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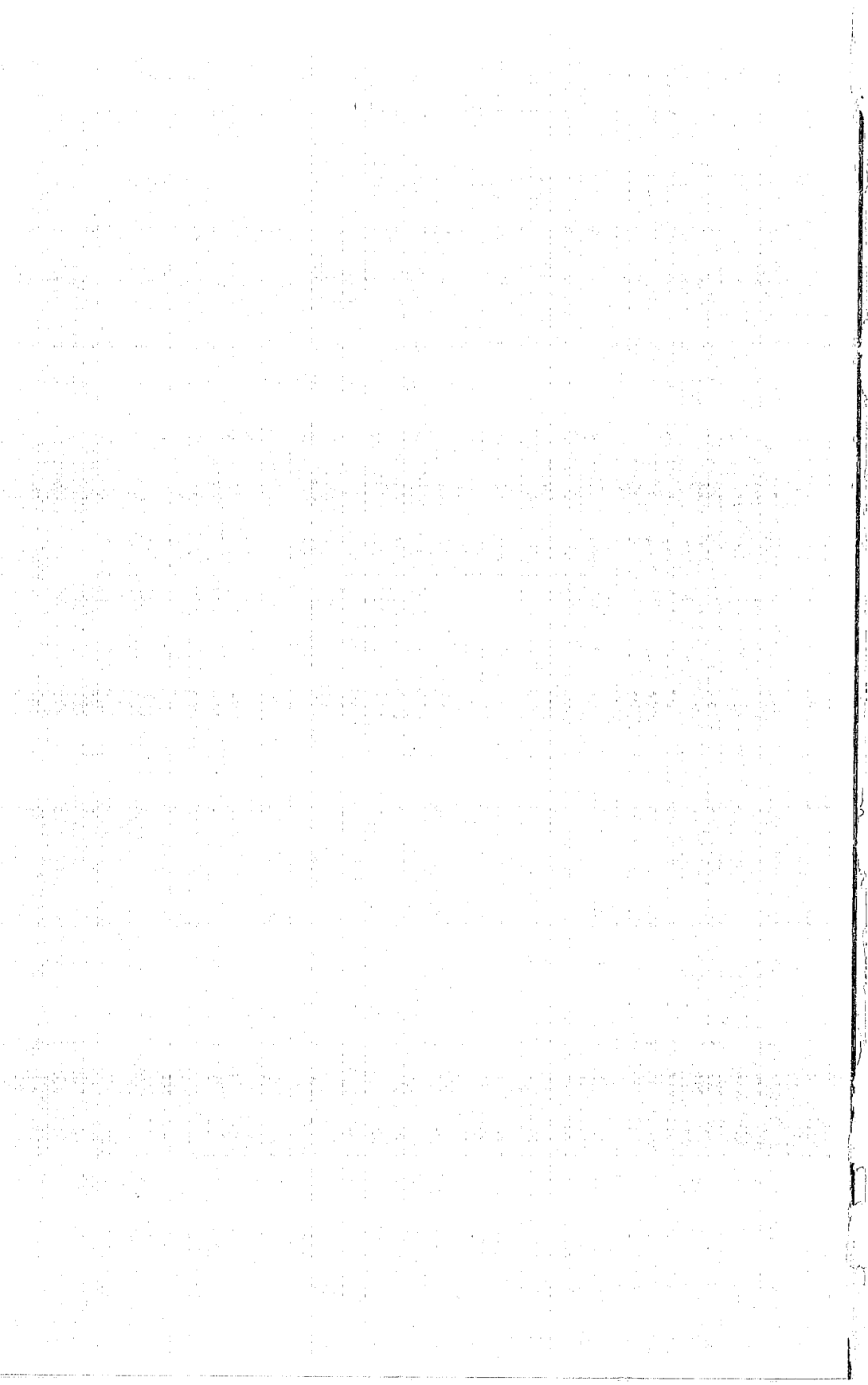
Volume 9, Part 1

May, 1962

GEOLOGY OF THE SOUTHERN WASATCH MOUNTAINS AND VICINITY, UTAH

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Brigham Young University Geology Studies

Volume 9, Part 1

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Geology of the Southern Wasatch Mountains and Vicinity, Utah

a symposium

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Extra copies of map available at \$1.00 each.

