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the Pacific Ocean. Farther on we descend along the *Cowlitz*, and glimpses of *Mt. Adams* (p. 425) are obtained to the left. At (2015 M.) *Kalama* (33 ft.) the train is transferred across the wide *Columbia River* by a large steamer. Beyond (2030 M.) *Warren* we skirt the *Willamette* (p. 515). In clear weather views are had of *Mt. St. Helens* (9750 ft.; to the N.E.), *Mt. Hood* (11,225 ft.), and *Mt. Jefferson* (10,567 ft.; to the S.E., more distant). The first of these was in eruption in 1898, emitting volumes of black smoke.

2056 M. Portland, see p. 516.

85. The Yellowstone National Park.

The *Yellowstone National Park*, which, by Act of Congress in 1872, was set apart as a public park or pleasure-ground for the benefit and enjoyment of the people, originally covered a tract 65 M. long from N. to S and 55 M. wide from E. to W., with an area of 3575 sq. M.; but to this has recently been added a forest-reservation of nearly 2000 sq. M. more on the S. and E., making a total area considerably larger than Connecticut or Inverness. The great bulk of the Park lies in *Wyoming*, but small portions of it are in *Montana* (N) and *Idaho* (W.) The central portion of the Park consists of a broad volcanic plateau, with an average elevation of 8000 ft. above sea-level. Surrounding this on all sides are mountains with peaks and ridges rising 2000-4000 ft. above the general level. To the S are the grand *Teton* and *Wind River Ranges*; to the E. the *Absaroka Mts.* To the N.E. a confused mass of mountains unites the Absarokas with the *Snowy Range*, which shuts in the Park on the N. The beautiful *Gallatin Range*, on the N. and N.W., lies partly within the national reservation. The whole district has been the scene of remarkable volcanic activity at a comparatively late geological epoch; and the traces of this activity, in the form of geysers, boiling springs, terrace and crater formations, cliffs of obsidian, deeply-cleft cañons, petrified trees, sulphur hills, and the like, are of the strangest and most startling description (see below). Its geysers are the largest in the world, excelling those of New Zealand or Iceland. Its lakes and waterfalls are also fine, and the marvellously coloured Cañon of the Yellowstone (p. 436) perhaps outstrips even the geysers as an attraction. A great part of the Park is covered with dense forests of yellow pine and Douglas spruce. An attempt has been made to make the Park a huge game-preserve, and large quantities of wild animals, including the last herd of buffaloes in America, elk, deer, bears, big-horn sheep, etc., are sheltered in its recesses. The ordinary tourist, however, will see little of these. No shooting is allowed within the Park precincts; but fishing is freely allowed, and excellent sport may be obtained in the Yellowstone, the Yellowstone Lake, and other waters (trout and grayling). The botanist will find much to interest him in the flora of the district, and it need scarcely be said that it is a peculiarly happy hunting ground for the geologist. — The Park is under the exclusive control of the Secretary of the Interior, and troops of U. S. cavalry are stationed here to protect the natural curiosities. The rules of the Park may be seen at the hotels, and any infringement of them is severely dealt with. — The Lower Geyser Basin was first explored by Capt. W. W. De Lacy in 1863, though trappers and hunters had previously brought home tales of its wonders. Since then the U. S. Government has sent various scientific topographical and geological expeditions into the Yellowstone, which has now been pretty thoroughly explored and mapped (comp. p. 429).

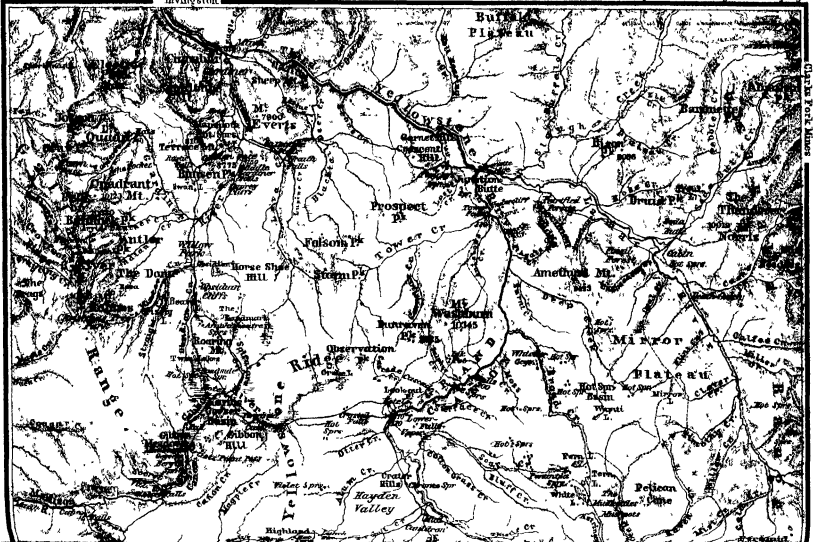
Geology of the Yellowstone Park (by *Arnold Hague*, U.S. Geological Survey). Geological evidence shows that the processes of mountain building were contemporaneous in all these ranges and took place near the close of Cretaceous time. By the upheaval of the mountains a depressed basin was formed, everywhere shut in by high land. Later, the pouring out

