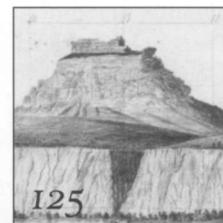
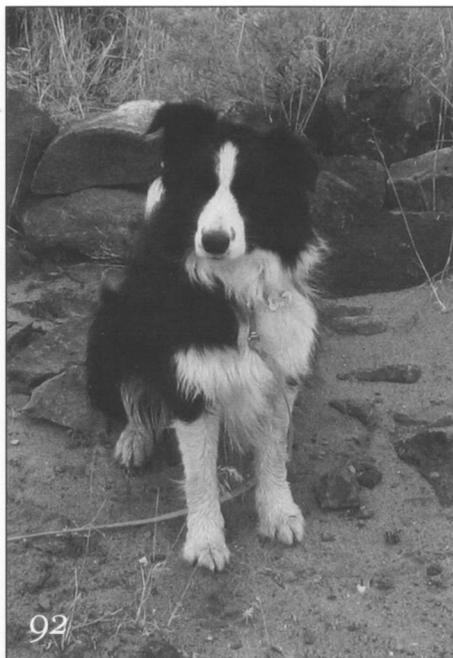


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JOHN GREBENKEMPER, KRISTIN
JOHNSON, AND ADELA MORRIS

LOCATING THE GRAVE
OF
JOHN SNYDER

Field Research on a Donner Party Death

IN JULY 1846, SEVERAL PARTIES OF CALIFORNIA-BOUND EMIGRANTS LEFT THE CUSTOMARY ROUTE AT FORT BRIDGER AND SET OUT ON THE NEW HASTINGS CUTOFF, WHICH, ITS PROMOTER PROMISED, WOULD SHAVE HUNDREDS OF MILES

off their journey. The sixty to seventy-five wagons traveling with Lansford W. Hastings entered the present state of Utah and followed the Weber River through the Wasatch Mountains to the plains surrounding the Great Salt Lake, but this was not the route Hastings had intended.¹ On his advice, a smaller train travelling behind Hastings, captained by George Donner, left the Weber River canyon and struggled for more than two weeks to hack a rough road through the trees and brush of the rugged Wasatch Range. They finally reached the Salt Lake Valley via Emigration Canyon on August 22, exhausted from the effort.

The Donner Party spent the following week traveling an easy route across the valley and along

the south side of the Great Salt Lake. On August 28 they began a long waterless drive across the desert west of the lake. Five difficult days later they were recuperating at the springs at Pilot Peak, searching for lost cattle, and caching four wagons that had to be abandoned. After taking stock of their provisions, they sent two men ahead to Sutter's Fort to seek more supplies, and finally rolled out again on September 10, following Hastings' tracks. When the Donner Party finally rejoined the California Trail on September 26 they were seriously late in their attempt to cross present-day Nevada and the Sierra Nevada into California.

The entries in James F. Reed's diary, the only surviving contemporary record of the Donner Party's journey in Utah and Nevada, are brief, giving little more than topographical descriptions and mileages. Other than a cryptic reference to "Mad Woman Camp," where "all the women in

1. Roy D. Tea, "The Tragic Decision of James Hudspeth: The Donner/Reed Party, Hastings Cutoff, and the Weber Canyon Route," *Overland Journal* 28, no. 2 (2010): 52-82.

camp were mad with anger” on September 14,² Reed says nothing about interpersonal relations within the wagon train, but later reminiscent accounts by survivors indicate that tensions were rising. This, in addition to the stress of the lateness of the season, the dwindling food supplies, and the sheer difficulty of the journey, no doubt contributed to the fatal quarrel that broke out in the first week of October.

THE REED-SNYDER FIGHT

The earliest description of the altercation appeared in J. Q. Thornton’s *Oregon and California in 1848* (1849), based on information provided him by Donner Party members in the fall of 1847.

On the morning of October 5th, they broke up their camp, and the caravan proceeded on its way. Mr. Eddy went out hunting antelope, and spent the forenoon in this manner, being frequently shot at by the Indians. At noon he came up with the company, which had stopped to take some refreshments, at the foot of a very high and long sand-hill, covered with rocks at the top. At length they commenced ascending the hill. All the wagons had been taken up but Mr. Reed’s, Mr. Pike’s, and one of Mr. Graves’, the latter driven by John Snyder. Milton [Milford] Elliot, who was Mr. Reed’s driver, took Mr. Eddy’s team, which was on Mr. Reed’s wagon, and joined it to Mr. Pike’s team. The cattle of this team, being unruly, became entangled with that of Mr. Graves’, driven by Snyder; and a quarrel

ensued between him and Elliot. Snyder at length commenced quarreling with Mr. Reed, and made some threats of whipping him, which threats he seemed about to attempt executing. Mr. Reed then drew a knife, without, however, attempting to use it, and told Snyder that he did not wish to have any difficulty with him. Snyder told him that he would whip him, “any how;” and turning the butt of his whip, gave Mr. Reed a severe blow upon the head, which cut it very much. As Reed was in the act of dodging the blow, he stabbed Snyder a little below the collar-bone, cutting off the first rib, and driving the knife through the left lung. Snyder after this struck Mrs. Reed a blow upon the head, and Mr. Reed two blows upon the head, the last one bringing him down upon his knees. Snyder expired in about fifteen minutes. Mr. Reed, although the blood was running down over his face and shoulders from his own wounds, manifested the greatest anguish of spirit, and threw the knife away from him into the river. Although Mr. Reed was thus compelled to do as he did, the occurrence produced much feeling against him; and in the evening Kiesburg [Louis Keseberg] proposed to hang him. To this, however, he was probably prompted by a feeling of resentment, produced by Mr. Reed having been mainly instrumental in his expulsion from one of the companies, while on the South Platte, for grossly improper conduct. Mr. Eddy had two six-shooters, two double-barreled pistols, and a rifle; Milton Elliot had one rifle, and a double-barreled shot gun; and Mr. Reed had one six-shooter, and a brace of double-barreled pistols, and rifle. Thus Mr. Reed’s comrades were situated, and they determined that he should not die. Mr. Eddy, however, proposed that Mr. Reed should leave the camp. This was finally agreed to, and he accordingly left the next morning; not,

