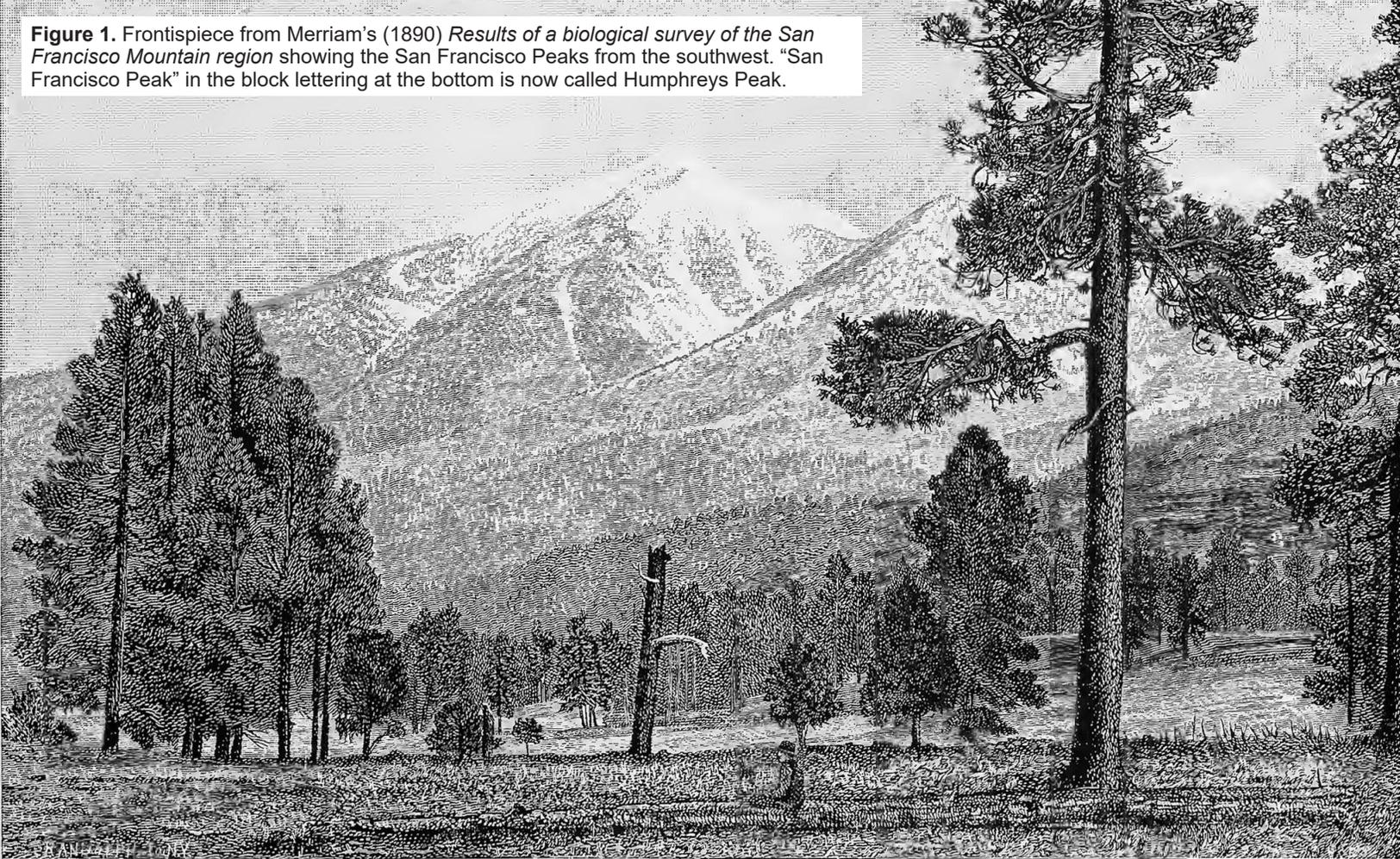


Figure 1. Frontispiece from Merriam's (1890) *Results of a biological survey of the San Francisco Mountain region* showing the San Francisco Peaks from the southwest. "San Francisco Peak" in the block lettering at the bottom is now called Humphreys Peak.



SAN FRANCISCO PEAK.

AGASSIZ PEAK.

