and other lots have since been purchased, making the reservation at present about 20 acres, one half of which is used for the purposes of the post. The average temperature is 46° F.; extreme cold, 90° F.; extreme heat, 90° F. The prevailing winds are west, northwest, and southwest.

Fort Porter proper was originally described as barracks and defensive works at Black Rock, New York, consisting of a block-house surrounded by a terre-plein and outer battery. The work, as completed, was a sunken redoubt, with a stone keep or citadel, surrounded by a terre-plein. The keep or citadel was burned by bonny-jumpers confined therein in 1863. barracks for two companies were erected in April, 1867. They consist of two frame buildings, 115 by 25 feet, and two stories high. The dormitories are in the second story, each being 55 by 26½ feet, and 8 feet 10 inches high, giving 518 feet air space per man.

The officers' quarters are one-story frame cottages, without cellars. All the buildings are badly built of unseasoned lumber, and are very uncomfortable in the winter season.

The hospital is an L-shaped frame building. One wing, 63 feet long by 23 feet wide and one and a half stories high, contains the offices, kitchens, &c. The other wing, 80 feet by 27, and one story high, contains the hospital ward, 41 by 26 feet, and 12 feet high. The ward is warmed by stoves, and ventilated by an air-shaft of ingress one foot square, which conveys the air underneath the ward and opens under one of the stoves, which is partially surrounded by a zinc sheathing. The vitiated and heated air is carried off by a shaft passing with the stove pipe through the roof. The bath-room, water-closets, attendant's room, and mess-room are also in this wing.

The quartermaster's and commissary's store-house is a frame building, 56 feet 10 inches long by 20 feet wide. It is one story and a half high, and contains an office and two store-rooms on the lower floor. On the upper floor are two rooms, one used as quartermaster's and the other as subsistence store-room. A good cellar extends about one-half the length of the building.

The guard-house is a stone building, one story and a half high, converted from a stable to its present use. On the first floor are the guard-room, 17 by 19 feet, and cell-room, 15 by 19 feet, containing eight cells, four on each side of a corridor opening into the guard-room. The prison-room, 16 by 17 feet, is on the second floor, and is tolerably well lighted and ventilated.

The subsoil drainage of the parade and other grounds about the fort is by means of tile drains emptying into the larger earthen pipe drains, which carry off the drainage and sewage from the barracks, and some of the officers' quarters. All the contents of the sewers and drains of this part of the post are discharged into the Erie canal, at least 50 feet below the lowest part of the post grounds now used, and 100 yards from the stable, which is the building nearest the mouth of the sewer. The drainage and sewage from the hospital and the officers' quarters, which are on the higher ground, are carried off by means of earthen pipe drains connecting with the city sewer.

The post is supplied with good water by means of iron pipes extending from the Buffalo City reservoir to the fort. The reservoir, two squares distant from the fort, is filled with water pumped from the Niagara River. In winter the supply is insufficient, as it is necessary to allow the water to run from the hydrants in very cold weather to prevent it from freezing in the pipes, the feed-pipe not being large enough. The supply fails in some of the officers' quarters and at the hospital, which is on higher ground, and the last point that the water reaches. Independent of this supply, the officers' quarters have large cisterns, which are filled with rain-water from the roofs of the buildings.

Statement showing mean strength, number of sick, and principal diseases, at Fort Porter, Buffalo, New York, for the years 1868 and 1869.

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*Include laryngitis, bronchitis, pneumonia, and pleurisy.
FORT WAYNE, DETROIT, MICHIGAN.

REPORT OF SURGEON B. J. D. IRWIN, UNITED STATES ARMY.

Fort Wayne, Michigan, is situated on the right bank of the Detroit River, about two and half miles from the city of Detroit, Michigan. Latitude 42° 23' north; longitude 82° 58' west; height above the sea 580 feet.

Since the first settlement at this point, which took place toward the close of the sixteenth century, it has constituted an important military station, receiving its garrisons from the several nations which have consecutively exercised dominion over the regions of country in its vicinity. The first settlement of Europeans at Detroit consisted of a religious mission under the Jesuits, which was promptly followed by a military trading post, established under an officer then in the service of the French government. After remaining in possession of its Gallic owners some sixty-odd years, it passed from beneath their authority, and became a part of the colonial possessions of Great Britain. In the early part of the present century it again changed owners, and became a part of the vast territorial domain of the United States, embraced within what was at that time known as the Northwest Territory.

During the occupancy of Detroit by its French and English owners, and subsequent to the change that brought it under the control of its present possessors, the troops stationed for its protection were quartered at points which have long since been absorbed by the growth and expansion of the city.

The site of Fort Wayne was selected some thirty years ago, shortly after which the Engineer Department of the army commenced the construction of a stockade fort in the northern part of the grounds.

The military reservation pertaining to the United States at this place consists of an irregularly oblong plat of ground, containing some 63 acres, lying parallel with and fronting the river. The geological features of the reservation present but few peculiarities. The formation consists of drift or subaqueous deposits. A thin superficial stratum of yellow sandy clay rests upon a strata of sand and gravel. Some few points in the vicinity of the river margin present accumulations of dark loam, the result of successive deposits of vegetable debris. The watershed of the country back of the military reserve manifests itself by the appearance of several small springs, which discharge their contents along the paludal margin of the river. The country in the vicinity of the fort is almost a plain or dead level, and presents the general physical characteristics of the Michigan peninsula.

The military reserve and the neighboring country produce an abundant supply of white oak, black oak, walnut, and hickory.

To the south of the fort the American side of the river is fringed with an extensive border of marshy bottom land, which extends some ten or twelve miles. At a point about a mile south of the fort, the river Rouge enters the Detroit River at almost a right angle. Much of the land bordering on the Rouge consists of marsh or swamp, and is intersected in many places by small streams, lagoons, and stagnant quagmires, wherein the aquatic vegetation is of the rankest and most prolific character.

The average mean temperature at Detroit from 1831 to 1842 was given as 47.21° F. During the last year the mean temperature at this post was 48° F. The lowest range of the thermometer was at 7 a.m., February 28th, when it descended to 3°; the highest at 2 o'clock p.m., August 29th, when it reached 96° F. March was the coldest, and July the warmest, months in the year. The amount of rain was 44.53 inches. Extremes in June and February, 9.10 inches during the former, and amount inappreciable during the latter month. Snow, amounting to 9.65 inches of water, fell during the year. The prevailing winds were from the southeast and southwest. Fierce thunderstorms are very frequent during the summer and autumn months.

The original design of the fort appears to have undergone extensive changes, as the works have received almost a complete remodeling, and now consist of an extensive permanent fortification
constructed of brick and stone, and the necessary earthen additions. When completed, the works are to be armed with some sixty or seventy guns, many of which will be of the heaviest caliber.

The interior of the main fort is a perfect square, and affords a parade ground, or place d'armes, containing 84,759 square yards.

The quarters for the troops at this station consist of two kinds: Those constructed of stone situated within the fort, and those built of wood on the outside of the fortifications. The barracks consist of an oblong stone structure, three and a half stories high, facing the north, and built perpendicular to the eastern and western sides of the square. The exterior is plainly but neatly finished. It is 186 feet long and 36 feet 6 inches wide. The front is devoid of balconies or galleries, but the rear of the building has solidly constructed balconies, ten feet in depth on the second and third stories, extending the whole length of the structure.

The quarters were evidently designed and finished for the accommodation of a battalion of five small companies of troops. The building is divided into five equal divisions, which are in turn subdivided into halls, dormitories, dining-rooms, &c. The halls are 33 1/2 feet long, 6 feet wide, and 11 1/2 feet high.

Cast-iron stairways, of a graceful and substantial kind, lead from the ground floor to the several stories of each set of quarters.

The facilities for heating the quarters consist of large open fireplaces in the dining-rooms and dormitories. Wood stoves, placed in the center of the sleeping apartments, are used in preference to fireplaces.

In addition to that afforded by the doors, windows, and chimneys, the walls of the building, on each floor, are perforated with ventilators for furnishing a constant supply of pure air and aiding in removing the impure gases generated by the occupants.

The amount of cubic space allowed to each occupant of the sleeping apartments is seldom in excess of 300 feet. The quarters occupied by Battery G, Fourth Artillery, are furnished with iron bedsteads. New wooden bunks are used by troops composing two companies of infantry.

The dormitories connect with ablution-rooms and the balconies previously described. These quarters are unexceptionably good and well adapted for troops serving in this latitude. They are every way superior to the wooden or frame quarters at the post. The sinks are badly arranged and miserably constructed, being nothing more than a temporary shed over an open trench, which latter is shifted as often as it becomes filled to repletion. The kitchens, store-rooms, and mess-rooms occupy the first floor of the barracks, which are divided into five equal sections, allowing one to a company. While the dining-rooms are unexceptionable, the facilities heretofore afforded for cooking were inadequate, owing to the stoves and kitchen furniture being frequently out of order, by reason of breakage and wear.

On the grounds outside, and to the south of the fortifications, a number of wooden buildings have been erected. The officers' quarters, hospital, guard-house, quarters for the post band, non-commissioned officers, married soldiers, and laundresses; the store-houses, bakery, suller's store, artillery stables, quartermaster's stables, ice-house, work-shop, and corral are irregularly scattered over the grounds, covering an area of some 300 yards from east to west, and 500 yards from north to south. Excepting the officers' quarters, the buildings are one-story frame structures, of a frail and very imperfect character. The fortifications being in an unfinished state, almost everything else at the station partakes in a great measure of their character. The buildings situated outside of the defensive works appear to have been constructed with a view to meeting the temporary wants of the garrison until such time as casemate quarters and other buildings suitable for a permanent stronghold could be furnished. Owing to these facts, but little has been done where much might have been accomplished in improving the quarters, grounds, drainage, &c. The quarters occupied by laundresses and married soldiers are well-constructed pavilion barracks, divided into twenty-four sets, which are excellent and ample for the wants of the command.

