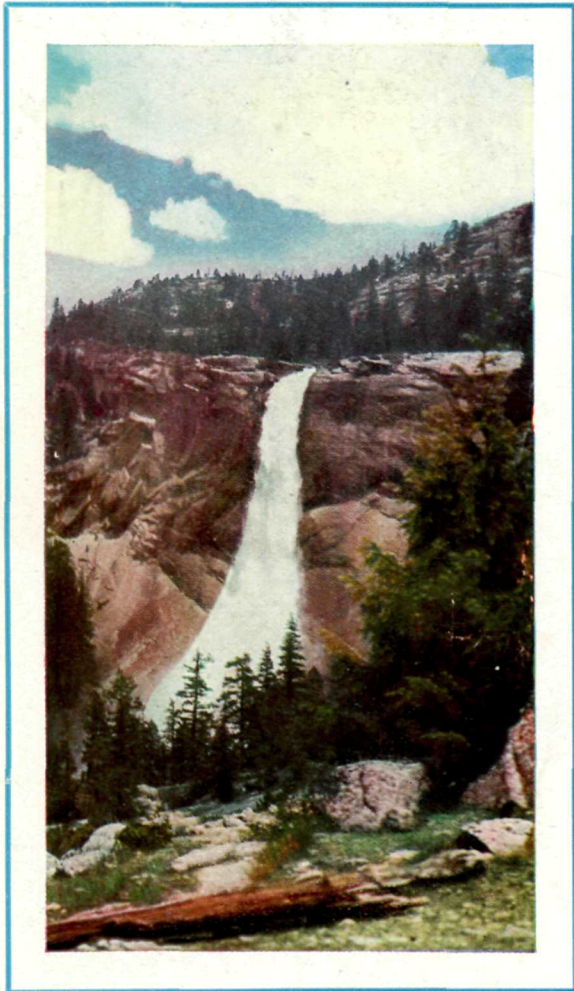


*Principal*

# WATERFALLS

*of the World*



*Special Number*

**YOSEMITE NATURE NOTES**

Price, 25 Cents

# YOSEMITE NATURE NOTES

THE MONTHLY PUBLICATION OF  
THE YOSEMITE NATURALIST DEPARTMENT  
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## Principal Waterfalls of the World

*And Their Relation to Those in*

### Yosemite National Park

by C. FRANK BROCKMAN

#### Introduction

In the spring and early summer, when the melting snowbanks of the High Sierra give way to the onslaughts of the advancing season, the numerous water courses of Yosemite assume a grandeur which has done much to attract the attention of the world to this area. Such is particularly true of Yosemite Valley where monumental precipitous cliffs foster free-leaping waterfalls and numerous cascades of great height and beauty. Their magnificence is directly linked with the geological significance of this area. Likewise it was the report of "a waterfall 1000 feet high" (Ref. 19) that served as the magnet which attracted James Mason Hutchings and his companions to the Valley, in 1855, in what is generally regarded as the first "tourist" visit to the area. It is fitting that these men, as well as those which comprised earlier military forays into the region, entered the Valley at a time when the great natural water spectacle was at or approaching its peak. Since tributaries of the Merced River are of

small size, largely fed by melting snow in the highlands, they become much reduced in volume in late summer and early fall. A number of these waterfalls disappear entirely as the season advances, to be reborn annually upon the rejuvenation of the high country snows.

Even previous to the expeditions noted, members of the redoubtable Walker party journeyed westward through the center of what is now Yosemite National Park in October, 1833. These men are generally credited with being the first white men to enter this region and members of this band noted the abundance of waterfalls which were undoubtedly seen from points along the north rim. In the narrative of Zenas Leonard, a clerk of the Walker party, appears the following—

*"We traveled a few miles every day, still on top of the mountain, and our course still obstructed with snow, hills and rocks. Here we began to encounter in our path, many small streams which would shoot out from under the high snowbanks, and after running a short dis-*

*tance in deep chasms which they have through ages cut in the rocks, precipitate themselves from one lofty precipice to another, until they are exhausted in rain below. Some of these precipices appeared to us to be more than a mile high."*

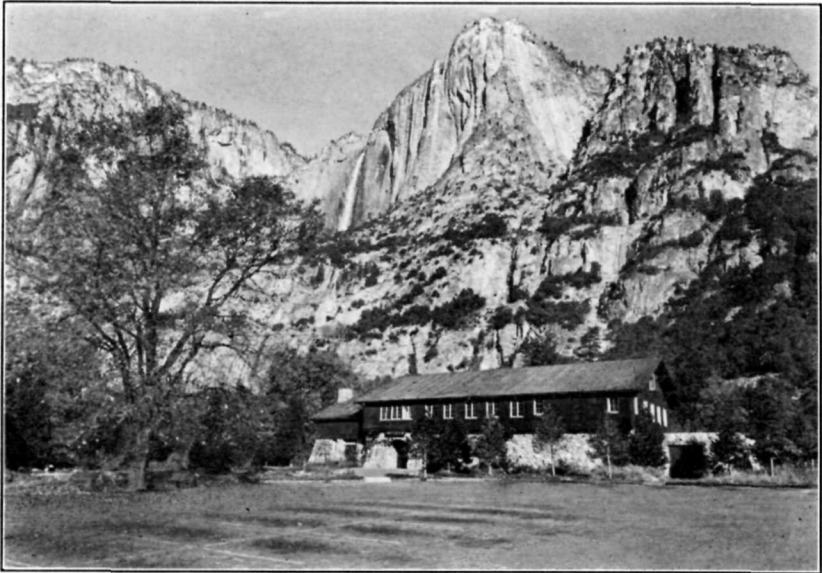
The foregoing statement has given rise to the thought that members of the Walker party were the first to gaze into Yosemite Valley. (Ref. 11.)

### **Geological Significance (Ref. 3, 23).**

The nature of many of Yosemite's waterfalls is singularly characteristic for they plunge from lips of hanging valleys. Such valleys were formed by the relatively smaller cutting power of their streams as compared to the Merced River during that period of this region's geological past when a great granite block of the earth's crust was tilted slowly to the west, eventually forming the Sierra Nevada of the present day. The Merced, flowing generally from east to west, received the greatest impetus from this uplift and over a period of approximately 60,000,000 years embedded itself in a V-shaped

canyon about 1/2 mile deep. Tributary streams, flowing from the north or south, were but little accelerated in cutting power by the impetus of the Sierra uplift and the valleys they eroded were of minor size. Thus, unable to match the erosive power of the Merced, these water courses were left "hanging" above that of the more powerful stream, their waters pouring over the rim of the canyon in a series of cascades.

The picture was materially changed by events of the ice age. From their source in the high elevations near the crest of the Sierra, glaciers converged upon the Valley, following the lines of least resistance—the previously formed, stream-cut Merced and Tenaya canyons. The resultant trunk glacier not only filled the Valley to the brim but also inundated sections of the adjacent terrain and extended at one time to a point several miles below the present town of El Portal. Due to the erosive power of the glacier ice the V-shaped canyon walls, which had previous-



Yosemite Falls from Plaza at Government Center

ly characterized the Valley, were stripped away leaving, instead, the precipitous cliffs over which plunge the waters of the tributary streams, as we observe today.

Each of Yosemite's falls has a distinct personality, for their appearance was determined by fractures in the granite which regulated the nature of the erosion in the canyon walls in each particular area.

### **Character of Yosemite Waterfalls**

Few areas of similar size can match the Yosemite Valley region in the number and beauty of waterfalls. True, there are many places in the world that are characterized by cliffs or canyons of greater size than those found here. In many such localities there are waterfalls of considerable interest and beauty. In many instances, however, these are broken in their descent by numerous ledges to form cascades consisting of a series of minor falls. Although this is also true in the case of many of the falls in Yosemite, rarely do we find such extensive, precipitous cliffs of such massive, unbroken height as one finds in this region. These cliffs, and hanging valleys by which most of the streams enter Yosemite Valley, provide the setting for Yosemite's matchless water spectacle. Their abrupt nature is responsible for many falls that are characterized by clear, unbroken leaps of great height, their waters plunging free of the cliffs to form falls in the most literal sense. It is that fact, rather than their height, that renders them outstanding among waterfalls in the world.

Since most of these falls are fed by the waters from melting snows in the high country about the rim of the Valley, or the more remote High Sierra region, they fluctuate in volume through the seasons. The best time to view them is in the spring and early summer, usually during

May and June, with the peak of interest being about Memorial Day. Broadly speaking, they are of small volume, long columns of water descending from great heights, shrouded at their base in clouds of mist and spray as they dash upon the rocks below. Their interest lies in ethereal grace and beauty rather than magnitude.

### **Location of Waterfalls in Yosemite Valley**

By means of the system of highways about Yosemite Valley—including the road to Glacier Point overlooking the great granite gorge—one may obtain excellent general views of all but two of the principal waterfalls of this area. In addition, more intimate approach is provided in most cases by numerous trails that lead to the rim from the Valley floor.

But 3 miles after passing Arch Rock Entrance Station, on the All Year Highway from Merced, one sees Wildcat and Cascade Falls (500 ft.) which descend over the irregular granite walls on the north side which characterize the Valley at that point. Although in reality cascades, they are quite beautiful and impressive. Such is particularly true of the latter and a parking area is provided along the highway where it can be viewed to best advantage. Bridalveil Fall (620 ft.) pours over the edge of the South Valley wall and can be seen to advantage from numerous points, particularly from the parking area near its base, from Valley View on the North Valley road, and from the esplanade at the east portal of the Wawona Tunnel. Ribbon Fall (1612 ft.) is best viewed near the junction between the old Big Oak Flat and North Valley roads just before one reaches the base of El Capitan.