2. James F. Reed, “The Journal of James Frazier Reed, July 31–October 4, 1846,” in *West from Fort Bridger*, edited by J. Roderick Korns and Dale L. Morgan; 2nd ed. revised and edited by Will Bagley and Harold Schindler (Logan: Utah State University Press, 1994), 230–231.

however, before he had assisted in committing to the grave the body of the unhappy young man.³

In 1877, over thirty years later, survivor William C. Graves wrote a memoir with an account of the death of his family's teamster:

This day of a terrible tragedy my father was in the lead, Jay Fosdick second, John Snider [sic] third, and Reed fourth; arriving at the foot of a short steep hill, my father's team was not able to pull the wagon up, so Fosdick took his team, doubled to father's and went up, then took both teams back and started up with Fosdick's. Snider said his team could pull up alone; just then Reed had got another team to double to his wagon, and started to pass Snider's wagon; but the leaders did not want to pass, and tangled in with Snider's oxen. Reed at this time was on the opposite side of the oxen from Snider, and said to Snider, "you have no business here in the way;" Snider said "it is my place." Reed started toward him, and jumping over the wagon tongue, said "you are a damned liar, and I'll cut your heart out!" Snider pulled his clothes open on his breast and said, "cut away." Reed ran to him and stuck a large six-inch butcher's knife into his heart and cut off two ribs. Snider then turned the butt-end of his whip stock and struck him three times, but missed him the third and hit Mrs. Reed, who had in the meantime got hold of her husband. Snider then started up the hill and went about ten steps, then he began to stagger; just then I got to him and kept him from falling, by laying him down easy, where he died in five minutes. We then went a little ways to a place where we could camp, and

3. J. Quinn Thornton, "From Oregon and California in 1848" (1849). In Kristin Johnson, ed. *Unfortunate Emigrants: Narratives of the Donner Party* (Logan: Utah State University Press, 1996), 36–37.

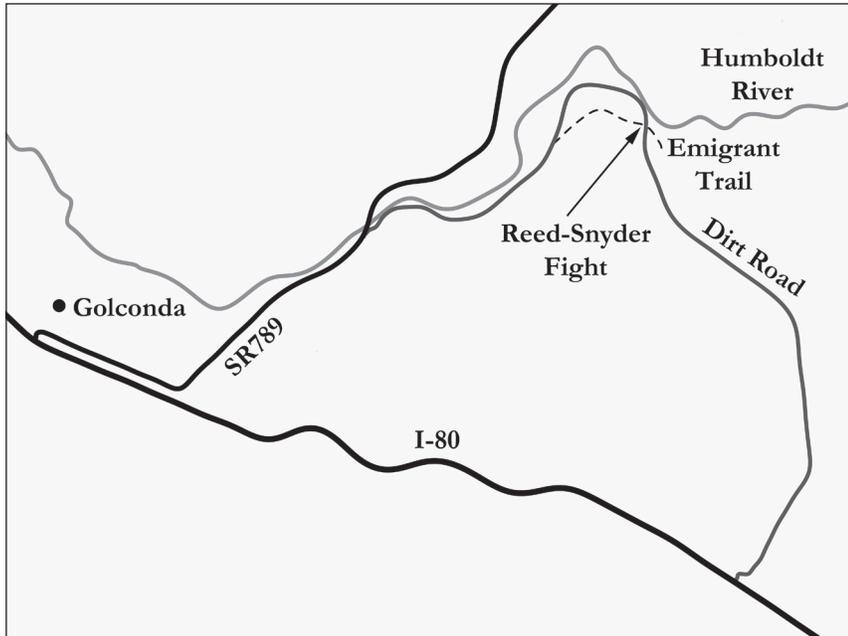
held council to find out what to do with Reed and took affidavits from the witnesses with the view of giving him a fair trial when we got to civilization. But Mrs. Reed and I were the only witnesses that got through, the affidavits were all lost, and I went back to Illinois the next June, so Reed taking advantage of the circumstances, went before a Justice of the Peace, told his own story, and was acquitted for the lack of evidence.⁴

Describing the tragedy nearly thirty-three years later, historian C. F. McGlashan wrote, "No other portion of the History of the Donner Party, as contributed by the survivors, has been so variously stated as this Reed-Snyder affair."⁵ While he acknowledged other versions, he adopted Thornton's viewpoint, that Reed had acted in self-defense; most historians have done the same.

