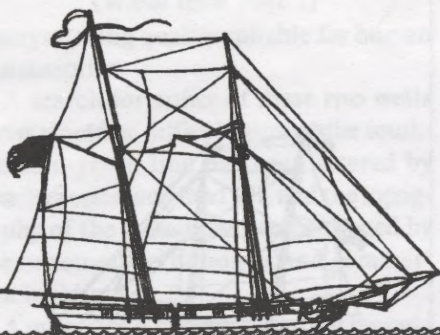


Florida Keys

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Key West's Search for Fresh Water

By Carston R. Heinlein
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Key West, like any other island, is dominated and controlled by the water surrounding it. And the more isolated an island is, the more the inhabitants rely on what the marine environment has to offer to sustain life. Early man lived near freshwater springs, artesian wells, streams, or lakes. Where fresh water was scarce, they eventually learned to collect and store rainwater for their fresh water needs. Many years ago Key Westers did the same. Archaeologists have found evidence that people lived on the island at least 2,000 years ago. They would not have lived here if there was no fresh water, we live by the grace of water.

Lieutenant Matthew C. Perry, Commander of the U.S. Schooner Shark, made one of the first documentations of freshwater existing on Key West in his report of March 28, 1822. He had sailed to Key West at the order of the Secretary of the Navy to examine the island (and harbors) and take possession of it, if he thought it had advantages as a U.S. Naval rendezvous.

Lt. Perry anchored the Shark about two miles off the southwest point of the island, and after arriving ashore he found several freshwater wells about 100 yards inland. "Wood and water is in abundance" he wrote in his report. He added that the water was not the best quality. But he gave no explanation for this condition. He enlarged the wells and enclosed one with a fence.

Many years before Lt. Perry's report, Bernard Romans gave us another source of information about the presence of water. Romans, a man of many talents, who had been traveling in Florida as early as 1760. For two years he was employed by John Gerard William De Brahm as mathema-



The Pirates Well drawn by Geo. Lehman for Miss Leslies Magazine. Photo credit: Monroe County Library.

tician, draughtsman and navigator. John DeBrahm was commissioned by the British to survey Florida, which had become a new addition to the British Empire in, 1763, after Spain ceded it to the British as required in the Treaty of Paris, at the close of the Seven Years' War.

Bernard Romans, despite his talents and his eye for detail, had one fault, he had difficulty in getting along with people, especially John DeBrahm. One day, he abruptly ended his employment with DeBrahm and set out on his personally financed exploration of Florida. This resulted in his writing a book, "A Concise Natural History of East and West Florida" published in 1775. The book confirmed his talent as a naturalist, botanist and writer. His survey proved to be a wealth of information for those who followed. In describing

Key West, this observation of his is very valuable in the study of freshwater supply on Key West, "Within the anchorage place eastward of the point is, a path leading to a well or pond of excellent freshwater; round which a low kind of stone wall is placed, the trees are marked with many names; the ground is trodden like a sheep crawl, occasioned by the deer who resort here to drink, this water place is one quarter of a mile from the beach." The stone wall suggests human habitation, possibly Indian, while the names on the trees is a clear indication that white men had been there prior to 1766. The term "Watering place", rarely used today was frequently used in old records describing a well, spring or pond where animals go drink, but not

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Society News

Lectures and Field Trips

By John Viele



Dr. Robert Gold speaking to KWMHS on February 2. Photo credit: Tom Hambright.

December 3.

Dr. Mary-Alice Herbert, English professor and publisher (together with her husband) of books about the Florida Keys told the story of republishing "Charlotte's Story" by Charlotte Arpin Niedhauk. Originally published in 1973, the book is a spell-binding account of the adventures of a young couple on isolated Elliott Key in the mid-1930s. As a result of her research in preparing the book for publication, Dr. Herbert was able to relate many fascinating details of Charlotte's life both before and after her experiences on Elliott Key.

December 17.

A full deckload of seventy Society members and their guests got underway aboard the schooner *Western Union* for a fundraising starlight sail and Christmas party. The wind was fair and the stars were bright. A Barbershop quartet entertained with Christmas carols, and John Cryer pointed out the constellations and navigational stars

New Book

Coming in April 1999 from Pineapple Press by John Viele "The Florida Keys, Volume 2 True Stories of the Perilous Straits." The book presents a selection of stories of shipwrecks, attacks by natives, sea battles, and pirate boarding. The book covers from

New Members

Ginny Church, Key West; Donna Hanson, Tavernier; Richard and Mary Alice Herbert, Sugarloaf Shores; Edward B. Knight, Key West; Janet Snyder Matthews, Sarasota,

and explained how the ancient mariners used them to find their way at sea. A delicious buffet featuring shrimp personally prepared by our president, Ed Little, capped a delightful cruise. The proceeds will allow the Society to complete the payment of our indebtedness for the bust of Key West clipper-ship builder John Bartlum.

February 2

Dr. Robert Gold, history professor and author from Jacksonville, Florida gave a talk on the voyages of Columbus, arguably the most important events of the Age of Exploration. The program was made possible by the Florida Humanities Council Speaker's Bureau. Dr. Gold discussed the significance of Columbus' achievements and the impact of his discovery on the Western world. Among the many fascinating revelations was a long list of fruits, vegetables, animals, and woods that were unknown in Europe before the Columbus' voyages.

the arrival of the Spanish to the end of the Second Seminole War in 1842. An accurate account of life in the Florida Keys and the Perilous Straits of Florida during the age of sail. Highly recommended. Tom Hambright

Florida; Joseph Pais, Key West; Dennis and Nina Rogers Micanopy, Florida; Robert and Laura L. Weinshenker Chesterfield, Missouri.



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Letters and articles are welcome. Please write to: Editor, Florida Keys Sea Heritage Journal, KWMHS, P.O. Box 695, Key West, FL 33041 (305) 292-7903.

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always having quality suitable for human consumption.

A search for either of these two wells today would be difficult because the southwestern shore line has been altered by beach erosion and land fill, and the topography of the island has been changed by the construction of homes and commercial buildings.

A quarter of a mile from the beach would put Roman's well no farther inland than Julia Street. It could possibly be at the site of the First State Bank on Simonton and Catherine Streets where evidence of Indian habitation has been found.

One continuous source of freshwater we know of is the spring recorded on William Adee Whitehead's map of Key West dated February 1829. It was called Middle Springs and was located on the northwest corner of Simonton and Angela Streets (Square 61, Lot 1) which would put it on the west side at the bottom of Solares Hill. This too would be about a quarter mile from the beach.

William Adee Whitehead, a young civil engineer, still a minor, came to Key West in October 1828 to go into business with his older brother John. However, he was employed by the proprietors to survey the island and layout the town, which was accomplished during the winter of 1828/29. His drawing of the plats and streets of the town are remarkable but in no way did they resemble the small settlement that occupied only the slender area on the northwestern waterfront. The remainder of the island was overgrown with trees, scrubs and had salt water ponds in the center and eastern half. He also added a double irregular lines running from the spring to Whitehead Street marking it "road." However, his plat did not indicate if the road, or path, was real and in service. Whitehead Street, rough and unpaved at the time, was the only roadway across the island, running from northwest to southeast.

John Whitehead, William Adee's older brother, first came ashore on Key West in 1818 after the ship he was traveling on wrecked on the Bahama Banks, but was able to continue on and put into Key West Harbor. While he waited for the vessel to be repaired he explored the island. Apparently he looked at the island as a businessman and recognized its commercial possibilities. A few years later he purchased one undivided quarter of the island from John Simonton, the second owner of the

island.

The completed survey indicated that John Whitehead owned a number of choice parcels of land including the one with the "Middle Springs."

To say that this spring sometimes referred to as Middle Springs or any other watering place is the often reprinted sketch of a well with a stone wall around it is the legendary Pirate's Well (on page 1) would be conjecture, Indians lived here, pirates, Spanish explorers, Cuban fishermen and wreckers frequented the island over the previous 200 years.

In 1822 Lt. Daniel Patterson found another spring on the south side of the island which he called "South Springs." He discovered it while making a military survey of Key West. Its position resembled Lt. Perry's well in that it too was 200 yards from the South Beach. It was either the same one, or in the same area.

Lt. Patterson further stated that the spring was near the center of a large marsh. He evidently spent a lot of time on the island because he saw South Springs in both rainy and dry seasons. The regular source of the freshwater was submerged and not visible during times of heavy rains because the marsh became a large pond. He reported that "in dry seasons, when there is no water in the pond or marsh around it, the water can be seen flowing into it almost as fast as it can be taken out ... After a heavy fall of rain, the whole marsh was covered with water and the water in the other wells was so improved as to be drinkable for a few days." Whitehead's map shows 10 freshwater ponds on the island. Wells were found mostly on the higher ground of the coastal ridge parallel to the northwestern waterfront. He also observed that the water in most of the wells and springs tasted like rain water.

Wreckers from the Bahamas, who had sailed these waters long before there was a settlement on Key West were familiar with watering places on the Florida Keys. The island of Key West with its excellent harbor and abundance of freshwater was employed by the wreckers as a lookout for sailing vessels grounding on the reef trying to navigate one of the unmarked channels or the Florida Straits. It appears that even with bad droughts, it was one of the few places in the Keys where even a limited supply of water was available. Apparently George Gauld in his survey of watering places of the Florida Keys for British seamen sailing these water, relied on informa-

tion from these men when he wrote in his report that "The principle watering place is at the north end of old Maticumbe where five natural wells are found," the described route one must take through narrow winding channels and strong currents that only a seasoned seaman with sailing vessel that would answer to his every command could navigate safely. Continuing, Gauld would also leave the reader to believe he was giving these men credit for information when he stated "on account of the watering place and of the plenty of fish and turtles, Maticumbe is much frequented by wreckers and turtlers," and marked the location on his chart, printing the words (WELLS) and (CRAWLS). (Crawls, is the name of an enclosure in shallow water for confining fish or turtles awaiting shipment.)