In the footsteps of C.H. Merriam and C.H.T. Townsend on the San Francisco Peaks of Arizona, USA

by James E. O'Hara

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Towering over the vast volcanic landscape of cinder cones, prairie, and ponderosa pine forest in north-central Arizona is a circular ring of mountain summits collectively known as the San Francisco Peaks. These are the remnants of a stratovolcano that formed some three million years ago and reached an elevation of ca. 4900 m, much higher than the present peaks (Bezy 2003). Later on, the core of the mountain collapsed and a depression, or caldera, took the place of the central peak and the sides of the original mountain became the summits of the San Francisco Peaks that we see today. The caldera is now a popular hiking destination called the Inner Basin, a high-elevation grassy meadow encircled by evergreens that give way to bare rock below the highest summits. Tallest of all is Humphreys Peak on the western side at an elevation of 3850 m (12,630 ft)—the highest summit in Arizona.

This story is about a little-known location in the San Francisco Peaks that served as a base camp for two groups of biologists in the late 1800s. One group was lead by C. Hart Merriam (1855–1942) (Fig. 2), who conducted a biological survey in the area for a couple of months in 1889, and the other included Charles H.T. Townsend (1863–1944) (Fig. 3) and his party of plant and insect collectors who camped in the same spot for several days in July 1892.

My interest in the San Francisco Peaks began over 40 years ago in 1980 when I found siphonine tachinids (the subject of my graduate studies at the University of Alberta) under scattered ponderosa pines on the eastern side of the Peaks near Bonito Park. I have since returned to the Peaks area about ten times on collecting and vacation trips. I have followed the paved and dirt roads around the base and driven up to the wildflower-rich Lockett Meadow (2600 m, Figs. 16–19), and hiked from there along the aspen-lined trail to the Inner Basin (2990 m, Figs. 20–21).

“*This story is about a little-known location in the San Francisco Peaks that served as a base camp for two groups of biologists in the late 1890s.*”

The name C.H.T. Townsend is a familiar one to tachinidologists due largely to the many species and genera he described and his 12-volume *Manual of Myiology* (Townsend 1936–1942), which deals primarily with the Tachinidae. Yet most of us who are well-acquainted with Townsend’s works did not know a great deal about his life until detailed and entertaining biographies appeared about him,

first in an issue of *Fly Times* and then in a larger work reviewing his 1500+ genus-group names (Evenhuis 2013, Evenhuis et al. 2015). It was in this biography that I first learned of Townsend’s adventurous two-month collecting expedition in 1892 that started and ended in Las Cruces, New Mexico. The two most distant destinations on that trip were the Grand Canyon and the San Francisco Peaks in Arizona. Townsend would later write about his more memorable moments at each of these places in two articles in the journal *Appalachia* (Townsend 1895a, 1895b).

My attention was drawn in particular to Townsend’s (1895b) account of camping at “Hart Little Spring” and climbing to the summit of “San Francisco Mountain” (Humphreys Peak). To reach the summit he had to hike through extensive forest to timberline and from there “the summit still towered up at the same gradual ascent for nearly 1,300 feet, being one stretch of loose volcanic rock, save the patches of alpine plants here and



Figure 2. C. Hart Merriam, undated (U.S. Library of Congress Prints and Photographs Division).

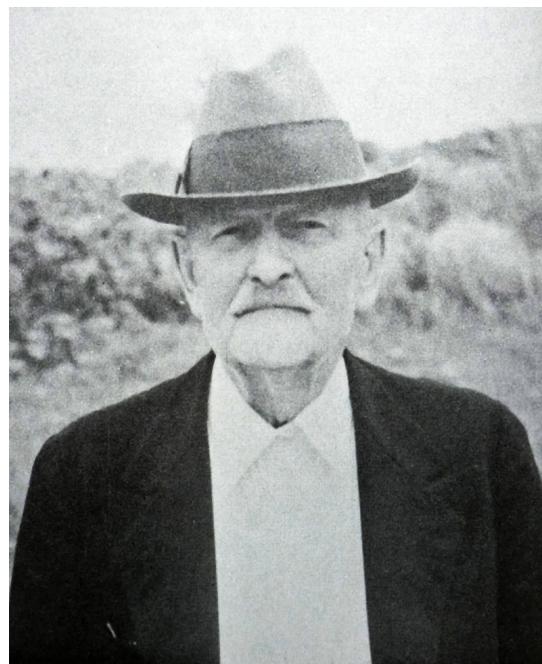


Figure 3. Charles H.T. Townsend in 1943 at the age of 79 (Arnaud 1958: 2).

there, which gradually grew less frequent toward the top” (p. 150). I was keen to see for myself this “Hart Little Spring” where Townsend spent his last hours at camp preparing the insects he caught on that sunny day in July 1892. But this was not to be – at least not at first – for I could not find a location for “Hart Little Spring” when I first looked for it online. Nor was I able to spot a sign for it when I drove along the Hart Prairie Road in 2018. I assumed the spring must be near or on the Hart Prairie Preserve on the western side of the San Francisco Peaks but I did not know where. Perhaps, I thought, the name and location of the spring had been lost to time.