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Geology of the Southern Wasatch Mountains and Vicinity, Utah

INTRODUCTION

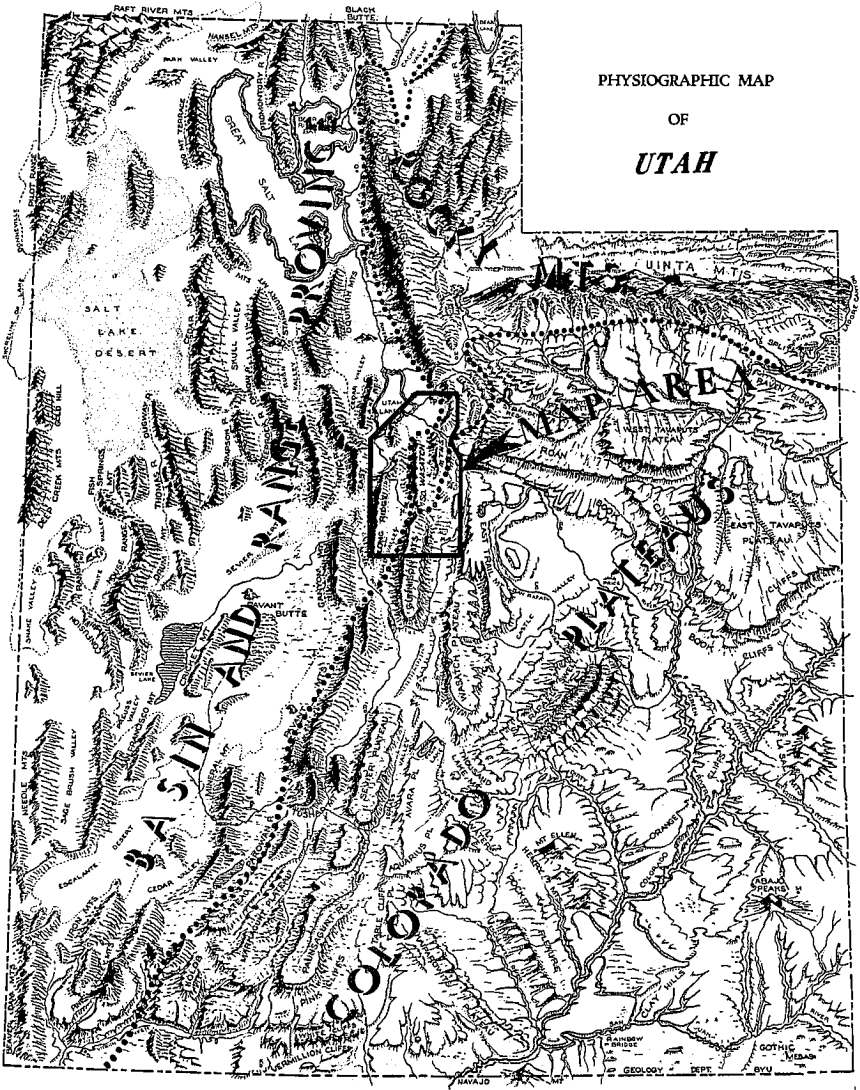
Utah is blessed with geologic features of unusual interest and great variety. The Canyon Lands, the Henry Mountains, the San Rafael Swell, the High Plateaus, the features of Lake Bonneville, the famous mining districts of Tintic, Bingham, and Iron Springs, the magnificent stratigraphic sections exposed in the Book Cliffs and in the Basin Ranges, all have revealed to geologists the tremendous sweep of geologic history and have been made classic through the writings of such pioneer geologists as C. E. Dutton, William M. Davis, C. D. Walcott, and G. K. Gilbert. So complex is Utah's geologic history and so numerous its problems that further detailed work, using improved procedures, continues to increase our understanding of this fascinating area. Each year some aspect is clarified and we wonder why it did not seem more obvious to us before.

