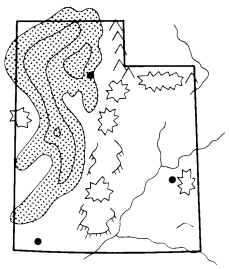
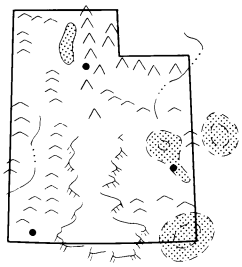
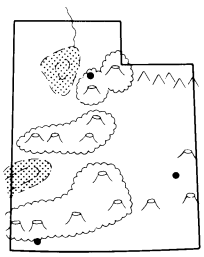
UTAH'S GEOLOGIC HISTORY



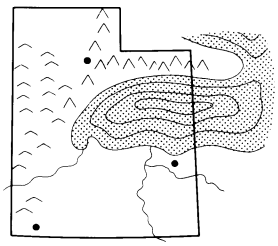
Pleistocene
(.01 - 1.6 mya*)



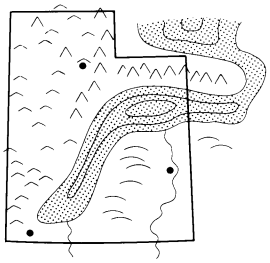
Pliocene & Late Miocene
(1.6 - 15 mya)



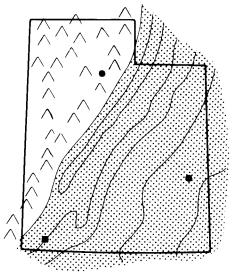
Early Miocene & Oligocene
(15 - 38 mya)



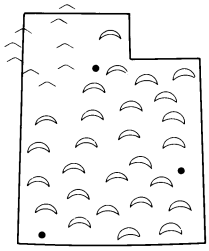
Eocene
(38-55 mya)



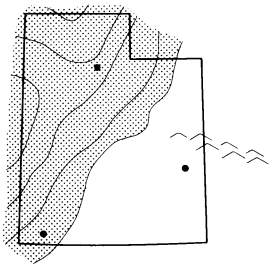
Paleocene
(55 - 66 mya)



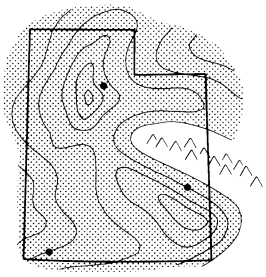
Cretaceous
(66 - 138 mya)



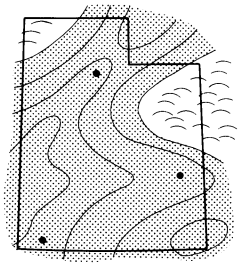
Jurassic
(138 - 205 mya)



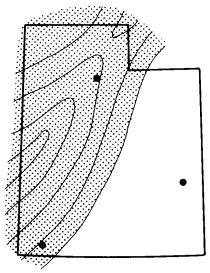
Triassic
(205 - 240 mya)



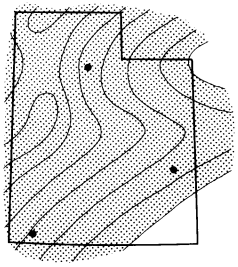
Permian - Pennsylvanian
(240 - 330 mya)



Mississippian - Devonian
(330 - 410 mya)

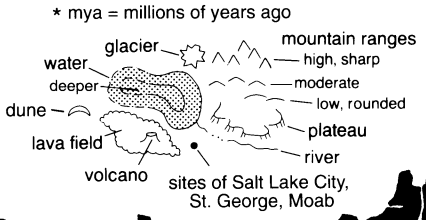


Silurian - Ordovician
(410 - 500 mya)



Cambrian
(500 - 570 mya)

* mya = millions of years ago



SOME UTAH GEOFACTS

- The last major earthquake (over magnitude 6.5) along the 240-mile-long Wasatch fault zone may have occurred between 300 and 500 years ago (Holocene Epoch) between Mona and Nephi, Utah.

- The youngest volcanic event in Utah was the eruption of the Ice Springs basalts in the Black Rock Desert, Millard County approximately 660 years ago (Holocene Epoch). This volcanic field consists of four major cinder-splatter cones and associated lava flows. Some of the cinders are being excavated for use as gravel.

- Lake Bonneville, a prehistoric fresh-water lake, covered most of northern and western Utah from 30,000 to 12,000 years ago (Pleistocene Epoch). At its highest level the lake spread over 20,000 square miles with a maximum depth of 1,000 feet. In comparison, the Great Salt Lake, the remnant of Lake Bonneville, covered 2,300 square miles at its highest level (1980s) with a maximum depth of 45 feet.