Incidentally, El Capitan is enhanced in beauty during the early



spring, when numerous small rivulets of water from the melting snow upon its crown, stream from the edge of the 3000 ft. precipice, dissolving into spray in mid-air as they are wafted about in the breeze.

The magnificent Yosemite Falls (2425 ft.) can be seen to advantage from many points, each of which presents this dramatic feature from new and unexpected angles to enhance its charm. Of especial importance in this connection are the views one obtains from the end of the short spur road, paralleling Yosemite Creek, just above Yosemite Lodge. Good views are also obtainable from the South Valley road below the Old Village, from the swinging bridge which spans the Merced River, from the plaza in front of the Park Museum at Government Center, and from Glacier Point. From the latter place Yosemite Falls serves as a highlight in the matchless mountain panorama provided by this location.

The boisterous ribbon of water which forms the Royal Arch Cascade (1250 ft.) can be seen best from points between the Ahwahnee Hotel and Camp Curry.

Of more minor character are Silver Strand Falls (1170 ft.) which may be viewed to the best advantage from the esplanade at the east portal of the Wawona Tunnel, Staircase Falls (1300 ft.) above and in back of Camp Curry, and Lehamite Falls, a not too impressive series of cascades in Indian Canyon which are most advantageously seen from in front of the Park Museum.

Although an excellent comprehensive distant view can be obtained of Vernal (317 ft.) and Nevada Falls (594 ft.) from Glacier Point, both of these must be approached on foot via the trail leading from Happy Isles, at the upper end of Yosemite Valley, to be properly appreciated. This trail also

affords a general but not too satisfactory view of Illilouette Fall (370 ft.). This is best viewed from a point on the "Eleven Mile Trail" between Happy Isles and Glacier Point. Illilouette Fall is one of two falls in the Yosemite Valley area that cannot be seen from a highway. The other is Snow Creek Falls (2000 ft.), composed of a series of cascades. Only its lower part can be seen from a point reached via the trail along Tenaya Creek above Mirror Lake.

Other sections of Yosemite National Park possess waterfalls of considerable interest and beauty but in most cases these suffer by comparison with those of Yosemite Valley. In other parts of this booklet mention is made of Tueeulala (1000 ft.) and Wapama Falls (1500 ft.) in the Hetch Hetchy region. The Tuolumne River also abounds in interesting cascades.

Since it is not mentioned elsewhere, attention should be called to Waterwheel Falls found about three miles below Glen Aulin on the Tuolumne River. It is not a falls in the same sense as those described here but it never fails to capture the imagination of those who hear about them and invariably holds the interest of all who see them. A hike of eight miles from Tuolumne Meadows is necessary if one intends to visit this point of interest. Here the waters of the Tuolumne River rush down the steeply inclined course. Obstructions in the granite of the river bed hurl the waters 30-40 feet into the air in a series of giant "wheels" that extend down the steeply inclined canyon for more than a mile. Visitors should plan to see these waterwheels during periods of high water, normally in July. Diminutive examples are found in several other places in the park, notably on the Silver Apron of the Merced River above Vernal Fall and on the same stream several miles below Merced Lake.



Vernal and Nevada Falls from Glacier Point (Courtesy of the Yosemite Park and Curry Co.)

*Photo by Ansel Adams*

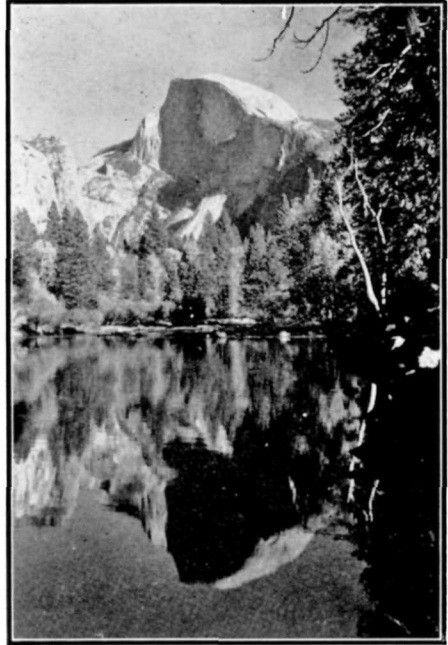


Yosemite Falls

*Photo by Ansel Adams*

**Detailed Description of Yosemite Falls****Total Height—2425 Feet****Upper Fall—1430 Ft. Lower Fall—320 Ft. Intermediate Cascades—675 Ft.**

Ranking with Half Dome and El Capitan in popular interest, this feature is perhaps most responsible for the world-wide fame enjoyed by Yosemite and thus is given special attention in this booklet. It was "the waterfall 1000 ft. high" that attracted the attention of James M. Hutchings. For many years the upper fall was considered the world's highest free-leaping waterfall—a term applied in cases where the stream entirely clears the cliff over which it falls. More recent discoveries, however, have made it necessary to modify this statement since there is apparently a higher free-leaping fall in Venezuela. Nevertheless, Yosemite Falls ranks as one of the grandest and best known water spectacles in the world. From the standpoint of sheer dramatic beauty it has few rivals. The stream does not leap clear for the entire height of the upper fall for it "first cascades tumultuously about 70 ft. through a narrow chute worn in the rock face; then, bounding out, it describes a parabolic curve through space, clearing even the bulging lower part of the cliff, which projects more than 100 feet beyond the top" (Ref. 23). As the season wanes and the volume and force of the stream becomes appreciably less, the character of the free leap is reduced accordingly. Often, in the fall, following extended dry periods, Yosemite Creek is reduced to a comparative rivulet which occasionally is barely discernible as it descends the precipitous face of the cliff. It was on such an occasion that Horace Greeley, who visited Yosemite Valley in 1859, pronounced the vaunted magnificence of Yosemite Falls as "humbug."



Half Dome from Sentinel Bridge

Yosemite Falls may be viewed from a number of vantage points. Those that are available from highways have already been noted but it is from certain points along the Yosemite Falls Trail that one obtains a clearer and more satisfactory perspective of its majesty.

This trail leaves the floor of Yosemite Valley at Camp Four, a short distance west of Yosemite Lodge. By this means it is possible to ascend to the very brink of the falls after a hike of  $3\frac{1}{2}$  miles, involving a climb of 2700 feet. Leaving Camp Four the trail climbs, via a series of switchbacks, to one of several natural horizontal ledges along the North Valley wall by means of which one proceeds to

a point above the top of the lower fall. Here one finds himself directly in front of the massive precipice over which the upper fall drops, observing at close hand the magnificent plunge of the stream for a distance several hundred feet higher than the Empire State Building. As the water thunders into the rocky basin at the base of the gigantic precipice it gradually disperses into a broad fan, bathing the entire area in spray. The more concentrated portions erupt from the mass in a never-ending succession of comet-like "projectiles" which have an almost hypnotic effect upon the observer. In the rocky basin at the foot of the fall, which is several acres in extent, the stream again converges by means of numerous rivulets and sheets of water into a narrow gorge, through which it cascades boisterously to the brink of the second plunge of 320 feet, constituting the lower fall.

Continuing toward the base of the upper fall one finds a short spur trail bearing to the right, which affords an even more intimate approach. At its end, during periods of high water, one is buffeted by wind and spray but at other times it affords a pleasant and highly satisfactory viewpoint. *Hikers should not proceed beyond the end of this spur trail. Slippery rocks above the gorge of Yosemite Creek are an ever-present danger.* Returning to the main trail the climb is continued along a series of switchbacks that ascend through a narrow draw to the west of the fall. After reaching the rim an obscure trail leads to a narrow, rocky ledge (a metal handrail is available here) by means of which one descends to a natural rocky platform, protected by a metal railing. Here, at the very brink, one may observe the waters of Yosemite Creek leaping into space toward the rocky basin nearly a quarter of a mile below.

### The Ice Cone of Yosemite Falls (Ref. 18)

Due to the fluctuating volume of Yosemite Creek, the falls present a varying appearance at different



Yosemite Falls compared with  
Empire State Building



times of the year. Vying with its interest in spring is its winter character.

During the fall, as colder weather approaches, the spray which bathes the cliff freezes during the night to form a giant fan of ice on the granite—narrow at the top and widening to nearly 150 feet at the base. During the day, as the sun warms the cliff, the Yosemite basin reverberates with intermittent reports as great slabs of ice drop to its floor. As the winter progresses this accumulated ice, together with spray freezing on the cone, and snow and ice that is washed over the brink of the falls from above the rim, gathers to form the famous ice cone. Usually the cone reaches its maximum size by late March, and while it is generally 200-250 feet high, there have been times in past years when it reached even greater size. In February, 1937, the engineering department of Yosemite National Park made a survey of the ice cone. With the information obtained on this survey, calculations were made from a picture of an ice cone taken during the days of John Muir, which is probably one of the largest ever recorded. This study indicated that the height of the cone was 322 feet, its base occupied an area of 3.7 acres, and it contained a total volume of 25 million cu. ft. of ice and snow. Ice cones are formed in a similar manner at the base of all the waterfalls in Yosemite Valley, but none are as large nor as spectacular as this one.

On several occasions the ice cone has been studied at close hand in order to determine its character, which varies considerably from year to year. In February, 1933, its surface was so firmly frozen that steps had to be cut with an ice axe to facilitate an approach to within 20 feet of the top. In other years it has been easier to negotiate.