In this light we embark on a summary of the current knowledge of the geology of the Southern Wasatch Mountains. The area lies at the junction of three major physiographic divisions: the Middle Rocky Mountains, the Colorado Plateaus, and the Basin and Range Province. It includes sedimentary, igneous, and metamorphic rocks ranging in age from Precambrian to Quaternary, and representing dominantly marine deposits of the Early Paleozoic Cordilleran miogeosyncline, the later Paleozoic Madison and Oquirrh Basins, the Cretaceous Rocky Mountain exogeosyncline, and Cenozoic deposits in freshwater lakes. The area has been involved in major structural deformation in Precambrian time, in folding and thrusting in Late Cretaceous (Laramide) time, and in block faulting in later Cenozoic time. In all, a greater variety of geologic features can scarcely be found in so limited an area.

The area is part of what is sometimes referred to as the "transition zone" in Utah. The transition involves more than the change from Basin and Range landforms to those of the Plateaus, it also involves older transitions from Cretaceous orogenic elements on the west to depositional sites on the east, from Paleozoic cratonic deposition on the east to geosynclinal behavior on the west. Two previous guidebooks have discussed the transition zone in Utah: to the north the Intermountain Association of Petroleum Geologists 10th Annual Field Conference in 1959 considered the Wasatch-Uinta Mountains transition area; to the south the Utah Geological Society 4th Annual Field Conference in 1949 traversed the transition between the Colorado Plateaus and the Great Basin in central Utah.

GEOLOGIC MAP

The geologic map accompanying this report was compiled from a great many sources, most of them published and unpublished theses by graduate students of Ohio State University and Brigham Young University (see "Index to sources of data" printed on the map). The original mapping was done on a variety of base maps, some prepared by plane table, some from air photos, and some on U.S.



INDEX MAP.—Shows Southern Wasatch map area in relation to physiographic provinces.

Geological Survey topographic quadrangles. In transferring the mapping from these diverse bases to the common base used innumerable minor adjustments were made in order to fit the original mapping to the new base as well as possible. Air photos aided in making the transfer for it was sometimes necessary to transfer data from the original map to the photos and thence to the final map in case the original map was too distorted to use directly.

In addition, in cases where adjacent mappers disagreed, the compiler has attempted to resolve their differences as best he could in order to eliminate map boundary faults. Many problems, yet to be solved, became apparent during the compilation and it is hoped that the present map may serve as a means of pointing out these problems in their regional setting for the benefit of future students of this complex and interesting area.

ACKNOWLEDGMENTS

Although many famous pioneer geologists such as William M. Davis and G. K. Gilbert had made reconnaissance observations pertaining to the Southern Wasatch Mountains, the first modern areal mapping in the area was done by Armand J. Eardley in the early 1930's. All later workers are indebted to the perspicacity of his observations.

Impetus for further work in the area came from Professor Edmund M. Spieker who extended his earlier interest in the Mesozoic problems of central Utah by directing Ohio State University graduate students in areas surrounding that of his initial work with the U.S. Geological Survey. Under him, S. L. Schoff's work in the Cedar Hills in 1937 was followed by that of many others of whom the following did work in the area of the present report: Dorothy Taylor, H. D. Zeller, R. E. Hunt, S. J. Muessig, R. E. Metter, A. C. Fograscher, J. E. Cooper, M. A. Khin, R. E. Mase, J. D. Hayes, and G. E. Thomas. Professor George E. Moore, Jr., of Ohio State University acted as graduate thesis advisor for some of these students.

For the past 25 years Professor Harold J. Bissell has been involved in problems relating to Utah Valley and the adjoining ranges. He has inspired a number of students to work in the West Mountain-Long Ridge-Southern Wasatch area and has served as adviser to most of the following Brigham Young University graduate students who have worked in this area: W. O. Abbott, R. S. Brown, R. S. Clark, L. C. Demars, J. H. Elison, D. R. Foutz, P. W. Gaines, R. W. Gates, T. A. Gwynn, H. D. Harris, R. A. Hodgson, K. D. Johnson, J. W. Madsen, D. F. Mecham, C. H. Peacock, H. N. Petersen, D. J. Peterson, D. O. Peterson, R. P. Peterson, J. R. Price, R. R. Rawson, J. A. Rhodes, S. F. Schindler, G. K. Serrine, C. V. Smith, J. W. Swanson, and B. O. White.