There was also freshwater on Key Vaccas, mostly in down slopes. These formed natural reservoirs for rainwater. There were also some retaining small pools from natural springs that existed even during dry weather. Gauld specified that there was "Particularly a large one on the north side of Key Vaccas, about six miles from the west end, where the water never fails, it lies in a valley about 100 yards from the beach, a little to the westward of three mangrove Islands." For Cayo Hueso (Key West) he stated that "The best place to dig at, and where you meet with the sweetest water, is about a mile eastward of the point."

Very good freshwater could be obtained on Bahia Honda by digging a shallow well in the sand ridge that parallels the shore line. This type of well was called a "sand well" or "beach well." These were usually temporary. Their existence depended on their usage, and whether the season was wet or dry. If the water became brackish, one would dig a new well near by and find much better water. Using this method, freshwater could be found in sand ridges from Key West to the mainland. The same method could also be used along the southern shore of mainland Florida, unless one dug into a layer of clay. This would make further digging for water useless. Occasionally, one might find one of these wells where someone had removed the ends of two barrels and placed it in the well to serve as casing to prevent the wall from collapsing. This would make a well approximately six-feet deep with cleaner water than would be without a casing. Sand's immense holding power of water in pockets, or depressions, in underlying rock made these wells pos-

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(Water from page 3)

sible.

The search for freshwater was a high priority with the Spanish during their exploration of Florida. They discovered freshwater wells of the Indians along the coast and the Florida Keys. They enlarged the wells because of their great needs. They then marked them on their charts. On several occasions they were used as reference points to locate sunken galleons. The Spanish, like the pirates, would kill for freshwater as easily as they would for gold.

In the early 1800s, piracy was a menace to maritime commerce throughout the Caribbean Sea, the Gulf of Mexico and the coastal waters of Florida. It was a detriment to the seafaring commerce of Key West and other sea ports. Without some form of protection from the Federal Government, thrifty and industrious businessmen were unwilling to make an investment in an island so remote from the mainstream of American commercial activity. The United States pursued the pirates more seriously in 1823 after it had purchased Florida from Spain. That is when the United States Navy sent Commodore David Porter to Key West to operate an anti-piracy squadron from the new Naval Supply Base at Key West. He suppressed piracy in the Caribbean Basin, particularly from their places of refuge in Cuba and Puerto Rico.

With the increased safety of the sea lanes, the number of merchant vessels entering the port increased. Encouraged by John Whitehead, who had purchased part of the island from John Simonton, the original American owner merchants and tradesmen from New England and Saint Augustine moved to, or established branches, on the island. The new settlers were industrious men and women bent on making Key West a prosperous business community and establishing a social structure. Some were given building lots, while others purchased them. Selecting lots on the high ridge extending along the water front of the north-west side of the island where the deep channel runs close to the shore. There were a number of freshwater wells in the area, of the best quality. It is believed that some of these wells were dug during Commodore Porter's years on the island for his men.

Also inhabiting the island were a few outlaws, derelicts, mere adventures, Bahama based wreckers and Cuban fishermen, all basically squatters, illegally living on land they did not own (unless some arrange-



Whitehead's Survey of 1829 showing the spring on Simonton Street. Photo credit: Monroe County Library.

ments were made with John Simonton) who had to give way or yield to the new owners. Whitehead's survey greatly helped in establishing the new ownership. Wells and Springs became private property. The days when captains could anchor their boats in the harbor and send their crews ashore with barrels to take as much fresh water from the wells or springs as they wanted was slowly coming to an end, water was selling for one cent a gallon.

Water tanks for freshwater were not yet built into ships when Key West was settled in the 1820s. Water was stored and transported on ships in barrels or hogsheads. The former had a capacity of 31 1/2 gallons and weighed 263 pounds. The latter had a capacity of 63 gallons and weighed 525 pounds. They were an ever-present sight on the wharfs and in the warehouses along with assorted freight, rope, rigging, horses, and drays.

Although the early settlers knew of the existing wells, they also dug additional wells on their own property for their personal use. Most had excellent drinking water, some did not. The system of collecting rain water from the roofs of buildings and storing it in cisterns was the alternative to wells for supplying freshwater. Cisterns were widely used by residents whether they had a good well or not. Cisterns would continue in use

for more than a century.

Because of a thin layer of hard-to-penetrate rock that caps the island, and because of the high water table, the cisterns were usually above ground. They were built of hand-hewn native-quarried rock and mortar. They were plastered inside and out. (Some still remain to this day and can be seen in the backyard of some residences. The remains of two are next to the Water-front theater at Mallory Square.) A low-pitched, wood-shingled roof covered the cisterns to keep the water clean by protecting it from falling debris, mosquitos and the intrusion of sunlight that could cause the proliferation of algae. Some cisterns were built with a portion of it under the house. (This was possible because their frame houses were on wood posts or piers of quarried limestone, to keep the house above the ground so that high tides, heavy rains and storm water could not flood the dwelling and to provide good circulation of air, preventing wood rot.) In another system the cisterns were entirely under the porch with accessible hatch in the porch floor.

Collecting rain water and storing it became the primary source of freshwater for the growing population on the island, lowering a bucket into the cistern to retrieve the water was part of daily life.

Freshwater weighs 8.33 pounds a gallon. To lift a bucket with two or more gallons of water up and out through the hatch was laborious work compared to modern convenience when all we do today is turn on a tap in the house.

Usually the cistern was in the back yard and the center of activity. Near it a shed or some form of shelter that served as a "wash house." In it was an assortment of tubs, scrubbing boards, home made soap and buckets with a short rope attached. Outside near by was a large copper vat for boiling clothes over an open fire (the vats also their bathtub). Generally charcoal fueled the fire for the vat, but also fueled the fire in the hearth in the outdoor cookhouse, also near the cistern. The bucket remained an essential household item for many years. An earthenware jar was ideal for storing the daily drinking water. When suspended in the air in the shade, the water remained cool. Unlike well water, rain water had little or no taste. And because of its softness, it was ideal for bathing and washing clothes. But that was only if the water collection system was properly maintained. The roof had to be free of debris from trees and birds.

During severe storms or hurricanes, the foam of the whitecaps on the waves around the island would be whipped up into the air and a salt-water mist would drift over the island. When this happened, the cistern's down spout, which guided water to it from the gutters on the roof, had to be disconnected. This would prevent the air-borne salt spray from entering the cistern and making the water saline and undrinkable. Periodic cleaning of cisterns was essential to remove the debris which accumulated in the bottom of the tank from the wash-off of even regularly cleaned roofs. The entrance to do this was through the hatchway which was otherwise used to draw water.

To supply visiting ships with local water, a large cistern was built on the north side of the Amos C. Tift Company Chandlery, which was on the northwest corner of Wall Street and Tift Alley. (The chandlery was built between 1837-1841.) Over the ensuing years, two additional cisterns were built south of the chandlery to accommodate increasing demand for water from ships. Each was a different size. One had a peculiar construction in that it was reinforced at the corners by buttresses. The run-off of rain from the warehouse roofs replenished the cisterns. The entire Tift property included nearly all of what is today

known as Mallory Square.

Although rain water was a proven source of freshwater, it had its short-comings. During the 1800s, and even today, less rain falls on Key West than on mainland Florida. The land mass of the Florida peninsula, bordered by large bodies of water, develops a combination of air currents and uneven temperatures which can produce rain clouds and rain. Also contributing to its rainfall is water evaporation from the Everglades and ocean, this too forms clouds and showers. The Southeastern peninsula of Florida specifically Dade County, receives an average of sixty inches of rain a year. However, although only a little more than a 100 miles southwest, Key West receives an average of 39 inches a year. By contrast, the six-square mile island obviously does not have the same rain producing conditions but is dominated by maritime weather patterns. In early summer (June) a large high pressure cell (The Bermuda High) moves westward and situates itself near the Keys. Southeasterly winds draw in moisture from the tropical Atlantic Ocean and the Caribbean Sea, giving Key West its wet, or rainy season until November, more than two thirds of the island's rain occurs during these months, supplemented with rain from tropical storms or hurricanes. During winter a few heavy showers fall before an approaching cold front from the north but normally last only a short time. Unless there was a great deal of rain in these showers, there would be a water deficit before the rainy season returns and the water supply would become uncomfortably low. A prolonged dry spell would result in dry cisterns.

Taking baths in the sea water at the beach was one way Key Westers had of conserving cistern water for drinking and cooking. Perhaps for us, bathing in the sea would leave an uncomfortable residue on our skins. But this probably was not a problem for the people living in Key West in the 19th Century. They were men and women of the sea. They always lived near the sea and it was just as natural for them to bath in the sea as in their home or backyard.

In the large homes of well-to-do families, a room was set aside for bathing. Servants (sometimes slaves) carried the water to this room in either a tea kettle or a ship's copper milk jug. Perhaps such families were less conserving in the use of water because their cisterns had a larger capacity than most other islanders. We don't know.

Population of Key West

1830	517
1840	688
1850	2,645
1860	2,913
1870	5,657
1880	9,890
1890	18,080
1900	17,114
1910	19,945

But undoubtedly they kept an eye on their water supply during the dry season just like everyone else.

One can imagine that the return of the rains were certainly welcome. Cisterns low on water, or empty, would begin to fill again. At the first good rainfall women would set out buckets, pans or any good container to collect enough rain water for the most delightful hair shampoo of the year. This was easier and quicker than drawing water from the cistern where it should be saved for drinking and cooking. Salt water is not good for cleansing hair. Vegetation that was dried by heat and the lack of rain, would become green again. However, the return of the rains were a mixed blessing, because they also brought mosquitoes and fevers.

There were times when the rain had a temperament of its own. It could pour in such a deluge that cisterns would overflow. To the delight of wild life, the ponds at Middle Springs, South Springs, and other areas would become lakes. But vegetable gardens could be drowned. And the dry season could be fickle too, exceed its usual duration and create a water shortage.

The demand for water on the island increased in February 1831 with the arrival of two companies of United States Army infantry. With their arrival, the population of the island nearly doubled. (They were here to give some security to the island during the political unrest in Mexico and Texas. It is not known what the men's early water supply was. But the Army soon realized that if personnel were increased, or the Army's stay on the island was made permanent, the Army would need its own water supply.