The officers' quarters are two-story frame cottages, built somewhat in the cheap tenement style. The house for the commanding officer is unexceptionable in its most minute details, while the remainder of the officers' quarters are miserably constructed, badly arranged, and unsuitable, owing to a variety of defects. The rooms are all under the regulation size, varying from 10 feet
square to 14 feet square. The lighting is sufficient. The ventilation, especially in winter, superabundant. The quarters are built to face the east and the river, to which they are parallel. There are three double buildings, with common entrances to halls which lead to four sets of quarters. Owing to the frail nature of the material used in their construction and to the fact that the buildings are raised about two feet above the ground, they are intensely cold and uncomfortable during the winter season. Their position is a very bad one, and they are necessarily crowded, both as to location and in their subdivision into so many sets of quarters. The privies are inconveniently situated within a few feet of the dining-room doors. Bath-rooms have been constructed for the quarters on the lower floors, but, owing to the difficulty of obtaining a supply of water, they are seldom used for their legitimate purpose.

The artillery stables have been occupied temporarily as commissary and quartermaster's store-rooms since the battery was dismounted. They are properly fitted up for the purpose, and in good condition.

The guard house is on the southwest corner of the new parade ground, outside of the fortifications, and is a strongly constructed frame building, 54 feet long by 30 feet. It is divided into the guard-room, 30 feet by 26 feet by 12 feet, two prison-rooms, and seven small cells. The ventilation is by twelve windows and two doors and a chimney. The windows in the cells and prison-rooms are heavily barred with close iron gratings. The heating is afforded by one large No. 10 wood-stove, placed in the center of the guard-room. There are no stoves or fireplaces in the cells or prison-rooms.

Until recently the hospital consisted of a main or pavilion building of one story, and a detachment of one and a half stories high. The main building is a frame structure, resting on posts three feet above the surrounding level, weather-boarded on the outside, with shingled roof. Its site is a little westward of about the center of the reservation, south of the southwest bastion of the main fortification, forming a large part of the west side of the parade grounds. During the autumn of 1869 it was moved on rollers to its present position, and early in the present year it was remodeled, repaired, and improved in accordance with plans submitted by the medical officer, which were carried out under his own supervision. An extension, 15 feet to the entrance end of the building, was erected, affording suitable accommodation for an office and dispensary. Four of the small rooms, used as store-rooms, office, dispensary, and steward's quarters, were removed and their space thrown into the ward, thereby enlarging it, and giving 22,666 cubic feet of air space, which is occupied by twenty beds, giving 1,133 cubic feet of space to each occupant of the ward when all the beds are filled. Each bed has an allowance of 83½ feet superficial space for its occupant. The exterior of the building is 120 feet 6 inches long by 24 feet, surrounded by a porch 11 feet high by 8 feet wide. The roof of the porch is supported by twenty-eight handsome pillars. The building is lighted and ventilated by thirty-three windows, five doors, and partial ridge ventilation. The plan of the hospital is shown in Figure 16.

A, ward, 73 by 23 feet; B, bath-room; D, dispensary; E E, steward's quarters; L, lavatory; K, kitchen; M, mess-room; O, office; R, reading-room; S S, store-rooms. Height of ward, 13 feet 6 inches. It is heated by the necessary number of wood and coal stoves. On the west side and at right angles to the end of the pavilion are two buildings, each containing one and a half stories, constructed over brick cellars, 7 feet deep. They are 12 feet distant from the main structure, allowing the porch to extend, without interruption, around the main building, thereby affording a full and unimpeded circulation of air. The detachment on the north end is 24 feet by 16 feet, and is subdivided above and below into two compartments, which are set apart for and used as quarters by the hospital steward on duty at the post. Prior to moving the main building, this was used as the kitchen, dining-room, and attendant's sleeping apartments. Parallel with this, on the corresponding end, a new structure, 36 feet by 18 feet, has been recently erected, the main floor...
of which is divided equally into a spacious kitchen and dining-room. The upper or half story is intended for an extra ward, to be used in case of necessity.

The exterior of the building is painted a light salmon color, relieved by dark bases and moldings, and light green blinds and lattice work. The interior wood-work is painted white, and the walls and ceilings hard finished and kalsomined. The flooring is of pine, except that in the ward, which is of white ash. On the outer or west side, a yard containing 137 feet by 130 feet is inclosed by a substantial board fence. Two-thirds of this is platted and laid out as a flower garden, with graveled walks and sodded borders; the remaining or outer portion contains the dead-house, laundry, wood-house, fowl-house, and privies. There are no water-closets in the hospital buildings, but that in the yard is a well arranged structure, recently erected. The dead-house is a neat frame house, 15 by 15 feet, fitted up with table and other suitable conveniences. The baggage of patients is properly labeled, and kept in one of the store-rooms. From the lower yard a door leads into the hospital garden. Owing to the limited amount allowed for the repairs and alterations of the hospital, the dispensary, bath-room, and office have not been completed.

Prior to changes recently made, the buildings used for the accommodation of the sick at this post were not only inadequate, but in many particulars were defective and unsuitable for the use of the invalids.

The original plan of the building was spoiled by endeavoring to get all the necessary apartments and subdivisions of a hospital within one long narrow structure, causing the space to be cut up into rooms but little larger than closets, as the central hall, 5 feet wide, left but 15 feet for lateral subdivisions, which constituted the store-rooms, office, dispensary, steward's quarters, &c. As the ward occupied the center of the pavilion, it escaped in a measure this defect. The strongest objection to the hospital lay in the fact that formerly when a patient entered it he had to remain by his bed until he was pronounced well and returned to duty, as the institution afforded no accommodation for the convalescent. This has been remedied by the erection of the spacious porches heretofore described, where comfortable seats afford him rest and enable him to indulge his choice of sunshine or shade as his inclinations or wants may dictate. Hitherto a sojourn in the hospital was little better than a mild form of imprisonment; but now the inmates who wish to do so can enjoy themselves in many ways without offending or annoying others who may require or desire strict quiet or repose. Everything about the place has a bright, cheerful aspect, causing the sick man who enters to feel that within the institution he shall find comforts and conveniences, as well as medicines, to aid in his restoration to health. With the small amount allowed to remodel the hospital, I have endeavored, as far as practicable, to remedy the defects and errors perpetrated in the original construction of the buildings.

The post bakery is a suitable frame building, 30 feet by 18, with brick ovens capable of baking for one thousand men. The building is divided into a capacious well-ventilated work-room, store-room, and a sleeping apartment for the baker.

There is no general laundry at the post, the washing of the command being done by the laundresses at their quarters.

The post chapel consists of a frame structure, 44 feet long by 24 feet wide, by 15 feet high, with a gabled roof, a vestry-room, 10 feet by 10, and a vestibule or entrance, 10 by 8 feet, which is carried up above the main building, forming a contracted steeple.

The stables consist of a strongly constructed frame building one and a half stories high, 250 feet long by 26 feet wide. One-half thereof is subdivided into quartermasters' and commissary store-rooms, and the remainder into stables for officers' private horses and those pertaining to the transportation of the post. It is built of heavy, rough plank, and is well ventilated.

The post library is a room 15 feet square, and adjoins and opens into the school-room. There are some 200 volumes of miscellaneous light reading. It is under the charge of the post treasurer, supervised by the post council.

The supply of water is furnished from the Detroit River; that for the use of the troops quartered within the fort is hauled in barrels from the dock, which extends into the river 75 or 100 yards. The officers and all others domiciled outside of the fortification formerly were supplied by a windmill, which worked irregularly and afforded but a meager supply. In the summer or calm seasons
the wind-mill ceased to be reliable, and in winter the supply from the river is frequently cut off, owing to the pipes freezing up where they pass over the shallow margin of the river. During the summers of 1868 and 1869 the water supplied for the use of the garrison was very bad, as it was taken from the stagnant margin of the river where the vegetable growth and accumulated drift and débris discharged from the city are carried down by the current, lodged and accumulated in immense quantities, rendering the water impure and injurious in its effects upon the health of those who were obliged to use it.

The proximity of the cistern to that part of the interior of the work wherein the privies and cess-pools have been excavated and filled up from time to time during the last ten or more years, renders it most probable that the water is contaminated in percolating through the porous sandy soil impregnated more or less with the drainage from the privies. The cistern should, correctly speaking, be denominated a well, as it is not lined with cement, and has the bottom open to allow water to ooze up through the sand. The internal use of this water is quickly followed by nausea, purging, and diarrhea. Upon examination it is found clear and free from sediment, but possessing a disagreeable saline or brackish taste.

Upon my recommendation the use of this cistern water has been positively interdicted. A small old-fashioned hand fire-engine was furnished for the use of the post in the early part of last year, and has been in daily use in filling up the water-tank since the wind-mill was destroyed in the autumn. A steam fire-engine has recently been added to the material of the post.

The level nature of the ground in the vicinity causes the drainage to be defective in an extreme degree. A system of sewerage is connected with the interior of the fort, but it is frequently choked or disarranged. Slops, offal, rubbish, and excreta of the post were deposited in the shallow water on the river bank or margin about 300 yards above the water-pipe during the year 1868. The point of discharge of the drain or sewer from the fort bears this same relation, while the sewer from the officers’ quarters draining the privies empties into the river about 50 feet above the mouth of the pipe which carries water from the river for the use of those quartered outside the main work.

During the summer and autumn the men of the command are ordered to bathe daily, and are conducted to the river at dusk by the first sergeants of the companies. In winter there are no facilities afforded, nor is there any disposition on the part of the men to indulge in general ablution.

The cemetery is located near the extreme southwest angle of the reserve, and is surrounded by a neat picket-fence. The area inclosed is 150 by 75 feet.