THE MYTH OF SNYDER'S GRAVE

"Gravelly Ford, on the Humboldt River, witnessed a tragedy."⁶ With these opening words, C. F. McGlashan's account of the Reed-Snyder fight created a myth that has persisted for well over a century. Since his *History of the Donner Party* appeared in 1879, myriad authors, including Donner Party survivors themselves,⁷ have dutifully identified Gravelly Ford as the fight's location. Early trail researchers and Donner Party buffs made the pilgrimage to present-day Beowawe, Nevada, then

4. William C. Graves, "Crossing the Plains in '46." (1877) Johnson, *Unfortunate Emigrants*, 217.
 5. C. F. McGlashan, *History of the Donner Party: A Tragedy of the Sierra*. Rev. ed. (Stanford, CA: Stanford University Press, 1947), 45–46.
 6. McGlashan, *History of the Donner Party*, 41.
 7. Virginia Reed Murphy, "Across the Plains in the Donner Party" (1891); in Johnson, *Unfortunate Emigrants*, 275; Eliza Donner Houghton, *The Expedition of the Donner Party* (Lincoln: University of Nebraska Press, 1997), 47.



MAP I. VICINITY OF IRON POINT

The dashed line is the emigrant trail. John Snyder died near the base of a sandy hill after it crossed the modern dirt road. It is 5½ miles from Golconda to the dirt road that meets Nevada SR789 just before it crosses the Humboldt River bridge, and another 5.6 miles along the dirt road to reach the base of the sandy hill. A Trails West marker is on the east side of the dirt road marking this spot.

out to the ford about five miles distant to gaze on the scene of this thrilling event. In August 1929, retracing the Donner trail eastward from California, Capt. Charles E. Davis visited Gravelly Ford and identified Snyder's grave, leaving an unusual marker: an empty tobacco tin attached to a wooden cross pounded into the ground, with a note inserted into the tin. On one of her trail-tracing journeys, Julia Cooley Altrocchi discovered Davis's cross and note. She wrote, "This identification of John Snyder's grave has since been corroborated by the very careful historian and student of the trails, Charles Kelly; by Jean Weir, State Historian of Nevada; and by several other authorities. Mrs. Dean Witter, of San Francisco and Beowawe, has recently made arrangements to place a suitable monument over the grave. There are others, however, who dispute the fact and place the murder further ahead on the trail."⁸

8. Julia Cooley Altrocchi, *The Old California Trail* (Caldwell, Id.:

By "others," Altrocchi referred primarily to George R. Stewart. In the 1936 first edition of his account of the Donner Party, *Ordeal by Hunger*, Stewart listed the fight in his chronology as follows: "October 5, Snyder killed near [Stone House]." He used brackets to indicate the modern name of the location.⁹ He briefly discussed this identification in an accompanying note: "McG[lashan], apparently from a misreading of GWC [William C. Graves], gives the scene of Snyder's death as Gravelly Ford. Actually, GWC places the scene several days' journey west of that point, and this checks with the date as given in Th[ornton]."¹⁰ Stewart's observation, buried as it

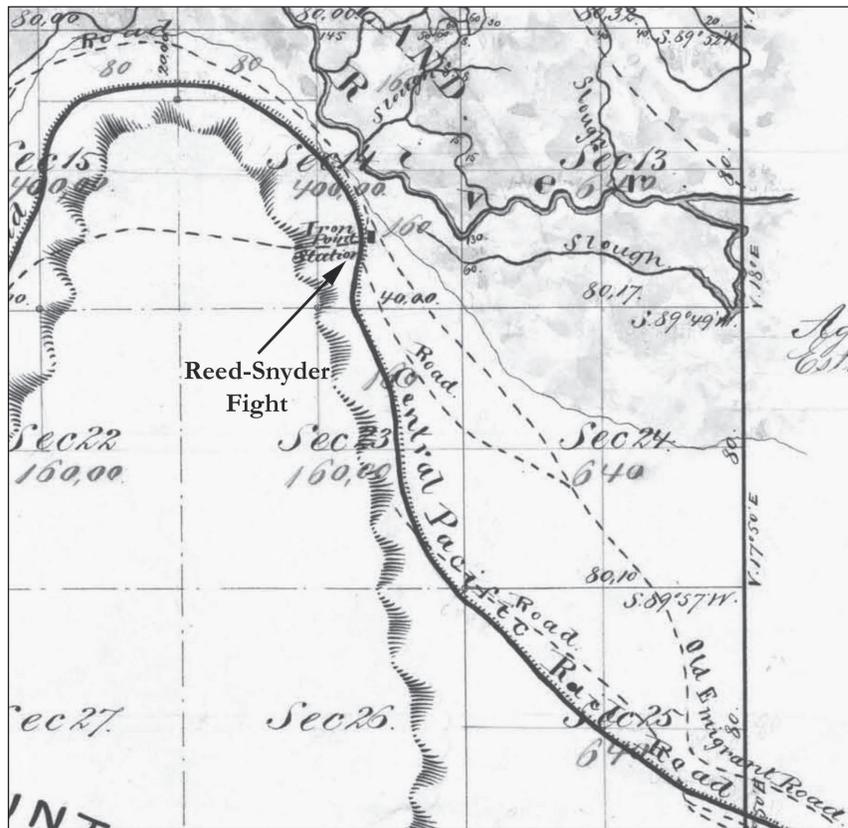
Caxton, 1945), 275–276. On page 22 of the introduction to the book, dated 1942, Altrocchi wrote that she had been retraced the trail every summer for a dozen years, more carefully nine years ago, and even more carefully two years ago; it is not clear, however, on which of these trips she visited Gravelly Ford.