The Army set up camp on property bordered by Angela Street, where White Street, Palm Avenue and Eisenhower Drive are today. Palm Avenue at the time was the
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Northern shore line and opened up into the Gulf of Mexico until it was filled in for the railroad. The 27 acre installation was officially named Key West Barracks until taken over by the Navy in 1950, and renamed Peary Court. In 1844 the Army demolished the temporary buildings it first built and began to build permanent ones. As the building went up so did above-ground cisterns.

The buildings were built either of wood or stone. Both groups had features in common, such as wrap-around, broad, covered porches. The covered porches provided shade, but they also served to extend the roof area thus greatly increasing the rain-catching capability of the roof. Most had slate roofs. Slate stays cleaner than many other roofing materials, thus it collects better quality drinking water. The wood buildings were on stone and brick foundations seven feet high.

Six officer's quarters were built on the property. Three bordered the parade ground on the northeast side and three on the southwest. Each had its own cistern. Two large barracks for the enlisted men were built on the southwest side and had four cisterns. A hospital was built in the northwestern corner and two cisterns stored water for it. The cisterns were at each end of the long building with the tops level with the porch floor. The non commissioned officers (NCO) quarters, stables, and laundry were on the south side of the property and were supplied by three cisterns. (The guard house, commissary, and quartermaster's store-house were stone buildings.) The water ran from these roofs to one or more of the fourteen cisterns on the grounds. Quarters for officers, married soldiers and laundresses had water-closets and bathrooms. Slops and sewage were carried into the Gulf by a work detail. A bathhouse was constructed over the water where soldiers could bathe in the sea the year around. In January 1862 Major Bennett H. Hill estimated that the total water-shed area of all buildings was about 32,000 square feet, and the capacity of the fourteen cisterns was 166,100 gallons.

In 1845 construction began on Fort Zachary Taylor at the entrance to Key West Harbor on the southwest side of the island. It was a part of America's coastal defense system from Maine to Texas. This enormous brick edifice was built 1,000 feet from the shore on a sand spit. From the land, it was accessible only by a bridge. The fort was designed to be as self sufficient as

possible. This was true of all forts. How to supply it with freshwater was one of the main concerns.

Rain was collected on the roof of the fort and channeled by the parapet into conduits. These were embedded vertically within each of the massive brick piers that supported arched ceilings forming the case mates (gun rooms). Then the water drained into sand-filled filter trays within the pier. Finally, the water overflowed from the trays into the cisterns beneath the ground-level casemates. A siphon-like connection between each of the 58 cisterns maintained equal levels.

Above each cistern's arch, a thick slab of slate was placed as part of the casemate floor. At the bottom of each cistern a capped two-inch pipe through the scarp wall (which was above sea level) was placed to drain the water if necessary. Each cistern was accessible through a trapdoor with a wooden cover in the floor of the casemates. As with the homes, the only method to draw water was with a bucket. The capacity of the series of cisterns was estimated at 812,182 gallons. An additional 144,144 gallons of water could be provided by the cisterns of the engineer's buildings located within the confines of the walls of the fort.

Captain J.M. Brannan was in charge of Fort Zachary Taylor. As early as November 11, 1860, after receiving intelligence reports of a possible conflict between the states, he moved a small force of his command from the Barracks to the fort. The remainder went to take command of the fort on the night of January 13, 1861, thus securing it for the Union, much to the relief of Captain E.B. Hunt, chief engineer in charge of construction. He wrote the following in his correspondence with headquarters two days later, "I have four months provisions and 70,000 gallons of water, but we could not stand a siege against any organized army and therefore should be reinforced immediately."

The fort was put to an unprecedented test before it was actually completed. However, no enemy ever attacked it. But the ability to sustain the lives and welfare of the Army personnel isolated many miles from other Union bases, remained a matter of grave concern for the officers responsible for the men.

While occupying the fort, a number of men contracted diarrhea. They complained of the cement taste in the water from casemate cisterns. This gave the first indication of problems with the drinking water. According

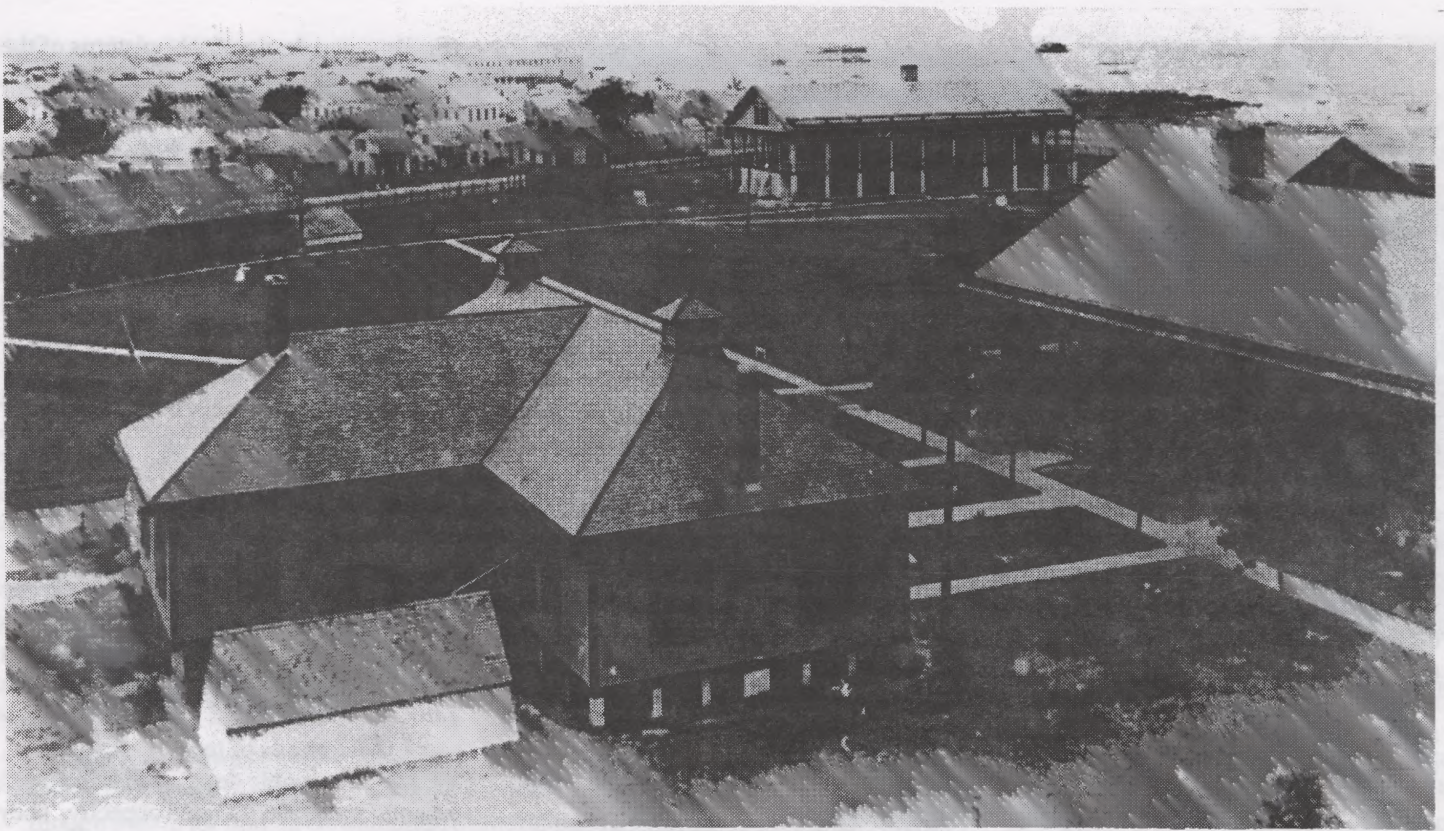
to one report by Captain Hunt, the water had a "decided laxative effect" on the men. He added, "in fact the only good water in the fort is likely to be what comes from the quarters." (Captain Hunt was referring to the tanks of the engineers and the cistern of the buildings and barracks within the compound of the fort that had their own rain water collecting system, independent of the casemate cisterns.)

Some of the engineers speculated that the problem was established during the construction of the fort when dirt and debris may have sifted through the poorly fitted temporary trap doors. However, the real offender was something else. It was the soil and sand from various parts of the island that was placed several feet deep on the arched roofs of the fort to cushion or bomb-proof the roof. The sand and dirt also served to prevent enemy projectiles from ricocheting into the fort.

Rain water seeping through this soil would gather pollutants on its way to the cistern, giving it the cement taste. The first complaint made by the men, Captain Hunt in his report September 3, 1861 to General J.G. Totton, stated that the "rotten line stone quality is strongly traced in the water from the archers through the sand filters" ... "in the two sand wells which I opened in the vicinity of the men's quarters the same fault appears" ... "the numerous wells here on the island give water quite distasteful."

By all indications they used marl, a mixture of clay, sand and limestone, to cover the arched roof of the fort. It is the dominant soil of the island just below the cap rock, water settling or passing through this type of soil becomes brackish, in this case it spoiled their drinking water. Lime is the main ingredient in cement, giving it the impression of cement. Captain Hunt reported that the water "is not well fitted for drinking, nor would it become so for probably one year." The troops were prohibited to use the forts cistern water for drinking.

The loss of the fort's main water supply for human consumption was quite a setback. What other water there was could not be relied on to supply the army through the dry season when more reinforcement arrived. This presented Captain Hunt with the problem of finding other sources of water. Fortunately, he found two good wells near the head of the bridge. It was not recorded if they had the volume of water to supplement the fort's requirements of freshwater.



An Officer's Quarters at the Army Barrack with a large cistern. Photo credit: Monroe County Library.