Instead of a post garden the troops at this station cultivate company gardens. The amount cultivated consists of a piece of rich, loamy soil, measuring 1,100 by 140 feet. The hospital garden contains 250 feet by 100 feet. That set apart as an officers’ garden has an area of 400 feet by 100 feet. They are cultivated by details from the command, and yield an abundance of almost all varieties of table vegetables.

The rations procured through the post commissary have been abundant, and are generally of good quality, with occasional exceptions, owing to meat or flour contractors endeavoring to furnish articles inferior in quality to that called for by their contracts. Eggs, milk, butter, chickens, and all varieties of fruits and vegetables are abundant in the vicinity of the post.

The clothing issued for the use of the troops, especially that furnished to the infantry, is very inferior in quality when compared with that in use some few years ago. The artillery clothing has been of fair average quality, and much better than that supplied for the foot soldiers. In any of the infantry companies it would be a difficult matter to find the clothes of any two men alike in color, texture, or finish. While the uniform is inferior in quality, it is, to the soldier who is obliged to purchase it sordid and, quite expensive, costing much more than similar articles sell for when sold by private parties.

The medical supplies are obtained from the purveying depot in New York City, and are received in good condition.

From the physical and geological peculiarities of the military reserve and the neighboring country, it will be readily inferred that fever of a malarial type usually constitute a large proportion of the sickness prevalent among the troops at this station. The number of cases of intermittent fever
during the year 1868 was 228—164 of the quotidian type, and 64 of the tertian variety. More than three-fourths of the cases took place during the last six months of the year. The malady became epidemic toward the latter part of July, and continued to make serious inroads on the strength of the command until the month of November. It attacked all classes, young and old, male and female, and the robust as well as the weak and feeble. In some few cases the fever assumed quite a severe type. Three young children and an adult female had the disease ushered in by violent convulsions. The prevalence of diarrhoea during the summer and autumn months was doubtless owing, in a great degree, to the causes that gave rise to the malarial fevers. Malarial emanations from the contiguous and surrounding paludal and marshy grounds; the deleterious effects produced by the use of impure water, and injurious consequences resulting from the constant upturning of extensive portions of the subsoil of the reservation in grading and finishing the ditches and glacis of the fortifications, were the fruitful sources engendering the element that produced the diseases having their origin in miasmatic poison. In the treatment of the fever it was frequently necessary to administer a mild mercurial, following it with a cathartic, in order that the liver and intestines should throw off their torpor and resume their normal functions. Afterward sulphate of quinine, in ten to twenty-grain doses, was given at bedtime. In many cases the quinine failed to break up the recurrent paroxysms. Relapses were frequent. Suspecting that the quinine, sulphate of quinine, and quinemia, was not a pure and reliable article, it was determined to try other remedies. With this view twenty-four cases were treated with chloride of sodium in drachm doses, given every hour during the period of intermission, for four consecutive hours before the expected paroxysms. The disease yielded readily to this remedy, and but few of the cases required more than one or two days' treatment with this cheap but very reliable anti-periodic. Seven of the cases had septenary relapses. Fourteen cases were treated with "cedron bean," of which five had relapses.

Some two years ago Lieutenant A. M. Raphall, United States Army, while attached to the United States legation at Bogota, Colombia, received from some of the natives of that country specimens of bean which was reputed by them to be not only a "remedia" for calentura, i. e., fevers of a periodical type, but believed to possess, when carried about the person, preventive or prophylactic powers in warding off attacks of disease of this nature. The bean consisted of a large nut, resembling in size and form a butternut. In its dried state, the only form in which I have seen it, the bean consists of a thick porous epicarp, within which are contained two oblong beans or kernels of a yellowish gray color, and weighing from one to two drachms each. In color and fracture they bear some resemblance to a piece of rhubarb. To the taste it is bitter, but not otherwise disagreeable. When the disease was at its height Lieutenant Raphall informed me of the reputation of this remedy, and kindly placed at my disposal three or four of the beans, the efficacy of which I at once proceeded to test. Learning from him that the inhabitants of Bogota and Panama took, as a dose, a portion "sufficient to cover a five-cent piece," I prescribed the powdered bean in five-grain doses, given morning and evening, and was greatly gratified to find in it another efficacious and reliable remedy in the treatment of intermittent fevers. It requires only from ten to thirty grains to break up an attack. In its action it was entirely free from any of the disagreeable effects of quinine. The relapses were fewer than when the disease was treated with chloride of sodium or sulphate of quinine. The limited quantity in my possession prevented me testing its efficacy any further, or varying its mode of administration. I have no hesitancy in pronouncing it a valuable anti-periodic, and doubt not that future experiments will demonstrate the existence of a powerful and valuable vegetable alkaloid which, in all probability, will prove at least equal, if not superior as a remedy, to the preparations obtained from Peruvian bark. I regret my inability to indicate the botanical history or character of the tree or shrub from which the "cedron bean" is obtained, further than that "it is the drupe and seed of Simaba cedron, a tree botanically allied to the Quassia excelsa and Q. amara." It is used as an antidote to the poison of venomous reptiles, being given internally and applied to the wound.
DESCRIPTIONS OF MILITARY POSTS.

Statement showing mean strength, number of sick, and principal diseases at Fort Wayne, Michigan, for the years 1868 and 1869.

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* Include laryngitis, bronchitis, pneumonia, and pleurisy.

FORT GRATIOT, PORT HURON, MICHIGAN.

REPORT OF ASSISTANT SURGEON M. K. TAYLOR, UNITED STATES ARMY.

Fort Gratiot is situated on the west bank of the St. Clair River, about 1,300 feet south of the forty-third parallel, in longitude 82° 24' west. The distance from the fort to the light-house, at the foot of Lake Huron, is three-quarters of a mile, and the general direction north-northeast. Elevation above the sea 598, and above the lake 20 feet. North of the post, and adjoining the reservation, is the little village of Gratiot, containing two or three hundred inhabitants. Port Huron is south of the post, and one mile distant. The Detroit branch of the Grand Trunk railroad passes in the vicinity of the post.

The early military history of the posts along the northern frontier is inseparably connected with the history of the discovery and early settlement of the same region. As is well known the French were the explorers and subsequent occupants, and they brought with them the habits and national traits peculiar to that people.

In a military point of view the geographical importance of this post was very early appreciated. The site was first occupied by a fortified trading post, which was, in 1686, taken possession of by M. Du Shit, then commanding at Mackinac, under instructions from the French governor general, Count Frontenac. The English were making strenuous efforts to connect their interests on Hudson Bay with those of New York, and thereby hem in the French, looking ultimately to their entire extinquishment along the St. Lawrence. The occupation of this post, therefore, had a double purpose; one to thwart the English schemes, and the other, say the instructions, "to protect our savages who may go to the chase, and serve them as an asylum against their enemies."

In 1761 the post was abandoned for the establishment of a fort at Detroit. This point was occupied again, however, as a military station in 1763, when the English began to make permanent settlements in the country.

In 1807, soon after General Hull became governor of the territory, the post was occupied by the forces at his command, and immediately after the surrender of the English forces to General Harrison, in 1813, at Detroit, the post was again without military occupation; but in May, 1814, a party arrived from Detroit, consisting of Major Forsyth, Captain Gratiot, and Captain Cobb, with a detachment of about 40 men, with instructions from General Harrison to locate the post and erect works. The fort thus established was rebuilt in 1828 upon the present plan.

"The lake and river shore in the immediate vicinity of the fort," says Assistant Surgeon Motte, "is a low, gravelly ridge, extending nearly a quarter of a mile from the margin of the lake, when the ground suddenly rises to the height of 25 feet above the surface of the lake, and retains this elevation, with little variation, to near the shores of Black River. This elevated ground gradually approximates the St. Clair toward the fort, and, a few rods below, it becomes a perpendicular bluff in immediate contact with the water."

This geological section belongs to the upper portion of the devonian group. The subcarbon-
iferous system outcrops about fifteen or twenty miles west of this; while upon the Canadian side of the St. Clair River, the boundaries of the oil-bearing strata underlying this section are defined by the outcrops in the vicinity of Petrolia, Enniskillen, and Bothwell. The general dip of the several strata is to the westward, beneath the great coal basin in the central portions of this State. The peculiar situation of this region has led many to believe that petroleum oil might be obtained by boring to the depth of a few hundred feet, as the geological stratifications have been little disturbed by the upheavals between this and the oil-bearing regions of Canada. The result of explorations, though not favorable to the capitalists engaged in them, gave a very complete knowledge of the underlying formations, which may be made of some practical value.

All the wells sunk in the vicinity pass through the following formations from above downward: 1. Soil and yellow sand, 8 to 12 feet; 2. Compact blue clay, 85 to 100 feet; 3. Vein of coarse sand and gravel, 1 to 10 feet; 4. Limestone shale, intercalated with thin veins of sand and gravel, 875 feet; making a total depth of about 1,000 feet. Immediately beneath the strata of blue clay immense quantities of gas have escaped in many places, and continued to do so even after the lapse of twenty-five years; and, at the depth of two or three feet in the limestone shales, pure water has always been obtained, which has risen in the wells about to the level of Lake Huron, or within ten to twenty feet of the surface of the earth. At the depth of about 500 feet salt water veins were struck, with a supply and strength quite sufficient to warrant investments for the manufacture of that commodity. The soil is mostly a sandy loam, and the proportion of marsh is small. Most of the surrounding country is covered with forest. Among the vegetable productions are oak, elm, maple, ash, hickory, black walnut, pine, &c.

The physical peculiarities of the St. Clair and Black Rivers, which form the peninsula on which the post is situated, are noteworthy in many respects. The latter is formed chiefly by the superficial drainage of the bottom lands situated to the west and northwest, the smaller tributaries constituting its origin arising in the upland districts of the interior portions of the State. Its course through the low districts is tortuous, the current sluggish, the water highly colored with decomposing vegetable matters, to the extent of suggesting its appropriate appellation. In the early settlement of this region it was navigated by small sail vessels, and later for many years a little steamer traversed its turbid waters for several miles in the interior. Now, however, its surface is nearly covered with the products of the lumber trade, and millions of logs are annually floated down its current with the spring freshets, ultimately to be manufactured into lumber by the numerous mills situated within a few miles of its termination.