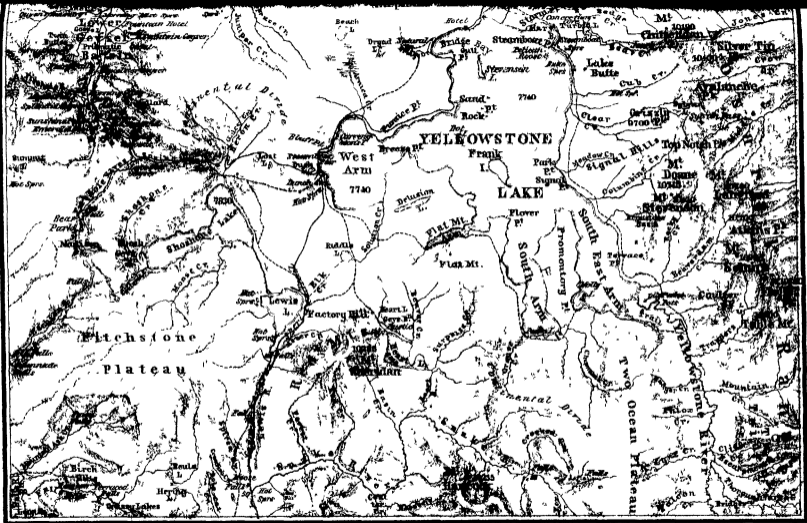
of vast masses of lavas converted this depressed region into the Park plateau. Tertiary time was marked by great volcanic activity, lavas being piled up until the accumulated mass measured more than 2000 ft. in thickness. At least two centres of volcanic eruptions, Mt. Washburn and Mt. Sheridan, are known within this area. The plateau built up of these lavas embraces an area of 50 by 40 M., the volcanic flows resting against the steep spurs of the encircling mountains. Strictly speaking it is not a plateau; at least it is by no means a level region, but presents an undulating country characterized by bold escarpments and abrupt edges of mesa like ridges. It is accidented by shallow basins of varied outline and scored by deep cañons and gorges. Evidences of fresh lava flows within recent times are wholly wanting; nevertheless, over the Park plateau the most unmistakable evidence of underground heat is everywhere to be seen in the waters of innumerable hot springs, geysers, and solfataras. A careful study of all the phenomena leads to the theory that the cause of the high temperatures of these waters is to be found in the heated rocks below and that the origin of the heat is in some way associated with the source of volcanic energy. Surface waters in percolating downward have become heated by relatively small quantities of steam rising through fissures in the rocks from much greater depths. Geysers and hot springs return these meteoric waters to the surface. They are in a sense volcanic phenomena and remain as evidence of the gradual dying out of volcanic energy. If this theory is correct, proof of the long continued action of thermal waters upon the rocks should be apparent, as they must have been active forces ever since the cessation of volcanic eruptions. Ascending currents of steam and acid waters have acted as powerful agents in rock decomposition and have left an ineffaceable impression upon the surface of the country. This is shown by numerous areas of altered lavas and extinct solfataras. No finer example of the action of steam upon lavas can be seen than along the walls of the Yellowstone Cañon. To-day the greatest activity is found in the geyser basins. The number of hot springs in the Park exceeds 400. If to these be added the fissures and fumaroles from which issue large volumes of steam and acid vapours, the number of active vents would be greatly increased. There are about 100 geysers in the Park. Between a geyser and a hot spring no sharp line can be drawn, although a geyser may be defined as a hot spring throwing with intermittent action a column of hot water and steam into the air. A hot spring may boil incessantly without violent eruptive energy; a geyser may lie dormant for years without explosive action and again break forth with renewed force.

Bunsen's theory of geyser action, which he announced after investigating the geysers of Iceland, is undoubtedly correct in its essential principles, and has stood the test of careful study of the varied hydro-thermal phenomena in the Yellowstone Park, where they occur on so grand a scale. In the latter locality it may be shown that it is not necessary that the geyser conduit should be vertical or even straight. Bunsen's theory rests on the well-known principle that the boiling point of water increases with pressure and consequently the boiling point at the bottom of a long tube is much higher than at the top. When heat is applied to the bottom of a deep reservoir, explosive action is likely to follow, and in the case of a geyser the expansive force of steam which is generated drives out violently the water in the tube which leads to the surface.

The thermal waters of the Park may be classed under three heads: 1st, calcareous waters carrying calcium carbonate in solution; 2nd, silicious waters carrying free acid in solution; 3rd silicious alkaline waters rich in silica. Calcareous waters are confined almost exclusively to the Mammoth Hot Springs, which lie just to the N. of the Park plateau. Although the waters break out in close proximity to the lavas, and undoubtedly receive their heat from volcanic sources, they reach the surface through limestones. With a few exceptions silicious waters are found issuing from the lavas from which they derive their mineral contents. Acid waters may be recognized by efflorescent deposits of alum and soluble salts of iron, and frequently by the presence of delicate sulphur crystals.







1 : 530.000



Kilomètres



Alkaline springs present more of general interest than acid waters, as it is only in connection with the former that geysers occur. They are the principal waters of all the geyser basins and most hot spring areas. They deposit mainly an amorphous silicious sinter, but in an endless variety of forms, as is shown in the geyser cones and incrustations on the surface and edges of hot pools.