9. George R. Stewart, *Ordeal by Hunger* (New York: Holt, 1936), 301.

10. Stewart, *Ordeal* (1936), 313.

MAP 2. GENERAL LAND OFFICE
MAP OF IRON POINT

This map was surveyed in 1868 and published in February 1869. The area of the Reed-Snyder fight is where the Emigrant Trail crossed the Central Pacific Railroad tracks. The original CPRR tracks ran around the base of the hill. The Iron Point Station, shown as a black rectangle, is near where the Emigrant Trail started up the hill. The map was provided by the Bureau of Land Management, Reno, NV.



was in a note in the back of his book, seems to have made little impression at the time. Irene Paden, for example, on her own trail researching expeditions, discovered Davis’s tobacco tin and note at Gravelly Ford and expressed no reservations about the fight having occurred there in her 1943 book, *The Wake of the Prairie Schooner*.¹¹

Stewart did not forget the issue. In 1950 he published an article in the *Pacific Spectator* noting that later authors persisted in identifying Gravelly Ford, despite having read and cited his book, and without adducing any new evidence to refute him. There was fresh evidence in his support: the

recently-discovered Miller-Reed diary, first published in 1947, indicated that the scene was five or six days’ travel past Gravelly Ford. Stewart also cited the research of Harrison C. Ryker, who had “recently found a particular steep little hill, in the proper area, on the emigrant road, close to the river—thus fulfilling all the requirements.”¹² In a letter to the curator at Sutter’s Fort, Ryker described the site as “two low hills near Stonehouse Railroad Station” with “a saddle between them,” “just north and west of Valmy Station”.¹³

11. Irene Paden, *The Wake of the Prairie Schooner* (New York: Macmillan, 1943), 400–402.

12. George Stewart, “Truth Crushed to Earth at Gravelly Ford, Nevada,” *Pacific Spectator*, 4:1 (November 1950), 46–48.

13. Harrison C. Ryker to Carroll D. Hall, November 30, 1948. Sutter’s Fort, Martha J. (Patty) Reed Lewis Collection, Box 8-4308, fd 124. Ryker is describing Treaty Hill, on the north

Stewart refused to let the matter rest. In the second edition of *Ordeal by Hunger* (1960), he included a lengthy discussion of the Gravelly Ford problem and McGlashan's error.¹⁴ McGlashan's source, William C. Graves, had written that, after sending two men ahead for provisions, "we had no more trouble till we got to Gravelly Ford, on the Humboldt, where the Indians stole two of fathers oxen and in two days after they stole a horse; but we pushed on"; the next incident he described was the Reed-Snyder fight.¹⁵ McGlashan had obviously associated the reference to trouble at Gravelly Ford with the Reed-Snyder affray, overlooking the references to Indian thefts at the ford and "two days after." By 1960, however, a number of authors had begun to take Stewart seriously, and increasingly the more trail-savvy writers followed his lead. Yet in spite of the evidence, there are still many who write that the fight occurred at the ford.¹⁶

IRON POINT

At Gravelly Ford the Humboldt River and the California Trail pass through a level valley, which clearly does not fit the scene described in the sources, with oxtteams struggling up a steep, sandy hill. In 1952 Dale L. Morgan wrote that the Donner Party had reached the vicinity of Red House,

side of the Humboldt, about 5½ miles northwest of Valmy, Nevada, and about 4 miles southeast of Iron Point.

14. George R. Stewart, *Ordeal by Hunger* (Boston: Houghton Mifflin, 1960), 316–317.
 15. Graves, "Crossing the Plains," in Johnson, *Unfortunate Emigrants*, 217.
 16. One recent author has the fight occurring at "a point between Iron Point and Golconda," "forty miles east" (emphasis added) of Beowawe, and the burial at Gravelly Ford, a mind-boggling and geographically impossible scenario. Allan W. Eckert, *Dark Journey: The Tragedy of the Donner Party* (Ashland, Ky.: Jesse Stuart Foundation, 2009), 312.

Nevada, on October 4, 1846, and the next day, while traversing the pass between the Osgood Mountains and the Sonoma Range, the fatal quarrel broke out.¹⁷ Morgan's general description has been narrowed down to Iron Point, which fits the itinerary indicated in the documentary record (about five days west of Gravelly Ford), and also the topography (a steep sandy hill with rocks at the top). The point is a ridge running south to north, and the Humboldt River curves around its northern tip in a narrow channel. Emigrants traveling along the south side of the river were forced to cross the ridge; otherwise they would have to go miles out of their way to get around it.

Then as now, Iron Point lies in a desolate stretch of the Nevada desert. The area was first surveyed in 1868 for the Central Pacific Railroad and the map of the survey was released in February 1869. Map 2 shows a portion of that map. The emigrant trail enters from the southeast, climbs to the top of the hill, and continues west. The railroad is shown as a dark line going around the point of the hill. The Iron Point Station is at the base of the hill where the emigrant trail begins to climb; the station had a double-tracked section where east and westbound trains could pass. Today a dirt road has been built on top of the railroad bed.

SEARCHING FOR SNYDER'S GRAVE

Author John Grebenkemper's abiding interest in overland trails and his work with Historic Human Remains Detection dogs intersected as he researched the fatal quarrel between Reed and Snyder. The historical record does not describe the burial site, nor did the surveyors record any grave markers on the 1869 map. The early accounts

17. Korn and Morgan, *West from Fort Bridger* (1994), 236n65.



LOOKING WEST ALONG THE EMIGRANT TRAIL

The CPRR roadbed crosses the trail in line with the vehicle at left. The trail continues up the sandy hill, where evidence of a swale can be seen. *All photos, unless otherwise indicated, taken October 5, 2011, by John Grebenkemper.*

LOOKING NORTH ALONG CPRR ROADBED

The emigrant trail comes in at right in front of the Trails West T-marker and the rocks, and climbs the hill to the left.





JUNCTION OF CPRR ROADBED AND EMIGRANT TRAIL

This view is looking south along the Central Pacific Railroad roadbed.