The St. Clair River presents many interesting features, alike as regards its physical relations and its connection with the early settlement and military occupation of the country. That the stream has undergone some very important changes since the historic period scarcely admits of doubt. Tradition and the configuration of the adjacent country both indicate it. According to the Indian tradition the ancient river channel was fully a half mile east of the present, and their canoes passed from Lake Huron directly to the head of Sarnia Bay. The river was then a broad, shallow stream, fully four or five times its present width, and scarcely 20 feet in depth. The changes effected are the result of the lake currents carrying down the sands along the eastern shore until, approaching the outlet, they have gradually accumulated and encroached on the river, thus forcing the stream into a narrower channel to the westward, with a corresponding increase of the rapidity of the current, and a final excavation of the clay bottom to its present depth of about 65 feet. Within the past ten years, and since the time Captain (now General) Meade made the survey, the shore has receded fully 100 feet, and nearly as much of an accretion has taken place on the Canada side. In confirmation of the view that the channel has become narrower, is the statement of Major Rogers, of the British army, the officer who took possession of the country in 1760, and who says “the river where it leaves Lake Huron is about 500 yards wide,” a distance more than twice its present width.

The officers' quarters and barracks are so situated as to inclose a parallelogram 100 feet wide and 191 feet long, which is used for the parade ground. To the rear of the buildings is a pasture field, and to the south, between the buildings and the railroad, is the post garden. The field south of the railroad is the drill ground, and is also occupied by the Port Huron Driving Park Association as a race-course.
The buildings occupied by the enlisted men as dormitories are two in number, and built of wood. The size of each is as follows: Of the main building at the north end of the parade ground, 100 by 30 feet, and 10 feet between floor and ceiling; of the detached building, 40 by 30 feet, and 10 feet between floor and ceiling. On the east end of the main building 13 feet are taken off and divided into two apartments for the use of the first sergeants. This leaves the dormitory space occupied by the companies as follows: One 87 by 28½ by 10 feet, and one 40 by 30 by 10 feet, to be occupied by 145 men, the present strength, or an allowance to each of about 254 cubic feet of space. In the main building the men are furnished with old-fashioned bunks, with two tiers of beds, each to accommodate two men. These bunks are about 4½ feet wide and 6½ feet long, and are occupied by four persons, and are placed so closely together as to allow room barely to get between them.

In the detached building the men sleep on a raised platform elevated about a foot and a half above the floor, slightly inclined toward the middle of the room, and extending three-fourths round the interior of the building. It is needless to say the barracks are over-crowded, particularly so as the windows are all located upon the side fronting the parade ground, and there are no arrangements for ventilation through the roof. In consequence of this, the men situated at the backside of the room get no air except that which has first traversed the bedding and persons intervening, of an almost unbroken line of sleepers. The barracks are warmed by wood stoves, and lighted at night by kerosene lamps.

The allowance of air space recommended by the English surgeons for each man in quarters is 600 cubic feet, and the regulations of the military authorities have fixed the average at 450 feet. In the place of those bunks so common in the American army, they have adopted iron cots for one man only, with the heads of the iron frames fastened to the building, and so made as to be turned up during the day against the wall, and by an additional device the cots form seats for the men. As for bedding, each man is allowed an iron bedstead, a rug, a paillasse, a bolster, two blankets, and two sheets. I must believe that the addition of these sheets to the allowance of enlisted men when in quarters is a necessity to their health and comfort, as it admits of more personal cleanliness, and by the greater facility with which such articles are washed contributing to the improvement of the general sanitary condition of the dormitories.

Men sleep in their drawers from the first to the last of the week, and sometimes from two to three weeks together, and the blankets are rarely washed every quarter of a year. What must be the effect of the necessary accumulations of the absorbed effluvia of the body by these woolen fabrics, particularly in close quarters and in warm weather, is not difficult to imagine. I believe the government will ultimately see the necessity of some reformatory measures in this direction, and will feel constrained to adopt them.

The kitchen in rear of the main barracks is well arranged, and of sufficient size to meet the requirements of one company for cooking purposes. The mess-room and kitchen of the other company are very insufficient, being only 30 by 16 feet, and entirely unfinished on the inside. The kitchen is separated from the mess-room by a thin board partition. The table-room is only sufficient to allow of seating about one-third of the company at once. It is therefore impracticable to serve the food of the men as it should be, and some complaints have been made in consequence.

Married soldiers’ quarters within the garrison grounds are mere huts, but a building below the railroad is used for some families, where the rooms are more comfortable.

The officers’ quarters consist of one building for the commanding officer, and four for the line and staff officers, arranged to accommodate two families each.

Shallow wells have been sunk on the reservation, and are readily filled with surface water to within four or five feet of the top, and afford a moderate supply of very inferior quality, suitable only for the use of public animals and general police. One well has been sunk a few feet in rear of the hospital building, and another in rear of the adjutant’s office. The water in the first is not used for any purpose; while that of the latter, which is several feet deeper, is used for general police purposes and for the government horses. At the foot of the bluff there are several places where small springs appear. The water supply of the post is very deficient as to quantity and quality. The present arrangements are as follows: A moderate supply of cistern water to most of the officers’ quarters—the wells before alluded to—and a very limited quantity of
lake water obtained by a penstock connecting with the reservoir of the Grand Trunk machine shop. The cistern water at most of the officers' quarters is sufficient for all the ordinary purposes of domestic use, and if a filtering apparatus were constructed, would do well for drinking purposes, though it is generally colored either by the dropping foliage of the surrounding trees, or by collections on the roofs of the buildings of the soil, dirt, and other matters thrown out by the passing locomotives. The total amount of all the cisterns would be soon exhausted in the event of a conflagration of any magnitude breaking out in the garrison buildings. The supply from the reservoir of the Grand Trunk railroad is very limited, and often entirely cut off. The height of the reservoir is barely above the surface of the parade grounds, and to take advantage of this supply a depression has to be made in the earth, so as to secure even a moderate flow. The penstock is tapped near the magazine for the purpose of affording the enlisted men drinking-water, but, like the supply to the officers, the flow is often stopped when the head is exhausted to meet the requirements of the railroad. In a word, therefore, the supply of wholesome water for the post is very short, and better accommodations in this respect are greatly needed.

The natural drainage of the post is by no means what a casual inspection of the situation would lead one to expect. The superficial deposits of soil, with the substratum of fine sand intermixed with a small proportion of clay, render percolation down to the thin layer of coarse sand and gravel immediately overlying the clay beds exceedingly slow; hence, when the surface drainage is not good, the water, after heavy rains, will remain in pools for several days.

The surface of the surrounding country is quite level and the drainage very bad. Public and private enterprise has done something to reclaim the lands and render them tillable, but not a moiety has been accomplished as yet, compared with what is absolutely needed. The effect of this condition upon the general healthfulness of the region is seen in the character of the prevalent diseases and the mortality of the inhabitants.

The general character of the diseases of this section may be inferred in part from what has been said in relation to the medical topography and drainage. A clearer understanding of its salubrity may be obtained, however, by an examination of the mortuary records of the city of Port Huron for the last ten years, whence it appears that the average mortality for that city is at the rate per annum of one in every sixty of its inhabitants. This is a greater death rate than the average of the whole State, the latter being one in sixty-eight. The diseases are chiefly those of a malarial origin, embracing remittent, intermittent, and typho-malarial fevers, and along the lake and river, pulmonary diseases, often complicated with malarial manifestations. Rheumatism for the last year has been quite prevalent in its milder forms, chiefly in consequence of the extreme variability of the seasons. From observations, it would appear that typhoid fever, in the restricted sense of this term, is of very rare occurrence, nearly all diseases approaching this condition assuming the typho-malarial form.

Statement showing mean strength, number of sick, and principal diseases at Fort Gratiot, Michigan, for the years 1868 and 1869.

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* Include laryngitis, bronchitis, pneumonia, and pleurisy.
FORT BRADY, MICHIGAN.

REPORT OF ASSISTANT SURGEON M. K. TAYLOR, UNITED STATES ARMY.

Fort Brady is situated on the southern bank of the Sault Ste. Marie, Michigan, in latitude 46° 30' north, longitude 84° 43' west; altitude 600 feet.

The military history of this post extends back to 1750, at which time the French claimed jurisdiction over all the territory north of the Ohio, and sought to establish posts at the more important places, for the purpose of controlling the trade of the lakes, and excluding the English as far as possible from obtaining a foothold on Lake Superior, as well as to establish a depot of supplies and afford protection to the traders.

The Marquis de la Jonquiere, Lieutenant Governor General of "New France," as Canada was then called, on the 18th of October granted the Chevalier De Repentigny, an ensign in the Canadian troops, and Sieur De Benne, captain of a Condi regiment, six leagues of land fronting on the Ste. Marie River, and extending six leagues deep as a "seignior," with the condition that they should take immediate possession, establish a fort, cultivate the soil, and raise stock for the support of the French element then trading along the lakes. A short time previously, however, a small fort had been established, and Repentigny had been in command; but it seems to have been only a temporary arrangement. Under the authority and orders following the grant, that officer proceeded to the post with a small body of French troops, and built a stockade a little east of the present stables and out-house, a portion of the enclosure extending within the old boundary of Fort Brady. The French held possession until 1762, after the fall of Quebec, when the commandant or governor, as he was called, hastily departed, and left the post in charge of Jean Baptiste Cadotte, a trader and voyageur in the employ of De Repentigny. In the course of the same season a small detachment of British troops, under the command of Lieutenant Jenette, arrived. On December 22d following the post was burned, and the English seem to have held only nominal possession until 1802, when another small force was sent to occupy it. As a matter of fact, however, from the abandonment of the post by De Repentigny until many years thereafter, it was under the control of Cadotte and the French Indian element. At the time of the massacre of Mackinac, during the Pontiac war, this was the headquarters of the Indian forces engaged. From the reoccupation by the English in 1802 until 1820, only a small force was present, probably as a mere exhibition of military possession for the purpose of protecting the traders.

