NEBRASKA GEONOTES

GEOLOGY ALONG SELECTED LINCOLN BIKE TRAILS

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NEBRASKA GEOLOGICAL SURVEY

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Lincoln's bicycle trails provide the interested rider with some excellent examples of how the local geological setting has influenced the landscapes we see around our city. This guide is designed to show you some of these features and maybe help you observe some others that we have not seen. The tours can be started on either of the ends of the trails; the features are large enough that you will have no trouble finding them. A small magnifying glass may help you to appreciate the fine details of some of the rocks you will see.

The first tour begins at the start of the Billy Wolff Trail between 23rd and 24th and N Street, near the Municipal Park swimming pool (fig. 1). The trail heads in a generally southeastward direction for about 4.7 miles, ending at Holmes Lake and Park. It follows the east bank of Antelope Creek to near 24th and J Street, where it crosses to the west bank. The trail continues along the west bank to about 27th and D Street; there you will have the option of going through a tunnel or staying above ground to cross the streets.

On this first leg of the trip, you will notice that much of the creek bank is now supported with limestone riprap. The limestone is of Late Pennsylvanian age and has been quarried from the Weeping Water area, about 32 miles east of Lincoln. The limestone may contain many tiny invertebrate fossils such as corals, bryozoans, brachiopods, clams, and snails. The limestone riprap was placed here because of frequent, small landslides along the creek.

Due to the grading done for Capital Parkway and for straightening the channel of Antelope Creek, slippage planes in the stream-deposited sediments accumulate water, which reduces the strength of the compacted alluvium. The landslide takes place when the weight of the sediments exceeds the structural integrity of the the supporting landmass.

The sunken gardens at Antelope Park offer the first clues about the geology in the region, although the gardens are not a geological feature in themselves. You will notice that many of the rocks in the landscaping are a very hard, dense, pink-to-purple material that, upon close examination, resembles sandstone. These boulders are composed of a rock called quartzite, and many millions of these rocks were scoured from their source area in western Minnesota and eastern South Dakota by glaciers of the Pleistocene age. In their northern source area, these rocks are bedded sediments of Precambrian age and are called *Sioux Quartzite.* They are made up of metamorphosed (changed) sandstones. These sandstones formed from sand that was shed as sediments from an ancient mountain range that existed in parts of Minnesota and Wisconsin from an event referred to by geologists as the Huronian Orogeny (Mountain Building).

These sediments were deposited in an ancient seaway where they were compacted and cemented together to form sandstone. These rocks are about 1 billion years old. The sandstones were eventually metamorphosed largely by silica cement bonding with the individual sand grains. Note that these quartzite boulders break across the individual sand grains that compose them, testimony to the fact that they have been transformed by heat and pressure into a different kind of rock.

Continue to the southeastern corner of 27th and D streets to the fountains; the trail branches here--stay to the left and continue for about 0.15 mile. Here you will find a rest area beneath which is a sandstone outcrop. Note the geological marker. The sandstone here is part of the Dakota Group of Late Cretaceous age.

The Cretaceous sandstones were originally deposited as sediment derived from low-lying land masses to the northeast. These sands were deposited in the channels of ancient rivers that drained these land masses or along ancient beaches that ran along the Cretaceous coastline. If you examine hand samples of these sandstones, you will observe that some are very friable and loose sand can be removed by rubbing the rock with your fingers, whereas others are more tightly compacted and cemented. In either case, you will observe that sandstone breaks around the individual grains of sand rather than across them, as with quartzite.

If you look across Capitol Parkway from the sandstone outcrop, you will see a slightly higher topographic feature. This marks the old city well field; it furnished Lincoln's municipal water supply until 1935, when city water began to be imported from ancient stream gravels of Quaternary age that are by the Platte River near Ashland, about 25 miles north and east of Lincoln. Salty water from the Cretaceous sandstones caused the relocation of Lincoln's water source. The Deborah Avery Memorial Fountain nearby the overlook of the sandstone outcrop is supplied by water from the old well field. You will notice a distinctly different

flavor to the water from this fountain than from the other city water sources.

Continue along the trail toward the shelter houses at the picnic grounds at Antelope Park. You will observe remnants of a landslide below the trail. This landslide occurred when permeable, silt deposits that overlie impermeable clay deposits became saturated with water. The water lubricated the surface on which the silt rested and the weight of the overlying deposits allowed them to flow freely under gravity.

Continue along the trail toward Holmes Park and Lake. Although the channel to Antelope Creek appears straight, it has not always been that way. The position of the old channel of Antelope Creek is shown on the map. You will observe that the old channel was very crooked with a large meander bend near 48th Street and Normal Boulevard. Antelope Creek had caused extensive flooding in this area in the past; channel widening and straightening began after a flood in 1952 did extensive property damage and cost about 20 lives. In addition to the channel work, the Holmes Park Lake was created by the construction of a flood-control dam. Most of the deposits in this area are glacial tills of Pleistocene age.