The Emigrant Trail crosses in front of the two large boulders and climbs the sandy hill on the right.

The Iron Point Station split in the CPRR roadbed starts at the two large boulders with one section of the tracks heading off to the right and the other section behind the boulders.

The two arrows mark the extent of the human remains scent.

indicate that Snyder's wagon became stuck in the sand while climbing the hill. A trip to Iron Point revealed that the hill has roughly the same steepness and soft sand from its start to the top. However, the trail in the upper portion of the hill narrows as it travels through rocks. A teamster could not have hoped to pass another wagon in that part of the hill. It was logical, therefore, to conclude that Snyder's wagon became stuck on the bottom half of the hill, where Reed and his team attempted to pass. Snyder presumably died in this area. The exhausted emigrants would most likely have carried his body to a nearby area for burial.

In 1998, Adela Morris founded the Institute for Canine Forensics.¹⁸ She had observed that

cadaver dogs could find hundred year old graves while training near an old cemetery. The group was founded to specifically train dogs to find old human graves. The training diverged from standard cadaver dog training and instead focused the dog on working slowly with its nose close to the ground to detect the faint scents from old graves. As the training improved and new dogs were specially trained for this field, they were able to find older burials. Working with archaeologist in California archaeological sites, they found that the dogs could detect burials that were many thousands of years old.

Historic Human Remains Detection dogs have skills that are similar to the better-known cadaver dogs used in police work, from whom their specialized training is derived. Both search for the

18. Institute for Canine Forensics website is at www.kqforensic.org

specific scent of human remains; they will not alert on animal remains, either buried or on the surface. Cadaver dogs search for recently deceased people, but HHRD dogs are specifically trained to locate old human bones and teeth and can detect the much lower scent levels emanating from hundred- or even thousand-year-old graves. The Institute for Canine Forensics certification test requires that the dogs find a number of hidden human bones and teeth that are over one hundred years old. In an example of their abilities, a certified HHRD dog working a site in the Czech Republic indicated human remains in an area thought to be free of burials by the archaeologists conducting the investigation. The archaeologists excavated and found a tomb containing human bones. The grave artifacts dated the burial to about 450 AD, or over 1500 years old.¹⁹

Though HHRD dogs are a relatively new innovation in forensic work, this was not the first time dogs with this specialized training had been tasked with searching for emigrant trail burial sites. They were used by Adela Morris and others at the Alder Creek campsite of the Donners during the 2003–2004 archaeological investigations conducted by Kelly Dixon, Julie Schablitsky, and Shannon Novak.²⁰ The dogs have also worked projects for the Federal Government, California State Parks, California Department of Transportation, several cemetery districts in California

and some private construction firms. The dogs are primarily used to locate boundaries in historic cemeteries and to locate Native American burials so those areas aren't disturbed in planned construction projects.

Adela Morris' Rhea and John Grebenkemper's Kayle were used to search for Snyder's grave. The dogs are trained by their handler and only work with that handler. Rhea is an eight-year-old Border Collie who does both historic and cold case law enforcement searches. Some of Rhea's cold case searches include the Jaycee Dugard kidnapping where she searched for other possible victims at the perpetrator's house and the 2002 murder of Mike Snyder in Albuquerque whose body was recovered in 2010. A few of Rhea's historical searches include the Napoleon mass burials in the Czech Republic and Nez Perce burials from the Chief Joseph band in Ft. Leavenworth.

Kayle is a two-year-old Border Collie who has been certified for historical searches since the beginning of 2011. Since certification, she has worked Native American burial sites at Redwoods National Park, Smith River State Park, Tolowa Dunes State Park, a construction site at UC San Diego and a highway project for the California Department of Transportation. She has also mapped the burial locations in historic cemeteries in Bodie State Historic Park and Marshall Gold Discovery State Park.

Authors John Grebenkemper and Adela Morris first tried to visit the site at Iron Point in June 2011. It had been a wet winter and the Nevada desert was green with vegetation. We turned on a dirt road that approached the site from the south. The road was muddy but presented no significant hazard in our 4WD vehicle. As we approached the Southern Pacific railroad tracks, the road entered a swampy area with soft mud in the road; the risk

19. Frederik Velinský, "Ojedinělý objev: Hroby z bouřlivých časů", *21 Století*, 2008, No. 16, pgs 111–113, October 17, 2008

20. See Dixon, Schablitsky, and Novak, *An Archaeology of Desperation: Exploring the Donner Party's Alder Creek Camp* (Norman, University of Oklahoma Press, 2011). Author Kristin Johnson's account of the use of dogs during this investigation is discussed in her blog located at <http://www.utahcrossroads.org/DonnerParty/Bulletin15.htm>. Accessed March 20, 2012. A video of HHRD dogs at work at the Donner Party Alder Creek site is available at www.kgforensic.org.



KAYLE ALERTING AT HUMAN REMAINS SCENT

Kayle alerts to human remains scent by sitting.

Both canines alerted on both sides of this set of rocks.

The alerts indicate that most of the human remains scent was coming from the area of the rocks that bordered the north side of the Emigrant Trail.

The Trails West marker is visible in the background.