In 1820 the late General Lewis Cass, then Indian agent for the northwest Indians, made a trip around the lakes, visiting the shores of Lake Superior and afterwards of Lake Michigan, going as far as Chicago, and when he landed at this place on his voyage up, the British flag was flying at the head of the rapids, near the termination of the canal. He proceeded in person to haul it down and raise his own in its place. There were nearly two thousand native and French residents whose sympathies were intensely Canadian, and consequently this act of his so enraged them that they were on the point of attacking him at once. Through the intervention of a few of the English half-breeds the Indians were quieted, and the general allowed to go in peace. On his return, however, from his voyage around Lake Superior, General Cass concluded a treaty with the Chippewas on June 20, 1820, for the purchase of sixteen square miles of land, with a river front extending from a large rock near the national boundary above the falls, to the Little Rapids, at the head of Sugar Island, the Indians reserving the right to fish undisturbed. This purchase constituted the original military district. Its boundary was about three and a half miles along the river, by four and one-third miles deep. This rock still remains as one of the leading peculiarities on Ashman's Bay, being a large boulder lying in shoal water about twenty rods from the ship channel, entering the upper end of the canal. In 1822 the government of the United States determined upon its permanent occupancy, and accordingly General Brady was directed to proceed, in the autumn of that year, to this place with six companies of infantry, and erect a stockade and buildings. The present hospital and bakery, the first of which was built for officers' quarters, and the latter for a guard-house, are all that are left of the structures then erected. The old stockade and
buildings remained until 1866, when they were so dilapidated that it was determined to enlarge
the garrison grounds and to erect new buildings.

The occupation of the post by troops has been interrupted in two instances. The first was
during the Mexican war when, at the outbreak of hostilities, the regular troops were withdrawn
and replaced by a company of the first regiment of Michigan volunteers, under Lieutenant E. K.
Howard, who remained here until the spring of 1848. These troops constituted part of an organi-
sation specially mustered into the government service for this purpose. From that time until the
1st of June, 1849, the post was unoccupied by troops. The second instance occurred in conse-
quence of threatened hostilities in Minnesota, in 1857, when the troops were transferred to Fort
Snelling, and the public property turned over to the custody of an ordnance sergeant. It remained
unoccupied until May 8, 1866, when Company D, Fourth United States Infantry arrived, from
which time to the present, one or two companies have been on duty.

The boundaries of the reservation have been a source of much trouble from the beginning, but
more particularly was this the case when attention was drawn to the mineral wealth of the country
west, with corresponding commercial activity along the lakes and enhanced value of the lands.
Conflicting titles, growing out of long previous occupation or pre-emption, unsettled every one in
his possessions, and from this annoyance the post was not exempt. To determine, therefore, what
was necessary for military purposes, and should be permanently reserved, as well as to determine
the titles to the lands, Congress passed an act, dated September 26, 1850, authorizing the appoint-
ment of a commission to adjudicate claims and for making an authoritative survey of boundaries.
Under this act, Lieutenant Wescott, United States Army, was detailed to survey the tract reserved
for the occupation of the garrison. Since then various encroachments have been made under
different pretexts, until now it appears likely that the military are to be dispossessed of fully one-
half of the ground really needed for culture in raising vegetables for the use of the post.

Fort Brady is situated on the right bank of the St. Mary’s River, six miles from Lake Superior,
and at an elevation ranging from 33 feet to 26 feet. The eastern portion of the garrison grounds
slopes gently to the river, but that between the commanding officer’s quarters and the river forms
an abrupt bluff of about 26 feet in height. To the rear of the garrison inclosure, at a distance of
400 feet, there is a boulder ridge ranging from 30 to 34 feet above the surface of the river in front,
which is the dividing elevation between the river slope on the one hand and the watershed to the
creek in the swamp on the other. This boulder ridge extends from the head of the rapids to Hay
Lake, a distance of four miles, and constitutes what may be called the second terrace. Back of
this ridge, ranging from a third of a mile wide at the head of the rapids to a mile and a half at
the head of Hay Lake, there is a slight depression of three to five feet, the surface of which is wet
and known as the “Swamp,” through which runs a small stream most of the year. In dry weather
in summer, and when the lake above is at low water, this stream may be dry, but in high water of
Lake Superior, with strong winds from the north or northwest, water will flow from Ashman’s
Bay at the head of the rapids through this little stream to Hay Lake, probably falling about 22
feet in four miles. Back of this swamp are the highlands, at an elevation of from 100 to 150 feet
above Lake Superior. On the Canadian shore, at a distance of from six to ten miles, there are
high lands ranging from 400 to 600 feet above Lake Superior, and on Sugar Island, in St. Mary’s
River, the elevation in the central portion attains to 300 or 400 feet.

All the swamp land situated between the hills on the river, from the head of the Portage, as it
is called, to Hay Lake is susceptible of cultivation if properly drained, and would unquestionably
be very productive; but as it is now the line of cultivation does not extend beyond the boulder
ridge except for a short distance along the Mackinac road. The swamp is densely covered with
coniferous and thick beds of moss, which hold water like a sponge, almost from one year to another.

The St. Mary’s River properly commences at “Pointe aux Pins,” six miles above the falls, where
the river leaves the lake at a right angle with the general trend of its shores. From its commence-
ment to the head of the rapids its current is moderate, but gradually accelerating until reaching
the falls, the waters plunge tumultuously over the rocks on a declivity of 18 feet in three-quarters
of a mile.

The quantity of water discharged, according to Lieutenant Henry, United States Army, is
about 200,000 cubic yards per minute. The greatest depth on the rapids does not exceed eight feet,
and this only for a channel a few hundred feet in width. On either side of the channel the water is very shallow, being rarely more than three feet at ordinary stages, except in the pools. Below the falls the river has variable depths of from 16 to 100 feet. In the middle of the stream on the rapids, and below for nearly a mile, the water is about two feet higher than it is on either shore, so that the surface presents a divided convexity.

The geological peculiarities of this vicinity belong to the lower silurian system, but geologists differ as to the proper place of the outcropping rocks. Exposed on the rapids and barely covered by the soil, for some two hundred yards on the American side, a ferruginous sandrock appears, varying in color from a light fawn to a dark red. According to American geologists, among whom may be mentioned Professor Hall, of New York, and Winchell, of the University of Michigan, and Messrs. Foster and Whitney, United States geologists, these rocks belong to the lowest in the silurian system, namely, the Potsdam sandstone, and until quite recently this has been accepted as satisfactory. The Canadian geologists, however, have classified them as belonging to the chazy system, or the second in the series above the Potsdam, which involves a corresponding correction, as Sir W. E. Logan says, of the whole geological classification of the upper peninsula. These rocks are nearly destitute of fossils, and hence the difference in opinion in relation to their position. No fossils have been found in this immediate vicinity, but on Laquamenon Bay, where the rocks again appear, one species of lingula was seen by Dr. Hall, and the same was found by Sir W. E. Logan on the Island of Laekache, near the Canadian shore. In consequence of this paucity of fossils, and from the peculiar relations of the superimposed rocks on the Canadian side, the latter bases his opinion; and if this classification were established, says the authority, "the copper-bearing portion of the Lake Superior rocks might reasonably be considered to belong to the calciferous and Potsdam formation."

On the Canadian side, at a distance of from three to four miles, the laurentian system appears at an elevation above the lake of from 300 to 600 feet, forming the metalliferous rocks of that region, the metals found being chiefly copper as sulphuret, and iron as hematite, with some plumbago, though not as yet in such quantities as to repay for investment in working the mines. The limits of the Potsdam or chazy system are defined by a slightly elevated, well-timbered ridge, appearing about one-third of the distance from here to Mackinac. South of this ridge the Black River limestones appear, and as we proceed in that direction, the other diluvial series, underlying the coal measures of the lower peninsula. It will be seen, therefore, that the St. Mary's River defines the boundary between the Canadian azoic system and the diluvial rocks of the American side.

The special geology of the immediate vicinity of the post has some interesting features in a sanitary point of view. It has been stated that the sandstones crop out on the rapids and appear on the surface about 500 feet on the American side, barely covered by a light soil. This occurs to the west of the garrison inclosure about 1,500 feet, and can be traced to the hills in the rear. It forms the barrier to the drainage of the great lake above, and has resisted for ages the combined disintegrating action of water, ice, and frost in maintaining the general level of that vast inland sea. Superimposed on this are the clay hills forming the table lands between this and Mackinac, which are stratified in the following order from the surface downward, as appears by a dry well sunk about two miles from the river, viz: first, soil and clay, 20 feet; second, clay marls, 5 feet; third, boulders, 10 feet; fourth, gravel, 10 feet; fifth, sandrock, 10 feet—total, 55 feet. The rock in this instance is dense and very hard, light colored, and of the same color as that on the rapids. The superficial strata of these rocks are light colored, compact, with matted patches colored with oxide of iron, very hard to work, and withstand the weather most excellently. Beneath these it readily splits into thin layers, and there is more oxide of iron mixed with its constituents, so that on exposure, it readily disintegrates and crumbles into a dark red sand. Below, it becomes hard again, has a dark brown color, and is more compact. Within the fort limits these several strata appear as follows, from the surface downwards:

First. Soil, fine sand, infiltrated with a little clay from one to one and a half feet thick.
Second. A hard, compact ferruginous stratum, consisting of sand with clay and iron cement almost impervious to water, and difficult to disturb, except with a pick; depth, three inches to one foot. This almost totally prevents the water from percolating through to the loose lake sands of
variable depths beneath, and hence, wherever it is thickest, water stands until removed by evaporation, unless drained off by surface ditches.