C. Hart Merriam

My interest in Hart Little Spring was unexpectedly revived in 2019 when I received my October issue of *Arizona Highways* magazine. Contained therein was a 4-page spread about *A Pilgrimage to Base Camp* (Hineline 2019) that recounts the author’s short hike to Merriam’s base camp at Little Spring (aka Hart Little Spring)—the very hike that had eluded me. The story begins with a dramatic lead:

“Unlike the trek from Lukla to Everest Base Camp, which takes eight or nine days, the march to Merriam Base Camp is pretty quick – about eight or nine minutes. As hikes go, it’s unimpressive, but the obscure camp it leads to played a vital role in the evolution of ecology.” (Hineline 2019: 49)

Hineline’s (2019) account goes on to review Merriam’s life and accomplishments and describes the significance of the studies he conducted in the San Francisco Peaks while camped out at Little Spring. This reminded me of what Merriam is best remembered for: his concept of life zones, and particularly their vertical distribution on mountains and the correlation between latitude and elevation. Like many other students, I first heard about “Merriam’s life zones” in a biology or ecology course at university. The zones were brought to life for me in the early 1980s when I was driving up to Mount Lemmon in the Santa Catalina Mountains outside Tucson and passed life zone markers strategically placed along the route¹. I did not realize at the time that these life zones had been proposed by Merriam based on a study he conducted just 400 km north in the San Francisco Peaks.

The choice of the San Francisco Peaks for Merriam’s survey was explained in his Prefatory Note to his published results:

“...many facts of scientific interest and economic importance would be brought to light by a biological survey of a region comprehending a diversity of physical and climatic conditions, particularly if a high mountain were selected, where, as is well known, different climates and zones of animal and vegetable life succeed one another from base to summit.” (Merriam 1890: 1)

Merriam travelled by train from Washington, DC to Flagstaff, Arizona, a town ideally situated at 2100 m on the south side of the San Francisco Peaks. He arrived on 26 July 1889 and was joined the next day by his assistant Vernon Bailey. Other researchers would come and go at times during the course of the survey. The budget for the expedition was not as liberal as Merriam would have liked and he was forced to make some concessions to stretch the funds as far as he could:

¹ For more information about this route, see *Guide to the Mt. Lemmon Highway* reprinted from *Sonoriensis* (Summer 1994) online at: http://www.eebweb.arizona.edu/Courses/Ecol406R_506R/Guide_to_MtLemmon_highway_Sonorensis1994.pdf.

“Much more would have been accomplished but for the insufficient fund available for the survey (only a little more than \$600 to cover the total cost of transportation, outfitting, hire of animals and men, purchase of tents, supplies, etc.), thus permitting the employment of but one man as cook and general camp-hand; while the animals, both in number and quality, were far below the standard usually considered necessary for field work, which circumstance caused many annoying delays. All our traveling was done on horseback, and our packing on burros.” (Merriam 1890: 2)

The site of the base camp was described as follows:

“After spending three days in outfitting, we proceeded to Little Spring, at the north base of San Francisco Mountain, and pitched our tents in a grove of aspens and pines, on a knoll just northwest of the spring, at an altitude of 2,500 meters (8,250 feet). This was our base camp for two months, and from it numerous side-trips were made into the surrounding country.” (Merriam 1890: 3)

Merriam’s objective was to conduct a biological survey of the area including the collection of mammals, birds, and reptiles, as well as the characterization of life zones based upon various parameters including the vertical distribution of indicator plants. Remarkably, the survey not only achieved these ambitious goals over the course of two months, but the subsequent report was published less than a year later (on 11 September 1890) and comprised 136 pages of text, 13 plates and 5 maps. Merriam was the sole author except for a chapter on reptiles. Hart Merriam was 35 years old when his survey was published and was already by then an accomplished mammalogist and ornithologist, a general naturalist, and a former medical doctor (Osgood 1944). All this was before the recognition he received from his *Biological Survey of the San Francisco Mountain Region and Desert of the Little Colorado in Arizona* and subsequent publications where he elaborated upon his life zone ideas.

