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MUNICIPAL RECORD

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SALT LAKE CITY, UTAH, FEBRUARY, 1927

VOL. 16 No. 2

TYPICAL FEBRUARY SCENE IN ONE OF OUR CANYONS

DEPARTMENTS OF CITY GOVERNMENT

Board of Commissioners

C. CLARENCE NELSON
Mayor and Commissioner of Water Supply and Water Works.
Room 114
515 Third Avenue. Residence, Was. 1669.
Office Was. 3122. Room 100.

T. T. BURTON ..... *Commissioner of Public Safety*
244 W. Seventh South.—Residence Was. 6846.
Office Was. 28. Public Safety Building.

CHARLES N. FEHR, *Commissioner of Public Affairs and Finance*
2101 Highland Drive.—Residence Hy. 4776.
Office Was. 1964. Room 211.

HARRY S. HUGUS *Commissioner of Parks and Public Improvements*
147 Ninth Avenue.—Residence Was. 6063.
Office Was. 1166. Room 112.

P. J. MORAN *Commissioner of Streets and Public Improvements*
1168 E. South Temple.—Residence Was. 2114.
Office Was. 1166. Room 100.

Heads of Departments

ALVIN REDDINGTON ..... *City Auditor*
1622 Lowell Ave.—Res. Hy. 2616-M.
Office Was. 8063. Room 202.

W. H. FOLLAND ..... *City Attorney*
1471 Michigan Ave.—Res. Hy. 2871-W.
Office Was. 7817. Room 414.

D. H. CANNON ..... *City Recorder and Editor Municipal Record*
1223 E. Seventh South Street.—Res. Hy. 1414.
Office Was. 3161. Room 266.

M. M. BEAVER ..... *City Treasurer*
1877 Ninth East.—Res. Hy. 119.
Office Was. 7716. Room 216.

ARTHUR J. LOWE ..... *Purchasing Agent*
141 East Second South.—Res. Was. 4141-J.
Office Was. 1902. Room 201.

H. C. JESSEN ..... *City Engineer*
232 A Street.—Res. Was. 9155-M.
Office Was. 113. Room 401.

H. K. BURTON ..... *Superintendent of Water Works*
121 Third Avenue.—Res. Was. 6795.
Office Was. 4481. Room 114.

R. S. SLEATER ..... *Superintendent of Parks*
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976 Wilson Avenue.—Res. Hy. 3899-J.
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DR. WILLARD CHRISTOPHERSON ..... *Health Commissioner*
666 Harvard Avenue.—Res. Hyland 2669.
Office Was. 617. Public Safety Bldg.

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181 Canyon Side.—Res. Was. 9862-J.
Office Was. 128. Public Safety Bldg.

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834 W. Second South.—Res. Was. 7112.
Office Was. 1618. Public Safety Bldg.

WALTER S. KNIGHT ..... *Chief of Fire Department*
179 Sherman Avenue.—Res. Hy. 2198.
Office Was. 883.

C. L. EVANS ..... *City Sexton*
City Cemetery.—Res. Was. 6297.

FRANK K. ARNOLD ..... *License Assessor and Collector*
741 Harrison Avenue.—Res. Hy. 1231-W.
Office Was. 1944. Room 210.

JOHN COOK ..... *Superintendent Warm Springs*
919 East Second South.—Res. Was. 7791.
Office Was. 1752.

Public Improvements and Other Statistics

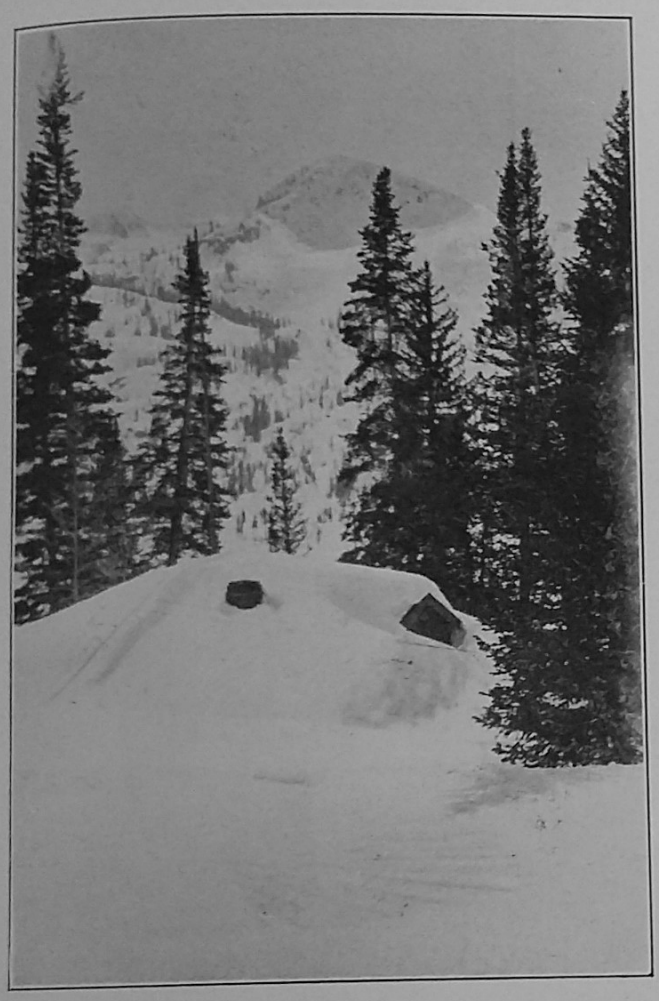
Latitude	North 40° 46′ 04″	
Longitude	West 111° 55′ 47″	
Elevation above sea, feet	4,916	
Estimated Population, 1926	146,666	
Area of City, square miles	52.3	
Miles of streets	424	
Miles of streets graded	424	
Miles of electric street railway	144	
Miles of streets paved	96.6	
Miles of public sewers	317.6	
Miles gas mains	317.6	
Miles of water mains laid	326.6	
Miles storm sewer	32.7	
Available water supply per day (av. gals.)	46,226,000	
Drinking fountains	41	
Water consumption, daily average, gallons per capita, 1925	179	
Number of White Way Street lights, 6.6 amp.	641	
Number of newspapers, daily	9	
Miles of paved sidewalks	439.9	
Miles of lighting districts	3.1	
Extreme length of Salt Lake, east and west	8.6 miles	
Extreme width of Salt Lake north and south	8.3 miles	