Yosemite Falls in Winter

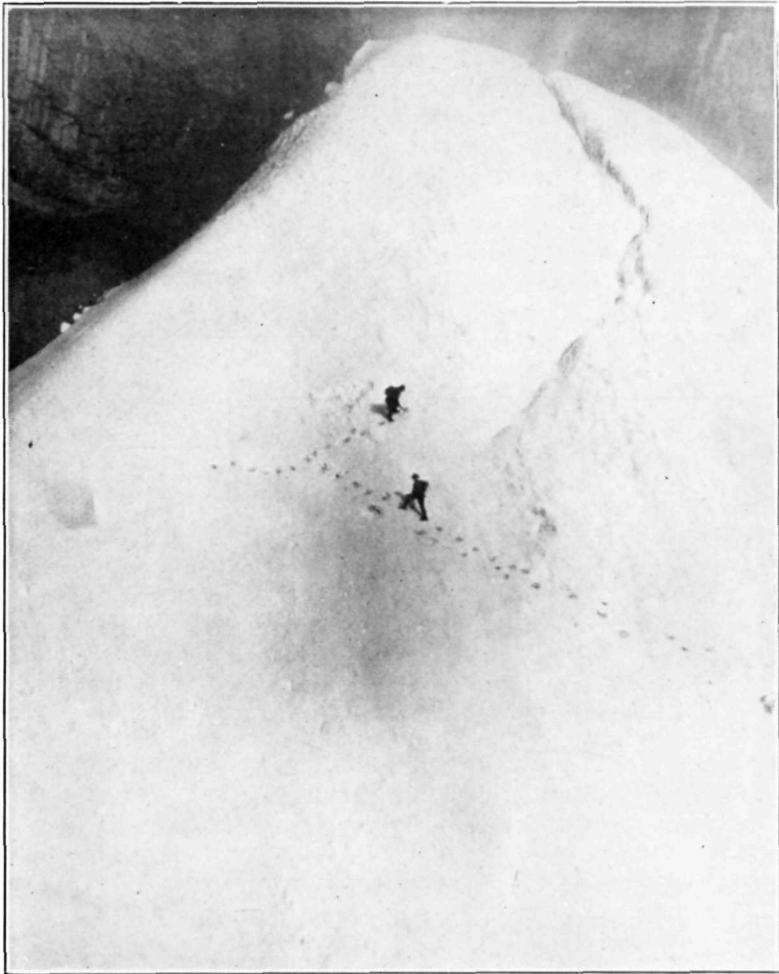
Incidentally, the ascent of the ice cone is not without considerable hazard. In addition to the danger of falling ice one often has to contend with the hazard of a considerable volume of water which not only falls with considerable force and soaks one to the skin, but presents an additional danger in that it undercuts the rear of the cone. Thus the topmost portion, being in the form of a cornice, might give way under one's weight if the ascent to the actual top is successfully negotiated.

With the coming of warmer weather the ice cone gradually disappears. The water in the falls hastens the natural melting process (it generally has a temperature of over 32 degrees at that time), by continually washing the cone in an increasing volume. Usually by early April most of the cone has disintegrated.

The Lost Arrow section of the Valley floor in the vicinity of Yosemite Creek, between the base of the lower fall and its junction with the Merced River, is often covered with a blanket of ice in the early spring. Since

this generally occurs about the time of the disintegration of the ice cone the two phenomena are usually associated. However, they are not directly related. The ice flow is the result of climatic conditions which prompt a sudden increase in the size of Yosemite Creek, followed by a sudden drop in temperature. Thus great quantities of ice are produced as the water thunders over the successive drops from the rim to the Valley floor. In addition, snow from above the rim

is washed over the brink by the stream. On the level floor of the Valley the retarded flow of Yosemite Creek possesses a force insufficient to carry the burden of ice away and, as a consequence, it is deposited along its banks and spread out over the adjoining level areas. On April 19, 1933, thirty-three acres in that region were covered in that fashion with snow and ice to a maximum depth of five feet.



Ice Cone of Yosemite Falls, February, 1932

### Comparison of Some of the PRINCIPAL WATERFALLS OF THE WORLD

Although a number of famous waterfalls occur elsewhere, notable among the world's areas for features of this type are the mountainous areas of our own west, the sharply incised coastal regions of southeastern Alaska, the fjords of Norway, the Alps and other important European mountain regions, the rugged area of northern South America and South Africa.

Comparison of waterfalls of the world is exceedingly difficult—indeed, almost impossible—for in addition to the fact that they are of many and varied types, there are still some little-known sections of the world in which further exploration may reveal falls of great height, volume or beauty. In addition, accurate data upon height and other related features are difficult to obtain and figures given in equally reliable references often vary on specific falls. Furthermore, computation of height in the case of waterfalls is not judged in the definite manner which characterizes the determination of elevations of high mountains. Many falls leap over a succession of intermittent precipices in the course of their total drop and it is often difficult to rate them on the basis of several individual falls or on the basis of one. Therefore, although visitors to Yosemite constantly desire comparative information on the falls of this region and those of other sections of the world, there can be no real comparison because of the lack

of a suitable "common denominator" to serve as a basis.

Generally speaking, waterfalls achieve renown on the basis of height, breadth, volume, picturesque nature of form and surroundings, and in some instances, the association which they may have with famous literature or with events of the past. Still another factor must also be considered—the height of clear or free leap which is of considerable importance in the case of the falls of Yosemite.

However, a study of the world's famous falls will reveal that they divide more or less naturally into two main groups. In one class are those which possess great volume and vast power which has as its outstanding exponents Niagara, Victoria Falls of the Zambesi in Africa, and Iguassu on the river of the same name in South America. The second type extols great height and delicate beauty, with Angel Fall of Venezuela, Yosemite, Sutherland Falls of New Zealand, or Kalambo in Africa as prime examples.

Approached from this point of view, and recognizing that there can be no real comparison between those of the two groups mentioned, the following discussion briefly outlines the characteristics of **some** of the principal waterfalls of the world which have, for one reason or another, impressed themselves upon the mind of man.



## Waterfalls Classified As to Height

### ANGEL FALL

Venezuela—3300 ft.

According to an article in *Natural History Magazine* (Dec., 1940), this fall is formed by a stream which plunges over the edge of Mt. Auyan-tepui, a lofty tableland (20 miles long and about 10 miles wide) which rises abruptly from grassy savannahs which separate it from the teeming jungles of the lower elevations. The



Yosemite Falls

rim of this great plateau from which the stream drops is reputed to be about 8000 ft. above sea level and roughly between 5400 and 6500 ft. above the mountain's base. The height of the fall is an estimate made by members of an expedition, sponsored by the Government of Venezuela, who flew over the fall in an airplane in 1939. It was discovered in 1937 by James Angel, explorer-aviator and soldier of fortune, whose

name it bears. Since, so far as can be determined, an accurate instrumental survey has not been made of this fall, this estimate is subject to verification. It is also described in the *Saturday Evening Post* (7-26-41) and in the book "Devil Mountain," by L. R. Dennison (1942). Photographs appearing in these publications indicate that it is unbroken by ledges for the greater part of its descent. Thus, if the original estimates (which range upward to "a mile high") can stand up under more precise studies, Angel Fall is a truly prodigious spectacle and easily qualifies as the highest free-leaping waterfall in the world. (Ref. 7, 15, 16, 27.)

### YOSEMITE FALLS

Yosemite National Park, California—2425 ft.

This, one of the most famous waterfalls in the world, is located on Yosemite Creek, a small tributary of the Merced River. The falls are formed by a succession of three drops, the uppermost being 1430 feet in height (approximately 1360 feet being in the nature of a clear or free leap), a lower fall of 320 feet (which also leaps clear of its cliff for most of this distance), and an intermediate cascade having a drop of 675 feet. The intermediate cascade includes a fall of about 100 feet. See page 7 for more detailed description. (Ref. 4, 23, 28, 33.)

### SENTINEL FALLS

Yosemite National Park, Calif.—2000 ft.

The height as noted consists, in reality, of two principal sections—the upper which is composed of a series of minor falls dropping from a series of rock ledges, each being from 50 to 200 feet in height, and the lower section composed of a more or less

clear leap of 500 feet. As the name implies, it is found on Sentinel Creek, which descends to the Valley floor through a deeply cut recess on the South Valley wall just west of Sentinel Rock. Although interesting in the spring it becomes much reduced in volume by mid-summer. (Ref. 23.)

### **SNOW CREEK FALLS**

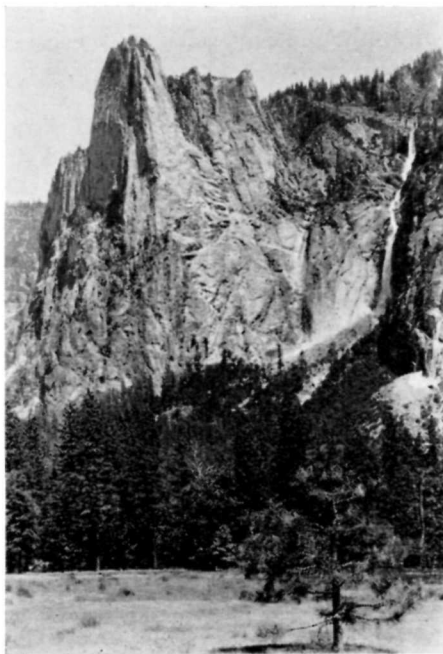
**Yosemite National Park, Calif.—  
2000 ft.**

Although the total height is considerable, these falls do not possess any clear leaps of consequence and are little known by the public. It is in reality a series of cascades on Snow Creek, by which that stream descends over the steep, irregular north wall of Tenaya Canyon to Tenaya Creek. The series of cascades rush boisterously down through a narrow, deep-set gorge and cannot be viewed in their entirety, except from a distant point on the Half Dome trail on the top and opposite side of Tenaya Canyon. There is no easily reached point affording such an advantage, although a section of their lower part can be viewed from a point a short distance above the Tenaya Canyon Loop Trail, 1½ miles above Mirror Lake. (Ref. 23.)