Third. White sand, loose, pervious to water. In the lower parts of the garrison water may be obtained in it by sinking shallow wells, except during the dryer seasons of the year. It appears to be the natural under drainage of the swamp. Southwest of the officers' quarters, near the angle of the inclosure, and also along the Portage road in several places where the side ditches cut the dense stratum above, water comes to the surface; depth from two to three feet.

Fourth. A second dense stratum, consisting of white sand and clay and a little lime, moderately pervious to water, and rather hard to disturb with a spade simply; depth variable, from a few inches to one and a half feet.

Fifth. Lake sand of variable depth, extending down to the boulders.

Sixth. Boulders, infiltrated with sand and gravel to variable depths, extending down to the sandrock in places.

The inclination of the several strata is toward the river, but when the same has been cut away by the river at a former higher level, the boulders appear very profusely on the surface. These boulders are quite peculiar in their character; they consist of large granite, gneiss, greenstone, porphyritic trap, and other azoic water-worn masses, weighing in many instances more than 30 tons, with smaller rocks closely intervening, and the interstices filled with loose sand and gravel. Their general lithological characters would indicate that they had been transported from the north shore of Lake Superior by glacial action, and that they had been subjected to very great attrition.

The shores of the lake and river exhibit terraces corresponding to the different water levels of past periods. There are four of these on the river below the rapids and three above, which correspond with the terraces on the lake shore. The business part of the village of Sault Ste. Marie is built on the first, counting from the river. Fort Brady stands on the second river terrace, with an elevation above the first of from 10 to 12 feet. The boulder ridge constitutes the second lake or third river terrace. All along the clay bluffs the last in the series may be distinctly seen. These terraces may be traced nearly the whole length of the river, and according to Messrs. Foster and Whitney, constitute one of the characteristic features of the Lake Superior shore.

It is altogether probable that at no very remote geological age the great falls of the St. Mary's River were at the Anenish Rapids, which, by a gradual wearing away of the rocks, have been slowly approaching the lake above, at the same time lowering its surface. There is no evidence, however, of any change in the character of waterfall occurring within the historic periods of this country. Though I think, with careful attention to the subject, the law of recession will be found to exist here, which is known to apply to the Falls of Niagara. The water level of this river and the lake above is subject to occasional great fluctuations, but the precise cause of such change is not well determined.

I am informed by E. Ashman, esq., a resident of this place for forty years, that on one occasion, about the year 1832 or 1833, the waters of the lake receded to such an extent that persons could easily walk across the rapids; that himself, with many others, visited the pools thus left exposed, and caught large numbers of fish. This lasted about one hour, when the waters returned with great force, barely giving the fishermen time to retreat to the shore.

There were no prevailing high winds or other natural causes observed at the place sufficient to account for the extraordinary phenomenon. It is possible that it arose from some subterraneous convulsion, analogous to the earthquakes that disturbed the whole of the southern Canadian counties in 1863, at short intervals, for one entire summer, and that from a similar cause the angular sandstone boulders which line the shores of the river below the rapids became detached from their original position, and were carried by the rushing waters down the stream. I have seen none of these rocks more than three feet above the water level, and manifestly they have no connection with the azoic boulders heretofore mentioned, which are found from 20 to 30 feet above the present surface of the river, and constitute the third river or second lake terrace. In consequence, however, of the gradual cutting down of the river channel by the waters, and removal of the sand and fine gravel, the azoic boulders and sandstones are found intermixed in the bed of the stream, and in many places become sources of great danger to vessels. Indeed, it is rare that a month passes during the period of navigation without a casualty occurring, and
what is more interesting these masses are changing their positions, so that in places the channels, which for years previously have been regarded as entirely safe, are now dangerous. The chief cause, probably, of this shifting of the boulders is due to changes in the channel banks by the undermining of the currents so that the boulders roll toward the middle of the stream as the earthy bed is carried away. Ice, also, has a very decided influence in shifting their positions, and even within two or three years past large masses weighing, perhaps, ten tons, have been carried from their original places into the channel some distance below.

The general plan and arrangement of the post is shown in Plate No. 2.

The barrack is a two-story building, 120 by 24 feet. The lower floor is divided into six rooms, which were originally designed for company kitchens and mess-rooms. They are now occupied as commandant's office, company officers' office, quartermaster's and commissary's office, commissary store-room, court-martial and amusement room, and post library reading and school-room. This story is 10 feet high. The second story, which is also 10 feet high, is designed for men's quarters, and is divided into six rooms; four being adapted to company quarters for two companies, and two for their respective first sergeants. A recess from the main part was converted into a wash-room; before this arrangement was made the men were compelled to perform their ablutions on the porch in all weather. This building taken as a whole is a most signal failure in everything pertaining to barrack accommodations. It was intended to quarter two full companies of 100 men each, at an allowance of 117.5 cubic feet air space per man. For the minimum strength of 68 men the rate would be 173 cubic feet air space per capita, thus allowing a cube of air of a fraction over 5 3/4 feet to sustain a night's respiration. To make the matter worse, the two middle rooms are 27 by 23 by 10 feet, with but two windows and two doors, and designed to quarter 36 men. The result is foul air both in winter and summer. The end rooms have six windows each, and are generally in good condition, but the windows are so arranged that the bunks have to be placed directly against some of these openings, and consequently the men often contract colds by the atmospheric currents blowing over them when asleep. The whole building is badly constructed; and a special defect is in the laying of the upper floor. Originally the flooring was soft pine one inch thick, but this became worn out so that last season it had to be relaid, which was done with but partially seasoned oak. This has shrunk so that it is now impracticable to scrub the floor in any manner without wetting the ceiling and floors below. Indeed, in many places the cracks between the floor boards are one-half to three-fourths of an inch wide. It is in contemplation to relay it the second time the ensuing summer. In addition to the other defects the men are supplied with double bunks 43 by 63 feet, two tiers high, and designed to accommodate four men each. These occupy so much of the interior that the men have but little space in which to perform their ordinary duties and have comfortable places to rest. The quarters are reached by two flights of stairs in the rear of the building, under the porch.

The building is surrounded on all sides by a veranda 6 feet wide, and extending to the roof. Back of the main building, at a distance of 10 feet from the veranda, are the company kitchens, the two being connected by a covered passage way, 6 feet wide. At a distance of 12 feet from the rear of the kitchens the company store and commissary rooms are located, being temporary structures of frame-work, weather-boarded. Still farther to the rear is the bakery, an old building erected in 1822 for a guard-house, constructed of hewn logs and weather-boarded. It is in a dilapidated condition, and should be replaced by a suitable structure, planned so as to be convenient and cleanly, and located where it will not endanger the other buildings in case of fire.

The guard-house is a small building one story high, situated to the west of the barracks at a distance of 160 feet. It is divided into four apartments, the front half being in one room, and occupied by the guard, and the rear being divided into a prison-room and two small cells. It was erected in 1867; size 24 by 20 feet, with a porch, 4 feet wide, in front. During the winter months this porch is boarded up and three small windows introduced at the respective sides and ends, so as to shield the sentinel from the cold, and yet allow a watchful care of the grounds and buildings.

The present hospital was erected in 1822 for officers' quarters. It was built of hewn logs, weather-boarded on the outside, and plastered on the inner side. It is in a dilapidated condition, and should be replaced by a suitable structure.

The ward, the largest room in the building, is 20 by 13 1/2 by 8 3/4 feet, and ventilated by two small windows. The interior wood-work has been very badly used, and the whole structure, outside and
in, is dilapidated and obnoxious to every sense of propriety and comfort. In the event of any severe contagious or epidemic disease prevailing at the post it would be wholly inadequate to meet the requirements of the hospital department.

The commanding officer's quarters is a building 32 by 42\frac{1}{2} feet on the ground, and one and a half stories high, and contains four rooms, a hall and two closets; having a porch, 6 feet wide, extending along the front and half of the north end. The second or attic story has but two rooms. To the rear, at a distance of 10 feet, is the kitchen, 12 by 20 feet, one story high. The building is situated near the bluff at the northwest part of the inclosure, and has a beautiful view of the river and Canadian shore.

South of the commanding officer's quarters, at a distance of 88 feet, is the building for the line and staff officers' quarters. It consists of a one and a half story building, 52 by 56 feet on the ground, with a porch, 6 feet wide, on the front.

It is divided through the middle, from front to rear, by a partition extending from the ground floor to the attic, whereby the house is separated into two distinct parts, and on either side of which is a long hall extending the whole length. The first floor of each side is divided into three rooms. To the rear, at a distance of 12 feet, is a covered passage way leading to the kitchens, the latter being one story high, and 15 by 15 feet each, and under one roof, but separated by a hall, 4 feet wide, leading to the water-closet in the rear. The building was intended to accommodate two families, but at present it is crowded so as to accommodate, after a fashion, the families of three married and one unmarried officer—a total of sixteen, who are stowed away in the building; one assistant surgeon and one lieutenant occupy the lower floor, and two lieutenants the attic. There are cellars under the kitchens only. The foundations of the main parts are sunk but little below the surface of the ground, and hence during the winter months the buildings, more especially the line officers' quarters, are subject to being raised by the upheaval of the earth by the frost, whereby they are more or less damaged every season. They were erected only three years since, that is, in 1866, but the walls are now badly damaged, and will soon have to be repaired to make them habitable and look decent. Already the south end of the porch of the officers' quarters has become detached from the main building by the frost, and considerably injured. In consequence of the drifting of the snow the foundations receive but very little protection during the winter, and hence are subject to the direct action of the frost.

