

INTRODUCTORY LETTER.

UNITED STATES ENGINEER OFFICE,
GEOGRAPHICAL EXPLORATIONS AND SURVEYS
WEST OF THE ONE HUNDREDTH MERIDIAN,
Washington, D. C., February 1, 1875.

SIR: The following brief statement of the operations of the zoölogical work of the expedition for the years 1871, 1872, 1873, and 1874, based upon the collections made by different members of the party in this period, and embracing an epitomized account of certain portions of the different Territories visited by the collectors, may prove of interest, besides assisting in giving an idea of the features of the several regions as regards geographical distribution.

Although the active operations of the expedition were inaugurated in 1869, owing to various circumstances it was not until 1871 that facilities adequate to a proper prosecution of natural history work, as an item of interest collateral to the special object of the survey, topography, were available. Anticipating at this time that the country through which the expedition must pass, being but little known and seldom visited, would prove a rich field for the study of the naturalist in developing the existence of many forms of animal and vegetable life, rare, if not new, to science, the services of Acting Assistant Surgeon W. J. Hoffman, United States Army, were secured, together with those of Mr. F. Bischoff, a collector of recognized skill and enthusiasm, to whom was confided the task of collecting.

The points of departure in 1871 were: Carlin and Battle Mountain, Nev., on the Central Pacific Railroad; the point of disbandment, Tucson, Arizona; the area between these places extending about eight degrees in latitude, and longitudinally from the 110th to the 119th degree.

The several rendezvous were: Belmont, Nev.; Camp Independence, Cal.; Cottonwood Springs, Nev.; Crossing of the Colorado River, Truxton Springs, Prescott, and Camp Apache, Arizona.

The expedition being divided, a collector was assigned to each of the main parties, who diverged therefrom in the vicinity of the rendezvous camps and other desirable points along the line of travel. In this way, facility was also afforded for visiting portions of Nevada, California, and Utah, which were minutely examined; special attention being paid to the areas in basins of drainage of large parts of the several interior basins, as Owens River, Death Valley, Amargosa Desert, Las Vegas Valley, valleys of the Muddy and Rio Virgen, southeastern edges of the San Francisco Plateau, Verde and Salt Rivers, and Rio Gila. The map of the region in question, however, affords a more graphic as well as a better explanation of the localities visited than would any written description.

The reports on the parts of the collection which were received show that the regions visited are possessed of great interest to the student of natural history, and with the study of the specimens themselves can hardly fail to extend greatly our knowledge of the range of the fauna and flora of North America.

It is to be regretted that the great fire in Chicago left but few of the specimens gathered; those that remain, however, suffice to attest the reputation for zeal and industry of the gentlemen by whom the collection was made, and are abundant evidence to warrant the belief that the collection entire must have been extremely interesting.

Confident, perhaps, of the recent universally marked increase in attention to this branch of natural science, and of the great enthusiasm being manifested by foreign governments in kindred researches, and, perchance, not unmindful of the necessity for increased knowledge of our own fauna and flora, for the proper study of the fauna and flora of other lands, and that to this end specimens were necessary for comparison to establish the degrees of resemblance which exist between different bodies, in 1872 every facility practicable was afforded.

In 1872, the natural history branch of the survey was placed in my charge, with Mr. H. W. Henshaw, as assistant. The expedition was organized at Salt Lake City, where investigations were made in regard to the natural history of the vicinity of Great Salt Lake.

From this point, Mr. Henshaw and myself proceeded south fifty miles

to Provo, Utah, where two weeks were most profitably spent in the vicinity of the city, the cañons of the Wahsatch range, Utah Lake, and the Provo River. At Provo the two collectors separated, the former joining Lieutenant Hoxie's party on the way to Eastern Nevada, while the latter proceeded with your party through Spanish Fork Cañon to the valley of the Gunnison, and southward.

Lieutenant Hoxie's route was from Fairfield, Utah, making a detour westward to Fillmore, Utah, passing *en route* the Onaqui, Thomas, House, and Gosi-Ute ranges of mountains, and following quite closely the outward course of Captain Simpson in 1858 and 1859, the southern limit of the so-called American Desert was crossed, the extreme western limit reached being Schell Creek Valley, Nevada. From this point, the direction was south by east to Snake Creek Valley, due east across Confusion Range, past White Valley, traversing the House Range by means of Dome Cañon, south, to the crossing of the Sevier, a short distance above Deseret City, and thence to Fillmore.

The country traversed by this party was, in most instances, here and there, for miles in extent, either wholly destitute of vegetation, or at times relieved of its frightful barrenness by patches of sage-brush or dreary alkaline flats; even the few streams and water courses met with were triflingly diminutive, while the vegetation on their banks bordered well on to sterility. From the uninviting and infertile character of the country, and the rapidity with which the party necessarily moved, results in the way of specimens were not remarkable, although those secured amply repaid the time spent in their collection, and seemed to fully mark many of the peculiarities of the fauna and flora of the districts traversed.

From Fillmore the march was southerly along the main range in extension south of the Wahsatch, crossing this at Frémont's Pass; thence to the eastern valley of the Sevier, which was followed south to Panquitch, at which point much interesting work was done near the town and lake of the same name. From Panquitch the route was south and west to the Rio Virgen, along which the course lay to Toquerville, a rendezvous camp.