### **KUKENAAM FALLS**

**Venezuela—2000 ft.**

Kukenaam is the name of a mountain tableland similar to Mt. Auyantepui and Mt. Roraima, all of which are located in the remote wilderness of southern Venezuela and British Guiana. Its crest, flanked by precipitous cliffs, is reputed to rise several thousand feet above the surrounding terrain. The falls are formed by the Kukenaam River which plunges over this escarpment. However, because few have seen it and, so far as can be determined, no accurate survey has been made of it, references to its exact nature and height are scanty and vague. (Ref. 4, 5, 6, 27, 37.)



Sentinel Falls

### **SUTHERLAND FALLS**

**New Zealand—1904 ft.**

Located 16 miles from the head of Milford Sound, on the southwestern coast of the South Island, these falls were discovered in 1879 by a prospector, whose name they bear. They are formed by the Arthur River which drops over a cliff in three steps, being respectively (from top to bottom) 815, 751 and 338 feet in height. None of these drops, with the possible exception of the lower, makes a clear leap. Since its appearance is not unlike that of Yosemite Falls it has often been termed the "Yosemite of New Zealand." However, few people have had an opportunity to enjoy its beauty since it lies off main travel routes in the area. (Ref. 23, 27, 28.)

### **TUGELA FALLS**

**South Africa—1800 ft.**

Located on the Tugela River in Natal. References to the height of



these falls vary considerably and, while the majority are in agreement at 1800 ft., some place it as high as 2810 ft. in height. The latter figure undoubtedly refers to the total drop throughout a series of cascades, in addition to any specific falls that might be present, since one source of information notes that the Tugela River "hurls itself through a series of falls 2800 feet high," another states that the "total drop of Tugela is 2810 feet," and a third notes that "the height of the main Tugela Falls, with its three steps, is 2050 feet." (Ref. 4, 9, 25, 27, 31, 37.)

### **RIBBON FALL**

**Yosemite National Park, Calif.—  
1612 ft.**

Although the highest single fall in a region outstanding for its display of such features, Ribbon Fall, unlike its more famous counterpart—Yosemite Falls—is not characterized by a clear leap for any considerable part of its drop. It is confined in a narrow recess in the canyon wall and splashes against the rocks as it descends. It is found on the north side of Yosemite Valley where slender Ribbon Creek pours over the great granite precipice at a point 3050 feet above the Valley floor. Since Ribbon Creek drains a relatively small area characterized by a comparatively low elevation where the winter snow pack is soon dispersed, it often disappears by late summer. In the spring and early summer, however, when the stream is swollen in volume by the melting snow, this slender plume of water presents a graceful picture as it descends along the face of the lofty precipice, its base enveloped in clouds of mist and spray as the waters plunge into the narrow confines of its limited basin. (Ref. 4, 23, 27.)



Ribbon Fall

### **KING GEORGE IV FALLS** **British Guiana—1600 ft.**

Other than the fact that these falls are formed by the Uitshi River, in the little known wilderness approximately 45 miles north of the Brazil-Venezuela-British Guiana boundary, little is known concerning them. (Ref. 27.)

### **WAPAMA FALLS** **Yosemite National Park, Calif.— 1500 ft.**

This, a companion to Tueeulala Falls in the Hetch Hetchy area of Yosemite National Park, pours over a steeply inclined section on the north wall of Hetch Hetchy Valley into the reservoir. It consists of about three principal drops. No recent data as to its exact height seem to be available, although John Muir stated, "It is about 1800 feet in height and seems to be nearly vertical when one is standing in front of it, though it is

considerably inclined." The topographic map of Yosemite National Park indicates a total descent of about 1500 feet. (Ref. 24.)

### **RORAIMA FALLS**

#### **Venezuela—1475 ft.**

Mt. Roraima, a lofty mountain tableland similar to Mt. Auyan-tepui and Mt. Kukenam, is found at the point where the boundaries of Venezuela, Brazil and British Guiana merge. This flat-topped mountain is said to be about nine miles long and 3 miles wide, with an elevation above sea level of 8600 ft., and with sheer cliffs 2000 ft. high below the edge of the plateau. During the wet season a number of waterfalls descend from points along the rim. It is probably one of these that bears the name of Roraima, but, like other falls in this same remote region, there are few definite facts concerning its nature and exact height. (Ref. 4, 6, 21, 27, 29, 31a, 37.)

### **KALAMBO FALLS**

#### **South Africa—1400 ft.**

This is one of Africa's most beautiful waterfalls. It plunges over a precipice in the path of the river of the same name, which forms the boundary between Northern Rhodesia and Tanganyika Territory. Although estimated variously from 705 to 1400 feet the height of this spectacular waterfall is more likely nearer the larger figure. It descends in two drops, the uppermost being about 1200 feet in height, with the lower and minor fall approximately 200 feet high. An excellent photograph will be found in the National Geographic Magazine of July, 1926. (Ref. 4, 23, 27, 28, 29, 37.)

### **BEAVER CHIEF FALLS**

#### **Glacier National Park, Montana—1400 ft.**

The total descent of 1400 feet consists of a series of cascades, without

any single drop of appreciable size, on a small stream connecting Lake Ellen Wilson and Lincoln Lake. These are two adjoining glacial tarns found at different levels in the rugged terrain, the former being the higher. It is rarely seen. These are pictured in the National Geographic Magazine of July, 1926 (p. 108), but the name given in the text is Diamond Falls. (Ref. 20a.)

### **GAVARNIE FALLS**

#### **France—1385 ft.**

Located on the French side of the Pyrenees, these falls descend in a series of cascades divided broadly into two units, 958 and 427 feet in height. During the period of high water they are said to be characterized by a clear leap for the entire distance. (Ref. 4, 8, 13, 23, 27, 29, 37.)

### **TAKAKKAW FALLS**

#### **British Columbia—1346 ft.**

These are among the best known of the many waterfalls in British Columbia. They are found in the upper Yoho Valley and their total descent includes a partly free leap of about 900 to 1000 feet. Some references list these falls as being 1200 ft. in height. (Ref. 4, 23, 29, 36, 37.)

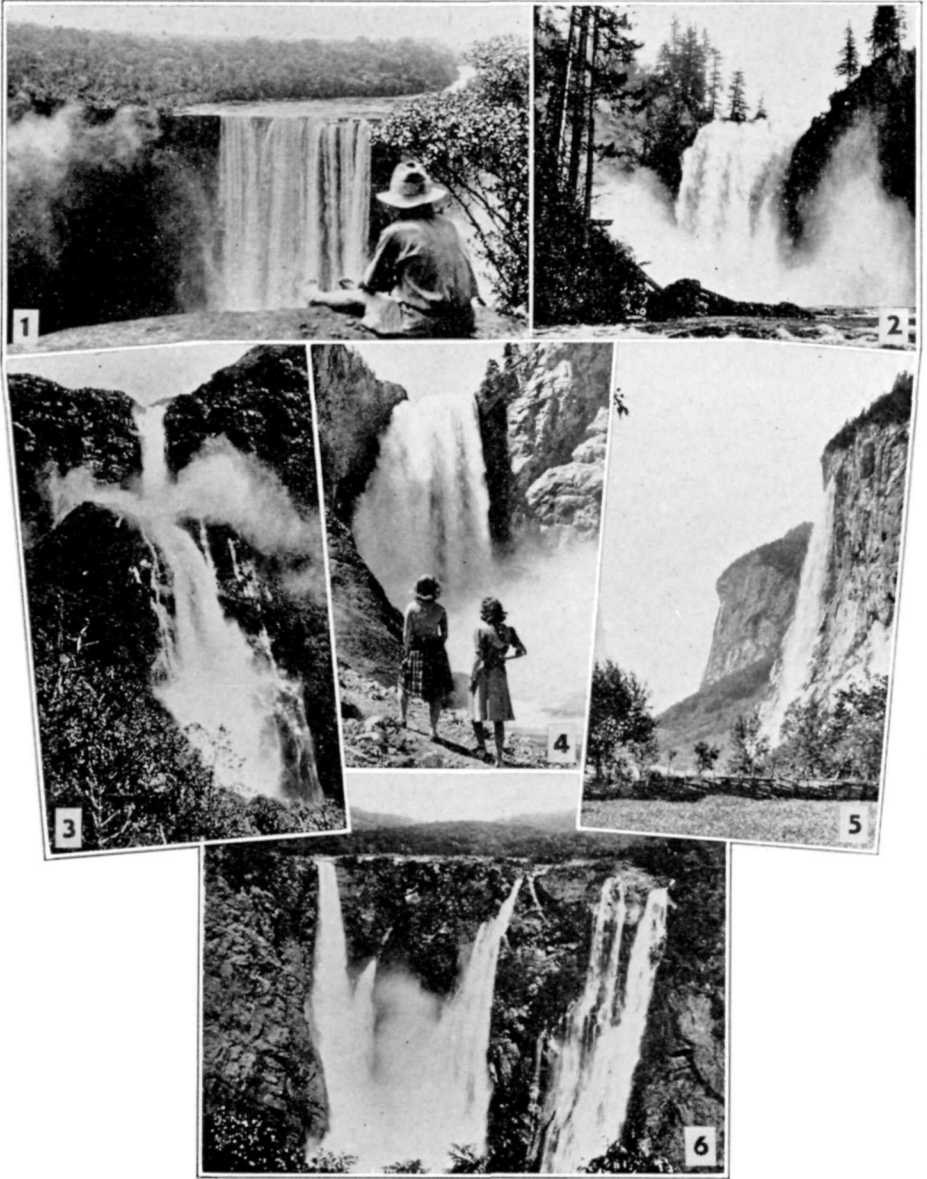
### **VASENDEN-FOS**

#### **Norway—1310 ft. (Ref. 27.)**

### **STAIRCASE FALLS**

#### **Yosemite National Park, Calif.—1300 ft.**

Consists of a succession of minor falls of little appreciable height which drop over a series of ledges on the South Valley wall behind Camp Curry. The Ledge Trail between Camp Curry and Glacier Point crosses this stream. They are much reduced in volume by mid-season. (Ref. 23.)