Arthur A. Baker of the U.S. Geological Survey has mapped in the Wasatch Range from Spanish Fork Canyon northward and his work and advice have served as a guide to many of the above listed workers. In addition to the many people whose field work has made the present compilation possible, I wish to acknowledge the efforts of the authors of the papers in the present volume. I also wish to thank Professors Clyde T. Hardy and J. Keith Rigby for help in preparing the road log, and Mr. Colbeth Killip for drafting the geologic map.

The Editor

Road Log

Tour of Southern Wasatch Mountains and Long Ridge via Provo - Spanish Fork Canyon - Thistle - Fairview - Moroni - Wales - Salt Creek Canyon - Nephi - Mona - Current Creek Canyon - Goshen - Santaquin, and return to Provo.

Mileage

- | | | |
|-----|-----|---|
| .0 | .0 | Start from Brigham Young University campus, Provo. Proceed east to 9th East Street, turn south and continue south on 9th East Street. Gravel pit excavations seen to east along the base of the Wasatch Mountains are in gravel and sand members of the Pleistocene Alpine and Bonneville Formations of the Lake Bonneville Group. |
| 1.8 | 1.8 | Junction 9th East and U.S. Highway 91 at the Provo City cemetery. Slate Canyon to east exposes quartzite and slate of Precambrian Big Cottonwood Formation in its lower part and Cambrian and Mississippian rocks in upper part. Maple Flat fault within canyon places Mississippian limestones on west against Cambrian quartzite on the east. Southward the highway rises over a pre-Bonneville alluvial fan. |
| 1.0 | 2.8 | Limestone ledges low on mountainside are horses of Mississippian rock dragged down along Wasatch fault. Limestone covers Precambrian and Cambrian rocks east of fault. |
| 1.2 | 4.0 | IRONTON. This steel plant is the older and smaller of the two steel making operations in Utah Valley. Coal from Carbon County and ore from Iron County are brought here for processing. As we cross over the Ironton fan we see the orangish-brown Tintic Quartzite exposed in the Wasatch Mountains to the east. Dark line in prominent ledge about half way up brown slope is the diabase flow in Tintic Quartzite. West Mountain is elongate ridge to southwest across Utah Valley. |
| 1.5 | 5.5 | STATE FISH HATCHERY. Little Rock Canyon east of Fish Hatchery is carved in vertical to overturned Deseret and Humbug (Mississippian) limestones. This marks the southern end of a faulted overturned anticlinal structure which extends from here northward for about 10 miles to Provo Canyon and which exposes Precambrian to Mississippian rocks in its core. Southward from Springville to Santaquin only post-Mississippian strata are exposed in the Wasatch Mountains. Highway at this point is crossing lake-bottom clays of the Pleistocene Provo Formation. |
| 0.6 | 6.1 | SPRINGVILLE. We rise off the pro-delta clays onto the toe of the Lake Bonneville delta. |
| 1.1 | 7.2 | Junction U.S. 89-91. Keep right. |
| 0.5 | 7.7 | Leaving Springville going east on U.S. 89. |
| 0.5 | 8.2 | Highway rises over front of delta built at the Provo level of Lake Bonneville from sediments derived mostly from Hobbles Creek |

Canyon to the east. Front of the Wasatch Mountains east of here forms large arcuate reentrant following the curvature of the Wasatch Fault. This is the classic area of triangular faceted spurs made famous by William Morris Davis as physiographic evidence of the normal fault origin of the Wasatch Mountains. Two and even three sets of facets can be seen on some of the spurs, each facet usually interpreted to indicate separate uplifts of the mountains along the fault.