It is these unrivalled hydro-thermal manifestations and their varied phenomena that have made the Yellowstone Park famous throughout the world, and gained for it the distinction of America's Wonderland.

Approaches and Plans of Tour. The season for visiting the Yellowstone Park lasts from June 1st to Oct. 1st, and June and September are less crowded than July and August. The principal approach is via *Livingston* on the *Northern Pacific R. R.* (see p. 421 and R. 84). The charge for a circular excursion ticket from Livingston, including railway and stage fares between Livingston and Cinnabar (each way), stage fares for the regular tour in the Park, and board and lodging at the Park hotels, is \$49.50 (from Mammoth Hot Springs \$44.50). A return-ticket from St. Paul, Minneapolis, or Duluth to Mammoth Hot Springs costs \$47.50 (to Livingston the same). Locomotion within the Park is carried on by the stage-coaches of the *Yellowstone National Park Transportation Co.* The roads are by no means as good as they might be, and some of the drives between the chief points of interest are rather tedious. The lack of a proper hotel at the Upper Geyser Basin, the most interesting spot in the Park, is also a great drawback, as it reduces the stay there to a few hours and compels the 9 M. between the Basin and the Fountain Hotel to be traversed thrice (comp. p. 433). Tourists of simple tastes may avoid this mal-arrangement by putting themselves in the hands of *Mr. Wylie* (of Gardiner, Montana), who has erected comfortable permanent camps (tents) in different parts of the Park and charges \$35 for a week's transportation, lodging, and meals, spending two nights at the Upper Basin and two at the Grand Cañon. Cyclists or persons in their own conveyances may use these camps for \$2.50 a day, and the same charge is made for each day beyond seven. Carriages may be hired at \$10-21 per day (3-7 pers.); saddle-horses \$2½ per day. Messrs. Raymond & Whitcomb (p. xxv) conduct parties from Boston to the Yellowstone at rates proportional to those above mentioned, while similar parties are brought by the Pennsylvania R. R. from New York and by the Burlington Route from Chicago. Camping parties may secure a complete outfit, guides, etc., at the Mammoth Hot Springs Hotel (p. 430). — The Yellowstone may also be approached from *Monida*, on the *Oregon Short Line R. R.*, whence the Park (85 M.) is reached by stage-coach in about 27 hrs. (comp. p. 444). The charge for a return-ticket from Omaha (p. 438) or Kansas City (p. 452), including the trip through the Park, is about \$120. — *Warm Wraps* are very necessary in the Yellowstone, as however strong the sun is by day, the nights are apt to be very chilly.

Hotels. The hotels of the *Yellowstone Park Association* (headquarters at Mammoth Hot Springs) are comfortable and well managed. The uniform charge is \$4 a day for the first week, then \$3.

Guides. Men to point out the way to the various points of interest may be obtained at the hotels for a moderate fee; but really intelligent and efficient guides are still a desideratum. Mounted guide, for longer excursions, \$5 per day.

Bibliography. The most detailed account of the Yellowstone is that of Prof. F. V. Hayden and his colleagues in the *Twelfth Annual U. S. Geological Report* (1878). See also *Hiram M. Chittenden's* 'Yellowstone National Park' (1895) and *Arnold Hague's* 'Geological History of the Yellowstone Park' (1887). Small *Guides to the Yellowstone Park*, by A. B. Guphill (50 c.) and W. C. Riley (25 c.) may be bought at the hotels. Good *Photographs*, by F. Jay Haynes, are also on sale.

a. From Livingston to Mammoth Hot Springs.

NORTHERN PACIFIC RAILROAD to (51 M.) Cinnabar in 2 hrs. STAGE thence to (8 M.) Mammoth Hot Springs in 1¾ hr.

Livingston, see p. 424. — The train ascends the valley of the Yellowstone and soon passes through (3 M.) the **First Cañon of the Yellowstone* or *Gate of the Mts.*, a gorge about 1 M. long, with rocky walls 2000 ft. high. The wider reach then entered is known as *Paradise Valley*. 31 M. *Dailey's* (4915 ft.). To the left is *Emigrant Peak* (10,960 ft.), at the head of *Paradise Valley*. Near (41 M.) *Sphinx* (5070 ft.) we thread the fine **Middle* or *Yankee Jim Cañon*, 'a gigantic and perfect piece of ice-work, with rocky sides smoothly polished and striated from the bottom to the top' (*Geikie*). As we approach the end of the railway, we see *Cinnabar Mt.* to the right, with the curious **Devil's Slide*, consisting of two dykes of hard sandstone, 30 ft. apart, ascending the mountain for about 2000 ft.

51 M. *Cinnabar* (5180 ft.) is the terminus of the railway and the beginning of the stage-line.

The coach passes (2 M.) *Gardiner* (dining-station for the Wylie parties, p. 429), at the confluence of the Yellowstone and the *Gardiner River*, where it enters the Yellowstone Park. It then ascends on the right bank of the *Gardiner* and in 1½ M. more passes from Montana to Wyoming ('Equality State'). Between *Cinnabar* and *Mammoth Hot Springs* the road ascends 1200 ft.; the last part is steep.