1—Kaieteur Fall, British Guiana (Brekenridge, Black Star). 2—Snoqualmie Falls, Washington (courtesy Puget Sound Power and Light Co., Seattle). 3—Sutherland Falls, New Zealand (New Zealand Government Publicity photo). 4—Upper Yellowstone Fall (National Park Service, Yellowstone National Park). 5—Staubbach Fall, Switzerland (Ewing Galloway, N. Y.). 6—Gersoppa Falls, India (Ewing Galloway, N. Y.).

**KRIMMLER FALLS****Austria—1250 ft.**

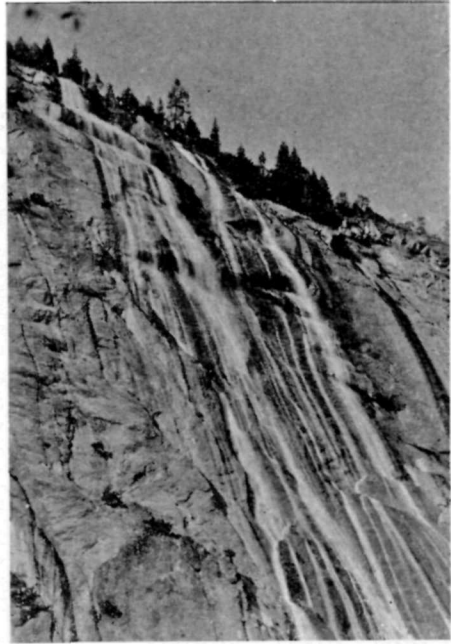
Approximately 50 miles southwest of Salzburg, a stream, formed by the discharge of the Krimml Glacier, descends in a series of three steps for the distance noted. The upper fall is said to be 460 feet high. References as to the total height of Krimmler Falls vary. One lists the total drop as 1450 feet, while another gives it as 2085 feet. (Ref. 1, 14, 27, 29.)

**ROYAL ARCH CASCADE****Yosemite National Park, California—1250 ft.**

In a literal sense this is not truly a fall. Just west of the Royal Arches, on the north side of the Valley, the waters of Royal Arch Creek descend as a swift ribbon of water over the steeply inclined, smooth granite which characterizes that location. Although it generally dries up by late summer it presents a highly pleasing note in Yosemite's spring water spectacle and is representative of a number of similar cascades in the Yosemite region and the adjoining High Sierra. (Ref. 23.)

**SILVER STRAND FALLS****Yosemite National Park, California—1170 ft.**

Formed as Meadow Brook, a small tributary of the Merced River, pours over the irregularly formed south wall of Yosemite Valley in a series of cascades. This stream, which drains a very small area, is never large at best. In consequence it usually disappears by mid-summer. Because of the limited time of its appearance it is often erroneously referred to by the name of Widow's Tears, "because they dry up so soon." This cascade may be best viewed from the east portal of the Wawona Tunnel in the spring, at which time it will be found in the angular recess between Stanford



Royal Arch Cascade

and Old Inspiration Points. (Ref. 4, 23, 27, 29, 37.)

**VALUR-FOS****Norway—1150 ft.**

This, an irregularly shaped fall consisting of numerous cascades, is numbered among the many waterfalls that adorn the fjords of Norway. (Ref. 23.)

**TUEEULALA FALLS****Yosemite National Park, California—1000 ft.**

One of the two principal waterfalls of the Hetch Hetchy area. It is found on the north wall of Hetch Hetchy Valley on a small stream which pours its waters into the Hetch Hetchy Reservoir. John Muir stated that it was the most graceful falls he had ever seen and compares it, in that sense, with Bridalveil of Yosemite Valley. He estimated its free descent as about 1000 feet. Matthes, however, lists its total descent at 1000 feet with an essentially clear leap of not more

than 600 feet. In full flood during May and June, it generally disappears by mid-summer. (Ref. 23, 24.)

### **STAUBBACH FALL**

**Switzerland—980 ft.**

One of the most widely known European waterfalls, this is found in the Sauterbrunnen Valley and is of the slender Yosemite type. It pours in a single leap from a jutting precipice, having a total height of 980 feet. (Matthes gives its height as 600 feet.) (Ref. 4, 23, 26, 27, 29, 37.)

### **GISSBACH FALLS**

**Switzerland—980 ft.** (Ref. 29, 37.)

### **TRUMMELBACH FALLS**

**Switzerland—950 ft.** (Ref. 27, 29, 37.)

### **WOOLOOMUMBI FALL**

**Australia—900 ft.**

Found on a branch of the Macleay River. This fall, according to Matthes, "not only leaps clear but shoots far out from the cliff owing to its momentum." (Ref. 4, 23.)

### **FIUME-LATTE FALLS**

**Italy—895 ft.** (Ref. 27.)

### **REMBISDEL-FOS**

**Norway—893 ft.** (Ref. 27.)

### **VETTIS-FOS**

**Norway—853 ft.**

This is another of the many falls of the Norwegian fjords which is outstanding in that its height represents an essentially clear leap. (Ref. 4, 12, 23, 29, 37.)

### **KING EDWARD VIII FALLS**

**British Guiana—840 ft.** (Ref. 27, 37.)

### **GERSOPPA FALLS**

**India—830 ft.**

This, most famous of India's falls, is found on the Sharvati River which descends over a cliff 830 feet high

from the Deccan Plateau in the southern part of the peninsula. The stream is over 200 feet wide and forms four separate, scenic falls which drop from various levels known as the Raja, the Roarer, the Rocket, and La Dame Blanche (White Lady). The first, which makes an essentially clear leap from the brink of the cliff, is the highest. The latter is considered the most beautiful, being characterized by lacy cascades which stream over the rocky precipice. (Ref. 4, 23, 27, 28.)

### **BASASEACHIC FALL**

**Mexico—827 ft.**

Estimates of the height of this fall range from 827 to 986 feet. Matthes states that "in the brief spring season this fall rivals the upper Yosemite in scenic splendor." It makes an essentially clear leap and is found in the Sierra Tarahumara in the State of Chihuahua. (Ref. 4, 23.)

### **BELLA-COOLA FALL**

**British Columbia—800 ft.**

Found in the upper Bella-Coola Valley is this little known but great leaping fall which, according to Matthes, is "800 feet, possibly 1000 feet high." (Ref. 4, 23.)

### **BIRD WOMAN FALLS**

**Glacier National Park, Montana—750-800 ft.**

One of the best-known falls of Glacier National Park. They are readily observed from the Going-to-the-Sun Highway approaching Logan Pass from the west.

### **KAIETEUR FALL**

**British Guiana—741 ft.**

Found on the Potaro River, in an isolated section of this region, this fall, according to Matthes, is "one of the highest falls produced by a river of considerable size." At the brink of the fall, the Potaro is 400



feet wide. Its waters flow lazily to this point, then descend in an almost perpendicular water curtain for 741 feet, which is similar, but on a larger scale, to Vernal Fall in Yosemite National Park. At its base, enveloped in a constant cloud of mist and spray, is a foaming cataract which descends rapidly to increase the total drop to about 800 feet. (Ref. 4, 6, 23, 27, 28.)

### **MARMORE'S CASCADE**

**Italy—700 ft.**

One of the famous European waterfalls. It is found near Terni on the Velino River, a tributary of the Nera. It descends an estimated distance of nearly 700 feet by a series of three falls (the first being 330 feet high) "from a tree-bordered cliff into a rocky cauldron, whence it rushes over huge boulders and through narrow gorges to make a truly exquisite picture." (Ref. 28.)

### **FAIRY FALLS**

**Mt. Rainier National Park,  
Washington—700 ft.**

Although the highest in Mount Rainier National Park, these are but little known to the many visitors who frequent that region. They are found on upper Stevens Creek and the total descent consists of three drops. (Ref. 27, 29, 37.)

### **TAUERN**

**Austria—660 ft. (Ref. 29.)**

### **FEIGUM-FOS**

**Norway—656 ft. (Ref. 29.)**

### **MULTNOMAH FALLS**

**Oregon, U.S.A.—650 ft.**

This is one of the most famous falls in the United States and is well known to those who have driven along Oregon's renowned Columbia River Highway. It is fed by Multnomah Creek, one of the many streams that rise upon the slopes of Mount

Hood, and descends in two drops—the upper being 541 feet and the lower being 79 feet. (Ref. 23, 27.)