A plan to replace and replenish the water in the casemate cisterns was given to General J. G. Totten, Chief of Army Engineers in Washington. The proposal was to purchase a naturally-sloped, 15 foot high, piece of land near the lighthouse. The land would be shaped into ridges and then plastered. Gutters would collect water in a rain-water run-off system to be accumulated in cisterns cut into the rock at the base. From there it could be pumped through a flexible hose or pipe to the fort. This same apparatus was successfully used in the West Indies. But the Chief Engineers in Washington rejected the proposal. They accepted an alternate plan instead - the immediate requisition and installation of a salt water distillation plant.

Key West, due to its strategic position and deep water harbor, was important to the Union. Headquarters took immediate action to follow Captain Brannan's recommendations and sent reinforcements. They soon arrived in the form of companies of infantry. (Some of the men brought their families.) The army also sent batteries of light artillery, horses, and livestock. Union war ships began to dominate the harbor.

During the Civil War, The Eastern Gulf Blockade Squadron's ships blockading the Confederacy, was stationed in Key West. The increased number of military personnel doubled the population of Key West

from 2,913 in 1860.

When Commodore Porter and his men were on the island, in the early 1820s, they took whatever they needed from whomever they wanted. This was not the case with the Union Army during the Civil War. At least that was not the case with freshwater.

Nevertheless, some of the people on the island who did not agree with the North resented the Union soldiers. The more outspoken southern sympathizers vacated their homes, voluntarily or by expulsion, and returned to southern states controlled by the Confederacy. They left behind their wells or cisterns with excellent water. Some of the Bahamians also left. They returned to the Bahamas because wrecking was suspended during the war and they believed the war was not their fight.

In May 1861, Asa Tift, one Amos Tift's sons, took his slaves and moved to New Orleans where he worked building gun boats for the Confederacy. He left his chandlery and three large cisterns in charge of his brother Charles.

At this time the island was under martial law with Major Hill in command. On January 16, 1862, the Major, dissatisfied with Charles' conduct, seized and took possession of the Asa Tift property for the United States Government. The brigade Quartermaster and the Provost Marshal then

occupied the offices, wharfs and warehouses were filled with Government war supplies. Undoubtedly the military used the cistern water. Tift's property was next to the Navy property.

Concern about the inadequacy of the potable water supply began to surface again. Solving the problem was important for the military which remained in Key West through the years. From the military's earliest presence in Key West, Naval and other U.S. Government vessels destined to the island were advised, or perhaps ordered, to add to the provisions the greatest quantity of water their vessels could bear.

The Army made a wise decision when it built the fourteen cisterns at the Key West Barracks. These could supply 2,000 men with freshwater from one rainy season to the next. However, it could not meet the demand put on it with the additional federal troops who arrived to help defend the island and maintain civil order. These men camped on land they cleared north west of the barracks. Water rationing was often the order of the day when the water supply was low and there was no sign of impending rain.

High temperatures, mosquitoes, insects, fevers, and water rationing, all contributed to troop's poor health and low morale. When there was a shortage of freshwater and local

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(Water from page 7)

suppliers could not meet the Army's demands, regiments and commands would contract to have water shipped in from distant areas. In most shipment the water was of poor quality and unsafe to use. Lack of good water continued to be a problem. One man wrote home "they would not let us have only what we wanted to make coffee."

"Disagreeable," "brackish," "thick and ropy," and "just not fit to drink," were some of the complaints of the troops. Finding wigglers (mosquito larva) in their canteen cups was not surprising. They probably led to some of their medical problems as well. Water purchased from local suppliers was somewhat better. This was delivered in large containers. It was similar to a barrel and called a "pipe." Its capacity was that of two hogsheads, (126 gallons) and weighed 1050 pounds when full. The regiments and commands paid one and one-half cents a gallon for the water thus supplied.

A cask is any wooden, cylindrical container with flat circular ends and sides that bulged outward, made usually of staves bound together with hoops. The barrel and hogshead are units of measure, mostly liquid but also dry measure as flour, 196 lbs, pork and fish 200 lbs, to a barrel. These containers smaller than the 32 1/2 gallon barrel are kegs, usually holding five, ten or twenty gallons liquid. Cement shipped for construction of the forts were kegs, equal to the 20 gallon liquid size.

The construction of Fort Jefferson, the largest of the American coastal forts was nearing completion 68 miles west of Key West on one of the seven islands of the Dry Tortugas, a name given to the group of islands by the Spanish because of the great amount of turtles found there. Later the word, dry, was added to their charts, indicating no fresh water wells.

Fort Jefferson, much larger than Fort Taylor, is basically of the same design and has 114 casemate cisterns with a total capacity of 1,236,200 gallons of water. The army engineers learned from the mistake made at Fort Taylor, when they placed limestone soil on the forts arched roof, and contaminated the water supply. It was then specified that "earth and sand to cover the arches obtained from an area of freshwater to prevent the water collected from becoming brackish." The apartment house and the engineer's buildings in the fort had their own rain water collection system and

storage tanks. The water collection at Fort Jefferson started pure and fresh from the new clean roofs.

In January 1861 there were 168 persons living at Fort Jefferson. This included engineers, construction workers, slaves, wives and children in the six families living there. They felt confident they had enough water. The residents considered it only a minor problem when salt showed up in the cisterns. The army repaired the outside walls of the cisterns with asphalt, believing they had never been made tight in the first place.

More troops arrived at the fort as the war intensified. The population increased to 550. It was about this time the army realized the massive structure had begun to settle. The island was not as structurally sound as they had first believed. The settling caused cracks to form in the cistern walls and salt water leaked into the freshwater supply contaminating it. Freshwater was running short and more troops would create a water shortage. (Population at one time reached a high of 2,000 persons.)

The engineers built a seventy foot wide moat that surrounds the fort, designed so that the sea water would rise on the incoming tide and carry sewage out to sea on the outgoing tide. The system did not work very well, mainly because it was not completed, and became a catchall for sewage and debris. Resulting in the polluted sea water in the moat penetrated the cisterns, as the fort continued to settle and the asphalt deteriorated, compounding the problem. An unsanitary condition that contributed to spread of disease. Emily Holder, wife of the Surgeon and health officer for the engineering department at Fort Jefferson, seemed to enjoy living on the isolated island. She took an interest in the construction of the fort and the welfare of the inhabitants, she participated in social life with the other families living in the newly constructed apartment house, recording major events and minor details as they happened.

On March 12, 1862 she wrote, "With fourteen hundred people on short allowance of water, with smallpox in their midst ... Colonel Putnam sent to New York for water condensers, so that we could have the cistern water for cooking, and was making ready a schooner to send to Havana for water, as they were as badly off in Key West as we were, having only sufficient for twenty-four hours, with three thousand troops, besides the citizens,"

(Emily was referring to the cisterns of the apartment houses.) At this time distillation plants (sometimes called condensers) were new, but they were promising. If drinking water could be made from sea water, it was just what Fort Jefferson needed.

Anticipation that the bad water and shortage problems would soon be solved began to fade when several months passed and the distillation plant did not arrive. Schooners continued to transport water from Havana. The U. S. Cuyler was ordered to "take on a supply of water there," despite the fact that Spain, the colonizer of Cuba, was not on friendly terms with the United States. Therefore, it was not considered a reliable source of freshwater.

Relief came to the fort in May when one of two distillation plants arrived. It was immediately set up in the northern section of the parade ground near the officers quarters. It had a rated capacity of distilling 7,000 gallons of tepid water per day. Some of the people doubted that the plant actually produced its rated capacity. They doubted that the second one did either. But undoubtedly the distilled sea water was better and purer than what came out of the cisterns.

To shorten the cooling time, the water from the condenser was run into large vats set half way into the ground. When one vat was filled, the water was channeled to a second one to allow the water in the first to cool. The distilled water was not to be used for bathing. People and bodies were washed in the sea water.

The Army engineers were responsible for the operation and maintenance of the distillers, and kept them running day and night. The men who operated them had a hot and mean job. The coal heavers had to deal with temperatures of 117 degrees around the boiler. They had to deal with the coal dust, and they had to rake the dust, ashes and slag from the fire box. For this they received no extra pay. The distilling plants had their brake downs, usually the engineers could make the repairs. Corrosion of the tubes in the condensers was the main problem and could not be repaired locally. The plant was therefore down until a new condenser arrived from the supplier.

Fort Jefferson received its distiller at about the same time as Fort Taylor. Little is known of the unit at Fort Taylor. Army records on May 27, 1862 state "The condenser (distilling plant) at Fort Taylor was producing a maximum of 4,000 gallons of water a day." Very little else is recorded about the

distiller. (However, during excavations of the fort in 1969 the old Civil War distilling plant was uncovered buried in one of the gun rooms in fair condition even to the identification plate that named the plant "Marine Aerated Water Apparatus," builder Dr. Normondy, and rated capacity 7,000 gallons of water daily.) We do not know if it solved the water shortage. It had to have been a significant help. The water from it was stored in some of the casemate cisterns that had been cleaned. More importantly the water was pure and fresh.

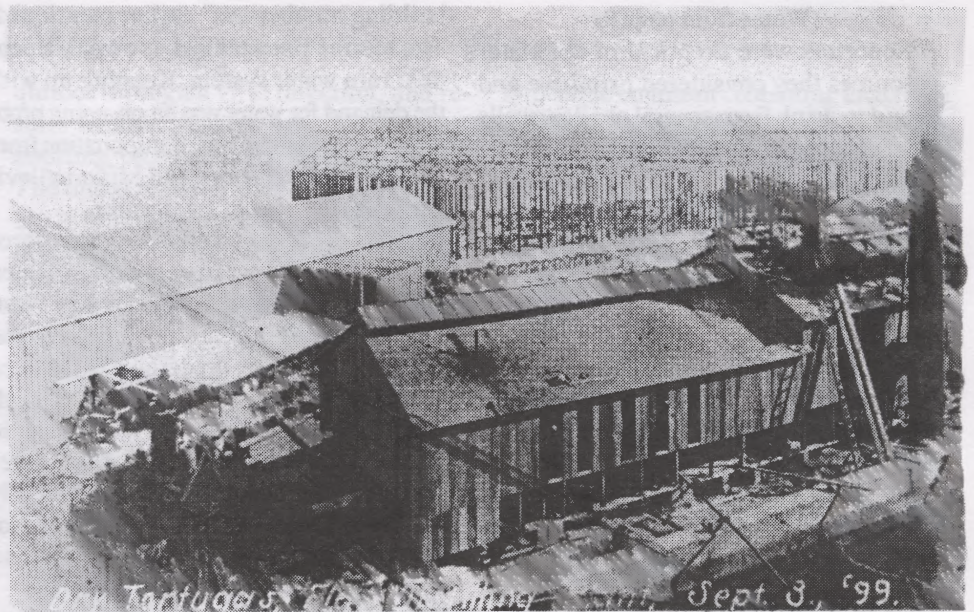
Polluted drinking water plagued the military. It was the major cause of typhoid fever. Several epidemics of the disease broke out, one in the spring of 1862, and another in the summer. This caused the deaths of many men, more from the Army than the Navy. Good sanitary conditions were essential with so many people living close together.