8 M. ***Mammoth Hot Springs Hotel** (6385 ft.), the headquarters of the Park Association (300 beds, incl. annex; baths with water from *Hot Springs*), is finely situated on a plateau about 800 ft. above the *Gardiner*, with *Mt. Evarts* (7900 ft.) rising to the E. (beyond the river) and *Terrace Mt.* (8100 ft.) and *Bunsen Peak* (8775 ft.) to the S. Adjacent is *Fort Yellowstone*, the military headquarters of the park.

This is the starting-point and terminus of the circular tour round the Park, which may be made in either direction, though that followed below is preferable, as reserving the fine *Yellowstone Cañon* to the last. Trunks and other heavy luggage are left here. The drive through the Park is made in light vehicles holding 3-7 people, and the same carriage is retained throughout by those who perform the circuit within the usual time (5½ days; fee to driver usual).

The *Yellowstone Park Association's Guide* conducts hotel guests over the Terraces free of charge, starting about 2.30 p.m. It is, however, preferable to visit the Terraces, if possible, in the morning or late evening, as the heat reflected from the glaring white formations is very trying. A guide is not indispensable, as the hotel is scarcely lost sight of. Smoked glasses are a desirable protection to the eyes.

Opposite the hotel, on the slope of *Terrace Mt.*, are the wonderful ***Formations** or **Terraces** formed by the calcareous deposits of the *Mammoth Hot Springs*. These deposits cover an area of nearly 200 acres, comprising 10-12 distinct terraces and 70 active springs, with a temperature varying from 65° to 165° Fahr. The main springs now active lie just above the Terraces, the total height of which is about 200 ft. The exquisite colouring of the formations (white, cream, salmon, red, brown, yellow, green, etc.), the singularly blue transparency of the water, and the striking arrangement of the terraces combine to form a scene that has no rival since the destruction of the famous *Pink Terraces* of New Zealand.

The first objects to attract the visitor's attention on leaving the hotel are the cones of two extinct geysers, named *Liberty Cap* (45 ft high) and the *Giant's Thumb*. The path usually followed in visiting the Formations diverges from the main road about 200 yds. to the S. of the former; the path near the Giant's Thumb is generally taken in returning. Among the chief points of interest are the *Minerva Terrace*, the *Jupiter Terrace*, the *Pulpit Basins*, the *Pictured Terrace* (with the *Blue Pool*), the *Narrow Gauge Terrace*, the *Orange Geyser* (a hot spring, not a geyser proper), *Cupid's Cave*, and the *Devil's Kitchen* — The grounds of a photographer's studio near the hotel are fenced in with elk-horns, found in the Park.

Those who stay more than a day at the Mammoth Hot Springs may walk or ride to the *Middle Gardiner Falls*, 4 M. to the S.E. They are about 150 ft. high and are in a cañon 1200 ft. deep. This excursion may be combined with an ascent of *Bunsen's Peak* (half-a-day; 'View). — An ascent of *Mt. Everts* (p. 430), including a visit to the *East Falls*, takes about a day. — A road leads to the E. from the Mammoth Hot Springs to (2 M.) *Yancey's Hotel* (S 2) at *Junction Valley*, whence a trail ascends the Yellowstone to (4 M.) the *Tower Falls*, 110 ft. high. There is a small forest of *Petrified Trees* 1½ M. to the S. of Yancey's. Fishermen and sportsmen will find Yancey's a good centre. Route thence to *Yellowstone Cañon*, see p. 437.

b. From Mammoth Hot Springs to the Lower Geyser Basin.

42 M. STAGE in about 10 hrs.

The road ascends to the S. through the cañon of the Gardiner River to (4 M.) the **Golden Gate*, where the W. branch of the river passes between Bunsen's Peak and Terrace Mt. The name is said to be derived from the yellow moss which grows on the rocky walls of the pass. The *Rustic Falls* here are picturesque. Fine retrospect. On issuing from the cañon we pass *Swan Lake* and cross a somewhat bleak plateau. To the right rise the snow-peaks of the *Gallatin Range*, including (from [right] to left) *Quadrant Mt.* (10,125 ft.), *Bannock Peak* (10,330 ft.), and *Mt. Holmes* (10,528 ft.). Behind us, to the N.W., is *Electric Peak* (11,155 ft.), the highest mountain in the Park. About 2 M. beyond Swan Lake we cross *Indian Creek*, an affluent of the middle fork of the Gardiner. Farther on, 6 M. from the Golden Gate, are *Willow Park* and *Apollinaris Spring*, with the first Wylie Camp (p. 429). To the left, 1½ M. farther on, rise the **Obsidian Cliffs*, a ridge of volcanic glass, 300 yds. long and 150-250 ft. high, once a favourite resort of the Indians, who made arrow-heads of the obsidian. In the construction of the road the large blocks of obsidian were shattered by being first heated by fires and then doused with cold water. To the right lies *Beaver Lake* (7415 ft.), so called from its numerous beavers' dams. The road skirts the lake for about 1 M., crosses the *Green Creek*, and then surmounts the watershed (7550 ft.) between the Gardiner, flowing into the Yellowstone, and the *Gibbon*, flowing into the Madison. We pass *Roaring Mt.* (l.), the little *Twin Lakes* (r.), and the *Devil's Frying Pan* (l.).