- 2.4 10.6 MAPLETON to east. Highway on flat terrace of Provo stage of Lake Bonneville.
- 0.7 11.3 Highway curves southeastward. Foothills at base of Wasatch Mountains are terraces of the Alpine stage of Lake Bonneville. This is the oldest commonly recognized stage of the lake. Terraces have been gullied somewhat by later erosion.
- 1.5 12.8 Sag pond made by branch of Wasatch Fault cutting Lake Bonneville gravels.
- 0.3 13.1 STOP NO. 1 just west of Spanish Fork road junction to discuss Wasatch Fault features. Fault abruptly makes almost 90 degree change of direction near mouth of Spanish Fork Canyon to trend westward at mouth of Shell Canyon. Poorly exposed Diamond Creek Sandstone (Permian) and North Horn Formation (Cretaceous-Tertiary) are on downthrown side of fault in low hills at foot of steep slope. Pennsylvanian part of Oquirrh Formation on upthrown side.
- 0.2 13.3 Hercules powder plant. Reddish beds behind plant are North Horn Formation. Lake Bonneville terraces on hillside here can be traced up Spanish Fork Canyon intermittently for several miles.
- 0.4 13.7 Railroad crossing.
- 0.2 13.9 Crossing Wasatch Fault, entering mouth of Spanish Fork Canyon. Desmoinesian part of Oquirrh Formation in road cut dips 15 degrees eastward. Highway parallels Denver and Rio Grande Railroad. Bedrock exposed for the next three miles is successively higher Oquirrh.
- 1.5 15.4 Spanish Fork power station and canal outlet.
- 1.0 16.4 Springs to left of highway are part of Spanish Fork culinary water supply.
- 0.7 17.1 White farm house on south side of canyon is on axis of southwesterly trending Pole Canyon Syncline. Core of syncline formed by Permian Kirkman Limestone whose contact with the Oquirrh Formation is on the hillside to the west. Contact of Kirkman with Diamond Creek Sandstone is on hillside to the east. Diamond Creek Sandstone holds up the slopes on both sides of the highway east of here. Kirkman is a non-resistant unit which here forms a strike valley. Several sinkholes caused by solution of the Kirkman Limestone may be seen by a short walk to the flat terrace just above and southwest of the farm house. The terrace itself was formed by Lake Bonneville.

- 0.6 17.7 Lake Bonneville terraces are prominent on north side of canyon.
- 0.3 18.0 Castilla Springs. Diamond Creek Sandstone exposed just above springs shows westward dip forming west limb of the Castilla Anticline.
- 0.4 18.4 Road cut exposes Diamond Creek Sandstone on east limb of Castilla Anticline. Eastward dip of beds continues from here to Thistle so that highway crosses successively younger formations.
- 0.4 18.8 North of road are exposures of lower Park City Formation limestones. Hillside ahead shows red Triassic Woodside Shale near triple power poles. Woodside is very thin here.
- 0.3 19.1 Road cut in Thaynes Limestone (Triassic).
- 0.2 19.3 STOP NO. 2. To south ledges of Thaynes Limestone at base of hill are unconformably overlain by Early Tertiary North Horn Formation. East of here the prominent escarpment is held up by the Jurassic Nugget Sandstone and between the Thaynes and the Nugget the red shales of the Ankareh Formation form a strike valley to the north.
- 0.2 19.5 Diamond Fork road junction. Contact of Thaynes Limestone and Ankareh Shale just west of road junction. Lower part of Ankareh Shale is equivalent to the Moenkopi Formation of southern Utah. A prominent red sandstone bed in the middle of the Ankareh may be equivalent to the Shinarump Conglomerate, and the upper part of the Ankareh is the probable equivalent of the Chinle Shale of southern Utah.
- 1.2 20.7 Nugget Sandstone ahead and in hills to the east. The Nugget Sandstone includes the sandstones mapped separately as the Wingate, Kayenta, and Navajo sandstones in southern Utah.
- 0.8 21.5 Across railroad tracks to southwest, landslide material derived from the North Horn Formation has moved through a gap in the Nugget hogback.
- 0.8 22.3 THISTLE. Junction U.S. 50-6 and U.S. 89. Turn south on U.S. 89.
- 0.1 22.4 STOP NO. 3. White sandstone cliff forms top of Nugget Sandstone which includes both red and white sands. Thin-bedded unit above the Nugget is the Jurassic Twin Creek Limestone. This is the partial equivalent of the Sundance Formation of Wyoming, the Twelvemile Canyon Member of the Arapien Shale of the Gunnison Plateau 20 miles south of here, and of the Carmel Formation of southern Utah. Thistle lies at the edge of the Colorado Plateau: east of Thistle on U.S. 50-6 the folded Paleozoic-Mesozoic sequence is concealed beneath nearly flat-lying latest Cretaceous and Early Tertiary strata which rest with profound angular unconformity on the tilted beds beneath.
- 0.6 23.0 Twin Creek Limestone in road cut.
- 0.5 23.5 Flagstaff Limestone exposed in road cut contains Early Tertiary mollusk fauna.
- 0.6 24.1 Flagstaff Limestone in road cut.