Yellow Fever was a different story.

The rain water in the casemate cisterns though unsafe for human consumption did not go to waste, steam driven self propelled war ships could dock at the Fort's Naval Wharf to take on a supply of water for their boilers and other non-sea water employments aboard ship. Ironically with all the water shortage problems during the Civil War, Navy Department officials advised all concerned "at Key West there are stores of coal, water and munitions of war." Naval commanders grumbled at the high cost of buying freshwater from civilian storekeepers who delivered hogsheads of it by horse and wagon. Freshwater was selling at two cents a gallon. Ice was shipped from Maine, packed with saw dust in the holds of large schooners. When it was available one could buy a glass of sugar water with ice for six cents.

Thirty-three years later Key West was to experience the impact of another war. The island's population had increased to 18,080 by 1890. Sponging and cigar manufacturing expanded rapidly during this period, adding their profits to the local economy making Key West famous and prosperous. In contrast, the military installations were in care-taker status, apparently nearly forgotten or on the lowest priority. When the war with Spain finally came in April 1898 the military was ill prepared to meet the demands imposed on it.

Improvements in harbor facilities progressed slowly and intermittently as appropriations permitted during the post Civil War years. Orders were to "reduce expenses



The distilling plant at the Dry Tortugas taken on September 3, 1899. Photo credit: Monroe County Library.

of every kind, economize on the use of coal—all vessels keep steam down—except in an emergency." Resulting in docks, coal storage sheds and ship loading coal conveyers incomplete by 1898 with little or no improvements in a supply of fresh water.

In as much as many people believed that war with Spain was inevitable it was not until after the sinking of the USS Maine, in February, that the Navy reactivated the base and made a serious effort to prepare for war. Key West the nearest base to Cuba would have a major role, mainly as a supply depot. Requisitions for a water distillation plant along with munitions and other provisions were made in March.

The arrival of men, ships and horses could not have come at a worse time, the previous winter was exceedingly dry with only one moderate rain which left barely enough water in cisterns for normal use. The island was in an extended dry season, a drought, only broken when rains came in July.

On April 20th, five days before war was declared, material for a small building and machinery for a 15,000 gallon per day distillation plant arrived at the Naval Base. Unlike the 7,000 gallon portable plants used during the Civil War, this one had to be assembled, a five inch saltwater suction pipe from the harbor to supply the boiler and a three inch return pipe to the docks to supply ships had to be in place as well as to other freshwater requirements on the base.

Fortunately there were two round 81,000 gallon cisterns near the south side of a large

two story masonry building in the center of activity that made an ideal site for the new plant. The cisterns were built upon completion of the 184-foot-long building constructed during the Civil War period as a naval coal depot and storehouse and was still in service. Known to some people today as U.S. Navy building number one, to others as the old Coast Guard building.

While the Navy had struggled to obtain a supply of water from nearby sources and from the half completed distillation plant. Also struggling to convince the Bureau of Equipment in Washington that their arrangements for water was inadequate, the tank vessel "Maverick" arrived with 1,000,000 gallons of water for Army use.

The base commodore telegraphed Washington for its transfer to the Navy but the Bureau refused to take over the tanker or to other chartered tankers, but granted four-fifths of the Army's water to the Navy. A second cargo of water was later obtained the same way. Major Sawyer the quartermaster in local charge, facilitated the transfers. None of the water went to civilians.

Adding to a population that doubled by the presence of troops, ships and war vessels, an army of newspaper correspondents descended upon the island with their chartered steam powered vessels which took water by the thousand gallons for their boilers and crews, aggravating an overburdened water supply. Hotels and rooming houses were unable to provide sufficient waters for the correspondents who turned to the town for drinking water.

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Reporters were skeptical of the water resources they considered primitive and afraid to drink from several shallow wells in town, being more or less brackish and under suspicious of being surface drainage, they would only drink bottled water, when available could be purchased from local stores and drug stores.

One correspondent from New York reported "every gallon of water has three purchasers, all with money and anxious to outbid each other." Little wonder that water advanced from one and one-half cents to two cents a gallon within two months time. "Most of the unpretentious brands of bottled water sell for one dollar a gallon." To make matters worse drug stores let their supply run out before telegraphing for more.

The second week of May, Naval Officer's attention was called to a well dug three years earlier for fire protection by H.G. Fulford, then street commissioner for the city and superintendent of the Philbrick street car company.

They tested the water and found it was not only fresh, but far superior to the water shipped in from Tampa. The well continued to supply water at a rate of 110 gallons per minute after the government pumped out and hauled away 36,000 gallons. An exceptional quantity for wells in the island. The officers were surprised that people of Key West did not know of the existence of this freshwater. No more information was found as to the location or how long the Navy was able to pump freshwater from the well, or if citizens were allowed any of the water.

On May 21, 1898 the Olivette arrived from Tampa with 30,000 gallons of water, just after heavy rains. For a short period of time the Navy believed the services of water boats could be dispensed with. The Olivette was a vessel of the Plant Steam Ship Company of Tampa.

The relief was short lived, because no more rain arrived. By the middle of June, there was the probability of a water schooner being put on from Miami to Key West. And on the 24 of June two schooners were taking on water from Kirk Munroe's spring in Coconut Grove for the run to Key West, the price was 75 cents a barrel.

Rain would only temporarily ease the situation, the Navy did not have the cisterns or tanks to store any great amount of water or large buildings with roofs and systems to collect therein, except the "Naval

building number one" earlier mentioned. The Marine Hospital had its own independent rain water system. Keeping up with the demand for water was an on-going problem through-out the war, transportation from Tampa, St. Petersburg and Miami alleviated the shortage of freshwater.

On the eve of the conflict there were three battleships, seven cruisers and nineteen other vessels of war assembled at Key West. The larger ships could not navigate the channel to the base, dredging had not been completed to accommodate deeper-draft vessels, they were supplied with coal and water from barges while at anchor, miles from the base, which was geographically the nations most important Naval Base at the time, some of the newer war ships had condensers as standard equipment.

Meanwhile the Army had reactivated Fort Taylor, in March 1898, knowing full well for years that the brick and mortar walls of the fort could not resist the impact of the newer heavy rifled artillery fire from a hostile fleet and could be reduced to rubble in a short period of time.

Not knowing what the Spanish fleet would or could do after the sinking of the Maine, the Army reinforced the fort and prepared for a new battery of coastal artillery by demolishing the entire top tier of the fort. The masonry which constituted the top was used to fill the lower casemates and cisterns on the south and west sides. In the back of this fill was twenty feet of sand and obsolete Civil War cannons, gun carriages, cannon balls and other hardware. In back of this was more cannons embedded in twenty feet of concrete. In so doing they destroyed their rain-water-collecting system so carefully engineered when the fort was built, and half of the fifty-eight cisterns at a time when the demand for freshwater exceeded the supply.

Experiences in the past with an inadequate water supply still fresh in their minds the Army constructed a large distilling plant at the Key West Barracks, very little information has surfaced except for the fact it had a rated capacity of 50,000 gallons daily and was operational by the 25th of May 1898. It is believed this is the distilling plant destroyed in the 1909 hurricane.

The island was nudged into the twentieth century with the help of the war, defeating the Spanish the United States became one of the world powers. Far from the main stream of life of America, citizens and business people were receptive to new enterprises, benefitting from the telegraph

since the 1860's, gas street lighting in 1884 superseded by electric street lights in 1890. The same year ice was manufactured locally. The Naval Base was lighted for the first time on April 5th 1898, power coming from the local electric company and electric-powered street cars replaced mule-drawn cars in 1899.

Bottled water could be purchased at some of the local stores, pumps to move water and pipes to carry it were available, but at home, cisterns continued to be a way of life, every household and most commercial buildings had one, and the bucket remained a household item.

Wells and springs were a modest source of excellent freshwater at best, adequate for a family or small community, some have survived to this day. However the total of all the wells and springs could never have supported a municipal water system.

(Part two, Solving Inadequate Water Supply for Key West, will be in a future issue of the Florida Keys Sea Heritage Journal.)

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Civil War Days in Key West

By Lewis G. Schmidt
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Part 3 (Fevers)

Union deaths from disease during the Civil War resulted in the loss of almost twice as many men as were lost in battle related fatalities. The total number of killed and mortally wounded has been reported as 110,070; while those lost from disease totaled 199,720; including died as prisoners of war, 24,866 (half at Andersonville in a 14 month period); deaths from accidents, 9,058; and deaths from other causes, 15,814. Not included in any of these statistics are the men who were discharged and died at home, or en route home, from wounds or illnesses contracted in the service, and their numbers were numerous. It is obvious from an examination of these records that the greatest risk to the troops resulted from the hazards of disease, and the lack of effective medical treatment.

The state of the art of medicine during the Civil War was rudimentary compared to today's standards; as surgeons, medical officers, nurses, and others associated with the profession were handicapped by limitations of training, and the availability of drugs and medicines. The ability to diagnose and treat the various diseases depended to a large extent on the capability of a single individual and station, as opposed to a finding based on the present experience of a diverse and complex organization of vast resource. It is important to keep that fact in mind when reading accounts and records of illness and disease during the Civil War, for the same illness might be diagnosed and identified by a variety of classifications, when in fact only one or two diseases may have been involved.