Number of 6.6 amp. arc lamps		668
Number of volumes in Free Public Library		135,518
Number of parks and playgrounds		31
Number acres in parks and playgrounds		1,815
Number public school buildings		47
Number of teachers in public schools		1051
Number of pupils of school age		32,401
Per cent in attendance		96.1
Value of school property		$7,000,000.00
Tax rate, state, mills		2.46
Tax rate, state schools, mills	1926	4.89
Tax rate, state high school, mills	1926	0.25
Tax rate, city, mills	1926	11.35
Tax rate, mosquito abatement	1926	0.25
Tax rate, city schools, mills	1926	9.75
Tax rate, county, mills	1926	4.60
Tax rate, state road, mills	1926	0.25
Total Tax rate, 1926, mills		33.50
Assessed valuation, 1926, Salt Lake City		$187,984,444
Number of fire alarm boxes		191
Number police boxes		71
Average annual precipitation, 50 years		16.33 inches
Average mean temperature, 50 years		51.6° F.

SALT LAKE IS ASSURED OF ABUNDANT WATER

Salt Lake is assured of an abundant water supply for the coming summer, all reports from the watersheds in the adjacent mountains indicate.

Unprecedented snowfall with admirable temperatures has been conducive to pre-



serving the precipitation until such time that it can be caught and stored with a minimum of loss.

Particularly at Brighton have conditions been favorable, reports reaching the water department show. On February 22 a stand of snow 94 inches deep was reported on the flats. Drifts, and there are an unusually large number of them this year, are correspondingly deeper.

With a far-sightedness that is commendable, Salt Lake City corporation is laying its plans for acquisition of additional water rights, to assure the ultimate increased population of the valley sufficient water without having to rely upon favorable weather conditions for it.

Attention is called to the recent application of 10,000 acre feet of water made by the city in the Echo canyon project—surplus waters of the Weber river.

While no immediate need is present for this water, priority rights should be established, in the opinion of the city fathers, and the application was made. Little difficulty will be experienced by the city in marketing the water until such time as it is needed by the water consumers of Salt Lake.

Returning to the most favorable reports from the observers at the watersheds, it is

significant to note that accompanying the heavy snowfall, snowslides and avalanches causing some damage have occurred.

The cooperative observers of the weather bureau in the three canyons, report snowfall and precipitation to the Superintendent H. K. Burton of the water department, after every storm. There are four such observers, as follows:

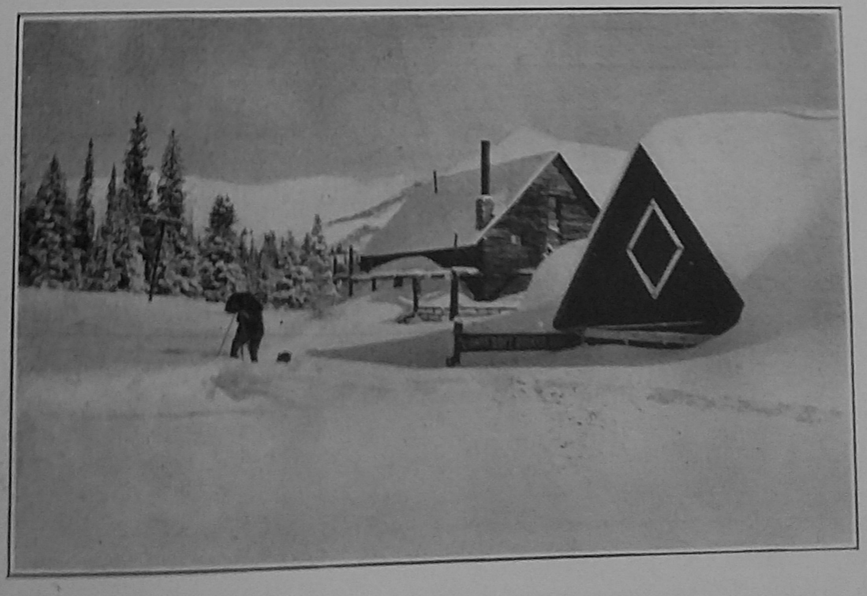
W. H. Staker, mouth of Cottonwood canyon; Harry A. Hammond, Brighton; S. G. Southers, Parleys canyon, Mountain Dell dam; and L. D. Allcock, at the head of City Creek canyon.

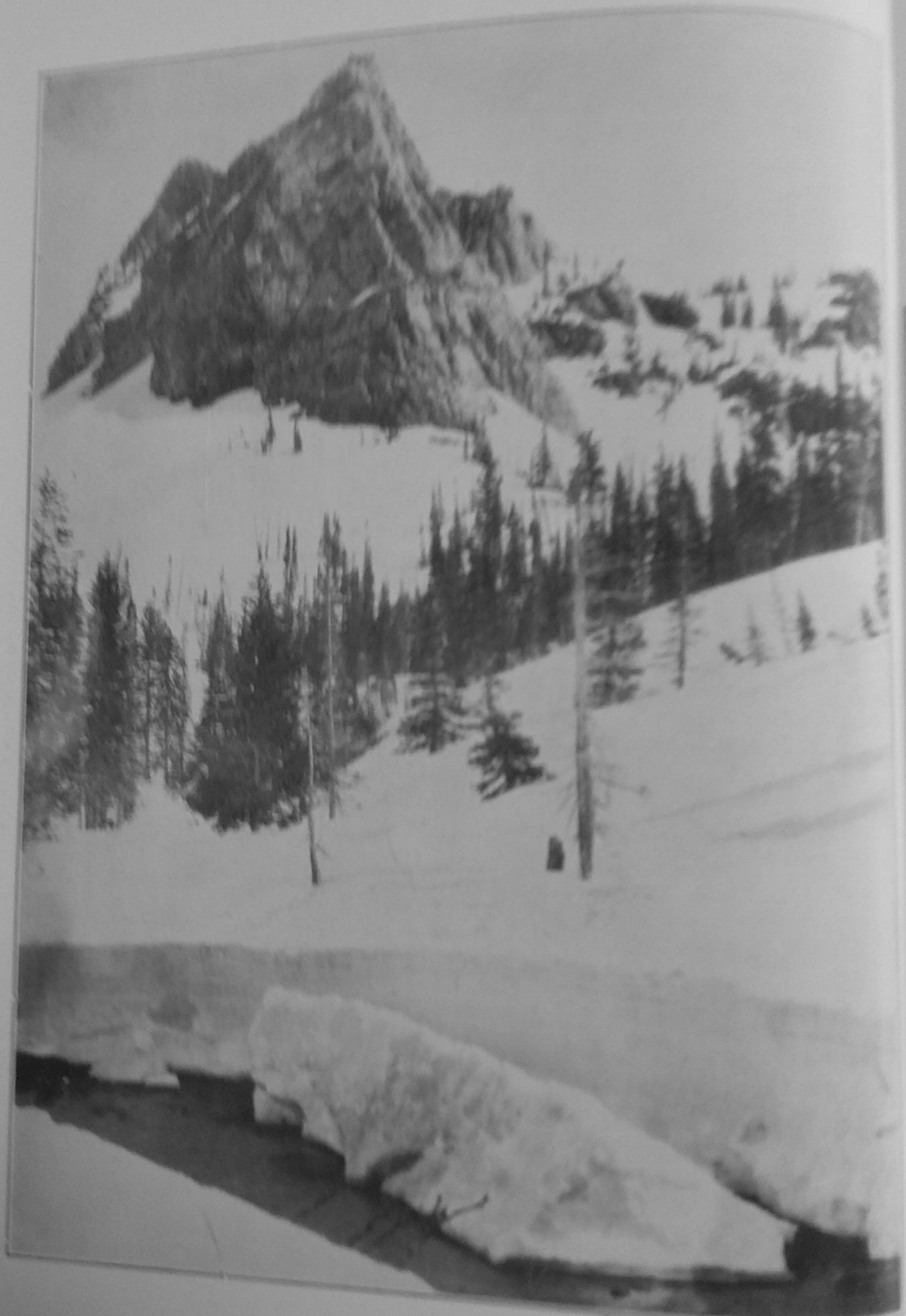
The following snowfall and precipitation figures have been compiled from their reports made during the months of November, December and January:

STATION	Month	Total Snowfall (Inches)	Precipitation (Inches)	No. of Days Having More Than .01 Inch Precipitation	Greatest Precipitation Within 24 Hours		Stand of Snow (Inches)	
					Date	Amount (Inches)	15th	End of Month
Mouth of Cottonwood	Nov.	6	2.94	Eight	27th	.81	None	None
Mountain Dell	Nov.	5	3.64	Ten	25th	1.5	1	2
City Creek	Nov.	7	2.99	Eleven	25th	1.35	None	None
Brighton	Nov.	75.5	8.82	Thirteen	27th	2.65	16	41
Cottonwood	Dec.	15	1.63	Eleven	22nd	.81	None	None
Mountain Dell	Dec.	27	1.40	Fourteen	12th	.4	12	12
City Creek	Dec.	26	2.15	Fifteen	12th	.77	12	11
Brighton	Dec.	34.5	2.61	Not Shown	12th	.56	Not given	44
Cottonwood	Jan.	14	1.11	Eight	11th	.3	None	None
Mountain Dell	Jan.	20.8	1.64	Nine	11th	.44	15	18
City Creek	Jan.	20.5	2.27	Eleven	11th	.68	15	18
Brighton	Jan.	62.5	4.77	Fourteen	20th	.9	46	60

The figures for February have come in intermittently but have not as yet been compiled by the weather bureau, but those received thus far in the water department show the most beneficial snows of the season.

Washington's birthday showed a stand of snow at ninety-four inches on the flats with drifts piled high at sometimes three times that depth.





WHAT THE TOURIST WANTS TO KNOW

To the tourist from the eastern and plains regions of the United States, the Wasatch mountains, when viewed for the first time, provide a distinct and never to be forgotten thrill. Few mountain ranges present such a majestic succession of lofty peaks and bold escarpments rising grandly from a flat valley floor as do the mighty Wasatch. Beginning in a low chain of hills in southern Idaho, the Wasatch mountains extend with southerly trend to a point east of Nephi, in Juab county, a distance of approximately 150 miles.

The Wasatch is the easternmost of that interesting type of mountains known as the "basin ranges," a series of tilted block mountains, whose general outlines are delineated by fractures along which more or less vertical movements have occurred, displacing the earth blocks unequally with relation to each other. The present Wasatch mountains are the deeply eroded, highly sculptured remnant of a huge earth block that has been successively elevated at its western margin along an extensive break in the earth's crust, known to science as the "Wasatch fault." The prominent western face of the range, that is such a striking topographic feature as seen from Salt Lake City, is the much modified scarp of the Wasatch fault. The total amount of displacement along this great rift in the earth's crust is not exactly known, but careful estimates show that it must be

Fig. 1. Young stream valley carved by Big Cottonwood creek in delta deposit near mouth of Big Cottonwood canyon. Successive levels of the stream indicated by the three groups of trees. White scar at base of mountain to left center is recent fault scarp. Old paper mill in lower right-hand corner.

several thousands of feet, the present total being the sum of many small movements occurring at widely separated intervals throughout a vast, almost inconceivable period of time. The uplifted mountain block, in reality, is a deeply dissected tilted plateau; the down-faulted block (Salt Lake valley) being now buried under thousands of feet of rock waste removed by erosion from the uplifted mountainous block to the east. The exact depth of the "valley fill" is likewise unknown, but a drill hole

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Fig. 2. Mouth of Little Cottonwood canyon from Wasatch boulevard. South fork mining of Little Cottonwood and north branch and terminal moraine of left canyon in middle distance. Note wedge shaped block in mountain dropped down by recent faulting, into both were cemented in ice foreground.

ern Wasatch, extending from Weber river north into Idaho; the Central Wasatch, opposite Salt Lake valley; and the Southern Wasatch, beginning at American Fork canyon and extending to Salt Creek canyon east of Nephi. The Bear river range east of Cache valley is considered by some as a branch of the Wasatch range, and by others as a distinct and separate range.

In that portion of the Wasatch opposite Salt Lake and Utah valleys, the mountains reach their culmination in height and grandeur. Here are the highest peaks and the most profound canyons. In order, from north to south, the prominent canyons in the Central Wasatch are: Big Cottonwood canyon, Little Cottonwood canyon, Bells canyon, Lone Peak canyon, Dry Creek canyon, Provo canyon, Rock canyon, Hobble Creek canyon, Spanish Fork canyon, Diamond Fork canyon, Soldier Creek canyon, Indian Creek canyon, and Santaquin canyon. Mt. Nebo, in Juab county, 11,900 feet in elevation, is the highest peak in the Southern Wasatch. Between Big and Little Cottonwood canyons are 11,115 feet in elevation; and Lone Peak, south of Little Cottonwood, is 11,251 feet in elevation. The highest peak in the range is Mt. Timpanogos, opposite Provo valley, with an elevation of 12,008 feet. Although these peaks, rising almost abruptly from the valley floor, are most impressive, they are not the highest peaks in the state, for Utah has at least eight peaks that rise above 13,000 feet in elevation, the highest being King's Peak, in the Uintah mountains, with an elevation of 13,498 feet.