The party to which Mr. Henshaw, assistant, was attached, after crossing the main range, passed southward through Strawberry, Thistle, Sam

Pitch, and Grass Valleys, through Frémont's Pass westward to the regular wagon road, thence south to Toquerville. At the last mentioned point, a minor party was organized for special operations, and consisted of two collectors and assistants. This section, under myself, proceeded south to Saint George, Utah, via Washington, Utah, thence westward and northward to Pine Valley, east to Harmony, and north to Beaver, and finally to Provo, where considerable time was spent, as at the commencement of the field work. By moving leisurely from point to point, and making detours from time to time to localities of special interest, many valuable specimens were secured, as well as much important information that it would hardly have been possible otherwise to have gained. From Provo, the party proceeded to Salt Lake City, and disbanded.

The reports of the operations of the season will show that while much was accomplished of value to our own knowledge of the animal and vegetable characteristics of the region specially visited, the extensive collections obtained will enable a distribution to foreign museums of duplicate specimens, many of them unique, and highly desired to fill gaps in the Old World representations of North American zoölogy.

Finding that the results of the previous season fully warranted the increased facilities then afforded this branch of the expedition, it was determined in 1873 to prosecute with renewed vigor observations incident to this interesting study, and the following were named to continue the work, viz: Dr. J. T. Rothrock, Dr. C. G. Newberry, Dr. O. Loew, and Mr. H. W. Henshaw. The party rendezvoused at Denver, Colo.; Dr. Rothrock being assigned to Lieutenant Marshall's party, Dr. Newberry to Lieutenant Russell's, and Dr. Loew to your own, Mr. Henshaw setting out in advance to make collections at special points.

The party under Lieutenant Marshall left Denver, and proceeded westward through Middle Park, visiting Georgetown, Fairplay, South Park, Roaring Fork, Cochetopa, Saguache, and Tierra Amarilla. The party to which Dr. Newberry and Dr. Loew were attached operated in Northern and Southern New Mexico and Arizona; Mr. Henshaw joining Lieutenant Russell's party at Fort Wingate in Western New Mexico, and proceeded through Western and Southern Arizona. The very extensive collection of these gen-

tlemen fully attests their zeal and industry in their respective departments. To Dr. Rothrock, and his assistant, Professor Wolf, is due the credit of a botanical collection hardly surpassed under similar circumstances in point of number and variety of specimens, and to Mr. Henshaw that of a unique and unprecedented collection of 1,200 bird skins.

In 1874, the results of the zoölogical collectors were simply unexampled, as a collection was secured excelling in value and magnitude that of any similar expedition. A party, consisting of Dr. J. T. Rothrock, H. W. Henshaw, and James M. Rutter, took the field early in May, and proceeded to Santa Fé, N. Mex., from which point their labors commenced. The route of travel selected was through portions of Western New Mexico and Arizona; the farthest southern point reached being old Camp Crittenden, not far from the Mexican boundary line, returning through Eastern Arizona and New Mexico to their point of departure in the latter part of December. Being independent of the topographical parties, they were enabled to carefully study the fauna and flora of certain areas not previously investigated, and in addition acquired valuable meteorological data. Another party left Pueblo, Colo., in July, consisting of Prof. E. D. Cope, W. G. Shedd, and R. J. Ainsworth, in charge of myself, and was organized for the especial purpose of investigating beds of fossil vertebrates and invertebrates in New Mexico and Colorado. As a detailed account of the routes of travel of the different parties has already been given in your annual report for 1874, it is unnecessary to repeat it here. In addition, the main or supply party had the services of C. E. Aiken as collector, who was able to add very largely to the stock of material gathered; and Dr. O. Loew, with Lieutenant Price's party, likewise furnished an important share.

Besides the labors of the regular collectors, it is pleasing to note the co-operation of many of the members of the different parties, who offered every assistance in their power to swell the general aggregate of results, among whom were Lieutenants Marshall, Hoxie, Russell, Whipple, and Birnie; Dr. O. Loew; and Messrs. Keasbey, Klett, Thompson, Gilbert, Howell, and Brown. It is also mentioned with pleasure that, during the entire time covered by the field operations of the survey, all the officers at the different military posts visited, cheerfully rendered every assistance

desired, and to their courtesy and uniform kindness much of the success of the natural history operations is attributable.

In the special work of preparing the reports relative to its collections, the expedition is under obligations to a number of distinguished scientists for their kind and gratuitous services in the work of identification of the individual specimens. The following are among the large number of the gentlemen in question:

In the determination of—

Birds, Prof. S. F. Baird; Dr. Elliott Coues, U. S. A.; Mr. Robert Ridgway, of the Smithsonian; Prof. J. A. Allen; Mr. George N. Lawrence, of the Lyceum of Natural History of New York; Mr. C. Hart Merriam, of the Yale Scientific School; Dr. Thomas Brewer, of Boston; Mr. William Brewster, of Cambridge; Mr. Charles E. Aiken, of Colorado; and Capt. C. Bendire, U. S. A.

I have the honor to be, very respectfully, your obedient servant,

H. C. YARROW,

Acting Assistant Surgeon United States Army.

First Lieut. GEORGE M. WHEELER,

Corps of Engineers United States Army, in charge.

Mollusca, Mr. George W. Tryon, jr., of the Academy of Natural Sciences of Philadelphia; Mr. W. G. Binney, of Burlington, N. J.; Dr. James Lewis, of Mohawk, N. Y.; and Mr. Temple Prime, of New York City.

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