By example, the Medical and Surgical History of the War of the Rebellion lists at least the following fevers: malarial, typhus, typhoid, yellow, common continued, bilious remittent, remittent, quotidian intermittent, tertian intermittent, quartan intermittent, congestive intermittent, bilious intermittent, intermittent, scarlet, and probably numerous other classifications, including all the other diseases that have a fever as one of their symptoms.

Another fever frequently mentioned by the troops was the "break bone fever" (dengue fever), described by Emily Holder at the Tortugas as though "the bones were being crushed, and the pain was veritable agony". The fever is transmitted by mos-

quitoes through a viral infection, and results in fever, chills, severe headache, sweating, prostration and pain in the joints. The initial reaction lasts two to four days, but is followed by a rash and rise in temperature. An infected patient may transmit the disease to other uninfected mosquitoes for up to five days, multiplying exposures and resulting in the spread of the infection to others.

Major Wilder, of the 2nd USCT, while stationed at Key West, reported suffering from the "acclimating fever which nearly everyone has sooner or later." He was of the opinion that by having it, he developed an immunity from other fevers.

The surgeon of the 55th Pennsylvania Regiment wrote of "Bilious Intermittent Fever" at Edisto Island in South Carolina in June of 1862; while nearby in August of 1862, his counter part in the 48th New York Regiment, at Pulaski, Georgia, wrote of a fever of a "mild form". But, when he listed the symptoms, the fever sounded anything but mild, and he might have been more exact in recording it as non-fatal. During the same period, and in the same general area, the Hilton Head-Port Royal-Beaufort area of South Carolina Lowcountry, the 47th Pennsylvania was suffering from deaths due to typhoid fever, while a short distance away yellow fever was prevailing at Hilton Head. And, Key West, Florida, was in a transitional period between typhoid and yellow fever.

Some examples of the symptoms of the various fevers listed in reports during the period were "intermittent paroxysm daily, every second day, or every third day, with frequent relapses which occurred in the progress of the disease and the congestions of the abdominal organs as manifested by enlarged spleen, diarrhea, dysentery and jaundice"; debility and anemia; altered condition of blood, boils and ulcers; consumption; hepatic congestion; febrile phenomena; concurrence of scurvy; adynamic condition; acute cerebral congestion (in the patient); congestion of lungs, liver, spleen, and kidneys; rheumatism; neuralgia; and probably a hundred other descriptions of symptoms throughout the records.

The problems and risks facing men who became ill can best be described by the following examples of treatments for these fevers: an active mercurial cathartic; quinine in doses of ten grains; for diarrhea, a

turpentine emulsion containing laudanum; powerful astringents; emetics of ipecacuanha and tartarized antimony; blistering the abdomen; dry cupping the epigastrium and abdomen, followed by bathing with turpentine lotions; acetate of lead combined with opium; tannic acid with anodynes; nitrate of silver; strychnine and Fowler's solution; tincture of chloride of iron; brandy; opiates; rhubarb; calomel; opium combined with tannin; prepared chalk; persulphate of iron; subnitrate of bismuth; vegetable or mineral astringents; saline cathartics such as epsom salts; twenty grains of calomel, followed by castor oil, followed by five grains quina dissolved in water by aromatic sulphuric acid, three times daily; castor oil and spirits of nitre; port wine and quinine; hot mustard baths and liberal doses of calomel; quinine, iron and wine; forty grains of chlorate of potash, twelve of citrate of quinine and iron, and two of powdered capsicum, taken in four doses during the day; iodide of potassium; iron in various forms; vegetable bitters; mineral acids; stimulants; counter-irritation and anodynes; tincture of iodine after Fowler's solution; mercurials and laxatives; one drop of creosote in the form of a pill; and of course, the usual rest and proper diets, in addition to other treatments too numerous to mention.

At Key West, one man was treated by an "old negro nurse who waited on him, when he was at the last gasp, [she] brought up a live fowl & cutting it in half placed half on each foot & drew the fever as she says away from the bowels & after that time he began to recover & we think now he is out of danger. In this disease it dont take long for a man to know whether he is going to be 'rubbed out' or not, 3 or 4 days generally settles the matter."

Without knowing the cause of yellow fever, a member of the 47th Pennsylvania, Pvt. Alfred C. Pretz, reported some personal measures taken by himself and his associates in regard to prevention of infection from mosquito bites, as he wrote: "liquid ammonia was kept in the office for the purpose of washing the skin where the little stingers have sown their venom".

"Remittent Fever has prevailed to a considerable extent. It was characterized by a daily exacerbation and remission. The greater number of those afflicted with it, presented the following symptoms: A

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(Civil War from page 11)

general feeling of lassitude for two or three days, with partial loss of appetite, followed by chills and flashes of heat alternately; cephalalgia, felt principally over the orbits, of a sharp lacinating character, sometimes, however, described as a dull, aching, heavy sensation. The eyes were most generally suffused, skin sallow, tongue coated, thirst, anorexia. The bowels in the greater number of cases were torpid, but in others disposed to looseness; there was a tenderness over the right hypochondriac and epigastric regions, frequent nausea, and sometimes vomiting. The pulse ranged from 85 to 115 per minute. The skin was hot and dry during the exacerbations, moist and flaccid during remissions. The urine was generally high colored, and caused frequent complaints of a scalding sensation while voiding it, and there was a continual complaint of pain in the back and extremities etc. The treatment which was found most beneficial was to administer a mercurial purgative in cases in which the bowels were torpid; when there was nausea, twenty grains of ipecacuanha were combined with it. After the intestinal canal had been acted upon, five grains of quinine were given four to six times daily. When there was diarrhea, half a grain of opium or five of Dover's powder were given with each alternate dose. When the peculiar effects of the quina were apparent the disease readily yielded. The epigastric tenderness, when severe, was treated with sinapisms and opiates. The diet was light as possible."

"Diarrhea prevailed considerably. The cases were uniformly mild (diarrhea that is), unaccompanied by any febrile symptoms, and yielded to treatment very readily. The treatment consisted of vegetable astringents and opium, tannic acid, and catechu being the astringents principally used."

"Dysentery also assumed a mild type, very few cases presenting much febrile actions. The treatment consisted in administering two grains of tartar emetic with half an ounce of epsom salts, and following it with a combination of acetate of lead and opium or more frequently two drachms of castor oil and forty drops of laudanum three times daily."

A cursory study of the sickness and mortality tables involving units of the Department of the South, indicates that between 10% and 15% of the regimental strengths were frequently suffering from the various fevers, diarrheas, and dysenteries. These particular categories of ill-

nesses were by far the greatest health problem faced by all the commands involved in the war.

The most common fevers of a serious and fatal nature with which the Union regiments were faced during the term of their service in Florida, were typhoid and yellow fever. Both have a direct or indirect relationship to polluted domestic water supplies or stagnant ground water, and as a result are of greater danger in tidal areas where these conditions are most likely to occur.

Typhoid first appeared in the records of the Union forces in the Department of the South in September of 1861, increasing in severity the following month, and with 83 cases and 17 fatalities reported in December. Its peak exposure in the department through the Civil War period included the first six months of 1862, and the command seemed to bring the problem under control with improved sanitary procedures after yellow fever ran its course in the second half of 1862.¹

Typhoid usually resulted from contamination of milk or water supplies, including ingestion of shell fish or plant material harvested from polluted waters; or even contaminated food handlers and flies spreading the disease. Symptoms would usually appear in 10 to 14 days (7 to 21 days the maximum parameters) after infection. Symptoms included, predominantly: headaches, occasionally nosebleeds, high fever, rose colored spots on the abdomen and chest, diarrhea or constipation, and enlargement of the spleen. Complications might be numerous, affecting every body system, and perforation of the intestine with hemorrhage was not uncommon and usually caused death within 21 days of onset. Antibiotics effectively treat the disease, although sadly, they were not available during the period of the Civil War. The fever was frequently attributed to miasmatic origins (vaporous emanations) during the war, and it was for this reason that the 47th Pennsylvania was compelled to regularly air their tent structures at Key West when the troops were suffering from fevers diagnosed as typhoid.

At Key West in 1862, typhoid ravaged the men in the spring and early summer, followed by yellow fever in late summer and fall. Not including civilians there were at least 2 deaths to members of the army's units and 1 in the navy in January, 3 army in February, 4 army in March, 15 army and 2 navy in April, 10 army in May, 9 army and 2 navy in June, 10 army and 3 navy in

July, 33 army and 17 navy in August, 44 army and 27 navy in September, 5 army and 6 navy in October, 2 army and 3 navy in November, and 1 navy in December. Those statistics would seem to indicate that typhoid fever affected primarily the Army's personnel, but yellow fever ravaged both branches of the service.

Fevers were not as great a problem at Key West in 1863, as the troops improved their camp and personal hygiene and became acclimated to the conditions during their second year on station. The weak and those susceptible to disease had been culled from their ranks by this time. As the troops were rotated and new units appeared at Key West in 1864, fatalities from disease increased, with at least 2 army and 3 naval personnel dying in January, 1 army and 3 navy in February, 11 army and 4 navy in March, 4 army and 6 navy in April, 19 army in May, 17 army and 7 navy in June, 22 army and 19 navy in July, 9 army and 5 navy in August, 6 army and 9 navy in September, 2 army and 6 navy in October, 1 army and 1 navy in November, and 1 army and 3 navy in December.

Yellow fever first appeared in the records of the Department of the South in July of 1862, with the peak months beginning in August and continuing through November. Remittent fever was also increasing during the same period, possibly having some relationship to the physician's diagnostic abilities and their capability to distinguish between the two fevers. Dr. Smiley reported that another patient who had the symptoms of bilious fever, died of yellow fever as "black vomit came on." Yellow fever would not reappear in the department until July and August of 1864, although 1863 was not without its problems as diarrhoea and dysentery became increasingly virulent during the period August through December.

