

An Early Exploration of the Arkansas Hot Springs¹

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In 1804, President Thomas Jefferson appointed an eminent scientist, William Dunbar of Natchez, Mississippi Territory, as the leader of an expedition to investigate the southern portion of the Louisiana Purchase lands. Because of Spanish reluctance to allow citizens of the United States to venture farther west than Natchitoches, Louisiana, Dunbar had to content himself with locating and observing the fabled hot spring of Arkansas. On 16 October, 1804, Dunbar, his assistant George Hunter, a chemist from Philadelphia, Pennsylvania, and thirteen soldiers from the New Orleans Barracks, began a 103-day expedition which brought them to the Arkansas phenomenon.

Dunbar's activities at the hot springs were numerous and show the diversity and depth of his scientific background. Fully a fifth of his daylight time was spent taking astronomical observations. He had faithfully taken fixes each day since leaving Natchez. Now, however, he was determined to fix the exact location of every hill, valley, spring, etc., in the immediate area. Some days he did little else, as on 16 December he reported, "Took all kinds of observations possible all day and believe them to be very accurate . . ." Also, he took time to instruct his fellow scientists on how to take more accurate astronomical observations. He wrote: "the circle was mounted on its pedestal very firmly, the Star towards the west and the moon overhead, so that when both were brought into the field of view and the Star made to move gently across the limb of the moon by a turn of the foot screw backward and forward, or by sliding the foot a little right and left so as to discover the true point of contact on the moon's limb, the Star being a little open, the observer had only to wait with his Eye fixed upon a permanent steady object until he was convinced of the contact being perfect: I consider one observation made in this way superior to any number or set of observations made by an instrument supported upon the arms of the most experienced observer. I would therefore recommend to all persons using a Sextant or reflecting circle by land to adapt a pedestal or support, with the three necessary motions; the superiority is so great, that he who has accustomed himself to use the one mode, cannot reconcile himself to the manifest imperfection of the other."

Dunbar also spent much time observing the countryside and commenting on its future possibilities. He mentioned that the soil of the hills was generally second-rate and rocky. Trees were numerous but small and scrubby. He was quite taken with the great variety of black and yellow grapes that grew in the area, and remarked that with care they could be cultivated by settlers. Descending from the hills to the valleys, he observed good soil and especially noted that it was excellent for wheat. He was an inveterate collector of everything he could lay his hands on. All kinds of bark, soil, rocks, and vegetation had to be collected and returned east. On 21 December, after five days of sleet and snow, he found a myrtle wax tree which still bore fruit. He was ecstatic as he exclaimed, "My God, it still has wax on it, it is beautiful and merits cultivation." A soldier was dispatched daily to the river barge with a load of specimens to be stored for the return trip. Everything Dunbar found deserved a closer investigation back home in his laboratory.

Dunbar spent considerable time writing in his journal. Every night found him expanding on notes taken during the day. Whenever the weather was too inclement to venture out-of-doors, he spent his time revising his notes and observations. On 14 December it started raining and sleeting; the next day it turned to

¹The research material used in this paper is from William Dunbar's "Journal." He carefully noted all he observed and took great pains to elaborate fully at night when he spent hours writing on the activities of the day. It is one of the most detailed journals written by an American explorer in the pre-Civil War period. The original journal is now housed in a vault in the American Philosophical Society building in Philadelphia, Pennsylvania. However, published copies are available: William Dunbar, "Journal of a Voyage," in *Documents Relating to the Purchase and Exploration of Louisiana* (Boston: Houghton, Mifflin & Co., 1904); the same journal is included in Eron Rowland (ed.) *Life, Letters and Papers of William Dunbar of Elgin, Morayshire, Scotland, and Natchez, Mississippi* (Jackson: Press of the Mississippi Historical Society, 1930).

snow. For the remainder of the month they were never without snow or freezing rain. "The Mansion," as Dunbar called his hut, did little to keep out the cold; so he wrote until midnight or later with only a candle which was periodically extinguished by a wind which blew through his quarters. Dr. Hunter became seriously ill on 18 December and almost died. The activities of the Philadelphia chemist were severely limited for the remainder of the journey, which increased the amount of work Dunbar personally undertook. On 20 December Dunbar recorded that he had been stricken with a severe case of diarrhea and a touch of the flu, which he blamed on "cold and wet feet and the inclemency of the weather." Fortunately, he had great resilience and was soon up and about finding new scientific marvels to analyze and record.

The observations, collections of artifacts and specimens, and writings were all necessary functions which he felt must occupy most of his time. However, as a scientist, rather than a military officer in the pay of the government, he could never suppress an innate curiosity and, as he later confessed to his wife Diana, he spent more and more time studying the waters of the hot springs. Rather than simply finding and marking the hot waters so that others could include them on a new map of the country, he felt obliged to observe and analyze the wonders he beheld. On 12 December he recorded, "I began to bring my journals up to date but instead occupied myself examining all the hot springs this afternoon." Again on 23 December, he wrote, "Began to take 4th of my 4 observations of the Latitude of this place, but instead I visited the hot springs."