My initial interest in Little Spring had led to a dead end largely because I was unaware of its historical significance as Merriam’s base camp in 1889. I learned from Hine’s (2019) article that the site is recognized as a Registered National Historic Landmark by the National Park Service because Merriam had set up his base camp there. Accompanying Hine’s text are pictures of the surroundings including a commemorative plaque (Fig. 4), Humphreys Peak, Little Spring, and a variety of wildflowers. Directions to Little Spring (which I had not been able to find before) were given as follows:

“From Flagstaff, go northwest on U.S. Route 180 for 9.5 miles to Forest Road 151 (Hart Prairie Road). Turn right (north) onto FR 151 and continue 7.5 miles to Forest Road 148B (look for the sign to Little Spring). Park here and walk a half-mile on FR 148B to the Merriam Base Camp site. FR 151 is unpaved but is suitable for most vehicles in good weather.” (Hine 2019: 51)*

* I did not see this sign when I visited in 2022.

The life zones of Merriam have generated much interest and discussion over the years. They continue to be used in certain circumstances and some aspects of the concept hold up better than others. On a global scale the “biome” has achieved greater acceptance and universality. Odum (1945) and Shelford (1945) are early works that discuss the relative merits of “life zones” vs. “biomes” and the review of Mucina (2019) gives a modern interpretation of the biome as a “crucial ecological and biogeographical concept”.



Figure 4. Plaque at Little Spring identifying this location as the C. Hart Merriam Base Camp Site and a Registered National Historic Landmark. (Photo: J.E. O'Hara, 1 September 2022)

Charles H.T. Townsend

Townsend and his companions reached Little Spring at around 2:00 pm on 14 July 1892 after an exciting visit to the Grand Canyon to the north (Townsend 1895a, Evenhuis et al. 2015). They had seen the snow-capped summits of the San Francisco Peaks on their way to the canyon and were resolved to climb the tallest peak before heading back to Las Cruces. They spent the rest of that first day collecting around camp. Then, as evening approached, Townsend's thoughts turned to securing "game" for the coming days and matter-of-factly recounted the night spent at a nearby lake:

"That night, Mr. Cordley and I started after supper, which was finished about dark, for a small lake a mile and a half nearer the mountain, where we thought it likely we might see some deer the next morning. It was dark when we started, each with our guns and a blanket strapped on our shoulders. The trail lay through thick woods, over fallen logs and rocks, and up wooded slopes and gulches, yet we kept it with some difficulty, and found the lake about 9.30 p.m. Here we rolled ourselves up in our blankets, but saw no game, and returned to camp next morning in time for breakfast." (Townsend 1895b: 149–150)

Townsend (1895b: 150–153) described in some detail his climb to the summit of Humphreys Peak on the second day, collecting insects along the way. There being no trail to follow, each person chose a slightly different route to the top. By today's standards an off-trail hike from Little Spring at 2550 m to the summit at 3850 m (a vertical difference of 1300 m or 4267 ft) would be regarded as strenuous but Townsend made light of it, remarking that "the climbing was not at all laborious; it only required persistent walking up a moderately steep slope", before adding "it is quite a little walk to the top".

Townsend reached the summit at noon, a little behind three of the others, but he had stopped now and then to collect insects along the way. He became a little disoriented during his descent “while wildly chasing bugs” and took a more southerly direction than he had intended. He was aware of possibly meeting at close quarters “bears, mountain lion, and other wild animals” as he pushed through some densely wooded spots and concluded “I would stand a pretty poor show if I should suddenly run against one of these animals, with only an insect net to defend myself”. Upon reaching more level ground and not knowing exactly where he was, he tried to find the lake where he had camped the night before. Failing that, he struck a course westward to meet up with the main road running north (presumably Hart Prairie Road). He followed that to the side road (FR 148B) leading east to Little Spring. There was some amusement in camp when he arrived from that direction, as the others could infer the reason for it. Townsend tried to cover for himself, saying “I had just split off around the hill to see how the collecting was. They appreciated the joke, and then we all shouted.” The party broke camp later that day to head for Flagstaff, but first Townsend had work to attend to: “I now mounted, pinned in boxes, and put away seventy specimens of insects that I had collected during the day.”

Townsend and his “New Mexico party” parted company with the “Arizona party” (that had joined them at the Grand Canyon) when they arrived the next day in Flagstaff. They purchased provisions and began their journey homeward on 17 July. They headed east following at first a route similar to that of the present Interstate 40. This took them along the southern edge of the Navajo Reservation. They were unlucky enough to be on the road during an unusually tense time between the Navajo and white settlers². They were warned their lives could be in danger but they pressed on nevertheless. Townsend (1895b: 154), in his usual fashion, made light of the danger: “I comforted myself with the remark that if the Indians captured us, they would at least secure a very complete outfit for collecting bugs”.