### **SKYKIA-FOS**

**Norway—650 ft. (Ref. 37.)**

### **MARADALS-FOS**

**Norway—650 ft. (Ref. 29, 37.)**

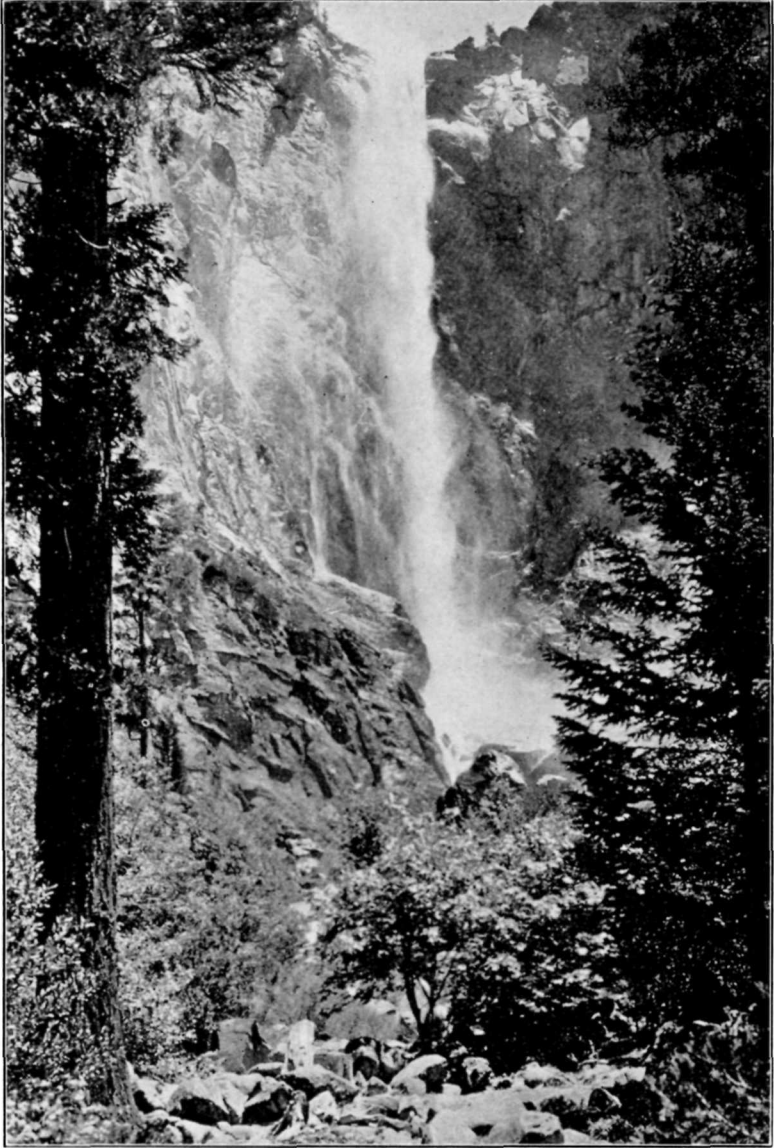
### **MALETSUNYANE FALLS**

**Basutoland, South Africa—630 ft.  
(Ref. 29, 37.)**

### **BRIDALVEIL FALL**

**Yosemite National Park, Calif.—620 ft.**

Formed by Bridalveil Creek, a tributary of the Merced River, this fall descends from the lip of a V-shaped canyon, which has been eroded by the stream, dropping over a vertical precipice to within 230 feet of the Valley floor. It is one of the finest examples of a free-leaping waterfall. In the spring and early summer the melting snow, in that section of the Yosemite upland which it drains, swells its volume to considerable size and a large area nearby is bathed in continual mist as the torrent dashes into the pool and upon the rocks at the base of the cliff. The delight of photographers is the series of rainbows which are formed in the afternoon as the sun strikes this spray. As summer wanes, and the snow above the rim disappears, the volume of this fall becomes appreciably less. By late summer it generally assumes the veil-like form indicated by its name (applied by Warren Baer, editor of the *Mariposa Democrat*, in 1856). In the autumn, when its volume is still further reduced almost to a misty spray, its waters are occasionally wafted upward by a sudden updraft from the Valley floor. The Indian name for this fall—Pohono or "puffing winds"—refers to that feature. (Ref. 10, 23, 27, 33.)



Bridalveil Fall (Courtesy of the Yosemite Park and Curry Co.)

*Photo by Ansel Adams*

**TWIN FALLS****British Columbia—600 ft.**

Like Takakkaw Falls, these are located in the upper Yoho Valley. Matthes states that they are "said to be about 600 feet high." (Ref. 4, 23.)

**TENAYA CASCADE****Yosemite National Park, California—600 ft.**

Found at the head of Tenaya Canyon. It is an impressive ribbon cascade of considerable volume. It is almost unknown among the waterfalls of Yosemite because of its inaccessible location. (Ref. 23.)

**NEVADA FALL****Yosemite National Park, Calif.—594 ft.**

This represents the first of the series of steps known as the "giant's stairway" by which the Merced River descends from Little Yosemite to Yosemite Valley itself. Here the Merced descends 2000 feet within a distance of 1½ miles and, in addition to Nevada Fall, includes Vernal Fall (317 feet) as well as numerous minor cascades and rapids. Nevada is one of the principal and most famous waterfalls in the Yosemite region and, although its volume assumes prodigious proportions in early summer when the Merced is fed by rapidly melting snow, it retains much of its interest throughout the year. It rushes through a narrow channel at the lower end of Little Yosemite Valley, writhing over the brink to leap clear of the almost sheer upper section of the precipice to dash upon the steeply inclined granite apron below. Yo-wiye (twisted fall) is its Indian name, referring to the stream as it writhes through the narrow cut at the brink. (Ref. 10, 23, 27, 28, 29, 33, 37.)

**RJUKAN-FOS****Norway—555 ft.****BOWEN FALLS****New Zealand—550 ft.**

As a companion to Sterling Falls, both of which have a volume similar to Illilouette Fall in Yosemite National Park, these descend as a parted curtain into the waters of Milford Sound on the southwest coast of the lower island. (Ref. 23, 27.)

**VORING-FOS****Norway—535 ft.**

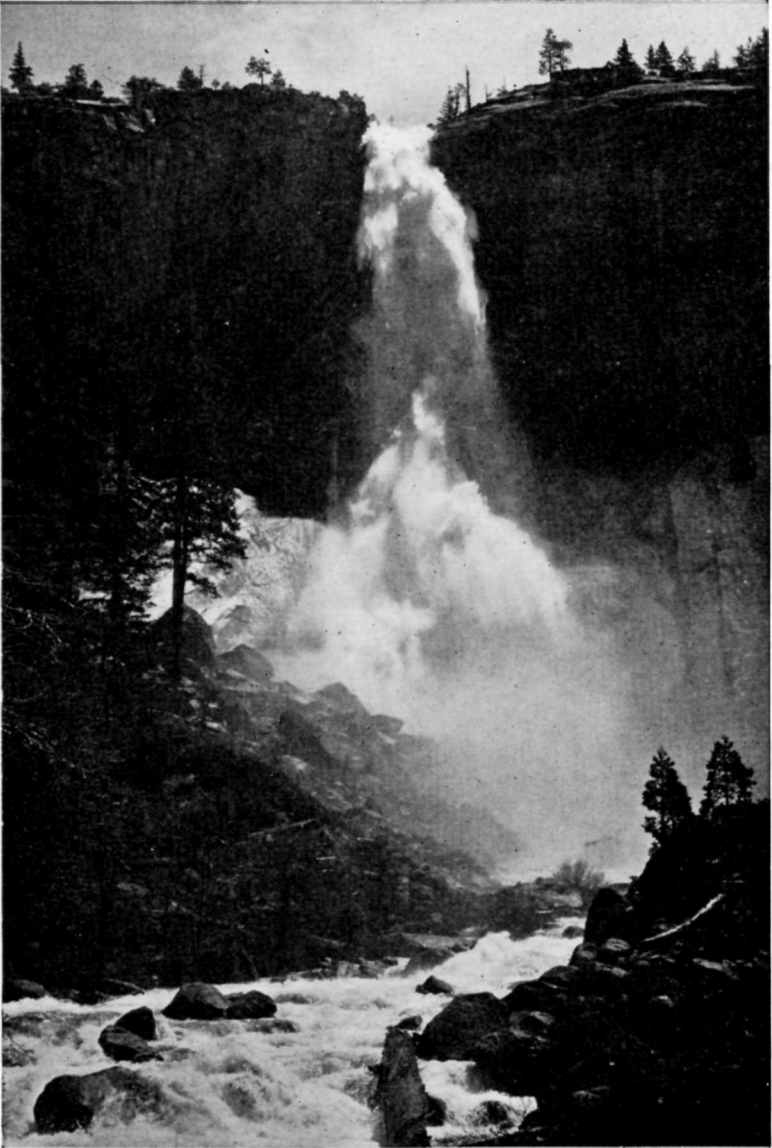
Although Matthes states that it "makes an almost unbroken descent of 850 feet," the majority of references list it as 535 feet high. It is one of many waterfalls found in the fjords of the Norwegian coast. (Ref. 23, 27, 29, 37.)