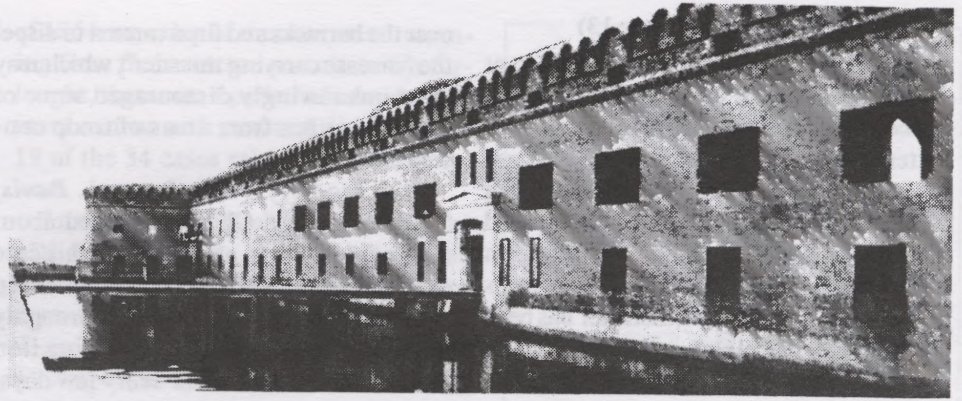
"Surgeon E.S. Hoffman, 90th New York...states that yellow fever in Key West has always been traced to direct importation from Cuba. Ass't Surgeon Cornick, U.S. Army, denies this and suggests a local origin." Weather conditions were said to be similar in 1861 and 1862, but military personnel on the island had increased considerably in 1862, when typhoid and yellow fevers became rampant. "Some local conditions no doubt favored its spread and added to its virulence, such as a large amount of decaying vegetation resulting from the clearing of land for military purposes, the breaking of ground for gardens, the exca-

vations involved in the construction of fortifications, and during the progress of the last, the opening and removal of about three hundred graves which is said to have occasioned an intolerable odor." We now know that the stagnant pools of water generated by these activities were a perfect environment for the breeding of the carriers of the pestilence.

Yellow fever results from the bite of a mosquito infected with the disease, and provided it was recognized as the carrier, mosquito eradication measures could be instituted to control its spread. The disease begins suddenly, with an incubation period of only 3 to 5 days, and with fever and chills, and congestion of the eyes, gums and tongue. Nausea, vomiting, and constipation are common, with jaundice usually appearing on the second or third day of the illness; the fever usually lasting from 12 to 72 hours² with an insatiable thirst. Some other symptoms were muscular pains in back and legs, abdominal distress, and headache and prostration. There was a marked tendency to hemorrhage from various parts of the body (one patient bled from the gums), and one of the characteristic symptoms is the vomiting of altered blood (black vomit), and similar black matter in the stools, after which coma and death usually quickly followed. Black vomit and the yellow and mottled appearance of the patient were the identifying characteristics.

Most fatalities generally occurred on the second or third day. Assistant Surgeon W.F. Cornick of the US Army, who had himself been exposed to the disease at Key West, wrote that "Nearly every case presented a different series of symptoms, influenced by the constitution, temperament and idiosyncrasy of the patient." There were occasionally distinct remissions, with the fever returning as if in an original attack as many as nine days later. During an epidemic, the fatality rate might be as high as 85%, as compared to 7 to 14% for typhoid fever, depending on the availability of adequate treatments.

Dr. Smiley described a yellow fever patient as he wrote that "his eyes were deeply congested, his face bloated and red, his stomach irritated, with tenderness of the epigastrium. He had nausea, with effort to vomit, and complained of headache, especially of the forehead above the eyes...his bowels had been constipated for several days. His pulse was 90, and rather small", and within 12 hours he was dead, having



The entrance across the moat to Fort Jefferson at the Dry Tortugas. Photo credit: Monroe County Library.

"thrown up...two quarts of black vomit".

Dr. Smiley reported that there were two methods with which to treat yellow fever. One was to administer "In the first stage a small bleeding perhaps, mild diaphoretics with mulcent beverages; slight purgatives, fomentations to the abdomen, a few leeches to the epigastrium, with the warm bath, and in more advanced stages, the preparations of bark...and other mild tonics. The other mode...consists mainly in the exhibition of very large doses of quinine and calomel frequently repeated...no means are neglected to excite the action of the emunctories, so that the morbid matter may be carried off through the skin and kidneys. Stimulants freely administered, with nourishing and easily digested food, complete the routine of treatment."

A doctor described what he believed was a successful treatment of yellow fever at Hilton Head in October of 1862. "The feet were placed in a bucket of water just as hot as it could be borne, and a sufficient quantity of mustard added to make it almost as strong as a mustard plaster. After bathing the feet for twenty-five or thirty minutes, that is, as long as it could be borne, the patient was placed in bed and covered with three or four blankets; twenty grains of quinine and the same number of grains of calomel were given to him at one dose, with a teaspoonful of spirits of nitre, and a large sinapism [mustard plaster] was applied to the epigastrium [over the stomach]. The blankets were permitted to remain for three or four hours, and then were gradually removed. The sinapism was permitted to remain as long as it could be borne, and until it had made a decided impression. The dose of calomel was repeated every three hours, and a teaspoonful of spirits of nitre as frequently. To those who vomited excessively, a mixture containing two drops of creosote to each dose was given every half hour or hour, accord-

ing to circumstances...the full doses of quinine and calomel were continued every three hours for two days, and then gradually diminished, and continued three or four days longer."

At Key West in 1864, Major Wilder of the 2nd USCT provided his description of yellow fever: "As soon as one is taken, every effort is made to throw off the poison...a profuse perspiration, open bowels and kidneys are the only safety. The most prompt treatment only, will save life, from 20 to 40 grains of calomel, half a tumbler of castor oil, & hot mustard baths taken at once are the only things which are found successful. This disease doesn't tolerate fooling, 3 or 4 days generally settles it, & frequently less time...A man feels all right at one time, & in 5 hours is dead. Sometimes a man is stricken down without one moment's warning—getting out of a carriage, or going up stairs."³

Many similar cases are described in the records, and symptoms and treatments varied according to the station and doctor. Surgeon Cummins of the British Navy wrote: "It is nearly impossible to distinguish between the morning effects of a night's debauchery and the fever." Another doctor in New Orleans reported that "Physicians may say what they please about their being able to distinguish a case of yellow fever as soon as they examine it. We do not believe it possible according to their ideas⁴. Rarely does a summer pass in which we do not hear of some intelligent and experienced practitioner being perfectly astonished at seeing what he had pronounced a case of intermittent or remittent bilious fever, terminate in black vomit or other haemorrhage."

During the period of the Civil War, little more was known of the origins of yellow fever than that it occurred in coastal re-

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(Civil War from page 13)

gions of dense population. Dr. Smiley at the US Hospital in Hilton Head wrote on December 10, 1862 that the fever "never extends far from the limits where the salt and fresh waters mingle", and as a result believed that it resulted from "decomposed animal ingredients subjected to a high temperature for a long time during the heats of summer, when the thermometer has been for two or three months at an average of not less than 79 or 80 degrees of Fahrenheit. The usual time for commencing its ravages is the latter end of summer or the beginning of autumn, and it always disappears immediately after it is met by the first frosts. The disease seldom attacks the same person twice."

Contemporary authorities considered it a fact that "the poison which is capable of producing yellow fever can be carried in the hold of a vessel, and in that way can be transferred to another ship or transmitted to another country." The same authorities believed in the "non-contagious character of the disease".

It was even reported in May of 1865 that a "Dr. Blackburn"⁵ in Bermuda, attempted to infect areas in the North with yellow fever by sending "clothing and bedding used by patients who died with the yellow fever to New York, Philadelphia and other Northern cities... That any human being should be so diabolical as to originate a plan to disseminate a pestilence by wholesale in any community, would until lately, have exceeded the limits of belief... A portion of the horrid cargo has been taken and buried [in Bermuda]... It will be recollected that there is no love for the Union in Bermuda."⁶ It was later reported that "Dr. Blackburn, the yellow fever fiend of Bermuda, has been arrested in Montreal for a breach of neutrality laws."⁷

The men of the 47th Pennsylvania would certainly have been interested in knowing, that at home in Perry County there was a cure for yellow fever. "Hoofland's German Bitters", which contained "No Alcohol or Bad Whiskey" and would "positively prevent Yellow Fever", along with a multitude of other ailments. At least that's what the Perry County Democrat advertised. The newspapers were full of advertisements for miraculous cures, and their extravagantly wild claims are an interesting study in themselves.

A better method of prevention would have been the one practiced by the Navy at Key West, when they hung burning tar barrels

over the barracks and fired cannon to dispel the "disease carrying miasma", which may have unknowingly discouraged some of the mosquitoes from areas of troop concentration.

With the navy's ship *James L. Davis*, Surgeon Eugene Chapin reported about 1864 in the coastal areas: "After this case of fever, we had the hatchways of the ship all closed up tight and the ship thoroughly fumigated with burnt tar by sticking iron pokers into buckets of tar every few days, and when we came to open the hatchways there would be such a thick black smoke of tar about, one would almost think the ship was on fire. We kept up this sort of fumigation for some time, it being considered a great purifier, and we thought it drove the yellow fever away from the ship", and it probably was successful in deterring the mosquitoes.⁸

Aboard the US bark *Roebuck* in September of 1864, it was reported that "Everything in the way of disinfectants has been used that could be. Copperas dissolved in water has been turned down the pumps, peak, and run, and the vessel smoked throughout every morning with red hot bolt dipped in tar. Vessels containing chloride of lime and others of the copperas have been plentifully distributed about the ship."⁹

Sgt. Harrison Herrick of the 110th New York, while stationed at Fort Jefferson in the Dry Tortugas in August of 1864, reported that the mail was "smoked before it came in the fort", in the hopes of preventing the spread of fevers.¹⁰ At the same station, Emily Holder recorded that "Even our mail came wrapped in a cloth saturated with lime."¹¹

Although not necessarily associated with fevers, dysentery and diarrhea were the most prevalent maladies affecting the troops. The infections were generally the result of and spread by the same vehicles as the fevers, and many of the same symptoms were common, with the occasional exception of fever itself. Antibiotics would again have been effective, and with the difficulty of diagnosing the various types and combinations of zymotic diseases, would have provided a shotgun treatment. Unfortunately, a lack of antibiotics resulted in the use of less effective treatments such as described by H.H. McClune, a prisoner at Fort Jefferson, when he wrote about "Bay Cedar on Bird Key... a tea made of its roots or branches is considered very good medicine for diarrhea". These illnesses were

usually less serious and of shorter duration than the various fevers, provided the soldier could remember that while laboring over a ditch or other primitive toilet.