An interesting feature of many of the canyons in the Central Wasatch is that they give evidence of their former occupancy by ice. During that distant epoch when ancient Lake Bonneville filled the basin region, glaciers existed at the heads of many of the canyons in the Wasatch mountains,

may be divided into three parts: the North-

elevation of 12,008 feet. Although these

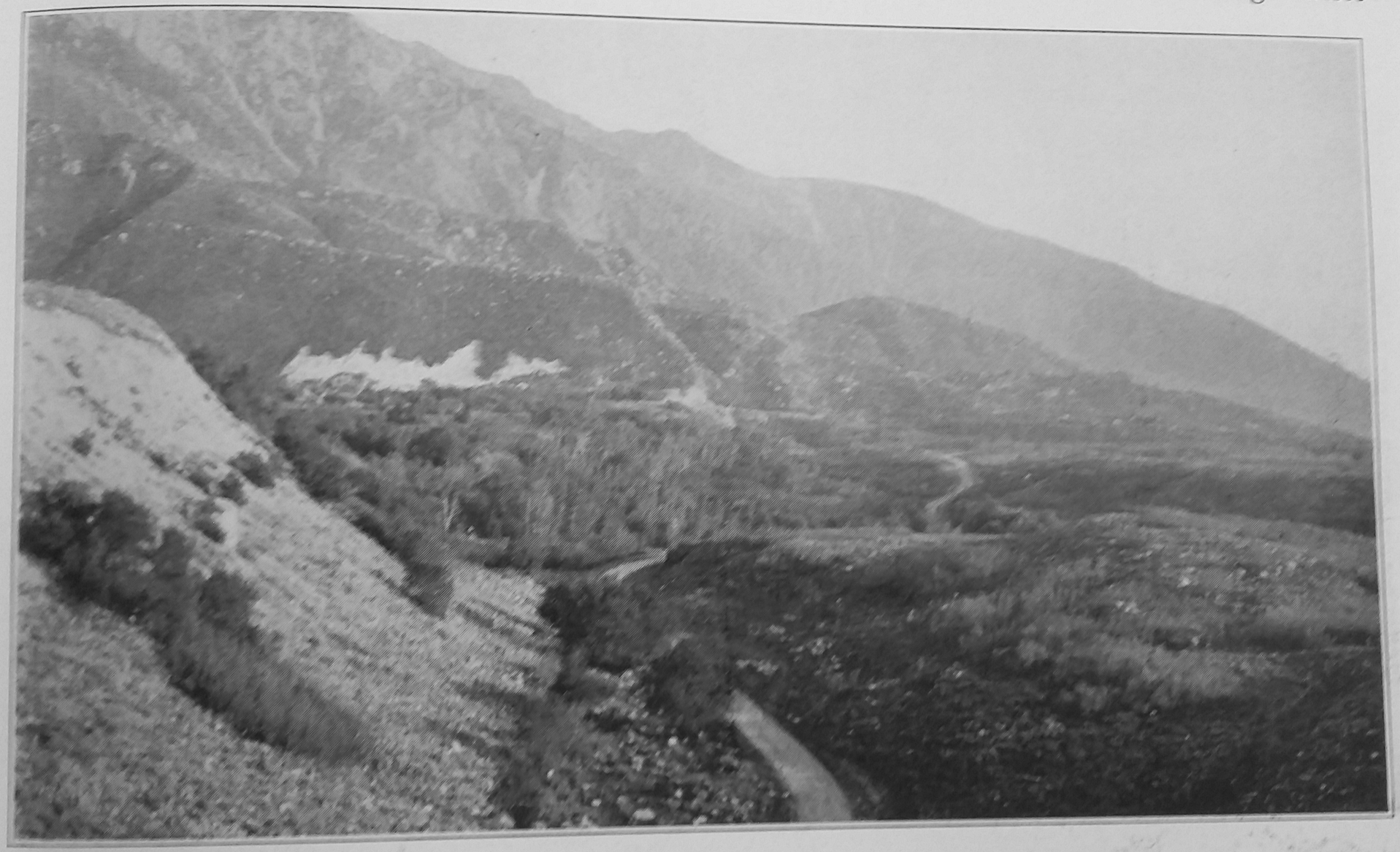

Fig. 2. Mouth of Little Cottonwood canyon from Wasatch boulevard. South lateral moraine of Little Cottonwood and north lateral and terminal moraines of Bell canyon in middle distance. Note wedge-shaped block in moraines dropped down by recent faulting; same fault scarp continued in left foreground.

peaks, rising almost abruptly from the val-

and in a few cases actually extended down the canyons to the valley margin. The work of these ancient ice masses is grandly displayed by the sculpturing—widening and deepening—of the canyons and by the enormous piles of rock debris, called moraines, left behind them. Exceptional opportunity is afforded in the Central Wasatch region to observe the effect and evidence of these extinct glaciers. This phase of the physiographic history of the Wasatch mountains has been given careful study by the United States Geological Survey, who have published a report by Wallace W. Atwood on "Glaciation of the Uinta and Wasatch Mountains," Professional Paper 61, from which the following descriptions in part are presented.

Bell or North Dry Creek Canyon

At the mouth of Bell, or, as it is sometimes known, North Dry Creek canyon, the first canyon south of Little Cottonwood, there is a series of symmetrical lobate moraines of magnificent proportions. (Fig. 3.) These morainic ridges extend almost a mile beyond the mouth of the canyon and rise nearly 500 feet above the highest Bonneville terraces and 700 feet above the stream bed at their western end. (See Fig. 2.) Seven hundred feet is not, however, the maximum thickness of drift at the mouth of this canyon, for the base of the formation is not exposed. The crests of the main lateral moraines slope gently westward, indicating approximately the surface slope of the ancient glacier near its end. From aneroid readings the last three-quarters of a mile of the crest was found to have a slope of 190 feet.