18 M. (from Mammoth Hot Springs) *Norris Hotel* (7260 ft.), where a halt is made for luncheon, is merely an eating-station. It lies in the *Norris Geyser Basin*, which, though not to be compared with the larger basins described at pp. 432, 433, contains features

of considerable interest. Some of its active geysers are of quite recent origin. Most visitors will see as much as they wish of this basin by walking on about 1 M. ahead of their carriage. In this way they may see a boiling spring to the left of the road, the *Black Growler*, to the right; the *Hurricane*, a short way to the right of the road (sign-post); and the *Constant Geyser*, the last in a large tract of geyserite which is unsafe for walking.

A path diverging to the left leads to the *Emerald Pool*, the *New Crater*, and the ($\frac{1}{2}$ M.) *Monarch Geyser*. — Numerous other small geysers and boiling springs are visible in various directions.

From Norris Hotel direct to the *Cañon of the Yellowstone*, see p. 437

About 3 M. from the Norris Hotel the road enters a valley named *Gibbon Meadows*, beyond which we descend the **Gibbon Cañon*.

About $\frac{1}{2}$ M. to the E. (left) of the entrance to the cañon are the *Artists' Paint Pots*, similar to those described below. — A path to the right, $\frac{3}{4}$ M. farther on, leads to the *Monument Geyser Basin*, 1000 ft. above the road, which may be neglected by the non-scientific tourist.

About 2 M. from the entrance of the cañon, to the right, is the **Beryl Spring*, one of the loveliest boiling springs in the Park (15 ft. across). Near the end of the cañon, to the left, are the **Gibbon Falls*, 80 ft. high. The next part of the road is comparatively uninteresting. The *Teton Mts.* (14,000 ft.; ascended for the first time in 1898), 75 M. to the S. W., are visible in clear weather. Farther on we descend gradually to the valley of the *Firehole River*, the two branches of which unite to form the Madison. At the forks of the Firehole and *Nez Percé*, 5 M. from the Gibbon Falls, our road is joined by that from *Monida* (p. 444). We go on $2\frac{1}{2}$ M. farther to the —

42 M. **Fountain Geyser Hotel* (7250 ft.), the usual halting-place for the first night after leaving Mammoth Springs. Hot mineral baths may be obtained at the hotel.

Every evening, at a point about 100 yds. behind the hotel, a group of bears may be seen eating the kitchen garbage of the day. They are so tame and inoffensive that, it is said, they will sometimes eat apples from the hands of the onlookers.

The **Lower Geyser Basin*, which we have now reached, has an area of 3-4 sq. M. and a mean elevation of about 7250 ft. It is known to contain about 700 hot springs, besides a score or so of geysers, arranged in groups. Within a few hundred yards of the hotel is the **Fountain Geyser*, which spouts every 2-3 hrs. Though not very high (30-50 ft.), the eruption of this geyser is so wide, has so many interlacing jets shooting in all directions, and rises and falls with so many variations, that it ranks among the most beautiful in the Park. The approach of an eruption, which lasts 15-20 min., is heralded by the gradual filling up of the crater. — Near the Fountain Geyser are the very singular and curiously fascinating **Mammoth Paint Pots*, or *Mud Puffs*, a group of mud springs of different colours (pink, yellow, etc.), within a crater about 40 ft. in diameter. The mud is thrown up with a curious 'plopping' sound and falls back into shapes resembling flowers, etc.

About 2 M. from the hotel, but somewhat difficult of access owing to the marshy nature of the ground, is the ***Great Fountain Geyser**, which rises to a height of 100-150 ft. and is one of the most remarkable Geysers in the Park. Adjacent are some interesting springs.

c. From the Lower Geyser Basin to the Upper Geyser Basin.

9 M. STAGE COACH in 3-4 hrs., including halt at the *Midway Geyser Basin* (see below).

The road runs at first towards the W., then turns to the S. and follows the *Firehole River*. In about 3 M. we are abreast of what is known as the *Midway Geyser Basin*, on the W. bank of the river; and a halt is generally made for a visit to it.

This group includes the great ***Excelsior Geyser**, the largest geyser in the world, throwing up nearly as much water as all the rest put together. With a short exception in 1890, it has not worked since 1888, when it threw a huge mass of water to a height of 200-300 ft. Its crater is nearly 400 ft. long and 200-250 ft. wide, and its walls rise 15-20 ft. above the level of the boiling water within. Its appearance amply justifies the name of *Hell's Half Acre*, which is sometimes applied to it. — A little to the N. is the beautiful ***Turquoise Spring**, a pool 100 ft. in diameter, remarkable for the intense blueness of its limpid water. — To the W. lies ***Prismatic Lake** (400 ft. long and 250 ft. wide), the marvellous colouring of which is indicated by its name. The volumes of steam which rise from it reflect those colours in a very beautiful way.

About 3 M. beyond the Middle Geyser Basin we reach the beginning of the *Upper Geyser Basin* (see below), which the road to the hotel traverses, following the course of the *Firehole River*. Among the springs and geysers near the road as we proceed are the *Artemisia Spring* (right), the **Morning Glory* (i.e. convolvulus; left), the *Fan Geyser* (r.), and the *Mortar Geyser* (r.). Beyond the bridge are the *Riverside* (l.), the *Grotto* (l.), the *Giant* (l.), the *Splendid* (r.), the *Comet* (r.), the *White Pyramid* (r.; at some distance), the *Oblong* (l.), the *Turban* (l.), the *Grand* (l.), the *Saw Mill* (l., these three beyond the river), and the *Castle* (l.).