The group passed through the Petrified Forest (later to be declared a national monument and then a national park) and proceeded eastward to the New Mexico border, spending “three interesting and very pleasant days” with the Zuni at their pueblo. The last stop of interest was a short distance to the east, Inscription Rock (now part of El Morro National Monument) where the signatures of Spanish explorers and later travellers are mixed with the petroglyphs of Ancient Puebloans. They crossed the mountains to Grants and continued eastward to Los Lunas, then followed the Rio Grande Valley to Las Cruces, arriving on 14 August. “We had thus driven over 1200 miles in two months, and our horses were now given a much needed rest” (Townsend 1895b: 157).

Little Spring, 1 September 2022

Mine was not the first “pilgrimage” to a place of some significance in the life of Charles H.T. Townsend. That distinction goes to Dan Hansen and Ronaldo Toma who visited a far more important location, the deserted homestead in Itaquaquecetuba, Brazil where the Townsend family lived for the last 25 years of his life (Hansen & Toma 2004). In that home Townsend wrote many taxonomic papers on the Tachinidae and the 12 volumes of his *Manual of Myiology*. Dan presented me with an unexpected gift upon his return from Brazil, a roofing tile embossed with the Townsend name recovered from a heap in front of the Olaria building on the old homestead (like the one in Fig. 8 in Hansen & Toma 2004: 5).

² This was started by the actions of Mormon pioneer Lot Smith and led to his death on 21 June 1892. See: <https://archiveswest.orbiscascade.org/ark:/80444/xv38250>

My visit to the area of Townsend's *Ascent of San Francisco Mountain* began on a sunny morning on the 1st September 2022. I headed northwest from Flagstaff, passing the turnoff to the Arizona Snowbowl ski resort and through Fort Valley before leaving pavement and taking the Hart Prairie Road northward. The ponderosa pine forest changed to semi-open prairie and soon I passed by the gated entrance to Hart Prairie Preserve (Fig. 6), a 100-hectare refuge for native plants and wildlife donated to The Nature Conservancy in 1994. The road curves to the west and skirts around the base of Fern Mountain (Fig. 7) before heading north again. Fern Mountain is a cone-shaped hill 100 m high with a faint trail leading to the summit from the southwestern side. I took this trail to the top later in the day, as I had on a couple of previous occasions. The well-defined summit has a sparse covering of grass, wildflowers, and shrubs (Fig. 5) and looks like a good hilltop for tachinids but on each of my visits I have seen limited activity.

I was aware as I drove north from Fern Mountain that I was entering Townsend country. He and his entomological companion, Arthur Burton Cordley (1864–1936), spent their first night wrapped in blankets beside a lake waiting for game that never materialized. That lake was likely Bismarck Lake, a feature marked on local maps with a national forest trail leading to it. I reached the trailhead by driving north 2.7 km from the gate at Hart Prairie Preserve and turning east on a signed side road. From there, the trailhead is just 1.0 km further on (Fig. 8). I first hiked this short 1.5 km trail in May 2018 before I knew about its possible connection to Townsend. It meanders through ponderosa pines and open prairie with the San Francisco Peaks as a backdrop. On that first hike I was not prepared for what I saw at the destination—a small muddy water hole. On this second visit in late summer, I was heartened to see some open water surrounded by lush vegetation (Fig. 9). I could envision this being an important water source for local wildlife, even though it seemed no more a lake than Fern Mountain was a mountain. Perhaps it was more 'lake-like' in Townsend's day.

Back on Hart Prairie Road, my directions and GPS coordinates told me the turnoff to Little Spring (Forest Road 148B) was close: another 1.9 km. A sign for Little Spring is supposed to mark the spot but I did not see it. I parked anyway and walked the rest of the way, first along the narrow road (Fig. 10) that ends at a "Road closed" gate and then along a trail. Was I on the right path? There was no marker for Little Spring but my GPS said I was on the right course. The evergreens and poplars gave way to a serene grassy meadow (Fig. 11), on the far side of which I could discern a metal fence enclosing a small patch of vegetation (Fig. 12). I knew this must be the fence I had read about that protects Little Spring from being trampled by larger 2- and 4-footed animals. Smaller creatures are free to pass underneath. I could not see the spring but I assumed it was hidden by the thick vegetation. Attached to the fence was a sign explaining how *Science Came to Little Spring Over 100 Years Ago* (Figs. 12, 14). I searched the area and soon found, in the shade of a tree, the rock and plaque marking this location as the *C. Hart Merriam Base Camp Site* (Figs. 4, 13). (And, I thought to myself, the *C.H.T. Townsend Base Camp Site* too.) It was somewhere close by that Townsend sat pinning his insects on 15 July 1892 after his *Ascent of San Francisco Mountain* and his circuitous return to camp. Present during my visit were dozens of *Ptilodexia* on the yellow heads of cutleaf groundsel (*Senecio eremophilus*) (Fig. 15) in the semi-shade of the trees and I wondered what tachinids Townsend caught when he was here over a century earlier.



