. I remember one very good quadrate I picked up on Dog Creek which I thought belonged to a *Platycarpus*. We could have made large collections of these fishes and mosasaurs but for the fact they were poorly preserved and interfered with the main object of the expedition.

On top of the Pierre deposits, which were the thickest, were the buff-colored sandstones of the Fox Hills group. We found no fossils in it, but I was assured by Cope of their position in the series. The Judith River beds, or Cretaceous No. 6, as Cope identified them, were above the Fox Hills. The rocks of this formation were composed of sandstone and clay. On the very highest summits of the Bad-lands was a thin bed of oyster shells. We remained in our camp over a month here. Every morning at sunrise we were in the saddle, taking a lunch of crackers and bacon. We returned late in the evening. Our chief discoveries were from a yellowish sandstone, in which we found many bone-beds, where loose teeth, bones and fragments of turtle shells were mingled together, often weathered out, lying loose on the surface. I have been deeply interested in reading Professor H. F. Osborn's and Mr. L. M. Lambe's 'Contributions to Canadian Paleontology,' Vol. III.,