The **Upper Geyser Hotel** is at present used as a luncheon-station only, travellers returning to the **Fountain Geyser Hotel** for the night †.

The ****Upper Geyser Basin** (7395 ft.), which is about $\frac{1}{4}$ sq. M. in area, contains about 40 geysers (including the largest, after **Excelsior**, and finest in the Park) and many beautiful hot springs. Most of the large springs and geysers are near the *Firehole River*. A good general view of the district is obtained from a mound near the hotel.

The chief points of interest in the **Upper Geyser Basin** may be seen in two rounds of about 3 M., one on either side of the river, and about half-a-day should be allowed for each. Hurried visitors will do well to engage a guide; in any case they should ascertain what geysers are 'due' and arrange their itinerary accordingly. A table at the hotel gives the periodic times of the different geysers, but few of them, with the exception of **Old Faithful**, can be trusted. Those who wish to see all the large

† This strange arrangement involves a threefold repetition of part of the journey and necessitates an uncomfortably early start for the drive to **Yellowstone Lake** (p. 435).

geysers playing have to stay several days or even weeks; while some geysers intermit their eruptions for months and years at a time. Most of the chief geysers are marked by little wooden signs. Thick shoes or overshoes are desirable, as parts of the formations are almost constantly wet from the overflow of the geysers.

Old Faithful, one of the most beautiful geysers in the Park, throws its stream, at intervals of about 65 minutes, to a height of 125-150 ft. The eruption lasts about 4 minutes. — Crossing the foot-bridge in front of the hotel, we reach the **Beehive**, so called from the appearance of its cone (4 ft. high), which throws a very compact stream of water from its nozzle-like opening to a height of 150-200 ft. To the E. of the Beehive is the **Giantess**, the interesting exhibitions of which are due once a fortnight (150 ft.). A little to the N.W. of the Giantess is the **Sponge**, so called from the appearance of its crater. — A little farther to the N. are the **Lion**, **Lioness**, and **Cub**, to the E. of which is the **Beach**. The path next passes between **Spasmodic** (r.) and the **Sawmill** (l., near a bridge over the Firehole) and reaches the **Turban** and the **Grand**, the irregular eruptions of which last (200 ft. high) are very fine. Near this is the **Young Faithful** or **Minute Man**, a small geyser which goes off every 5 min. and lasts for 1 minute. Continuing to follow the path towards the N., we pass

Beauty Spring, cross the river, pass the **Oblong Geyser** with its fine crater (to the right, close to the river), and reach (1 M. from the hotel) the

Giant Geyser, perhaps the finest geyser in the Basin, which plays irregularly, throwing its column to a height of 250 ft. The eruption lasts for 1½ hr. About 200 yds. to the N. of the Giant is the **Grotto**, remarkable for its curiously-shaped cone. We recross the river by the carriage-bridge, just above which, by the river's bank, is the attractive **Riverside Geyser** (thrice daily; 80 ft.). To the N., also adjoining the river, are the **Mortar** and the **Fan**, so called from the shape of its display, which usually follows that of **Riverside**. On the opposite side of the road is the exquisite **Morning Glory Spring**, a most delicately tinted pool, so called from its resemblance to a convolvulus or morning glory. We may now return to the hotel (1½ M.) by the road passing the **Castle**, named from the shape of its crater (every 30 hrs. or so; 75 ft.). Near the Castle is a fine spring known as the **Castle Well**.

For our second circular walk we leave the hotel by a path leading through trees to the N.W., with **Iron Spring Creek** a little to the left. We cross this stream to visit the beautiful **Emerald Pool** and **Sunshine Pool**, and then recross it and follow the path past the little **Mud Geyser**, to the curious **Black Sand Basin** and **Specimen Lake**, the latter a flat and dry expanse, with numerous semi-petrified trees. A wagon-road leads hence to the N. to the **Devil's Punch Bowl**, about 1 M. from the hotel, and is continued, sweeping round to the E., to the main carriage-road, which it joins above the **Oblong Geyser** (see above). A digression to the left (N.) will take in the **White Pyramid** (the cone of an extinct geyser), the **Splendid Geyser** (every 3 hrs. every alternate day; 200 ft.), and the **Comet Geyser**.

The **Biscuit Basin**, part of the Upper Basin about 2 M. from the hotel, is so called from its resemblance to a huge oven with biscuits baking. It includes the **Sapphire Pool**, the **Soda Geyser**, the **Black Pearl**, and the **Silver Globe**.

A ROAD, now comparatively seldom used, leads from the Lower Basin through the **Hayden Valley** to (25 M.) the road leading from Yellowstone Lake to the Grand Cañon. The road ascends **Mary's Mountain**, the watershed between the Missouri and the Yellowstone, by the rough and precipitous **Devil's Stairway**. Fine retrospect of the **Teton Mts.** (p. 432), about 100 M. distant, as we ascend. At the top of the hill lies **Mary's Lake** (8335 ft.). Farther on we pass some hot springs and cross **Alum Creek**. To the left (N.) rises **Mt. Washburne** (10,345 ft.), while the **Absaroka Mts.** come into sight on the right front (E.). The road then descends gradually into **Hayden Valley**. The drive through the valley to the (25 M.) cross-roads, where we turn to the right for (9 M.) Yellowstone Lake and to the left for (8 M.) the Cañon (comp. p. 437), is rather uninteresting. The herd of buffalo in the Park is said to winter here.

d. From Lower Geyser Basin to Yellowstone Lake.