**AFDAL-FOS****Norway—525 ft. (Ref. 27.)****SKJAEGGELDAL-FOS****Norway—525 ft. (Ref. 27, 29, 37.)****STERLING FALLS****New Zealand—504 ft.**

In a fairly regular leap these descend into the waters of Milford Sound on the southwestern shore of the South Island. It is a companion of Bowen Falls. (Ref. 23.)

**CASCADE FALLS****Yosemite National Park, California—500 ft.**

Consists of a series of beautiful cascades by which Cascade Creek, a tributary of the Merced River, descends over the rugged north slope in the lower section of Yosemite Valley. It is approximately three miles above Arch Rock Entrance Station. Nearby is the smaller Wildcat Falls. (Ref. 23.)



Nevada Fall (Courtesy of the Yosemite Park and Curry Co.)

*Photo by Ansel Adams*

**MARINA**

**British Guiana—500 ft.** (Ref. 37.)

**HILAWÉ FALLS**

**Hawaiian Islands—500 ft.**

Found in the northern part of the island of Hawaii, these falls, said to leap fully 500 feet, are visible from Waipio Bay. (Ref. 23.)

**STUIBENFALL**

**Austria—500 ft.**

Found in the Otztal, a mountain range in the eastern Alps in the southern portion of the Tyrol. Its descent is broken into a series of leaps. (Ref. 27.)

**STIMSON FALLS**

**Philippine Islands—500 ft.**

This cataract which, according to the National Geographic Magazine (Sept., 1930), makes a total descent for an estimated distance of 500 ft. is composed of a series of cascades. It was found in the remote jungles of northern Luzon by members of the Sixth Photographic Section, U. S. Army, while on a flight over the region, who named it for Hon. Henry L. Stimson, then Governor General of the Philippines. (Ref. 27.)

**GASTEIN FALLS**

**Austria—487 ft.**

Located near Salzburg, Austria, the total height is divided into two parts. The upper fall drops 207 feet while the lower is characterized by a descent of 280 feet. (Ref. 27, 37.)

**TOSA FALLS**

**Italy—470 ft.**

The total descent, as noted above, is broken into three specific cascades. (Ref. 27.)

**TEQUENDAMA FALL**

**Colombia—456 ft.**

Although less in height but greater in volume this is somewhat similar

in appearance to Nevada Fall in Yosemite National park. (See National Geographic Magazine, July, 1926 and Oct., 1940 for illustrations.) It is found but fifteen miles west of Bogota, the capital of Colombia, where the Bogota River hurls itself over the sheer precipice in its path. (Ref. 22, 23, 27, 28.)

**KING GEORGE CATARACT**

**Cape Province, South Africa—450 ft.** (Ref. 27, 37.)

**HERVAL CASCADES**

**Brazil—400 ft.** (Ref. 27, 37.)

**AUGHRABIES or HUNDRED FALLS**

**South Africa—400 ft.** (Ref. 29.)

**AKAKA FALLS**

**Hawaiian Islands—400 ft.**

North of Hilo, and above Honomu, on the island of Hawaii are found these falls which, according to Matthes make "a free leap of about 400 ft." (Ref. 23.)

**ILLILOUETTE FALL**

**Yosemite National Park, Calif.—370 ft.**

Formed as the creek of the same name, which is the largest of the tributaries of the Merced River, plunges from its hanging valley into a narrow gorge. Although viewed from a point on the Vernal Fall trail above Happy Isles the position of the stream with respect to the narrow, confining walls of its canyon is such that its beauty cannot be properly appreciated. This fall is most advantageously viewed from points on the "Eleven Mile Trail" which passes from Happy Isles to Glacier Point via Vernal and Nevada Falls. (Ref. 23, 27, 29, 33, 37.)

**HORWICK FALLS**

**South Africa—364 ft.** (Ref. 27.)





Illilouette Fall

### **GRANITE FALLS**

**Mt. Rainier National Park, Washington—350 ft.** (Ref. 27, 29, 37.)

### **SCHLEIERFALL**

**Austria—330 ft.** (Ref. 27, 29.)

### **WALDBACHFALL**

**Austria—330 ft.**

The total descent, as noted above, is made up of three drops. (Ref. 27.)

### **CASCADE d'OURSIERE**

**France—328 ft.** (Ref. 27.)

### **VERNAL FALL**

**Yosemite National Park, Calif.—317 ft.**

One of the two principal steps in the "giant's stairway" by which the Merced River descends from Little Yosemite to Yosemite Valley proper. Here the river, approximately 80 feet wide during early summer when it

has the greatest volume, descends over the brink of a broad, vertical cliff in the form of a translucent undivided curtain of water. In the pool and upon the rocks at its base the falling waters are churned into filmy spray which bathe the canyon below the fall in a constant cloud of mist, thus accounting for the name of the Mist Trail, a narrow, rocky footpath by which one reaches the brink of this fall from the main horse trail at Register Rock. Upon the nearby rocky canyon walls grow many interesting plants and the vegetation in the vicinity is kept constantly fresh and green by moisture from the falls. It was this fact that prompted L. H. Bunnell to apply the name, Vernal, in 1851. The Indians knew it as Yan-o-pah or "little cloud," referring to the mist already mentioned. (Ref. 10, 23, 26, 27, 28, 29, 33, 37.)

### **GRAND FALLS**

**Labrador—316 ft.**

Located on the Hamilton River, approximately 300 miles from the coast, these have a total width of about 200 feet. (Ref. 4, 27, 29, 34, 37.)

### **VIRGINIA FALLS**

**North West Territory, Canada—316 ft.** (Ref. 27, 37.)

### **YELLOWSTONE FALL (Lower)**

**Yellowstone National Park, Wyoming—310 ft.**

Although exceeded by many others in height and volume the nature of its surroundings makes this one of the most impressive waterfalls in the world. Located in the Grand Canyon of the Yellowstone River, which makes two impressive leaps within slightly less than  $\frac{1}{2}$  mile (upper fall is 109 feet high), the beauty of this impressive fall is enhanced by the varied hues of the bordering canyon walls. (Ref. 23, 26, 27, 28, 29, 32, 37.)

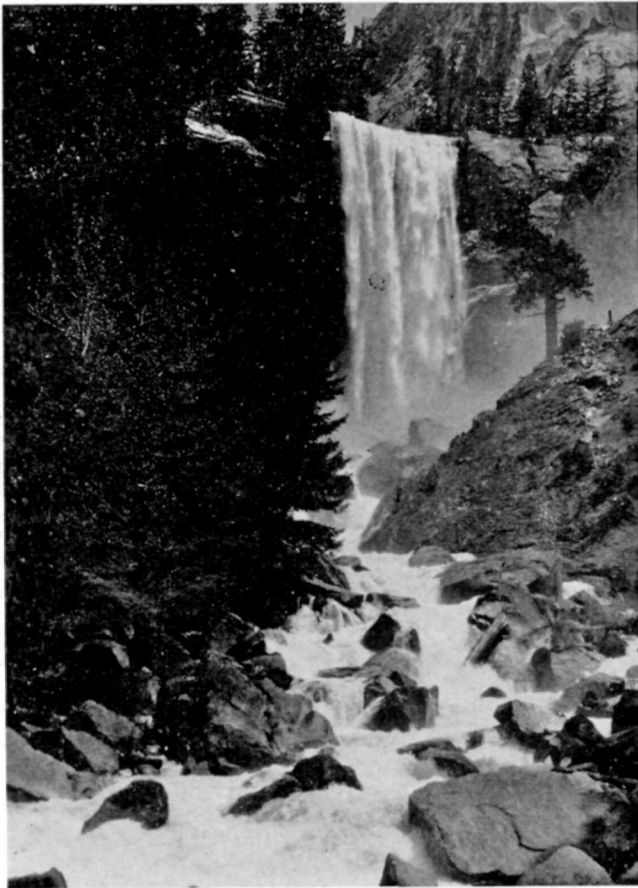
**SLUISKIN FALLS**

**Mt. Rainier Nat'l Park, Washington  
—300 ft.**

On the Paradise River which has its source in the small glacier of the same name. (Ref. 27, 29, 37.)