- 0.3 24.4 Red exposures ahead are Nugget Sandstone and Twin Creek Limestone.
- 0.1 24.5 Moroni Formation volcanic rocks crop out east of road.
- 0.7 25.2 Road cut and hoodoos are in Moroni Formation which seems to have filled in a late Tertiary valley in this area.
- 0.7 25.9 Highest mountain to west is Loafer Mountain, elevation 10,687 feet. Oquirrh Formation forms peak. East flank of Loafer Mountain exposes tilted Kirkman, Diamond Creek, and Park City formations, all overlapped by Tertiary sedimentary and volcanic units. Several older stages of valley development appear above the present level of Thistle Creek on the lower eastern slopes of Loafer Mountain. The crest of Loafer Mountain supported small valley glaciers during the Pleistocene.
- 0.8 26.7 Blind Canyon. Birdseye marble quarry on pointed hill to the east. Birdseye marble comes from Flagstaff Limestone and is an attractive brown stone made of large nodular pisolitic structures formed by fresh-water algae in Eocene Lake Flagstaff. This porous stone has been used in the interiors of many public buildings in Utah.
- 1.4 28.2 BIRDSEYE. White schoolhouse just west of highway. Birdseye marble quarry again visible on hilltop east of highway. Rocks near highway are volcanics of Moroni Formation. Large sloping erosional surfaces have been developed on the softer volcanics west of the highway.
- 2.4 30.6 Nebo Creek road junction. Wasatch Plateau can be seen ahead down the highway through gap in skyline.
- 0.1 30.7 Mount Nebo may be seen to southwest.
- 1.3 32.0 Fishing pond by ranch. Hills to east are composed of Moroni volcanics, North Horn, Price River, and Indianola formations; those to west are Moroni volcanics.
- 0.3 32.3 Dry Creek Canyon to east. Gray sandstone in canyon bottom is Price River (Cretaceous) overlain by red beds of the North Horn Formation to the north and underlain by nearly vertical beds of the Indianola Group (Cretaceous) to the south.
- 1.6 33.9 Road cut at crest of rise in highway exposes Tertiary limestone. To the east in Hjork Creek Canyon a white cliff of vertical Price River conglomerate overlies Indianola to the northwest in vertical angular unconformity. Indianola rests on Twist Gulch Member of Arapien Shale north of the canyon. On south side of canyon craggy beds of North Horn formation overlie the Price River. The interested reader is referred to A. M. Khin and R. E. Mase whose 1956 Ohio State theses discuss this complex area.
- 2.8 36.7 SANPETE COUNTY LINE. Entering Indianola valley, Wasatch Plateau ahead and to the east, Cedar Hills to the west.
- 0.5 37.2 Indianola junction. Hills west of highway expose Colton (?) and Green River formations. Hills to east include a faulted complex of Jurassic and Cretaceous strata. Price River Formation is ex-

posed at mouth of Rock Creek Canyon east of Indianola and this is overlain by North Horn and Flagstaff formations southward.