Many men who were incapacitated by these and other infections were frequently assigned to lighter housekeeping duty in the barracks, mess, or kitchen, only serving to expose others and compound the problem for his unit. Corporal George Washington Albert, almost continuously sick during his 14 month stay at Fort Jefferson, was frequently assigned kitchen duties. Lack of proper waste treatment methods and facilities only served to perpetuate and spread the problem, as exemplified by the 47th Pennsylvania's problems with the engineering department at Fort Jefferson in regard to clearing the moat. The toilets operated on the principal of tidal flush (twice each 24 hour period), and the material was flushed into the moat surrounding the fort, which at least in the earlier periods was not open to be cleansed by the action of the sea. A continuous lack of clean, fresh water only served to compound these and other problems. The temporary and crowded conditions of an army camp have been home for these scourges of the soldier since man threw the first stone or wielded his first club.

An examination of the Fort Jefferson Hospital records during the fourteen month period of the 47th Pennsylvania's stay reveals at least 74 different diagnoses for those members of the regiment who were "admitted". It is important to keep "admitted" in mind, since many soldiers who were sick

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never gained or sought to gain admission to the hospital. The records are difficult to read and an individual diagnostician's terms and penmanship limit the accuracy of the following list of admissions, which in any case are only intended to be approximate:

Abscess (5 cases), abrasion, anthrax (fungus infection), asthma, bilious coli (gall bladder), boil, bronchitis (5 cases), carbuncle, cardiac, cataract, catarrh (upper respiratory, 11 cases), "cholice", chol. morbus (gall bladder), chorea (spasmodic movements), congestive fever, conjunctivitis (eye infection), constipation, consumption, cramp, M. cutis (skin), bilious fever, bronchitis, "debiletas" (general weakness, 10 cases), diarrhea (28 cases), dysentery (164 cases), "erticonis", enuresis (bed wetting), feb. "conjco", "feniculous", fracture, fistula ani (abscess anus), gonorrhoea (9 cases), "hemeroelygia", hemorrhoids, hepatitis, "hermicralpis", hernia, "inebritas" (drunk), infected glands, infected testicles, intermittent fever (6 cases), lacerated wound, lumbago (backache), "mellana", mentum uni, nephritis (kidney disease), neuralgia, nyctalopia (night blindness), odontalgia (toothache), ophthalmia (eye problem), orchitis (inflammation testicles), otitis (earache), phlegmon (inflammation), phimosis (stricture penis), phthisis (tuberculosis), pneumonia, "polopene ani", remittent fever (169 cases), rheumatism, rubeola (measles, 5 cases), sciatica (backache), scorbutus (scurvy), sprain (6 cases), subluxation (dislocation), stricture (narrowing), syphilis (9 cases)¹², "toncillitis", tumor, typhoid, ulcer, "vanula leiseas", "ven. wart", "vuln. scolops" (healing wounds, 8 cases), vulgus incision (ordinary cut), and 23 cases with no diagnoses (the number of cases has been included with only those diagnoses of 5 or more admissions).

The following is a monthly breakdown of total admissions of members of the 47th Pennsylvania to the Fort Jefferson Hospital during the period of December 1862 through February 1864: 24, 17, 19, 70, 40, 48, 24, 23, 29, 32, 89, 53, 13, 34, and 23; with March (70, mostly dysentery) and October 1863 (89, mostly bilious remittent fever) showing the greatest numbers of admissions. The records for the period of October and November 1863 indicates an involvement with bilious remittent fever of epidemic proportions, evidenced by 71 cases of the fever in October and 45 cases in November. The normal monthly average for the exposure was less than 10. In January

of 1864, as many of the men were returning from their veteran re-enlistment furloughs, there was a period of considerable involvement with venereal diseases, and 19 of the 34 cases related to these problems.

An especially difficult period during the 47th Pennsylvania's stay at Fort Jefferson was the period late in 1863 when remittent fever broke out in October, with 206 patients, including prisoners, admitted in a 61 day period. The hospital was admitting one to six cases every day in October, until the 21st, when five to fourteen were admitted each day through the 27th. On November 1, the hospital had ten admissions, November 3 had fifteen, and the 13th had seventeen cases. Although the 47th Pennsylvania did not experience deaths in epidemic proportions at any one period, it did suffer from non-fatal epidemic conditions on several occasions.

Part 4 of Civil War Days in Key West will continue the story of life on the island beginning in June 1862 with the arrival yellow fever.

¹ Medical & Surgical History of the War of the Rebellion

² At Fort Jefferson, Emily Holder reported that with yellow fever, "four and five days was the length generally of the course the fever ran".

³ Key West in the Summer of 1864, letter June 19, 1864

⁴ The tables included in the Medical and Surgical records of the War of the Rebellion substantiate this conclusion.

⁵ A lengthy history and examination of the plot alleged to have been hatched by Dr. Luke P. Blackburn of Mississippi, is included in a detailed description published in the Philadelphia Inquirer of May 23, 1865, with follow up articles on May 26, 27 and 30 detailing the investigation and trial.

⁶ Philadelphia Inquirer, May 8, 1865

⁷ Philadelphia Inquirer, May 20, 1865

⁸ By Gone Days, Acting Asst. (Navy) Paymaster Eugene Chapin

⁹ ORN, Volume 17, page 761-2; Master Martine

¹⁰ Sun, Sand and Soldiers, Harrison B. Herrick diary, Oswego Co. Hist. Soc.

¹¹ At The Dry Tortugas During The War, Emily Holder

¹² As the Veteran Volunteers were returning from furloughs in the North.

Lewis G. Schmidt is a resident of Allentown, PA. Since he retired in 1979 from Bell Telephone Company, he has been able to pursue his study of history.

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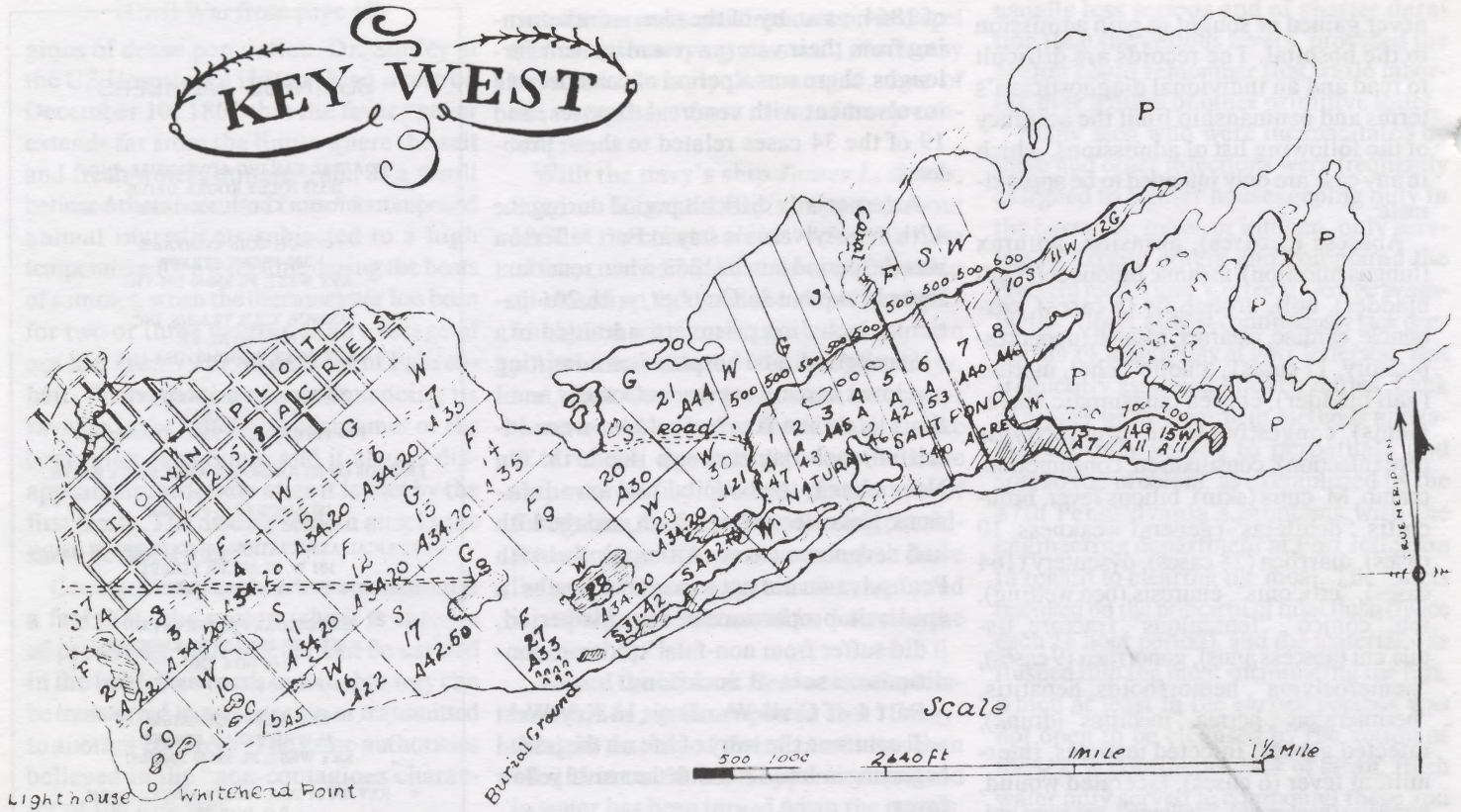
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William Whitehead's Survey of the Island of Key West dated 1829. Photo credit: Monroe County Library.

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