The sinks of the officers' buildings, hospital, and barracks are all in bad condition for want of proper drainage and ventilation. They have had to be disinfected repeatedly during the past season to make them tolerable. In the spring they are nearly filled with water, which, as the warm weather comes on, drains away until the contents of the vaults become in some degree inspissated. Besides this, they are quite shallow, and rapidly filling up. Last fall the men's sink had to be removed from its position in the angle of the inclosure near the convent to its present position, 100 feet toward the river. The building is 16 by 8 feet on the ground, and divided longitudinally by a board partition. On either side of this partition are pieces of scantling at the proper height for a rest, which are boarded down to the floor, leaving the space on the top entirely open, so that all the exhalations from below find a ready escape upward into the interior of the building. To make the place bearable, therefore, the doors are kept constantly open, and even then it is most intolerably obnoxious, not only to those who have to visit it, but to every one in that section of the garrison grounds, as well as to persons living outside the military limits. There is a small ventilating flue reaching from the floor to about two feet above the roof, but this effects comparatively nothing in the way of efficient ventilation. From a careful investigation of this subject, both in civil and military life, I am thoroughly satisfied that too little attention is generally given to the construction of private water-closets and public sinks; that as a result of this inattention, habits of constipation and all the train of evils arising therefrom—colds, and, with the more delicate and sensitive, neuralgia and rheumatism, particularly of the lumbar regions—are often induced.

The garrison grounds are very inadequately drained. Nowhere within the government reservation, except in the immediate vicinity of the commanding officer's quarters, can a cellar be excavated to the depth of three feet without having water stand in it more than two-thirds of the year. The cellar of the officers' quarters has not been dry for months, although it purports to be drained.
by a small conduit about two inches square, in sections, put in at the erection of the building, three years since. The garrison fields to the rear of the cemetery were cultivated in vegetables the past season, and, although an unusually dry one for this region, when the fall rains commenced it was found difficult to secure the crop because of the grounds being covered with water.

At the Baptist Mission a well has been dug to the depth of twelve feet, with an unfailing supply of water, coming to within nine feet of the surface, or about two feet above the grounds in front of the officers’ quarters. This indicates about the height of the surface water of the swamp. Last spring the water stood to the depth of two feet for two months on the surface between the officers’ quarters and the corner of the inclosure containing the springs. Underneath the hospital a cellar has been excavated to the depth of three feet, yet it is practically useless, for, in the first place, it is not deep enough to be of any service, and, in the next place, it is always wet.

Heretofore the slopes from the company kitchens have been drained by an open ditch less than two feet deep, round by the rear of the hospital toward the river, and those from the hospital take the same direction. In warm weather the stench arising from this ditch is intolerable, and in more southern localities would be productive of the greatest harm.

What is required, therefore, is a proper system of drainage, and it seems strange that a government post like this should be occupied so long without any attention being given to this very important matter. A large sewer, sufficient to carry off all the kitchen slopes of the barracks, the hospital, and the water falling from the roofs of the buildings and surface water, as well as to drain the garrison privies, seems imperatively demanded.

The history of the post, as shown by Dr. McDougall’s report in 1837–38 to the Surgeon General, (see Meteorological and Medical Statistics, 2d part, page 72,) establishes beyond controversy that want of attention to sanitary science cannot be allowed even in this northern region, except at the most imminent risks.

Another sewer is required to drain the officers’ cellars and grounds, and a system of open ditches is needed to drain the garrison fields, if they are to be cultivated properly. This matter cannot be urged too strongly, in view of this being occupied as one of the permanent frontier posts, and the consequent steady accumulation of effete matter which in the end must be productive of much disease. The ground is seldom frozen during the coldest winters; the heavy body of snow affording such a protection that potatoes have remained unhurt in the ground as they were raised, during the winter, and have sprouted again the next year most vigorously.

With the peculiar obstacles in the underlying strata to drainage below, the soil inevitably becomes permeated with noxious elements, until ultimately some disastrous results must appear, unless prevented by proper sanitary precautions, and of these more complete drainage is the chief. During a long winter a certain amount of the slopes, waste-water and garbage, and other matters will inevitably be thrown out upon the snow, there to remain until warm weather, when much of them goes into the soil, however thoroughly the ground may be policed. An effective sewer, therefore, is imperatively demanded, alike as a sanitary measure and as a saving of labor in keeping the grounds in order.

Water is furnished to the garrison by water-carts. It is obtained from the river below the landing, where the slope of the river is such as to allow the carts to be driven into the stream about 150 feet, near the verge of the channel. The supply thus obtained is excellent. What is needed, however, is a more abundant supply kept in reservoirs near the places where it is to be used for cooking and police purposes, and where in the event of fires breaking out it can be made available in their extinguishment. As the matter now stands, there is no adequate means of saving the garrison from a general conflagration if any one of the permanent buildings should take fire when the wind is in a favorable direction for the spreading of the flames. Lake water can be obtained and conducted to all the garrison grounds by a conduit not exceeding 4,300 feet in length; the fall would be approximately between two and three feet, and with suitable reservoirs the garrison could be abundantly supplied with pure water for all purposes at a moderate expense. With force-pumps or water-rams it could then be made available for any emergency. This subject needs special attention, for in four instances, within a short time, the post has been in danger of being burned out, from causes arising within the military limits; and in addition to this, the garrison is so near the middle of the village of Sault Ste. Marie, which is built in a shabby manner, and with none but the simplest means of arresting fires, that it is at all times in danger of a general conflagration.
The subsistence stores furnished for both officers and men of this post are of the best quality and in abundance. They are principally obtained from the purchasing commissary at Chicago. The variety furnished for officers' consumption is very satisfactory. Extra vegetables and other articles of food are raised on the grounds assigned to the company commanders for the benefit of their commands. There are no special post gardens, nor is any ground set apart for the use of the hospital.

The present command did not arrive here until the 10th of May, 1867, and there was so much to be done to get the buildings in a decent condition for occupation and in clearing the inclosure of rubbish, that comparatively nothing was accomplished in the cultivation of the garrison fields. As a result of this, in the following winter the men were destitute of the necessary supply of fresh vegetables, and in the month of March last there were some of the preliminary symptoms of scurvy exhibited in about a dozen cases among the troops.

To meet the requirements of the men a diet table was prepared, (see which, annexed to the end of this subject,) which the commanding officer directed to be strictly followed in regard to variety and daily changes. As will be seen, the table is a modification of that furnished from the Surgeon General's Office for use in hospitals. The changes in the dietary arrangement thus effected produced beneficial results. Under this system there is a decided gain in the company savings, and little additional articles in the way of relishes, and a very creditable supply of white ware and good cutlery for table use, were purchased. The course pursued in relation to slaughtering beef is very reprehensible. Under instructions of the commissary department, to economize in forage and feed, several head have been slaughtered at once, the product in the aggregate amounting to three or four thousand pounds, which is placed where it will be frozen, and kept in that condition until issued. Last year the animals slaughtered in the latter part of December and first of January were sufficient for the wants of the garrison until the 1st of May. At the present time the quantity on hand will last to nearly the same time. In other words, the beef is killed nearly four months in advance of its ultimate consumption. The result of this course is, the beef becomes dry, tough, tasteless, and subjected to great loss in weight. It is neither fresh beef, dried beef, nor corned beef, but possesses a sort of combination of qualities that makes it particularly undesirable if anything else could be obtained as a substitute. For at least a half or three-fourths of an inch on the outside the meat is dry and tough; the fatty parts, which are generally juicy, palatable, and well flavored, become tasteless and repulsive, possessing more of the qualities of a tallow candle than anything else, the juiciness and peculiar flavor of good fresh beef being entirely destroyed. The loss is not less than ten per cent of the serviceable part of the animal as regards actual weight, and the deterioration in quality is vastly more.

In answer to protests against this system, it was claimed that it was cheaper for the government to sustain the loss in weight by desiccation than to feed the animals until required for issue. So considerations of economy, having the ascendancy, prevailed.

**Diet Table.**

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast:</td>
<td>Breakfast:</td>
<td>Breakfast:</td>
<td>Breakfast:</td>
<td>Breakfast:</td>
<td>Breakfast:</td>
<td>Breakfast:</td>
</tr>
<tr>
<td>Cold boiled or</td>
<td></td>
<td></td>
<td>pork gravy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>roast pork.</td>
<td></td>
<td></td>
<td>Cold boiled pork.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinner:</td>
<td>Dinner:</td>
<td>Dinner:</td>
<td>Dinner:</td>
<td>Dinner:</td>
<td>Dinner:</td>
<td>Dinner:</td>
</tr>
<tr>
<td>Roast beef.</td>
<td>Baked pork and</td>
<td>Beef soup.</td>
<td>Beef stew.</td>
<td>Baked pork and</td>
<td>Baked fish or</td>
<td>Baked fish or</td>
</tr>
<tr>
<td>Bread.</td>
<td>beans.</td>
<td>Meat or baked</td>
<td>Meat.</td>
<td>beans.</td>
<td>meat or boil.</td>
<td>meat or boil.</td>
</tr>
<tr>
<td>Supper:</td>
<td>Supper:</td>
<td>Supper:</td>
<td>Supper:</td>
<td>Supper:</td>
<td>Supper:</td>
<td>Supper:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>beans.</td>
<td>beans.</td>
<td></td>
</tr>
</tbody>
</table>
It has been said, and apparently sanctioned by the highest medical authority, that at this post and at Fort Mackinac, malarial diseases were unknown among the native inhabitants, and that only imported cases were ever seen in these regions; but it has been discovered that such statements are incorrect. Indeed, the prevalence among the native population of intermittent fevers and intermittent neuralgia is quite equal to the same in many southern latitudes that are supposed to be particularly liable in that direction. The first case coming to notice was a half-breed woman, born and brought up here and who had never been away, who resided below the fort about one mile on the Portage road. It was a well-marked and severe case of tertian intermittent. Soon after that another, in a three-fourths Indian, aged over seventy years. He was born on the south shore of Lake Superior, but had been a resident for fifty years in this vicinity. This was a tertian facial neuralgia, and very severe. About a dozen cases from Churchville have called at the post for advice within the year, four of whom were native Indians, and two Indians born near Hudson’s Bay, and who had never been south of this place. At Fort William, province of Ontario, Canada, on the north shore of the lake, in the middle of last September, there was seen a well-marked case of intermittent fever which had been running from the 1st of June, in a native Scotch girl, aged about twelve years, brought up at that post. She had all the characteristics of chronic malarial poisoning—chronic enlargement of the liver and spleen; and the paroxysms the while had been occasionally quartian, tertian, or quotidian, presenting the usual capriciousness in this respect that the disease exhibits along the banks of the Mississippi north of St. Louis.