- 2.5 39.7 Cuesta of Green River Formation east of highway.
- 4.0 43.7 RAILROAD OVERPASS near summit of hill.
- 0.1 43.8 STOP NO. 4. Road cut in upper beds of Green River Formation. This section was measured by A. C. Fograscher as part of his 1956 Ohio State University Master's thesis on the Green River and Crazy Hollow formations in this area. Fograscher assigned the lower 56 feet of beds exposed in this road cut to his "Zone B, Unit 2" of the Green River Formation. This unit consists dominantly of green, brown, and gray shale and argillaceous limestones. The upper 12 feet of beds exposed in the road cut are assigned to his "Zone C," a part of the Green River consisting of tuffs, limestones and shale. Fish scales and bones and turtle plates may be found in the Green River beds here. The Crazy Hollow Formation, consisting of about 200 feet of variegated shale, sandstone, conglomerate and limestone, overlies "Zone C" of the Green River Formation immediately west of the top of the road cut.
- From the hilltop into Fairview we get an excellent view of the Wasatch Monocline across the Sanpete Valley to the east. The north end of the monocline is cut by north-south faults which parallel the monoclinal trend. Beds exposed in west front of Wasatch monocline at its north end are mostly North Horn Formation with a capping of Flagstaff Limestone on top of ridge. To the south the Wasatch Plateau is also capped by Flagstaff Limestone which there forms the resistant beds on the flank of the monocline. Traveling towards Fairview the highway proceeds along the upper part of the Green River Formation on the dip slope of cuestas which face Sanpete Valley north of Fairview. Hills just west of highway are capped by Crazy Hollow Formation.
- 6.2 50.0 FAIRVIEW. To the north the front of the Green River cuesta can be seen. Hills just west of Fairview expose Crazy Hollow Formation. East of Fairview Utah State Highway 31 enters Cottonwood Creek Canyon. Flagstaff beds are exposed near canyon mouth, then North Horn higher in the canyon.
- 1.1 51.1 Leaving Fairview. Wasatch Monocline grandly displayed to south-east.
- 0.8 51.9 161 feet of Crazy Hollow Formation is exposed on hillside west of highway. Just above base of hill is a sandstone member in the Crazy Hollow formation which here forms a ledge about 45 feet thick. Top of the hill is capped by a few feet of Moroni Formation. This is Fograscher's measured section 15.
- 3.6 55.5 MOUNT PLEASANT city limits. Plateau to east exposes North Horn at base of slope. North-south normal fault about 2 miles east of base of slope brings the following Cretaceous succession into view in the Pleasant Creek reentrant: Blackhawk, Castlegate, and Price River, with North Horn capping the top.
- 1.0 56.5 Mount Pleasant city center. Turn west on State Highway 116.

- 0.3 98.4 Leaving Salt Creek Canyon. Nephi ahead.
- 1.7 100.1 NEPHI. City center, turn north on U.S. Highway 91.
- 1.1 101.2 STOP NO. 7. Intersection of Nephi city cemetery road with highway. South end of Mount Nebo shows overthrust of Pennsylvanian-Permian Oquirrh Formation and other Permian units over Triassic and Jurassic formations beneath the thrust. "J" on the hillside is on Jurassic Arapien Shale, Oquirrh beds form the drab slope immediately north of the "J". Reddish beds just south of the "J" are Triassic in fault contact with the Arapien.
- The front of the Wasatch Mountains here is bounded by a recent fault scarp which cuts alluvial fans at their heads. The south end of this Recent scarp can be seen from this point and we can trace it northward as we proceed along the mountain front.
- 4.6 105.8 Highway crossing crest of alluvial fan. Long Ridge to the west across Juab Valley. To the east Mississippian and Pennsylvanian strata are nearly vertical in the west flank of Mount Nebo. The non-resistant Manning Canyon Shale forms a strike terrace which trends diagonally northeastward across the mountain front. A slump area has developed where the Wasatch Fault intersects the Manning Canyon Shale.
- 1.3 107.1 MONA.
- 0.3 107.4 Turn west on gravel road to Currant Creek Canyon one block north of school building in downtown Mona.
- 0.3 107.7 Spring north of road.
- 0.1 107.8 Railroad crossing.
- 0.3 108.1 Crossing Currant Creek.
- 0.3 108.4 Road turns north.
- 0.1 108.5 STOP NO. 8. View of west face of Mount Nebo. Precambrian to Upper Paleozoic units exposed along mountain front. Wasatch Fault branches about 5 miles to the north along the front and the downdropped block on the west forms the lower foothills at the northeast side of Juab Valley. Long Ridge to the west of this stop is made up of Early Tertiary latites.
- 3.6 112.1 Volcanic rocks (latites) form hills here.
- 1.0 113.1 Ahead may be seen light colored Paleozoic limestones flanked by the darker colored volcanics.
- 1.0 114.1 Volcanic outcrops near road.
- 0.2 114.3 Bridge over Currant Creek Canal.
- 0.1 114.4 Bridge over Currant Creek itself.
- 0.2 114.6 STOP NO. 9. Base of cliff is Cambrian Ajax Dolomite. It is overlain by 91 feet of Opohonga Limestone, 234 feet of dolomite which has been called Bluebell but which may be part of the Victoria, 44 feet of Devonian Victoria sandstones and dolomites, and 98 feet of Pinyon Peak Limestone. Lavas conceal higher beds here.
- 0.3 114.9 Volcanics rest on Mississippian Gardison Limestone on west side of canyon.