Figures 5–9. 5. View of San Francisco Peaks from Fern Mountain south of Bismarck Lake (1 September 2022). 6. Gated entrance to Hart Prairie Preserve from Hart Prairie Road (also known as Forest Road 151) (1 September 2022). 7. Fern Mountain to the north from entrance to Hart Prairie Preserve (1 September 2022). 8. Trailhead for Bismarck Lake trail (7 May 2018). 9. Bismarck Lake with San Francisco Peaks to the east (1 September 2022).



Science Came to Little Spring Over 100 Years Ago

In 1889 C. Hart Merriam led a field crew from Washington, D. C. to conduct forest surveys in northern Arizona. They camped here at Little Spring for several months that summer.

As a result of their field studies, Merriam defined key "Life Zones" from the Alpine tundra atop the San Francisco Peaks to the lower deserts. Scientists today continue to study ecological relationships of plants, land forms and climate.

Merriam's Life Zones on the San Francisco Peaks

- Alpine
- Spruce Fir
- Mixed Conifer
- Ponderosa Pine
- Pinon-juniper
- Upper Sonoran

Protecting a Historic Spring

Only a small number of potential springs such as Little Spring are found on the Peaks. The fence you see surrounding Little Spring is an effort to restore the unique riparian habitat. Its design allows most wildlife to visit the spring and minimizes impacts to the sensitive aspen trees from grazing and browsing damage.

Wildlife including mule deer, red squirrel, wild turkey and black bear visit this spring which provides water year round.

A Productive Forest

Look at the forest around Little Spring. Douglas fir, limber pine and aspen identify this forest as the Mixed Conifer life zone that grows between 8,000 & 9,000 feet in elevation. The diversity of conifers and understory plants provide food for a variety of local wildlife.

Home Sweet Hole

Squirrels, mice and some birds utilize cavities in living or dead trees abandoned by woodpeckers or roosted out by fungus. Bats will roost under loose bark on the rainy side of large snags. Look around for the nearest wildlife tree with this sign.

Wildlife: Black Bear, Spotted Owl, Red Squirrel, Douglas Fir, Limber Pine, Ponderosa Pine, Pinon-juniper, Upper Sonoran, Three-toed Woodpecker, Big Brown Bat.

Coconino National Forest
www.fs.usda.gov/coconino



Figures 10–15. (All pictures taken on 1 September 2022.) **10.** View along short access road (Forest Road 148B) to Little Spring. **11.** Small meadow before reaching Little Spring. **12.** Little Spring area with rectangular metal fence surrounding the spring (sign on fence enlarged in Fig. 14). **13.** Plaque commemorating the *C. Hart Merriam Base Camp Site* in the shade of a tree by a fallen log (plaque enlarged in Fig. 4). **14.** Sign attached to fence with information about Merriam's research and historic spring. **15.** *Ptilodexia* sp. (Dexiinae, Dexiini) feeding from a flower (cutleaf groundsel, *Senecio eremophilus*) at Little Spring.



Figures 16–21. 16. Lockett Meadow at 2600 m in the San Francisco Peaks, with view west towards Humphreys Peak (5 July 2017). 17. Lockett Meadow Spring in the middle of Lockett Meadow (5 July 2017). 18. *Adejeania vexatrix* (Osten Sacken) (Tachininae, Tachinini) feeding from a flower in Lockett Meadow (5 July 2017). 19. *Tachina* sp. (Tachininae, Tachinini) feeding from a flower in Lockett Meadow (5 July 2017). 20. Trail to Inner Basin from Lockett Meadow passing through a thick forest of quaking aspen (*Populus tremuloides*) (13 August 2013). 21. Inner Basin meadow at 2990 m, with view west towards Humphreys Peak (13 August 2013).