Within the main moraines, and probably while the ice yet occupied the upper part of the valley, waters accumulated and formed a lake. The fault scarp that crosses the lake flat exposes laminated clays and cross-bedded sands and gravels to a thickness of several feet. The waters rose in the intermoraine basin until it reached the pass located near the middle of the terminal moraine. The lake was then drained by the outlet stream (See Fig. 3) as it cut its gorge into the glacial material. The deposits made in this lake bury a part of the first recessional moraine and leave but 5 or 6 feet of the second rising above the lake flat. The third ridge is the most prominent recessional

Fig. 3. Near view of terminal glacial moraine at mouth of Bell canyon. Depression in left center marked by dark growth of vegetation was carved by overflow of waters ponded in a lake behind the moraine. Lone Peak in the distance.

al moraine in the lower part of the valley, rising 20 to 25 feet above the surrounding land and maintaining a strong ridgelike form between the main lateral moraines. The fourth recessional moraine is represented by a belt of glacial boulders rising 8 to 10 feet above its surroundings.

As the front of the glacier retreated the thickness of the ice in the valley became less, and at those stages when the minor frontal moraines that cross the valley were developed recessional lateral moraines were also made. These side moraines descend into the valley and, curving inward, join the recessional frontal moraines. This series of moraines is so well developed that the position and form of the lower portion of the glacier during successive stages of retreat are distinctly shown.

Above the moraines at the mouth of Bell canyon the valley is a great rock gorge. The form of this gorge and the smoothed condition of its bare rock walls suggest at every step the amount and vigor of the work done by the ice that occupied the gorge and built up the moraines at its lower end. The trail upstream crosses great, irregular masses of drift. The ascent is by a series of gentle reaches and abrupt rock ledges. Above each ledge the valley bottom is somewhat level or rolling. Lakes or old lake beds are of frequent occurrence. The stream descends by rapids or falls from one bench or step in the canyon to the next below.

The entire fall from the catchment basin to the mouth is about 4,470 feet, an average of nearly 1000 feet per mile. This very high gradient accounts for the vigorous ice action recorded on the rock surfaces throughout the upper portion of the valley and in the massive moraines at and near the mouth.

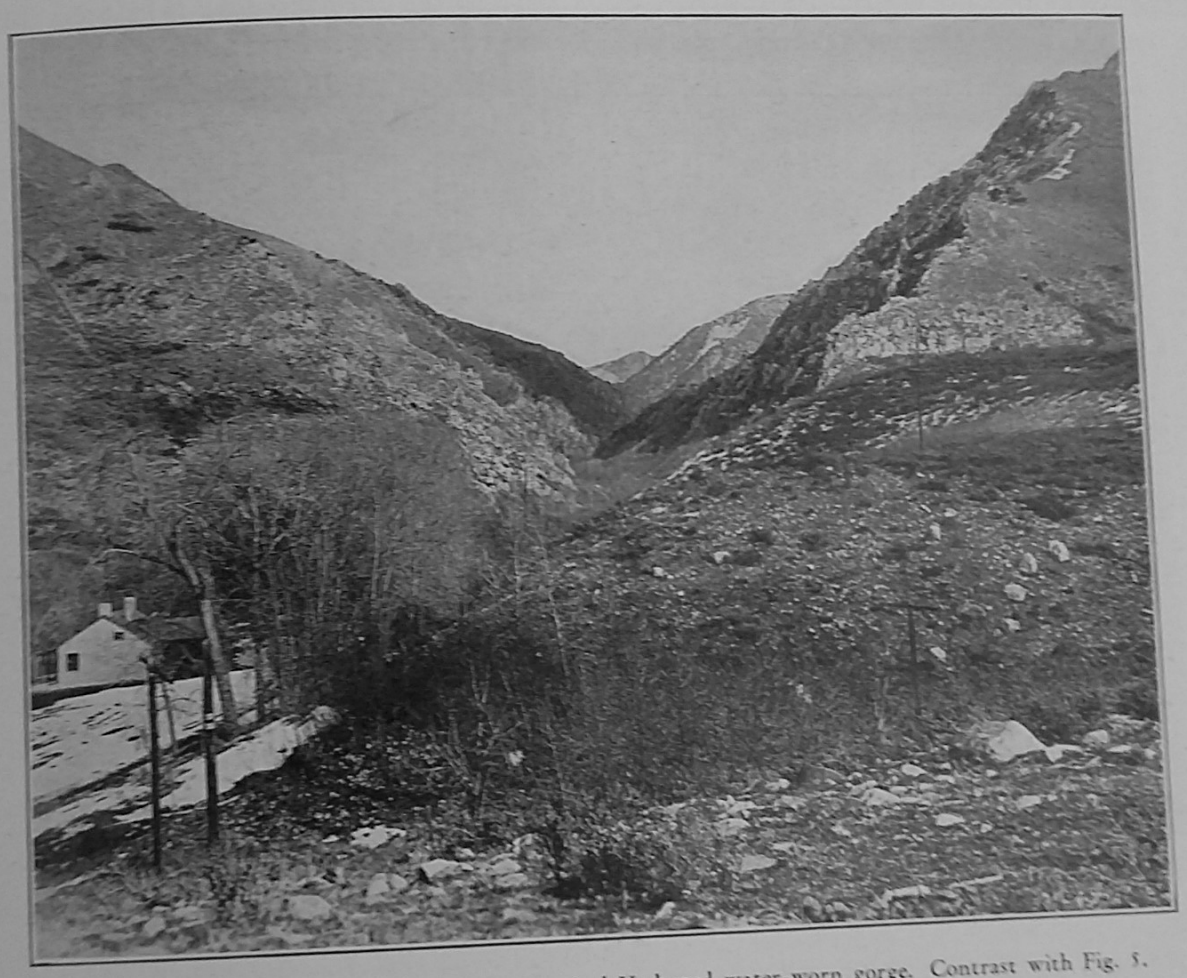

Fig. 4. Mouth of Mill Creek canyon. A typical V-shaped water-worn gorge. Contrast with Fig. 5.