- Utah contains the only U.S source of beryllium. Bertrandite, the mineral mined for beryllium, is found in Oligocene-age volcanic tuff beds (porous rock formed by the consolidation of volcanic ash) in Juab County. Beryllium is used in electronic components and abrasion-resistant cutting edges.

- Coal is Utah's state rock. The majority of coal in Utah is formed from the fossilized remains of plants that lived in marshes and swamps near the western edge of a Cretaceous sea. These plant remains were altered to coal by heat and pressure resulting from their deep burial over time.

- Museums worldwide contain mounted skeleton casts of dinosaurs discovered in the Morrison Formation (Jurassic Period) in Utah, including numerous skeletons of Utah's state fossil, *Allosaurus*. This carnivorous dinosaur weighed up to 4 tons, stood 17 feet high, and measured 35 feet long.

- The Jurassic-age Navajo Sandstone, which creates some of the most spectacular scenery in Zion and Arches National Parks, and the Nugget Sandstone exposed in Red Butte and Parleys Canyons of the Wasatch Range, were once both part of a large dune-covered desert that almost completely covered Utah.

- The caverns of Timpanogos Cave National Monument are carved from the Mississippian-age Deseret Limestone. The Timpanogos Cave system contains colorful stalactites and stalagmites and consists of three caves interconnected by man-made tunnels. In 1887, Martin Hansen discovered the first cave while following cougar tracks to its entrance. The other two caves were discovered 34 years later.

- Trilobites from the Cambrian-age Wheeler Shale in western Utah are prized in museums and private collections around the world. Fossils from this formation are unique in that a large number of perfectly preserved specimens have been found.

- Utah's highest point, King's Peak (13,528 ft), is composed of Precambrian-age quartzite and was carved by Pleistocene-age glaciers.

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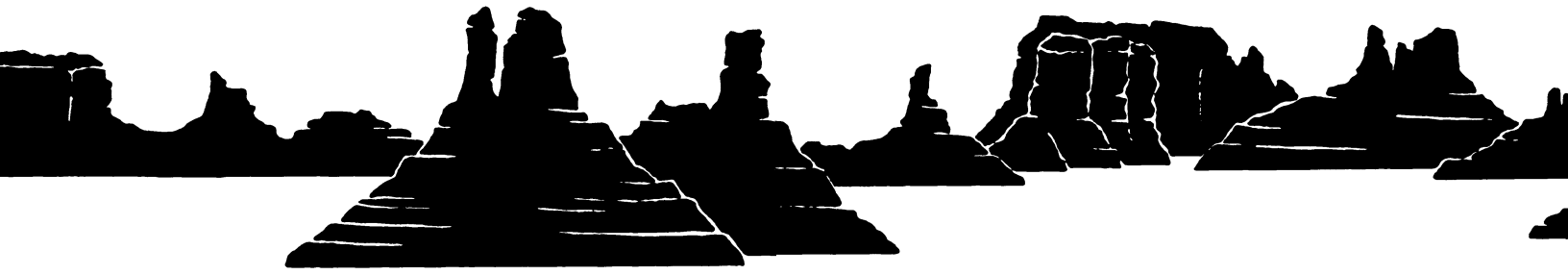
Maps from W.L. Stokes, *Geology of Utah*; text by Christine Wilkerson; graphics by Vicky Clarke.



UTAH'S GEOLOGIC HISTORY

(Not scaled for geologic time or thickness of deposits)