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Figures 22–27. **22.** View of San Francisco Peaks looking west from Bonito Park on the east side of US Route 89 (31 August 2022). **23.** View of Sunset Crater volcano (in Sunset Crater National Monument) looking east from a hill north of Bonito Park (6 September 2014). **24.** Malaise trap on edge of Bonito Park with Sunset Crater to the east (6 August 1983, reproduced from slide). **25.** Wildflowers among the ponderosa pines on the edge of Bonito Park (12 August 2013). **26.** *Mochlosoma* sp. (Dexiinae, Dexiini) on the trunk of a ponderosa pine on the edge of Bonito Park (3 September 2014). **27.** A dispersed camping site on the far side of the meadow under the pines in the Coconino National Forest north of Bonito Park, where I have camped multiple times (5 August 2016).

Epilogue

Merriam and Townsend attracted both praise and ridicule for some of their work, both during their lifetimes and after their deaths. As an odd coincidence, both became known as taxonomic “splitters” for the many species (and in Townsend’s case, genera) they described that were later synonymized with other names. For Merriam this was among mammals, for Townsend among flies. But the stories related here highlight a different aspect of both men: their adventurous spirit, love of the outdoors, and obsessive drive to collect. This last attribute served Townsend well for the next 50-odd years as he amassed a huge collection of flies, especially from Peru and Brazil. Most of these are still in existence in major collections and are a lasting legacy of his life in the field.

Coordinates and elevations for places mentioned above and for insect collecting in the area

West side of San Francisco Peaks

Junction of U.S. Route 180 and Hart Prairie Road (Forest Road 151): 35°17.17'N 111°45.43'W, 2331 m.
Hart Prairie Preserve gate (Fig. 6): 35°20.67'N 111°44.32'W, 2560 m.
Start of trail to summit of Fern Mountain: 35°20.78'N 111°44.67'W, 2545 m.
Summit of Fern Mountain (Fig. 5): 35°20.94'N 111°44.33'W, 2678 m.
Turn-off to Bismarck Lake: 35°21.77'N 111°44.73'W, 2609 m.
Trailhead for Bismarck Lake trail (Fig. 8): 35°21.79'N 111°44.08'W, 2605 m.
Bismarck Lake (Fig. 9): 35°21.88'N 111°43.26'W, 2683 m.
Turn-off to Forest Road 148B and Little Spring (park here or drive ahead 0.5 km and park at closed gate): 35°22.41'N 111°44.04'W, 2523 m.
Little Spring (Figs. 12–15): 35°22.49'N 111°43.53'W, 2550 m.

East side of San Francisco Peaks

Bonito Park on west side of Sunset Crater Volcano National Monument (Figs. 22, 24): 35°22.16'N 111°33.30'W, 2130 m. To get here from Flagstaff, drive north on US Route 89 and turn right (east) at 35°22.35'N 111°34.52'W and head towards Sunset Crater on the paved road. The ponderosa pine forest thins out on the right and becomes a large meadow called Bonito Park. A good place to stop for collecting is the small parking area on the right after 1.25 km (35°22.27'N 111°33.67'W) (Figs. 24–26). I have had better luck collecting tachinids among the sparse wildflowers and grasses under the scattered pines than in the meadow itself, which is dominated by the prairie sunflower (*Helianthus petiolaris*) (Fig. 22). I caught *Freraea montana* (Coquillett) (with a nearly straight M vein) and *Siphona* (*Aphantorhapha*) *arizonica* Townsend here in the early 1980s but have not seen them since. *Ptilodexia* and *Mochlosoma* (Fig. 26) are common. August and September have been the best months for me.

Lockett Meadow (Figs. 16–19): 35°21.63'N 111°37.24'W, 2600 m. To get here, turn left (west) at Sunset Crater road (see Bonito Park turn-off above) and follow directions to Lockett Meadow (take a right at 35°22.37'N 111°35.14'W and then a right again at 35°22.42'N 111°35.91'W). The dirt road is steep and narrow (one lane) in places. Tachinines are common on flowers in Lockett Meadow. There is a parking fee for day use but parking is free at the trailhead for the Inner Basin a little farther on.

Trailhead for Inner Basin trail from Lockett Meadow: 35°21.39'N 111°37.39'W, 2635 m. There are different wildflowers and thicker undergrowth here than in the open Lockett Meadow.

Inner Basin meadow (Fig. 21) (at pumphouse): 35°20.40'N 111°39.08'W, 2990 m.
Inner Basin trail: <https://www.fs.usda.gov/recarea/coconino/recarea/?recid=55110>.

Further information for insect collectors and visitors

A large portion of the land around and including the San Francisco Peaks belongs to the Coconino National Forest¹. Casual insect collecting is generally permitted in national forests but if in doubt then visit or contact the Flagstaff Ranger Station². A permit is required for scientific research in the Coconino National Forest and can be requested through the Coconino National Forest Supervisor’s Office³. Some areas adjacent to, or surrounded by, the national forest are protected and no collecting of any

sort is allowed without a permit, including Little Spring and Hart Prairie Preserve⁴ on the west side of the Peaks and Sunset Crater Volcano National Monument⁵ on the east side.