**CHAMBERLAIN FALLS**

**British Guiana—300 ft. (Ref. 27, 29,  
37.)**

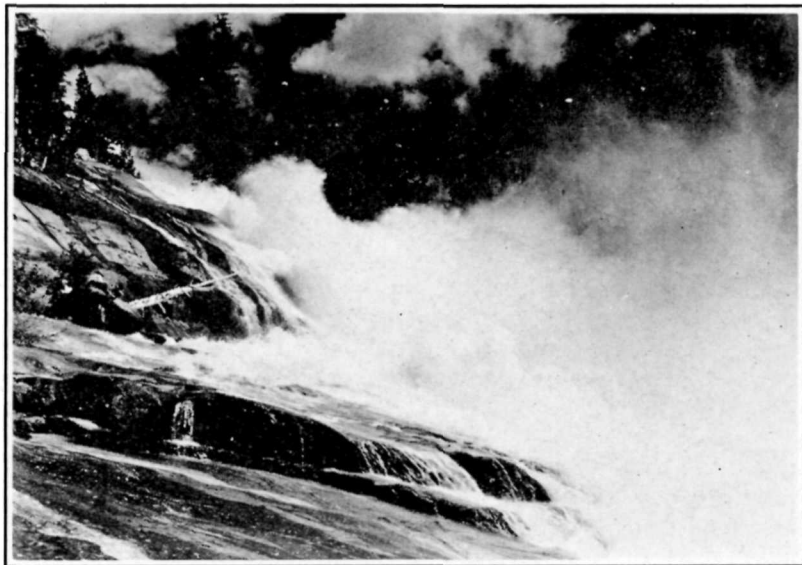


Vernal Fall

### OTHER WATERFALLS CLASSIFIED AS TO HEIGHT

Among many additional smaller waterfalls are Barenfall, Austria—296 ft. (Ref. 29.); Reichenbach, Switzerland—295 ft. (Ref. 27, 29, 37); Ichi-No-Taki, Japan—276 ft. (Ref. 27); Snoqualmie Falls, Washington—270 ft. (Ref. 27, 29, 37); Seven Falls, Colorado—266 ft. (Ref. 29, 37); Montmorncy Falls, Quebec—265 ft. (Ref. 27, 29); Detti-fos, Iceland—257 ft.; Fall Creek Falls in the Cumberland Mountains of Tennessee which are said to be the *highest in eastern United States*—256 ft. (Ref. 30); Schleirfall, Austria—250 ft. (Ref. 27, 29); Harsprang, Sweden—246 ft. (Ref. 29, 37); Kegon-No-Taki, Japan—246 ft. (Ref. 27, 35); Handegg, Sweden—240 ft. (Ref. 27, 29); Taughannock Falls, New York—215 ft. (Ref. 27, 29, 37); Foyers, Scotland—205 ft. (Ref. 29); Cascade of

Dianzundu, Port. West Africa—200 ft. (Ref. 26); Comet Falls, Mt. Rainier Nat'l Park, Washington—200 ft. (Ref. 29, 37); Shoshone Falls, Idaho—200 ft. (Ref. 26, 27, 37); Kesselfall, Austria—196 ft. (Ref. 29); Twin Falls, Idaho—180 ft. (Ref. 26, 27, 37); Narada Falls, Mt. Rainier Nat'l Park, Washington—168 ft. (Ref. 26, 27, 37); Cascade de Couz, France—164 ft. (Ref. 27); Gullfoss, Iceland—150 ft. (Ref. 20); Handol, Sweden—148 ft. (Ref. 26, 27, 37); Tower Falls, Yellowstone Nat'l Park, Wyo.—132 ft. (Ref. 27, 32); Myitnge Falls, Burma—131 ft. (Ref. 27); Kerka Falls, Yugoslavia—130 ft. (Ref. 29); Scale Force, England—120 ft. (Ref. 27); Upper Yellowstone Fall, Yellowstone Nat'l Park, Wyo.—109 ft. (Ref. 27, 29, 34, 37); and Schaffhausen, Switzerland—100 ft. (Ref. 37.)



Waterwheel Falls on the Tuolumne River

(See page 4)

**WATERFALLS OF VOLUME AND POWER****NIAGARA FALLS****U. S. and Canada—158 to 167 ft.**

Discovered by Father Hennepin in 1678 this is, perhaps, the most famous cataract in the world. Millions have seen it but even to those who have not had that good fortune it is a symbol of tremendous power because of the thousands of words that have been written about it and the countless pictures of it that have been circulated throughout many years. It lies between Lake Erie and Lake Ontario, and is bisected by the Canadian-United States boundary. Near the brink the river is divided by Goat Island. Thus, but 6% of the water is diverted into that portion of

the channel which leads to the American Falls, 167 feet high and about 1000 feet wide. The Canadian Falls, which carries the bulk of the water, is in the form of a great horse-shoe 158 feet high and about 3000 feet wide. The total width, including Goat Island, is approximately one mile. Although not as high as either Victoria or Iguassu, Niagara surpasses both of these in volume, visibility and opportunity for general study and the charm of its aesthetic beauty is not marred by the aspect of its tremendous power. In addition, unlike either of its rivals, there is little fluctuation in volume through the seasons and in winter it is embroidered with icy lacework on a grand scale. (Ref. 26, 27, 28, 29, 37.)



Niagara Falls (Courtesy of Niagara Falls Chamber of Commerce)

*F. O. Seed*



Victoria Falls (Selchow, Black Star)

## VICTORIA FALLS

**British South Africa—256 to 343 ft. high.**

Discovered by David Livingstone in 1855, these great falls are located in the heart of Africa, about midway in the course of the Zambesi—"the greatest river in the world which casts itself in full volume over a precipice" (*Nat'l Geog. Mag.*, July, 1926). At this point the mile wide, regal Zambesi, with a thunderous roar, abruptly hurls itself into the narrow confines of a deep chasm at right angles to the river's course. The opposite side of this chasm is but 80 to 240 feet removed from the precipice over which the river pours and the churning waters send up clouds of spray which rise high into the air, and which can be seen for many

miles. A narrow channel, little more than 100 feet wide, provides the only means of escape for the imprisoned waters which here are characterized by great rapids and whirlpools of tremendous force. Below this gorge the river changes direction several times as it rushes through a narrow canyon on its way to the Indian Ocean.

It is higher than either Niagara or Iguassu. At the brink of the falls the waters of the Zambesi are diverted into four channels by three islands, somewhat as Goat Island diverts Niagara's waters. Although magnificent at any time the volume of the Zambesi varies greatly between the wet and dry seasons. During the flood period the clouds of spray are so dense that it is impossible to properly observe and appreciate the spectacle. (Ref. 26, 27, 28, 29, 37.)

## IGUASSU FALLS

**Brazil and Argentina—210 to 230 ft. high.**

This, the third in the triumvirate of the world's most powerful cataracts, although smaller in volume than either Niagara or Victoria, has greater breadth and by many is considered the most picturesque. It is found in the heart of South America on the Iguassu River at a point where the boundary of Brazil merges with that of Argentina. About one half mile wide some distance above the falls, the Iguassu River broadens as it approaches its great precipice which, including the numerous islands which divide the stream into a number of watercourses has a total width of nearly two miles. Generally speaking, however, there are two principal channels. The narrower and deeper forms the Brazilian and Union Falls, while the latter, after

describing a great arc on the Argentine side, drops in a series of two leaps to form San Martin Falls. The greatest volume of water passes over Union Falls (213-230 feet high) which lies partly in Brazil and partly in Argentina. San Martin Island, which occupies a position comparable to that of Goat Island in the case of Niagara, forms the main division between the two principal sections of this cataract. Thus it prevents a comprehensive view of the entire fall from any one point. (Ref. 26, 27, 28, 29, 37.)

## DRY FALLS

**Washington, Ghost of a Once Mighty Cataract.**

Although the information in this booklet is concerned with existing waterfalls, it is fitting that mention be made of a great cataract which in



Iguassu Falls (Ewing Galloway, New York)



its prime, thousands of years ago, undoubtedly surpassed any fall of the present day in majesty and power. Today its great precipice is dry. The mute splendor of the scene is awe-inspiring for it is 405 feet high and more than a mile wide—2½ times greater than the precipice of Niagara!

How was it formed and what caused its demise? Previous to the Ice Age the Columbia River followed a course essentially similar to that of the present day. Deeply imbedded in a broad valley it described a great arc in central Washington which has given rise to the term "big bend country" as applied to that area. With the advance of the ice cap to a point on the big bend plateau south of the upper arm of the Columbia's course, that portion of the river's

valley was engulfed by the glacier. Streams having their origin in the ice cap raced southward across the big bend plateau to merge in the southern arm of the Columbia's course before flowing west to the Pacific. The stream that formed the Grand Coulee and its great falls was the largest of these. With the retreat of the ice the original valley of the Columbia was vacated by the glacier, the waters deserted the temporary short cut across the big bend plateau and the Grand Coulee and its falls dried up and passed into history.

The Dry Falls, one of the most interesting geological phenomena in the world, is found about 25 miles south of the famous Coulee Dam, a short distance from Highway 49, in the State of Washington.

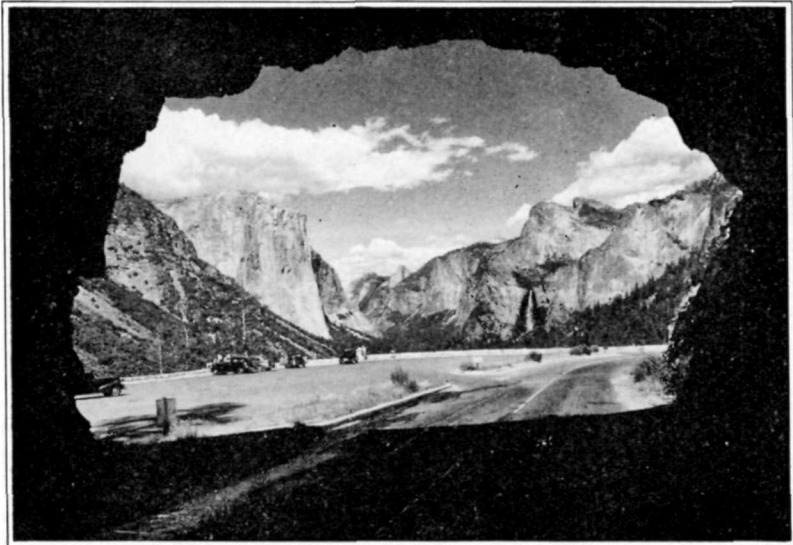


Dry Falls, State of Washington (Courtesy of Spokane Chamber of Commerce)

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Yosemite Valley from east portal of Wawona Tunnel

*N. P. S. photo by Ralph Anderson*

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