44 M. STAGE in 9-10 hrs., including a stoppage for luncheon.

From the Lower Basin to the (9 M.) *Upper Basin*, see p. 433. The road then ascends to the S.E. along the *Firehole* or *Madison River* to (1½ M.) *Kepler's Cascades*, where the river descends for 130 ft. in a series of leaps. About 1 M. farther on it bends to the left and follows *Spring Creek*.

Near this turn is the *Lone Star Geyser*, which plays every ½-¾ hr. to a height of 75 ft. — About 5 M. farther to the S., at the W. end of *Shoshone Lake*, is the *Shoshone Geyser Basin*, with the *Union* and other interesting geysers and hot springs. *Lake Shoshone* (7830 ft.), 6½ M. long and ½-1 M. wide, consists of two expanses united by a narrow strait. It is surrounded by wooded hills.

Our road ascends steadily along *Spring Creek*, affording fine views of *Shoshone Lake* (see above), and at a point about 8 M. from the *Upper Basin* crosses the '*Continental Divide*' or *Watershed* of the *Rocky Mts.* (ca. 8100 ft.). This '*Divide*' here makes a curious sweep to the N. and then bends round again, so that we cross it a second time, at a height of 8500 ft., about 6 M. farther on, near *Lost Lake*. The road then descends, passing *Duck Lake*, to (3 M.) *Yellowstone Lake* (see below), which we reach at the *West Bay* or *Thumb* (Luncheon Station). The *Hot Spring Basin* here contains about 70 hot springs, many of which are remarkable for their brilliant colouring. One lies so close to the lake, that it is literally possible to catch a trout in the lake and cook it in the spring without changing one's position. About 150 yds. from the lake is a group of '*Pant Pots*', which many visitors consider finer than those described at p. 432. A small *Steamer* plies from this point to (20 M.) the *Yellowstone Lake Hotel* (see below).

For the rest of the way the road skirts the W. bank of **Yellowstone Lake* (7740 ft.; 1447 ft. above the top of Mt. Washington. p. 144), one of the largest bodies of water in the world at so lofty an altitude, having an area of 140 sq. M., a shore-line of about 100 M., and a longest diameter of 18 M. Its shape is irregular and has been likened to a hand with three fingers and a thumb. The outlet is at the wrist (N.), near the *Yellowstone Hotel*. The lake is surrounded by lofty mountains. The *Yellowstone River* enters it on the S. and issues from it on the N. Before reaching the hotel we circle *Bridge Bay*, so called from a curious *Natural Bridge*, about 1½ M. from the lake.

The **Yellowstone Lake Hotel*, 35 M. from the *Upper Basin*, is well situated on a bluff overlooking the lake and backed by a forest. It commands a fine view of the lake and of the *Absaroka Mts.* beyond. Among the chief of these (named from N. to S.) are *Mts. Cathedral* (10,700 ft.), *Chittenden* (10,190 ft.), *Silver Tip* (10,400 ft.), *Grizzly* (9700 ft.), *Doane* (10,715 ft.), *Langford* (10,780 ft.), *Stevenson* (10,420 ft.), *Atkins* (10,700 ft.), *Schurz* (10,900 ft.), *Eagle Peak* (10,800 ft.), and *Table* (10,500 ft.). Nearly S., considerably to the

right of those just mentioned, are the **Red Mts.**, culminating in *Mts. Sheridan* (10,385 ft.) and *Hancock* (10,235 ft.). The numerous islands in the lake also enter pleasantly into the view.

BOATS (50 c. per hour) may be hired for excursions on the lake, and the fishing is excellent, the trout being large and voracious (use of fishing-tackle 50 c. per hr.). — The bears in the adjoining forest are almost as tame as those mentioned at p. 432. — To the E., among the Absaroka Mts. (p. 435), is the region known as **Hoodoo** or **Goblin Land**, where the extraordinarily grotesque forms of the rocks and crags will repay the lover of the marvellous who is prepared for a somewhat rough and trying expedition.

e. From Yellowstone Lake to Yellowstone Cañon.

17 M. STAGE in 4 hrs.

The road leads to the N. and N.W., following the left bank of the *Yellowstone River*. About 7 M. from the hotel, to the left, is the ***Mud Caldron** or **Volcano**, one of the weirdest and most extraordinary sights in the Park. It consists of a circular crater about 20 ft. deep, the bottom of which is filled with boiling mud, constantly rising in pasty bubbleings, interspersed with more violent eruptions. The horrible appearance of the muddy pulsations and the groaning sounds which accompany them suggest an entrance to Inferno, with the spirits of the damned making abortive efforts to escape. — About 2 M. farther on the road through *Hayden Valley* (see p. 434) joins ours on the left, and 2 M. beyond the cross-roads, to the right, rises the *Sulphur Mt.*, or the *Crater Hills* (150 ft.), where large amounts of sulphur have been deposited by the various vents. The large boiling spring, at the foot of the highest hill, is strongly impregnated with sulphur, and its fumes are very disagreeable. To the left are several small mud-springs.—As we approach the Hotel, about 4 M. farther on, we obtain glimpses of the *Upper Fall* and the *Cañon* (see below). Finally we cross a bridge over a small stream forming the *Crystal* or *Cascade Falls*.