On the southern edge of the San Francisco Peaks at an elevation of 2100 m is Flagstaff, an outdoor/recreation-oriented city with a population of about 80,000. The downtown area reflects both the frontier heritage of the city⁶ and its Route 66 history, and has an eclectic mix of restaurants, taverns, shops and art galleries. There is a wide range of hotels and motels with easy access to both sides of the Peaks. There are privately-operated campgrounds in the vicinity of Flagstaff and a popular primitive campground run by the Forest Service in the mountains at Lockett Meadow⁷. My personal preference when in the area is to split my time between lodging in Flagstaff and dispersed camping in locations on either side of the Peaks. “Dispersed camping” is the term for free camping on public land and there are many pull-offs along the dirt roads that allow this type of camping; just follow the rules posted online⁸.

¹ <https://www.fs.usda.gov/coconino>, <https://www.fs.usda.gov/main/coconino/about-forest/about-area>

² 5075 US Route 89, Flagstaff, AZ, +1 928-526-0866; <https://www.fs.usda.gov/recarea/coconino/recarea/?recid=70983>

³ <https://www.fs.usda.gov/main/coconino/passes-permits/other>

⁴ <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/hart-prairie-preserve>

⁵ <https://www.nationalparks.org/explore/parks/sunset-crater-volcano-national-monument>

⁶ <https://www.legendsofamerica.com/az-flagstaff/>

⁷ <https://www.fs.usda.gov/recarea/coconino/recarea/?recid=55136>

⁸ <https://www.fs.usda.gov/detail/coconino/recreation/?cid=stelprdb5313448>

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References

- Arnaud, P.H., Jr. 1958. The entomological publications of Charles Henry Tyler Townsend [1863–1944]; with lists of his new generic and specific names. *Microentomology* 23: 1–63.
- Bezy, J.V. 2003. A guide to the geology of the Flagstaff area. Arizona Geological Survey Down-to-Earth Series DTE-14: 56 pp.
- Evenhuis, N.L. 2013. Charles Henry Tyler Townsend (1863–1944): man of wanderlust and mystery. *Fly Times* 50: 15–24.
- Evenhuis, N.L., Pont, A.C. & Whitmore, D. 2015. Nomenclatural studies toward a world list of Diptera genus-group names. Part IV: Charles Henry Tyler Townsend. *Zootaxa* 3978: 1–362.
- Hansen, D.E. & Toma, R. 2004. Visit to Itaquaquecetuba (Brazil) and the old homestead of C.H.T. Townsend. *The Tachinid Times* 17: 3–8.
- Hineline, M. (with photos by T. Bean) 2019. A pilgrimage to base camp. *Arizona Highways* 95 (10): 48–51.
- Merriam, C.H. 1890. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado in Arizona. *North American Fauna* 3: vii + frontispiece + 1–101, 119–136 + 13 pls. + 5 maps.
- Mucina, L. 2019. Biome: evolution of a crucial ecological and biogeographical concept. *New Phytologist* 222: 97–114.

- Odum, E.P. 1945. Bird distribution and ecological concepts. A symposium. Part 1. The concept of the biome as applied to the distribution of North American birds. *The Wilson Bulletin* 57: 191–201.
- Osgood, W.H. 1944. Biographical memoir of Clinton Hart Merriam (1855–1942). National Academy of Sciences of the United States of America. *Biographical Memoirs* 24: frontispiece + 1–57.
- Shelford, V.E. 1945. Bird distribution and ecological concepts. A symposium. Part 6. The relative merits of the life zone and biome concepts. *The Wilson Bulletin* 57: 248–252.
- Townsend, C.H.T. 1895a. A wagon-trip to the Grand Cañon of the Colorado River. *Appalachia* 7: 48–63.
- Townsend, C.H.T. 1895b. An ascent of San Francisco Mountain (Arizona) and the homeward route. *Appalachia* 7: 149–157.
- Townsend, C.H.T. 1936–1942. *Manual of myiology in twelve parts*. Privately published, Itaquaquecetuba, São Paulo.
- U.S. Library of Congress Prints and Photographs Division. Harris & Ewing Collection. Record no. LC-DIG-hec-15601, <https://www.loc.gov/pictures/search/?q=LC-DIG-hec-15601&co=hec>.