- 0.2 115.1 Spur on west side of Currant Creek exposes Ordovician at base, Bluebell (?), Victoria, Pinyon Peak, Fitchville, and Gardison.
- 0.3 115.4 Mississippian Deseret Limestone in fault contact with lower Paleozoic beds. Deseret is much brecciated near the mouth of Currant Creek Canyon.
- 0.3 115.7 Road junction at mouth of Currant Creek Canyon, turn northeast. Lake Bonneville material forms terraces along foothills east of road. To the west are the East Tintic Mountains, type locality for most of the Lower Paleozoic stratigraphic units used in this vicinity. The Tintic mining district was famous as a major lead, silver, zinc camp at the turn of the century. Recent finding of a major new ore body as a result of geologic work done by Lovering and Morris of the U.S. Geological Survey is reactivating the district.
- 1.7 117.4 Descend lake terrace at south end of Utah Valley. From here we can see to the left front the Oquirrh Mountains, to center front the Lake Mountain, and to the right front West Mountain in the near distance. The mountains beyond West Mountain are the Wasatch Mountains near Provo.
- 1.0 118.4 GOSHEN
- 0.3 118.7 Junction with U.S. Highway 6 in downtown Goshen. Turn east.
- 2.0 120.7 Railroad crossing. Warm Springs Mountain to the east forms the north end of Long Ridge. Foundations of abandoned mill on Warm Springs Mountain which was built to process ore from the Tintic Standard Mine, and it operated from 1920 to 1922. The operation proved uneconomic and the mill closed. Later the dump from the mill was reprocessed at a profit.
A major reverse fault cuts the ridge in the gully south of the mill juxtaposing Cambrian and Mississippian carbonate units.
- 0.8 121.5 Chaffin quarries to east are located in Victoria and Humbug formations.
- 0.6 122.1 Railroad crossing. Gray ledges east of road are Mississippian Great Blue Limestone. Kiegley Quarries may be seen to the northeast at the southern end of West Mountain. They produce carbonate flux for the steel mills near Provo.
- 1.7 123.8 Reservoir north of highway.
- 1.1 124.9 Railroad overpass.
- 0.6 125.5 SANTAQUIN. Continue through town on U.S. Highway 6.
- 1.6 127.1 Junction U.S. Highway 6 and 91. Proceed northeastward toward Provo. Precambrian rocks are exposed on face of Dry Mountain east of highway.
- 1.6 128.7 Town of Spring Lake east of highway.
- 1.3 130.0 Red Point at north end of Dry Mountain can be seen to the east. Excellent Pennsylvanian fossil collecting from basal Oquirrh at Red Point.
- 1.0 131.0 PAYSON. Continue through town on U.S. Highway 91. Highway rises over a Lake Bonneville spit at the east edge of town.
- 3.8 134.8 Highway crosses pond in town of Salem. The Dream Mine can

ROAD LOG

be seen at the base of the Wasatch Mountains due east of Salem. View to the southeast shows pre-Lake Bonneville fans forming high sloping surface along west base of Loaefer Mountain.

- 4.0 138.8 SPANISH FORK. Proceed through town on U.S. Highway 91. As is the situation with many towns in Utah Valley, Spanish Fork is laid out upon post-Provo fan gravel. This alluvial gravel was deposited when the level of Lake Bonneville dropped below the Provo level and streams then poured across the relatively unconsolidated deltaic sediments, cut into them, and spread the detritus in fans.
- 1.9 140.7 Pro-delta clay of Provo Formation on either side of highway. Distal edge of the Provo delta seen approximately 100 yards east of highway.
- 0.5 141.2 White clay member of the Provo formation well exposed west of highway.
- 2.3 143.5 SPRINGVILLE. Railroad underpass at south edge of town. Note intricately folded Mississippian beds in Wasatch Range northeast of town.
- 7.4 150.9 Brigham Young University campus in Provo, End of tour.