If you take the alternate trip along the Antelope Park Trail, you will travel through more glacial deposits. The drinking fountain near the John Schildneck Bandshell was made from cobbles and boulders of mostly pink Sioux Quartzite. As you approach the underpass at Sheridan Boulevard, you will observe that the deposits are a light yellow-gray color and form fairly steep slopes. These are wind-blown loess deposits of Pleistocene age. Loess may contain fossils of tiny, white land snails.

If you continue to the end of the Antelope Park Trail, you will exit near a shopping mall on a topographic high overlooking the floodplain of Beal Slough. The high is made up of sandstones of the Dakota Group of Cretaceous age. We do not know if they are the same bed of sandstone that is exposed near the city well field on the Billy Wolff Trail. The cut made through this sandstone for the construction of the new Nebraska Highway 2 is now almost entirely overgrown. These deposits produced some excellent examples of fossil leaf imprints while the cut was fresh.

The Highway 2 Trail continues eastward to 56th Street; much of it is along the channel of Beal Slough. This channel was straightened and relocated in several areas, but this drainage has never caused the serious flooding that has characterized Antelope Creek.

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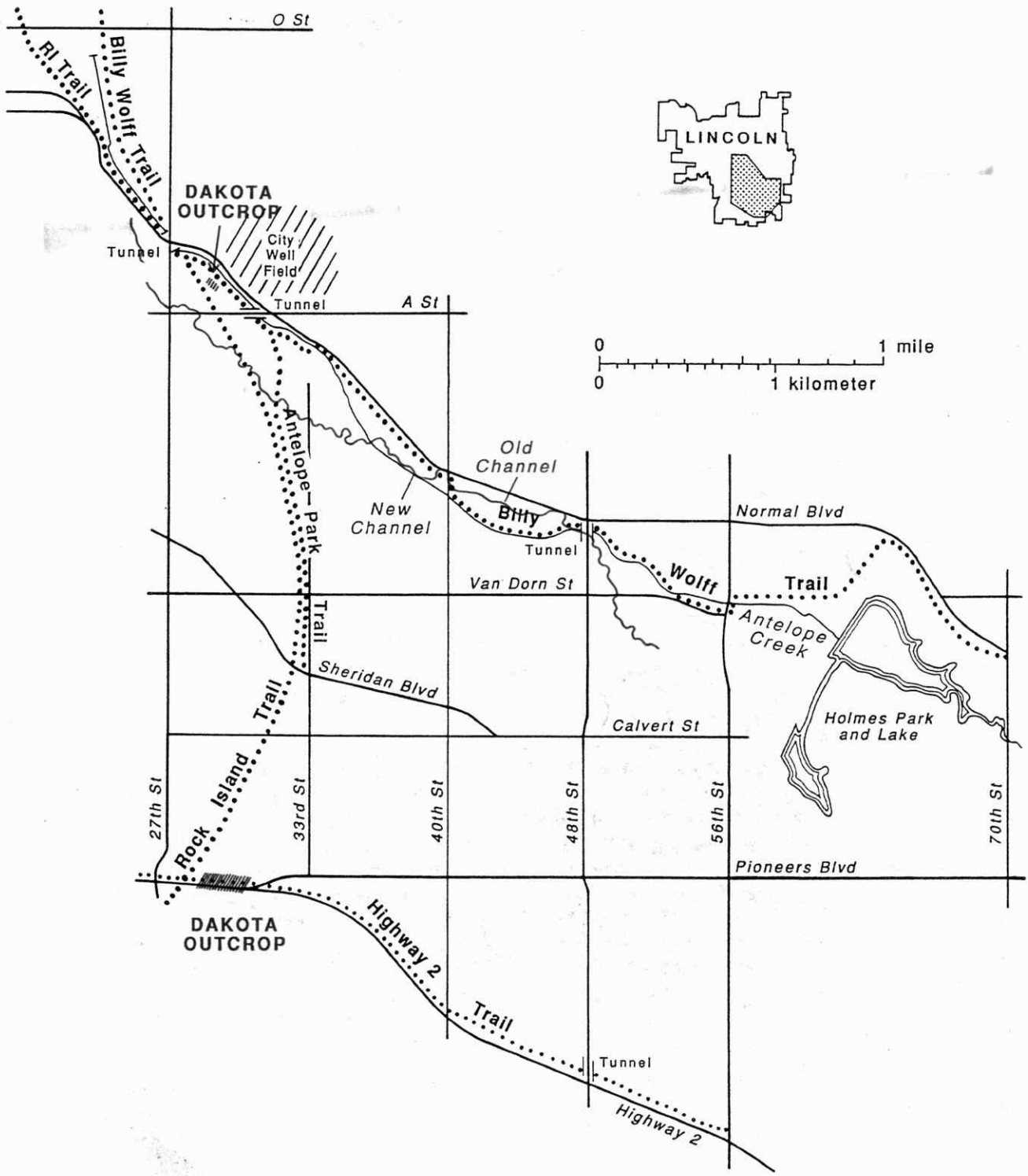
Fig. 1. Geology along selected Lincoln bike trails. Dakota outcrops and old channel of Antelope Creek in blue.



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