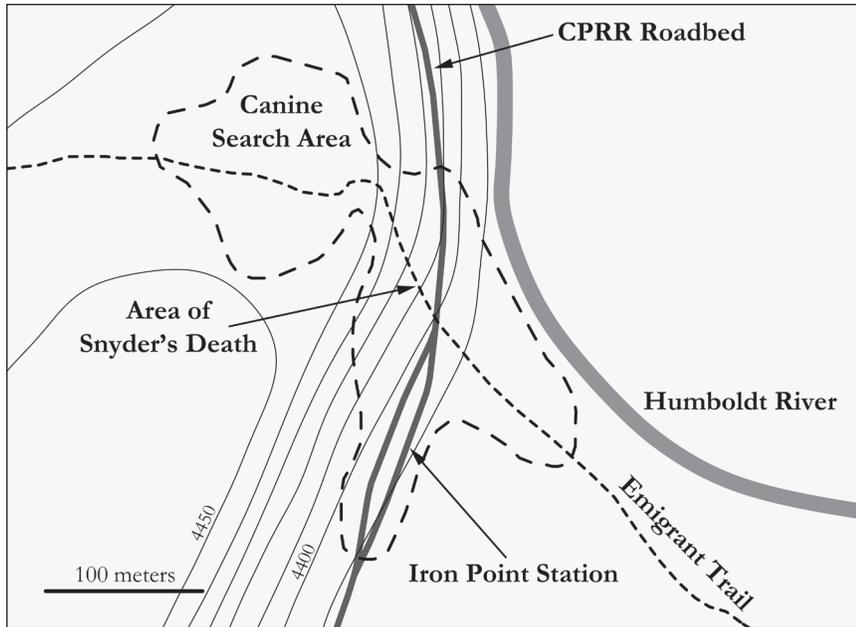
RHEA ALERTING AT THE ROCKS ON THE NORTH SIDE OF THE EMIGRANT TRAIL

Looking across the dirt road (the old railroad bed) the swale of the original trail can be seen traversing the sandy hillside. The Trails West marker is the post to the right of the rocks. *Photo taken October 5, 2011, by Adela Morris.*

was too high at getting stuck with just a single vehicle and we turned around to try the other route through Golconda.

The second approach from the west started as a dirt road at the bridge crossing the Humboldt River along Nevada State Route 789. A 5.6-mile

drive along this road brought us to the junction of the Emigrant Trail and the dirt road. A Trails West railroad track marker is at this site. There was but one problem—the mosquitoes were so thick that they hovered around the car like a black cloud. After fully covering as much exposed skin



MAP 3. CANINE SEARCH AREA

John Snyder was killed as the Emigrant Trail climbed up a 50' high sandy hill as shown by the contour lines. The long dashed line is the search area covered by the HHRD dogs; the short dashed line is the Emigrant Trail. The solid line is the original route of the Central Pacific Railroad; today this is a dirt road. The Iron Point Station is south of where the trail crosses the CRR track bed and can be seen as the place where the tracks divided into two tracks so east and west bound trains could pass. Snyder was killed on the lower section of the climb up the hill.

as possible, we exited the car to check the site. Moving quickly to avoid giving the mosquitoes a chance to land, we walked to the top of the sandy hill. The hill was covered in foxtails which are a severe hazard to a scent searching dog if they inhale one into their nose. Between the mosquitoes and foxtails, it was apparent that there would not be any search possible for several months. On the way back out along the dirt road, it sounded like rain hitting the windshield as we collided with the swarms of mosquitoes.

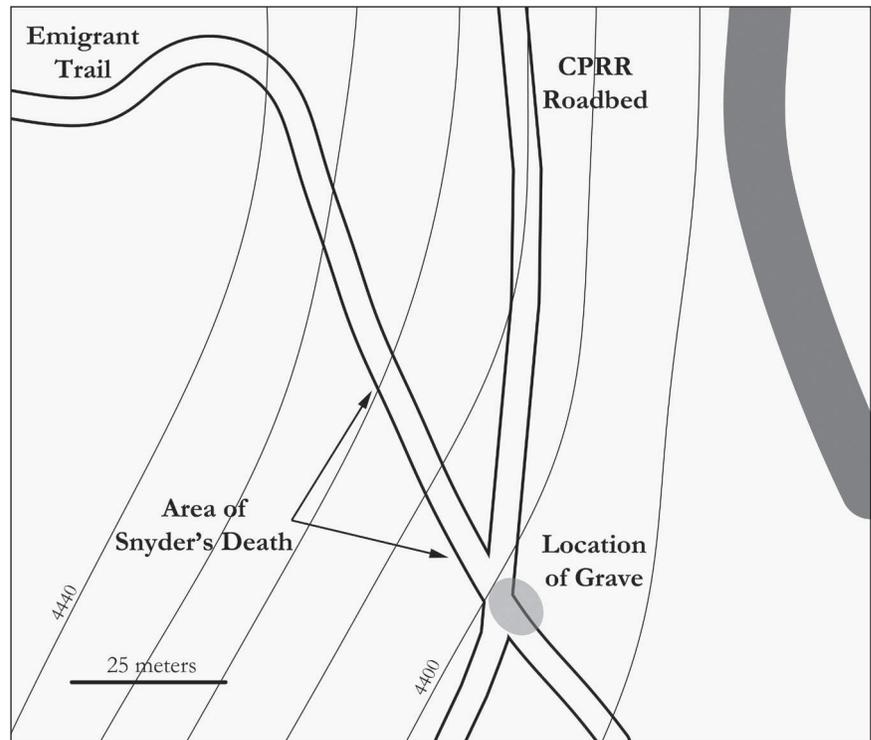
The final search of the Iron Point site was conducted on October 5, 2011, exactly 165 years after John Snyder's death. The day was overcast with scattered rain and an air temperature in the 50s, excellent conditions for this type of search. The scent from a single burial as old as Snyder's is not very intense and the dogs worked slowly with their nose close to the ground while covering the entire

search area. If the search pattern missed the grave by a few tens of feet, the dog might not detect the scent from a single burial. Thus a finely gridded search pattern was created covering more than six acres.