The walls in the upper portion of the canyon are of white granite, and the immense amphitheatral catchment basin is hemmed in by granite peaks that rise to elevations between 11,000 and 12,000 feet. The upper limit of glaciation is clearly marked on the canyon walls at many places. The rugged, talus-clad summits present a sharp contrast to the smoothed and roche moutonnee surfaces below. The ice rose at many points within a few hundred feet of

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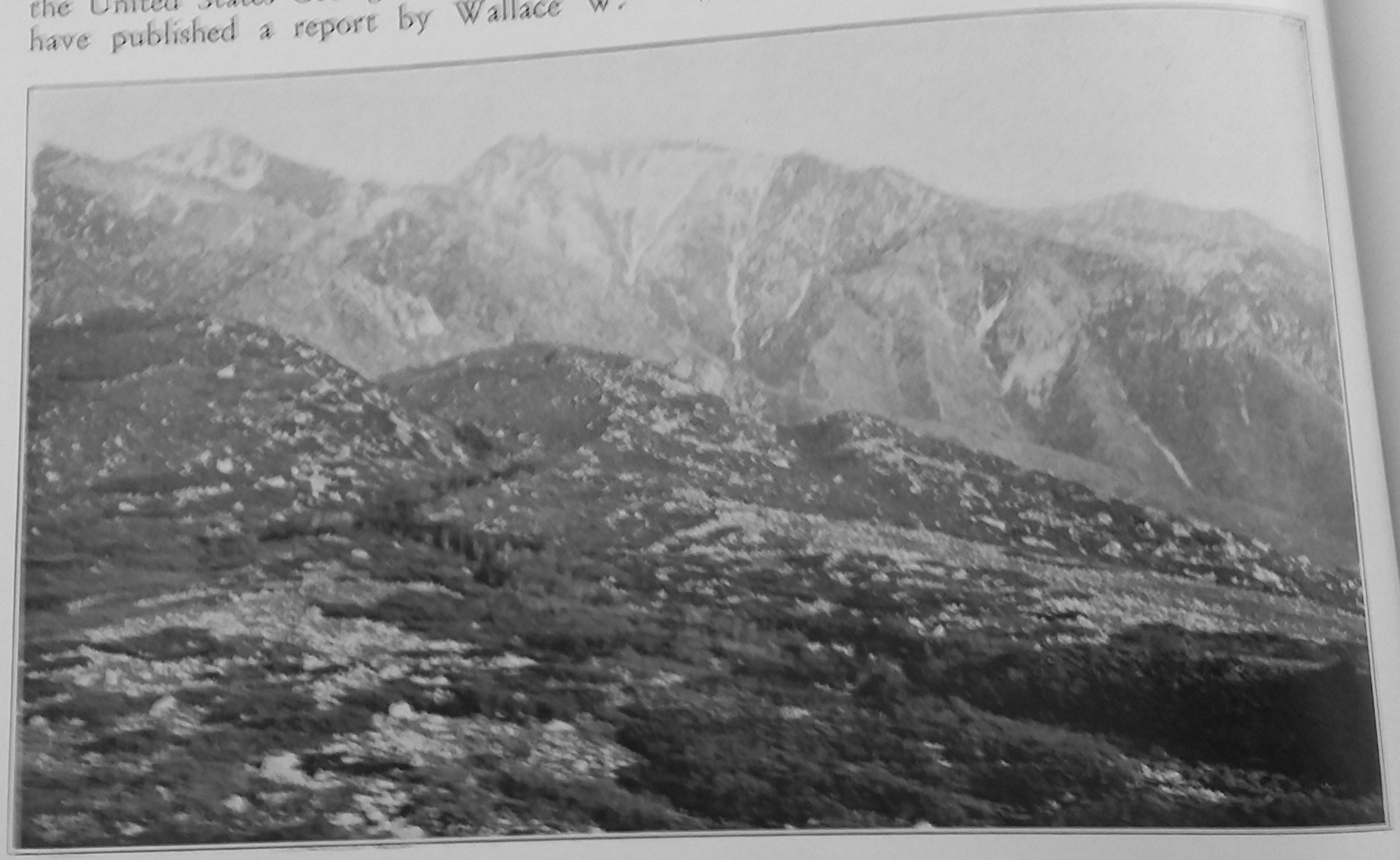

Fig. 5. Near view of terminal glacial moraine at mouth of Bell canyon. Depression in left center marked by dark growth of vegetation was carved by overflow of waters ponded in a lake behind the moraine. Lone Peak in the distance.

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Fig. 4. Mouth of Mill Creek canyon. A typical V-shaped water-worn gorge. Contrast with Fig. 5.

the top of the bounding walls. In the basin the upper limit of glaciation is not so well marked. Weathering and neve work in the higher altitudes has accomplished so much since the glaciers melted that the basin walls are rugged and heavily covered with talus. The general appearance in the basin suggests that, while the upper 1000 feet of Lone Peak was probably not covered during the glacial epochs, most of the mountains rose but 500 or 600 feet above the snow fields.

Lone Peak and the surrounding peaks are among the first summits which the moisture-bearing winds from the west met, and as there were large catchment basins on all sides of them the heavy precipitation of the glacial period was retained, and vigorous glaciers developed from this center. The catchment basin of Bell canyon is 2 miles long and about 1 mile wide.

If the region about Lone Peak could be pictured as it was during the ice age the view would be that of an immense snow field with rugged peaks rising above the white expanse, and six glaciers leading off in as many directions down the mountain valleys.

Postglacial and post-Bonneville faults border the west base of the mountains, crossing the moraines of five of the glaciers that reached the Bonneville level. See 2.) The offset or displacement varies the different faults and from place to in the same fault. Where the faults the moraines of Bell canyon a west facing escarpment shows a displacement over 100 feet, while an eastward-fac escarpment indicates a displacement about 15 feet. The distance between two fault lines varies from 50 to 60 fe up to as many rods. At the mouth of Cottonwood canyon (see Fig. 2) a has dropped in such a way as to form troughlike depression, bordered on eith side by precipitous faces.