The ***Grand Cañon Hotel** (7710 ft.) is finely situated on an elevated plateau, about $\frac{1}{4}$ M. from the river and the upper end of the cañon. It is a good point to spend a few days, as the attractions of the cañon demand repeated visits, while good fishing may be enjoyed in the river above and below the falls.

The ****Grand Cañon of the Yellowstone**, in some ways the most marvellous and indubitably the most beautiful of the wonders of the Yellowstone, extends from the Great Falls (p. 437) to a point near the E. Fork, a distance of about 24 M. Its depth is from 600 to 1200 ft., and its width at the top varies from about 300 yds. to 1500 yds. The upper part of the cañon, where it is at its deepest and narrowest, is also the scene of its most gorgeous colouring, the tints of the enclosing cliffs including the most brilliant shades of red, orange, yellow, and purple, 'as if a rainbow had fallen from the sky and been shattered on the rocks'. The formation of the crags and cliffs is exceedingly bold and picturesque. Far below flows the

river, a thread of the most exquisite blue. The margins of the cañon are fringed with dark-green pines.

Visitors should follow the trail which leads to the S.E. from the hotel across the grass (comp. map of cañon in hotel), enters the wood, and leads to the brink of the cañon, which we reach near *Look-out Point*, affording one of the finest views of it. To the W. appear the *Lower Falls* (see below), at the head of the cañon. [The *Red Rock* below *Look-out Point*, reached by a steep but safe trail, also affords a good view of the falls.] We now follow the path along the edge of the cañon towards the left (L.), passing various good points of view, among the best of which is *Hayden Point*. A small geyser may be observed sending up its column of steam far below on the side of the chasm, and a quick eye will easily detect some eagles' nests on the inaccessible peaks of the pinnacles of rock below us. In about 2 M. we reach *Inspiration Point* (1500 ft. above the river), which commands a splendid view of the gorgeous colours of the upper part of the cañon (afternoon-light the best) and of the more sombre hues of the pine-clad Lower Cañon. This is the limit of the walk in this direction and we may now retrace our steps. [Those who do not care to walk both ways can ride or drive to *Inspiration Point* and *Look-out Point*.]

The **Great or Lower Falls of the Yellowstone**, as fine, though not so high, as the famous falls of the Yosemite (p. 509), plunge from a height of 310 ft. into the abyss of the chasm. The river suddenly contracts here from a width of 250 ft. to 75 ft. The falls are reached from the hotel in 10-20 min. either by a direct trail (steep) or by an easy trail diverging from the road at the bridge over the *Cascade Falls* (p. 436). The platform at the head of the falls commands a fine view of the cañon, with *Look-out Point* conspicuous to the left (*Inspiration Point* concealed). — To reach the **Upper Falls**, which are $\frac{1}{2}$ M. farther up and about 110 ft. high, we cross the above-mentioned bridge, follow the road for a few minutes more, cross a second bridge (to the left), and then follow the road through the wood. The rapids above the Upper Falls are picturesque. The stretch of water between the two falls is to all appearance calm and sluggish, though the current is really very rapid. — Some good views are also obtained from the opposite side of the cañon, which may be reached by crossing the river by boat above the Upper Fall. One of the best is had from *Artist's Point*, where Thomas Moran painted the picture of the Yellowstone in the Capitol at Washington.

Mt. Washburn (10,340 ft.), which rises to the W. of the Yellowstone Cañon, commands a splendid view of a large part of the Park, including Yellowstone Lake and the Grand Cañon. It is easily ascended from the hotel on foot or on horseback in 4-5 hrs. (10 M.; guide desirable). The usual route is to follow the trail leading over the E. flank of the mountain to *Tower Falls*, and diverge from this to the left at its highest point (ca. 4000 ft. above the river). [It is intended to construct a carriage-road over Mt. Washburn to *Junction Valley* (Yancey's; p. 431), which will form part of the regular circuit of the Park and obviate the doubling of the route from the Norris Basin to Mammoth Springs (see below).] — The above-mentioned trail to *Tower Falls* (p. 431) is 16 M. long. Another trail leads to the *Tower Falls* via *Dunraven Peak* (8865 ft.) and the W. flank of Mt. Washburn. From the Falls to ($\frac{1}{4}$ M.) *Yancey's*, see p. 431.

f. From the Yellowstone Cañon to Mammoth Hot Springs.

30 M. STAGE in 7-8 hrs.

The road leads to the W. and farther on descends into the valley of the Gibbon, passing the pretty **Virginia Cascades*, which have a total fall of about 200 ft. Just beyond the cascades we turn sharply round an angle known as 'Cape Horn' or the 'Bend in the Road'.

12 M. *Norris Basin Hotel*, and thence to (30 M.) *Mammoth Hot Springs Hotel*, see p. 431.