When the dogs detect human remains, they alert the handler; some sit at the spot, others lie down at the source of the scent. Although we had deduced that Snyder was probably buried toward the foot of the hill, we searched the entire area: three acres on top of the sandy hill, along both sides of the Emigrant Trail; three acres at the base of the hill along the trail; and the area on both sides of the trail as it climbed the hill. We felt this would cover all of the likely burial areas near the site of the Reed-Snyder fight. (See map 3)

We worked the dogs separately, out of visual range of the other team, so that neither dog could cue the other dog or handler. Thus, if both dogs

MAP 4. LOCATION OF GRAVE
 The human remains scent found by the two HHRD dogs is on the northern side of the Emigrant Trail. The gray ellipse is the probable area that contains a grave. The two arrows show the section of the trail in which the Reed-Snyder fight occurred. Rocks on the upper part of the hill make it impossible for two wagons to pass. The Humboldt River is shown to scale on the right side of the map.



alerted at a particular spot, the second alert would collaborate the first. Neither dog alerted in the search area at the top of the hill, nor in the areas on either side of the trail on the climb up. However, on the lower section of the search area both dogs independently found a single area that contained human remains scent. There was no other indication of a human burial in any other area that we searched.

INTERPRETATION OF SEARCH RESULTS

When a human being dies, the body begins a process of decomposition. Internal bacteria consume the body's cells, creating numerous volatile chemical components. Arpad Vass and colleagues have identified 478 different compounds in a study

at the University of Tennessee Anthropological Research Facility.²¹ We have no idea which of these chemical components signals a human burial to the dogs, but as noted earlier the canines can uniquely identify human remains while ignoring the remains of other common mammals such as deer and cattle. One recent study by Mary Cablk and colleagues shows that there are significant differences in the volatile organic compounds generated by human decomposition compared to animal decomposition.²²

21. Arpad Vass et al., "Odor Analysis of Decomposing Buried Human Remains", *Journal of Forensic Science*, Vol. 53, No 2, pgs 384-391, March 2008.
 22. M. E. Cablk, et al., "Characterization of the volatile organic compounds present in the headspace of decomposing animal remains, and compared with human remains", *Forensic Sci. Int.* (2012), doi:10.1016/j.forsciint.2012.02.007

In a burial, the chemical components of decomposition saturate the bones and surrounding soil. As the flesh is consumed, the bones and soil can retain these chemical components for centuries. For a dog to detect the burial, the scent of these chemical components must migrate to surface to reach the air column where it enters the canine nose.

In a relatively shallow burial of a few feet in homogenous soil, most of the scent will reach the surface directly above the body. In this case, the dog can often outline the extent of the grave by alerting at various places over the body. Some soils are relatively impermeable to vapor migration and the scent will migrate through cracks in the soil and rodent holes. Under these conditions, the canine may alert off to one side of the burial. The dogs are trained to find where the scent reaches the surface, but this may not be directly over the grave.

At Iron Point, both canines indicated that the primary scent was reaching the surface along the north side of the Emigrant Trail near its junction with the dirt road that runs above the abandoned Central Pacific Railroad roadbed. On the east side of the CPRR roadbed, the emigrant trail has become a dirt road for modern vehicular traffic. (See map 4)

The dogs' alerts indicated that the scent was primarily appearing on both sides of a series of rocks that extended along the north side of the Emigrant Trail dirt road. The scent started near the junction with the CPRR roadbed and continued for about ten feet to the east. The dogs were not detecting scent along the road surface.

The surface of both roads has been packed over time by the passage of numerous vehicles and road graders. This packed surface can create an impermeable barrier to scent, which then flows to the

side of the road where it finally reaches the surface and is detectable by the dogs. The line of alerts along the edge of the road indicates that the burial is likely under the current road surface.

There is a secondary issue at the Iron Point burial. When the Central Pacific Railroad built this roadbed in 1868, they placed several feet of rocks on the ground surface to provide support for the railroad track and ties. The area in which the two canines found scent indicates that the eastern part of the CPRR roadbed was placed on top of the burial. This means that the scent from the burial site may have to migrate through the original desert soil, the rocks and dirt that form the CPRR roadbed, and the surface of the modern dirt road. The original burial was likely shallow, at only a few feet, but the additional rocks and dirt probably increased the burial depth to greater than 5 feet below the current surface. The additional depth can cause the scent to spread over a larger area. Map 4 uses a gray ellipse to identify the burial area, reflecting our estimated uncertainty about the specific location of the burial.

From all of the canine scent alerts, we conclude that the detected burial at Iron Point is likely under the emigrant trail either at or slightly east of the CPRR roadbed, and from circumstantial evidence we infer that this is the grave of John Snyder. The following points are not proof, but make a strong case that this is his burial site:

- The grave is located downhill, within one hundred feet of where we believe Snyder died. The exhausted Donner Party would have tended to select the nearest possible gravesite.
- The grave is located at the nearest flat location to the site of Snyder's death. It is more difficult to dig a grave on the side of a hill. The emigrants would most likely have dug the grave on level ground.

Dogs in Service

Throughout history, dogs have played an important role in man's daily life because of their outstanding scenting abilities. Canines trained to alert on specific scents have long been utilized in law enforcement, U.S. Customs, the military, and search and rescue work.