ERA	PERIOD	EPOCH	MILLIONS OF YEARS AGO	DESCRIPTION OF EVENTS
Cenozoic	Quaternary	Holocene	.01	Current erosional and depositional processes dominate. Basin-and-range faults continue to be active. Volcanic eruptions continue in western Utah, as recently as 660 years ago. The Great Salt Lake, a remnant of Lake Bonneville, diminishes and accumulates a vast quantity of salt.
		Pleistocene	1.6	Glaciers blanket the Uinta Mountains, the Wasatch Range, and mountains of the Colorado Plateau. Lake Bonneville, a large fresh-water lake, covers many northern and western Utah valleys. Sand and gravel is deposited along the shoreline. Humans first appear in Utah during this epoch.
	Tertiary	Pliocene	5	Volcanism continues in southwestern Utah. Basin-and-range faulting and regional uplift continues.
		Miocene	24	Igneous intrusions continue to form in the Henry and Abajo Mountains. Igneous activity similar to that in the Oligocene continues until approximately 15 million years ago. Basalt flows and volcanic cones form in southwestern Utah. Basin-and-range faulting in western Utah creates mountain-valley-mountain topography and the Wasatch fault zone. Regional uplift rejuvenates major river systems in the Rocky Mountains and the Colorado Plateau. The carving of the canyonlands begins.
		Oligocene	38	The igneous rocks that form the Henry, La Sal, and Abajo Mountains in southern Utah begin to intrude. Igneous activity produces intrusive rocks in northern Utah and volcanos in southwestern Utah. The majority of Utah's copper is probably associated with an Oligocene-age intrusion in the Bingham mining district, west of Salt Lake City.
		Eocene	55	Lake Uinta, part of a larger Green River Lake system in Wyoming and Colorado, forms in northeastern Utah. The lake gradually contracts and is replaced by a river system. In the Uinta Basin thousands of feet of sediment are deposited. Granitic intrusions and volcanic flows occur in northwestern Utah during the late Eocene. Eocene-age reservoir rocks contain sizable amounts of oil and gas.
		Paleocene	66	Eroding highlands prevail in western Utah. The Uinta Mountains, smaller uplifts, and the Uinta Basin, become prominent features in eastern Utah. Lake Flagstaff forms in central and northeastern Utah and possibly extends into southwestern Utah. Mammals flourish.
Mesozoic	Cretaceous		138	Lake and river systems gradually decline. Sediments from highlands near the Utah-Nevada border spread eastward. In eastern Utah, seas invade from the east. Western Utah rises due to thrust faulting and folding generated by east-west-directed compressional forces. Dinosaurs and reptiles wander through major coal-forming swamps and marshes near the coastline that gradually retreats from central Utah eastward. Dinosaurs disappear at the end of this period.
	Jurassic		205	A large, sandy desert covers most of Utah during the Early Jurassic. The resulting rocks now create some of the most spectacular scenery in Utah's national parks. Later, shallow sea-ways from the north invade Utah twice. In central Utah, the Arapien basin develops and receives over 6,000 feet of sediment including large amounts of gypsum and salt. In the Late Jurassic, dinosaurs roam within extensive lake and shifting river systems. Granitic intrusions form in western Utah. Jurassic-age host rocks contain large uranium deposits located in the Colorado Plateau and extensive oil and gas reserves in northern Utah. The first birds evolve.
	Triassic		240	Shallow seas from the west spread across northern and western Utah and occasionally overlap with eastern and southern mudflats that are crisscrossed by reptiles and amphibians. After a period of erosion, river and lake systems dominate. Some of these sediments now contain large quantities of petrified wood. Currently uranium is found in Triassic-age rocks of the Colorado Plateau. Dinosaurs and primitive mammals appear.
Paleozoic	Permian		290	Deposition continues in the Oquirrh and Paradox basins. Red rocks form in the Paradox basin of sediments shed from the Uncompahgre highland.
	Pennsylvanian		330	Seas containing fusulinids, brachiopods, and conodonts cover most of Utah. Sediments continue to accumulate in the Oquirrh basin. The Paradox basin and the adjacent Uncompahgre highland develop in southeastern Utah. Salt, potash, and organic-rich shale accumulate in the shallow, restricted Paradox basin. Pennsylvanian-age reservoir rocks contain large volumes of oil and gas. Reptiles originate during this period.
	Mississippian		360	Warm, shallow seas rich with life cover Utah for most of this period. The Oquirrh basin develops in northwestern Utah. Large quantities of limestone are deposited. Mississippian-age reservoir rocks hold an abundant amount of oil and gas.
	Devonian		410	Shallow, temporary seas in eastern Utah, and deeper seas in the west contain primitive fish, corals, brachiopods, and conodonts. The Stansbury uplift in north-central Utah develops into a prominent ridge above sea level during the Late Devonian. Amphibians appear.
	Silurian		435	Shallow seas containing corals and brachiopods blanket Utah. Dolomite is the predominant rock being formed.
	Ordovician		500	New life forms prosper in fluctuating seas of western Utah while eastern Utah remains above sea level. The first vertebrates, primitive armored fish, evolve.
	Cambrian		570	Subsidence of western Utah continues. Trilobites thrive in the deep seas of western Utah, while shallow, oscillating seas cover eastern Utah.
Precambrian			4500+	This era encompasses approximately 85 percent of the earth's 4.5-billion-year history. Sediments shed from a newly formed continent (North America's predecessor) more that 2.5 billion years ago are visible in northern Utah. Granitic and metamorphic rocks found south of Salt Lake City are material that collided and adhered to the south side of the continent between 1.6 and 1.8 billion years ago. Later, western Utah subsides and sediment deposition increases. There are several periods of glaciation during the late Precambrian. Simple organisms such as bacteria and blue-green algae evolve (about 3.3 to 3.1 billion years ago).