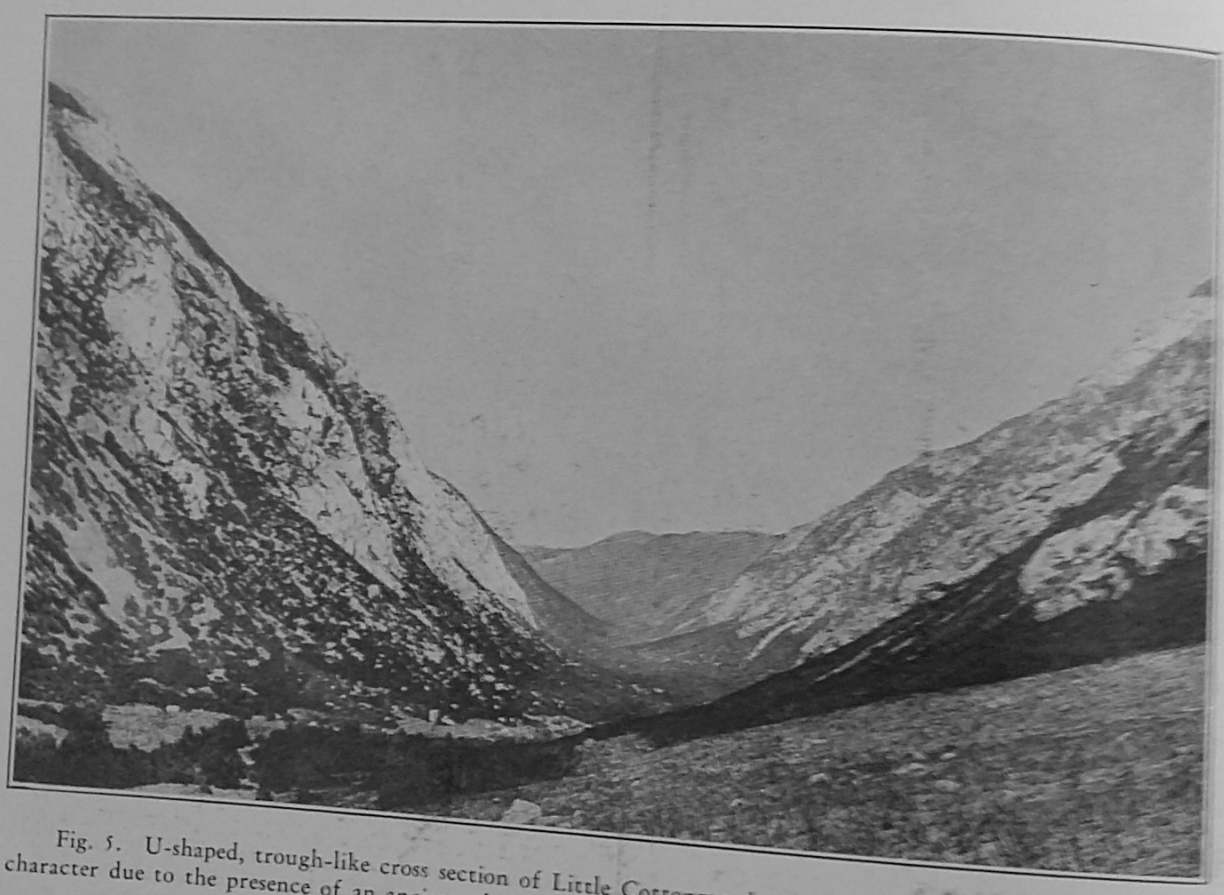

Fig. 5. U-shaped, trough-like cross section of Little Cottonwood canyon. Smooth steep walls and open character due to the presence of an ancient glacier. Contrast with Fig. 4 of an unglaciated canyon.

On the south side of Little Cottonwood valley, just west of the mountains, six distinct morainic ridges were recognized and mapped. On the north side of the valley but four well-developed ridges were determined. In the intervening area certain of the moraines are traceable by belts of large boulders. The partially buried moraines appear as ridges that contain many large boulders, and rise from 5 to 10 feet above the fluviatile deposits about them.

The main south lateral moraine is a beautifully symmetrical ridge with a narrow crest, at places not more than 8 or 10 feet wide. The surface of this moraine, as well as the surfaces of all the Little Cottonwood

moraines, is strewn with white granite boulders procured by the glacier in the lower part of its course. The crest of the main south lateral moraine rises 340 feet above the flood plain of the Little Cottonwood at the mouth of the canyon.

The north lateral moraine is not ridge-like, but is a great bank of drift lodged on the side of the mountain. The upper limit of the north lateral moraine material is at about the same elevation as the moraine crest south of the valley. The upper limit of the ice on this side is clearly shown by the upper limit of white granite boulders on the mountain slope.

The notable northward turning of the Little Cottonwood glacier after leaving the canyon may have been due in part to a depression in that direction, but may perhaps be entirely accounted for by the greater westward extension of the south wall of the canyon as compared with the north. The north wall ends fully half a mile upstream from the terminus of the south wall, and the ice may thereby have been allowed to deploy to the northward.

Since the ice left the region, and since the lake waters retreated, Little Cottonwood creek has cut a gorge 150 feet deep in the glacial and lacustrine material. The lowering of the base-level of the stream by the recession of the lake and the partial blocking of its waters by faulting have complicated the stream's history. The valley just west of the sunken fault block is a sharp V-shaped gorge, while above and below the faulting the valley is relatively broad and open.