Furthermore, since this report has been commenced, twenty cases have occurred in native Indians, half-breeds, and native Canadian-French inhabitants residing along the river, in all of which quinine had to be given to obtain relief, although it is mid-winter, a season of the year when such maladies are rarely seen in any latitude north of 40°. These cases have been accompanied with hepatic and splenic enlargements, tenderness on pressure over these organs, and sympathetic neuralgia in various parts of the chest, head, and upper extremities. Upon investigating the antecedents of each individual for the purpose of determining, so far as practicable, the prevalence of malarial disorders, it is believed that this northern section is no exception to the usual law of paludal exhalations and consequent diseases.

Statement showing mean strength, number of sick, and principal diseases at Fort Brady, Michigan, for the years 1868 and 1869.

<table>
<thead>
<tr>
<th>Years</th>
<th>Mean strength</th>
<th>Whole number taken sick</th>
<th>Typhoid fever</th>
<th>Malarial fever</th>
<th>Diarrhea and dysentery</th>
<th>Tonsillitis</th>
<th>Diphtheria</th>
<th>Venereal diseases</th>
<th>Rheumatism</th>
<th>Phthisis</th>
<th>Catarhal affections</th>
<th>No. of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1868</td>
<td>107.41</td>
<td>291</td>
<td>2</td>
<td>20</td>
<td>15</td>
<td>4</td>
<td>1</td>
<td>.................</td>
<td>19</td>
<td>1</td>
<td>47</td>
<td>1</td>
</tr>
<tr>
<td>1869</td>
<td>106.66</td>
<td>194</td>
<td>1</td>
<td>42</td>
<td>21</td>
<td>7</td>
<td>...........</td>
<td>10</td>
<td>14</td>
<td>1</td>
<td>33</td>
<td>2</td>
</tr>
</tbody>
</table>

*Include laryngitis, bronchitis, pneumonia, and pleurisy.

FORT MACKINAC, MACKINAC, MICHIGAN.

REPORT OF ACTING ASSISTANT SURGEON H. R. MILLS, UNITED STATES ARMY.

Fort Mackinac is situated on a bluff on the southeastern portion of the island of Mackinac, near the straits of the same name which connect Lakes Huron and Michigan, latitude 45° 51' 22" north, longitude 84° 41' 22" west. Height above the lake, 155 feet; above the sea, 728 feet. The nearest post is Fort Brady, 60 miles to the northeast. The only town of importance near the post is Sheboygan, on the mainland, 18 miles south. Its population is about 2,000. The nearest railroad station is at Saginaw, 150 miles distant. The island was first occupied by the English as a military post, soon after the destruction of old Fort Mackinac and its garrison on the mainland by the French in 1763, on account of its security from attacks from Indians. About 1795, it was turned
over to the United States government by treaty, as a part of the result of the revolutionary war, but in 1812 it was again occupied by the English. The island is about nine miles in circumference, and rises on its eastern and southern shore in abrupt rocky cliffs, the highest point being 250 feet above the water, Fort Mackinac being situated on the south side near the lake. Situated on the highest point of the island and about half a mile to the rear of the fort is "Fort Holmes," which was built by the English during their occupancy of the island in 1812–13–14, and called by them "Fort George." It was upon this point that the United States forces were making an attack when Major Holmes, of the United States Army, was killed, which circumstance subsequently gave the present name to the work.

Geologically the island is made up of the Onondaga salt group of the upper silurian system, and the upper Helderberg limestone group of the devonian system. The former is 25 feet in thickness, forming the base, and the latter is about 275 feet in depth, forming the body and cap. The face of the south end of the island is most plainly terraced. Beginning with the top of Fort Holmes, more than 200 feet above the present level of the lake, there are four distinctly marked tables or terraces before we come to the water, each bearing the undulating line of aqueous formation. Another proof of the existence of wave action, which must have been in process for a long period of time, is the fact that from the base of Fort Holmes to the present beach, worn, rounded pebbles, similar to those on the beach, are found upon digging two or three feet into the earth at any point on the line indicated; all arranged and sorted according to size, just as they are on the beach at the present time. The existence of the island is therefore evidently due to no sudden uplift, but to the gradual subsidence of the waters of the lakes, consuming thousands of years of time.

The timber on the island is mostly small, probably owing to its having been cut down at not a very remote period. It is composed of beach, maple, oak, and poplar, principally, with a liberal supply of the coniferæ, viz: pine, spruce, hemlock, cedar, juniper, tamarack, &c. Conium maculatum is found in abundance.

The reservation contains a little over two square miles. The surface is regular, but there is very little soil covering the underlying rock.

The climate is agreeable, the presence of a large body of water preventing extremes of temperature. The extremes are 90° F., and 23° F., the average about 39° F.

The fort consists of stone and earthworks, inclosing about half an acre of ground.

The barrack is a two-story frame building, 112 by 29 feet, and intended to accommodate one company. The dormitories are fitted with two-story double-bunks, and allow 377 cubic feet of air space per man. There are no special arrangements for ventilation.

Two buildings are used as officers' quarters. One, the oldest building at the post, is of stone; the other is a one-story framehouse. These allow about four rooms to each officer. The buildings are very plainly finished, and have none of the modern conveniences. They are warmed by wood stoves.

The hospital is a comparatively new frame building outside the fort, measuring 46 by 30½ feet. There are two wards, one for six beds, air space per bed 739 feet; the other, for four beds, air space per bed 650 feet. It is heated by wood stoves.

There is a post library of 200 volumes.

The water supply is from the lake by water-carts, and from five cisterns. The natural drainage is good, and is the only form in use.

The general sanitary condition of the post is good, and there are no prevailing diseases.

*Statement showing mean strength, number of sick, and principal diseases at Fort Mackinac, Michigan, for the years 1868 and 1869.*

<table>
<thead>
<tr>
<th>Years</th>
<th>Mean strength</th>
<th>Whole number taken sick</th>
<th>Typhoid fevers</th>
<th>Malarial fevers</th>
<th>Diarrhoea and dysentery</th>
<th>Venereal diseases</th>
<th>Rheumatism</th>
<th>Phthisis</th>
<th>Catarhal affections*</th>
<th>No. of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1868</td>
<td>55.16</td>
<td>54</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>14</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1869</td>
<td>65.16</td>
<td>59</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>14</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

* Include laryngitis, bronchitis, pneumonia, and pleurisy.
DEPARTMENT OF THE SOUTH.

POSTS DESCRIBED.

Newport Barracks, Newport, Kentucky.
Taylor Barracks, Louisville, Kentucky.
Charleston, South Carolina.
Savannah, (Oglethorpe Barracks,) Georgia.
Atlanta, (McPherson Barracks,) Georgia.

Fort Pulaski, Georgia.
Key West, Florida.
Fort Jefferson, Florida.
Fort Barrancas, Florida.
Mobile, Alabama.

NEWPORT BARRACKS, KENTUCKY.

REPORT OF SURGEON GLOVER PERIN, UNITED STATES ARMY.

This post is in latitude 39° 5' north, longitude 79° 40' 4" west from Washington, and at an elevation of 588 feet above the sea. It is situated on the left bank of the Ohio River, at its junction with the Licking, and constitutes a part of the town of Newport, Kentucky. On the opposite shore of the Ohio River is the city of Cincinnati, and on the left bank of the Licking, at its junction with the Ohio, the city of Covington. The three cities are said to contain nearly 250,000 inhabitants.

The first purchase at this point was made in the year 1803. The deed sets forth that the land was for the purpose of having erected thereon an arsenal, magazine, &c. Two additions to the site were made by purchase, in the year 1806, giving a total area of about six acres. The ground is about five feet higher on the Ohio River front, sloping gradually to Taylor street, and has about the same descent from the northeastern line to the Licking River. The mean elevation above extreme low water in the Ohio River is nearly 55.8 feet.

The southeastern, or Taylor street front, is inundated once in from five to seven years, and the whole ground once in fifteen years. From an inspection of the retained copies of sick reports I have been unable to discover that these inundations had any effect upon the health of the command.

The post has been occupied mainly as a depot for recruits. The temporary barracks erected at an early period have been replaced by structures built of brick; this change was made, with few exceptions, between the years 1843 and 1848.

The geological formation at this point is that of the lower silurian. The blue limestone containing the trilobite and other characteristic organic remains of this period is about sixty feet below the surface, and is covered by alluvium, sand, and gravel.

The primitive forest growth in the neighboring country is beech, walnut, hickory, sugar-tree, white oak, &c.

The climate may be classed among the temperate, and the seasons are tolerably well defined. By inspection of the accompanying abstract of meteorological observations taken from the register kept at this post, embracing a period of fourteen years, from 1856 to 1869, inclusive, it will be perceived that the seasons change by quite a regular gradation.

The greatest extremes of temperature registered during this period were 97° and 20° F. Average mean temperature during the winter was 33.24°; spring, 53.12°; summer, 71.25°; autumn, 55.23°; average annual rain-fall, 43.89 inches. The prevailing winds are the south, southwest, north and northwest.

The summer season is the longest, as the temperature of the months of May and September would point to their classification with that season, rather than with spring and autumn respectively. The mean temperature of the month of May for fourteen years was 63.07°, and of September, 67.42°.