During World War II "casualty dogs" were used to locate injured soldiers on the battlefield. The dogs were taught to find the injured soldiers and return to the handler, who would then follow the dog back to the victim. The casualty dog was the start of the modern day Search and Rescue dog, a dog taught to locate people who are injured or lost. Search and Rescue has always been a volunteer effort; the amount of people it takes to look for a lost person is overwhelming. Most law enforcement agencies are unable to staff the number of people it takes, so volunteers were brought in to help look for the lost person.

In the early years search dogs were taught to find living people who were lost. It soon became apparent that not all dogs trained to find live people would alert and show their handlers a dead body, and that dogs need specialized training in different environments. The dogs were trained for different disciplines depending on the need of the agency or specific requirements for the area. New terms for the different disciplines were adopted. Avalanche trained dogs were needed to work in a snow environment, disaster dogs needed extensive training in agility along with

- The grave is located within the tracks of the Emigrant Trail. It was common for emigrant parties to bury their companions in the actual trail so that the grave would not be visible to Indians, who were widely believed to disinter remains. The body of another 1846 emigrant, William P. Sallee, for instance, had to be reburied twice.
- The grave is located under the eastern side of the Central Pacific Railroad roadbed. This implies

training in a rubble environment, and area dogs needed imprinting on cadaver scent if they were going to be reliable for finding expired lost people.

In 1986 Adela Morris got involved in Search and Rescue, training her first dog to find lost people. Following her interest, she soon became fascinated with teaching and using the dogs to help locate human remains, victims of crimes. She recognized that there needed to be specialized training for both the dog and handler to work crime scenes. In 1997 she established the Canine Specialized Search Team (CSST), a resource of the County of Santa Clara Medical Examiners–Coroner’s Office. This team specialized their dogs to only find human remains and work in a controlled methodical way so they could be used for law enforcement cases without damaging a crime scene. In 2004 CSST came under the control of the Santa Clara County Sheriff’s Office. CSST is known and requested throughout California and are known as a team that specializes in cold case law enforcement work.

In 1998 Adela also saw the need for an organization that could develop research and education that was needed to train the new generation of detection dogs. ICF teaches workshops all over the country and provides a format for handlers all over the world to share their knowledge of this field. Out of ICF grew the new specialized dog: the Historical Human Remains Detection dog (HHRD). This happened by a chance discovery in 1995 when Adela was working her dog on a training exercise and part of her search area contained a cemetery from the 1906 earthquake. Out of curiosity she helped her dog over the short fence to see what would happen. She was amazed and confused when her dog started poking her nose into ground squirrel holes and alerting. We now know that ground dwelling animals make pathways for scent and her dog was only showing her the location of scent.

The evolution of the Historical Human Remains Detection dog continues to change. ICF took the knowledge from our law enforcement work and continued to develop it to train our dogs to have even a lower threshold of scent detection. There is clearly overlap between dogs who specialize in law enforcement cold cases and old burials. The ICF team has separated from CSST in order to hone skills that are needed for archaeology.

that the grave was present before the CPRR was built through this area in 1868.

- ♦ This is the only grave present within 100 yards of the site of Snyder’s death, as we have interpreted the historical record. If the Donner Party chose to

bury John Snyder at some other place, it wouldn’t have been far from either the top or the bottom of the sandy hill.

While other deaths may have occurred at Iron Point before the advent of the railroad, Snyder's is the only one for which we have found a documentary record.

The only way to prove that John Snyder is buried in this grave is to archaeologically excavate the site. If human skeletal remains are discovered, a forensic anthropologist would have to examine them and attempt to determine the individual's sex, age, race, and cause of death. The examination might also reveal other traits such as handedness, habitual activities, diseases, genetic conditions, and so on, that leave telltale evidence in the bones. Other specialists' analyses might reveal even more; any artifacts recovered from the grave might provide additional information about the individual, his life, and his death, for instance, and pollen samples might pinpoint the season in which he died. If the grave's inhabitant was a young adult male Caucasian with knife marks on his ribs, who died in the autumn about 150 years ago, his identification as John Snyder will be almost certain. And if the deceased does not match these criteria, we will have another mystery to solve.

JOHN GREBENKEMPER has been a member of OCTA for nearly two decades. During that time, he has visited and hiked various sections of the emigrant trails. In 2007, he joined ICF and learned how to train his dog to find old human burials. This ability could be valuable to determine the location of emigrant burials. He has taken his dog to numerous marked or suspected emigrant graves and found that not all marked graves contain a human burial.

KRISTIN JOHNSON is a librarian at Salt Lake Community and has been researching the Donner Party for twenty years. She is the editor of "Unfortunate Emigrants": Narratives of the Donner Party (Logan: Utah State University Press, 1996), the proprietor of the New Light on the Donner Party website, and was the historian for the Donner Party Archaeology Project.

ADELA MORRIS, Human Remains Detection Canine Handler & Instructor, has been involved in Human Remains Detection (HRD) since 1986. She is the founder of the Institute for Canine Forensics (www.K9forensics.org), a nonprofit group for the advancement of research and education for canines and handlers. She is also the founder of Canine Specialized Search Team, a volunteer resource for the Santa Clara County Office of the Sheriff in California. She is an instructor for Human Remains Detection and Historical Human Remains Detection (HHRD). As an instructor she has traveled all over the US working with individuals as well as groups teaching the specialized techniques needed to be involved in this work.

Her involvement with Search and Rescue found her working on disasters like the Loma Prieta Earthquake, Oakland Firestorm and the Columbia Shuttle Disaster. She has worked several hundred law enforcement cases including the search for Sandra Cantu, the property where Jaycee Dugard was kept, Polly Klass and Xiana Fairchild.

After working many years using her dogs to locate human remains for law enforcement cases, she now specializes in cold cases, historical and prehistoric burials.