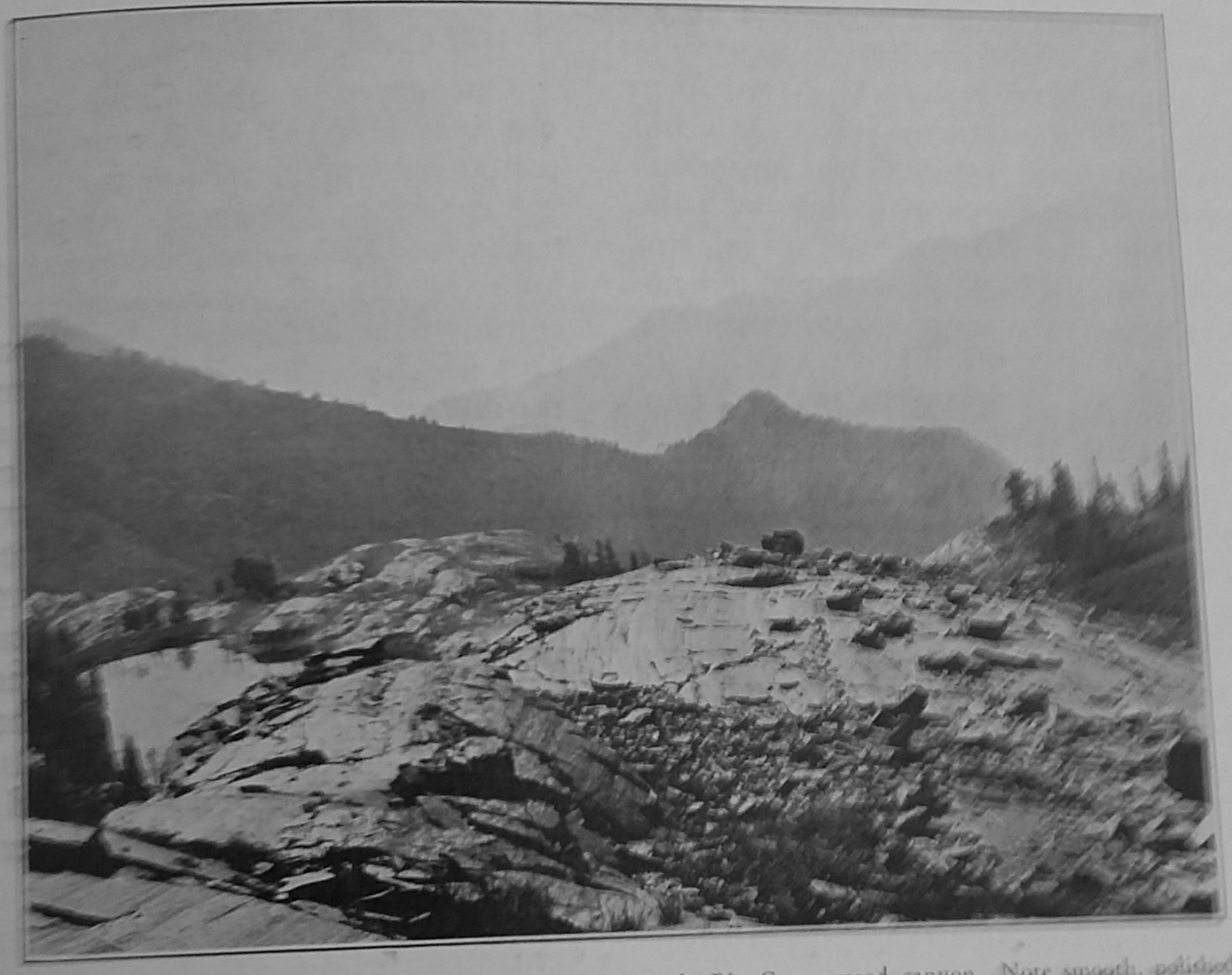

Fig. 6. Track of an ancient glacier in Mill B Fork, Big Cottonwood canyon. Note smooth, polished and grooved floor and scattered erratic blocks left by the melting ice. Lake Blanche in rock-scoured basin at left.

Big Cottonwood Canyon and Its Tributaries

As approached from the west, or the Bonneville basin, Big Cottonwood canyon does not appear to have been glaciated. Near the mouth of the gorge are two well-developed terraces associated with different levels at which the Bonneville waters stood (Fig. 1). These terraces are made up of stratified sand, gravel, cobbles, and boulders, the material growing coarser upstream. The lower terrace is 110 feet below the Bonneville terrace at the mouth of the can-

yon, but it rises gradually until it grades into the upper terrace.

During the maximum extension of Lake Bonneville a bay about 1½ miles long apparently extended up the lower end of Big Cottonwood Canyon. The slight rise in the surface of the alluvium is not too great a slope to carry delta deposits of material so heavy. The delta built in this bay was intrenched when the lake waters fell, so that a stream flat was developed. A second lowering of the lake caused the trenching of this stream flat, giving the second terrace. Still other terraces have been developed at lower levels.

In contrast to the smooth U-shaped form of Little Cottonwood canyon (Fig. 5) the Big Cottonwood gorge is rugged and somewhat V-shaped. Great cusps or points of rock project from the sides of the gorge, and pinnacled, rugged faces stand out as indications that glacier ice never moved down the valley.

At the mouth of Mill B Fork and a few rods below there are strong, fresh moraines, which rise fully 150 feet above the Big Cottonwood stream. The lower slopes of the valley of Mill B are relatively smooth and nearly free from talus and other debris resulting from rock weathering, while the higher slopes are notably rougher and are covered with talus and disrupted and disintegrated rock. The junction of these two types of slope topography is held to mark the upper limit of the ice which moved down the valley, and it would indicate that the maximum thickness of the Mill B glacier was between 500 and 600 feet. The rock surfaces in the basin of Mill B are notably striated, grooved, and polished, and the postglacial work is insignificant. (Fig. 6.)

In the amphitheatral basin the rock in the bottom is for the most part a hard quartzite, and yet there, at the very beginning of the action, this hard rock was wonderfully and beautifully polished, grooved, and striated. The stoss sides of prominences are, almost without exception, so smoothed that it is difficult to walk over them if they have much slope. At one place the trail, wide enough for a horse to walk on, is located in a great glacial groove. Overhanging surfaces are polished and deeply striated. The general effect is that of a roche moutonnee area nearly as extens as the floor of the catchment basin. Fig is a good representation of a small port of this area.

Within the basin of Mill B there three rock-basin lakes. These basins, ha ing maximum depths of 20 feet, w gouged out by the ice. The downstre sides of the basins, where the ice mov uphill, are wonderfully grooved and p ated. The catchment basin is large and w protected on the east, south, and west si by lofty peakes.

Mill Creek Canyon and Its Tributaries

One entering Mill Creek canyon fro the west (Fig. 4), or Bonneville basin, ca see no signs of glaciation for 2 miles abo the mouth of the gorge. At this point th valley of Mill Creek becomes wider an loses the rugged, pinnacled forms that ar common farther below. In the wider por tion of the valley there are remnants o till terraces rising about 90 feet above th stream. These terrace remnants are in th form of benches left at intertributary spaces in the main valley. If the portion cut away by side wash and tributary st could be replaced, the continuous latera moraines once present in this part of th valley would be reproduced. The amount which has been cut away suggests a longer period of erosion than has elapsed since th final melting of the last glaciers of th region.

The completion of the Wasatch boulevard, paralleling the base of the Central Wasatch, enables one to visit by automobile most of the areas just described. The region at the mouth of Bell canyon and Little Cottonwood, with their huge moraines, can be reached in less than an hour's ride, most of the route being over a fine hard-surfaced highway. For residents as well as tourists, the evidence here presented of these ancient glaciers in the Wasatch will well repay one for a visit to the mouth of Little Cottonwood canyon. For the more ambitious hiker, the Lake Blanche district is highly recommended.

EDITOR'S NOTE.—This is the second of a series of articles appearing from time to time in the Municipal Record, prepared by the Science Committee of the Wasatch Mountain Club. Their aim is to acquaint both citizen and tourist with the many interesting physical features of our local region.

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