He discovered four main springs and found that the temperature of each ranged from 132° to 150°. He tried to find the source of spring number 4 and traced it to a channel under the eastern side of the creek. He found a thick green moss clinging to the sides of all the springs. He had never seen or heard of any such growth before and examined it carefully while packing a large quantity to study in his laboratory. He felt that the green moss was a vegetable product and not just an accumulation caused by precipitation. This will be adequate proof, he wrote, "of the wonderful powers of nature in the production of animal and vegetable life in temperatures which have been hitherto thought sufficient to extinguish the vital principle . . ." Just as amazing was the fact that the green moss was covered with millions of minute shelled animals shaped like a mussel or kidney and about the size of a small grain of sand. The purplish shell would open and two very slender sharp clawed feet would emerge to feed on the matter.

He also tried to analyze the water itself. Each day he recorded experiments designed to determine what gave the water its revitalizing effect. He tested stagnant and running water; he experimented with hot and cold water; but alas, on 19 December he wrote that he was unable to discover anything in the water except some weak acid which was probably carbonic acid. It made the water hard and difficult to fother.

Some of the hot springs boiled, while most did not. The Mississippian discovered that the temperature of the boiling water was also 212°. This puzzled him; surely the water should boil at a lower temperature! After considerable investigation he noted that where the water boiled the land was not elevated "so as to alter the pressure of the atmosphere." When the weather was so inclement that he could not venture outdoors, he carried on experiments in his hut. On 22 December, he evaporated ten quarts of hot springs water and it produced about ten grains of matter "of which the chief part appeared to be carbonated lime with some feculum, the greater part dissolved with effervescence in the muriatic acid."

By 23 December, he was so absorbed in his scientific observations of the waters that he relegated all else to his spare time. He traced each spring to its possible source. Along the way he discovered that the waters deposited a principally calcareous stony matter on rocks and earth. There was evidence of silex and lime in the matter as it took the form of sparkling crystals. He and Dr. Hunter studied it under the microscope, but neither could positively identify silex in the matter. He also observed a strange species of cabbage growing near the water. It was dark green with shades of purple and tasted like a radish.

In the hot waters of the springs, Dunbar found broken branches that took root while hanging in the midstream. This shocked him above all else, as he wrote: "It is surprising to see plants, shrubs and trees with their roots also in the hot water; the circumstance being observed by some of the visitants of the hot springs; has induced some of them to try experiments by breaking off branches of trees and sticking them into the run of hot water; we actually found some branches of the wax myrtle thrust into the run of hot water of temperature 130°, where the foliage of the branch was not only of a good healthy colour, but at the very surface some fresh roots were sprouting from the branch, upon examination the wood was found decayed where it entered the mud at a greater depth; this had the appearance of being so strange and singular that few persons will be willing to believe it, judging no doubt that some deception or want of accuracy has led us to error; but I assure you it has not."

The question of how a perpetual fire could get started underground and keep up the high temperature of the springs challenged Dunbar. He was never satisfied with the myriad of answers offered by Hunter and himself. The best analysis he could volunteer was recorded in his journal on Christmas eve: "Nothing around us but an immense bed of blue or blackish schistous, bottom or bed of creek is composed of nothing else; I have taken pieces of the stone, which was soft by decomposition, possessing a very strong aluminous taste. This schistous all around here and in hills. Known to chemists that aluminous schistous being moistened in due degree by water, generates in progress of decomposition a very great degree of heat; I leave it to scientific men to decide whether this cause may be to account for heat."

While Dunbar tested water and gathered specimens, the men hunted and returned the new-found treasures to the barge. He worked himself and his soldiers so hard that he almost forgot to celebrate Christmas. The men did not forget, however, and he graciously allowed them a free afternoon. He wrote Christmas night that "this being Xmas we were obliged to indulge the men with a holy day for which purpose they had hoarded up their ration whisky to be expended on this day; a great deal of frolick was the consequence; but perfectly innocent: we amused ourselves with some farther experimental enquiries into the qualities of the hot waters, . . ."

By 30 December the temperature dipped to 9° above zero and the party had exhausted all but enough supplies to make the return trip in safety. So Dunbar reluctantly ended his investigations and moved his men and equipment back to the river and the barge. As the Mississippian departed, he sadly observed that time had allowed the investigation of only the most obvious wonders of the hot springs. More questions had been raised than answered. And yet, how many scientists are privileged to be the first of their breed to not only find, but also explore, such a wonderland as the one discovered by this hardy band of inquisitive Americans in 1804-1805?
