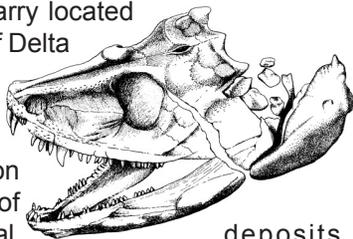


RAGBRAI Geo-pedia

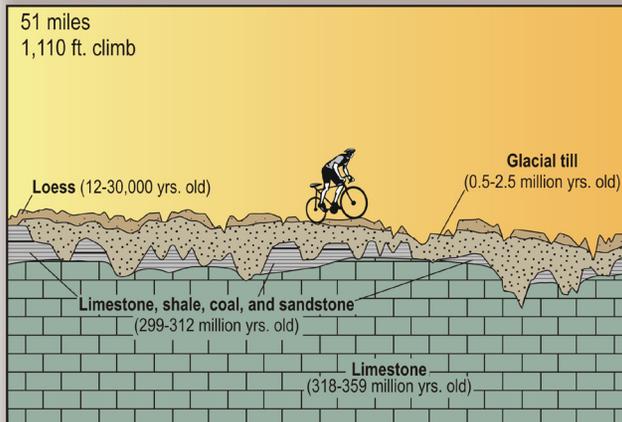
First to Walk the Land

In a little limestone quarry located just south of the town of Delta a major fossil find was discovered. In 1984, while conducting a field investigation into the occurrence of Pennsylvanian coal deposits within depressions in the underlying Mississippian bedrock, a geologist from William Penn College noticed a unique rock formation within the Heimstra Quarry. An ancient, dish-shaped, depression in the bedrock layers that was filled with limestone conglomerate and capped with shale, that was later interpreted as the remains of a near shore sinkhole. In 1985, a geologists with the Iowa Geological Survey further investigated the unique formation and discovered fossil remains of several different species of amphibian-like creatures, known as **tetrapods**. Tetrapods were the first aquatic animals to leave the ocean and move on land using modified fins as limbs. These fossils, found in Mississippian rocks, are some of the oldest known tetrapod fossils on Earth! One of the newly discovered creatures was given the name **Whatcheeria deltae**, after the nearby town of What Cheer. The best preserved remains of the Heimstra Quarry tetrapods are currently on display at the Field Museum in Chicago, Illinois.



COVER PHOTO: Grant Wood's 1931 depiction of the rolling hills, with a mixture of native and agricultural vegetation, seen in southern Iowa, titled *Young Corn*.

Day 6 Milestones



Start: Oskaloosa

Fremont: 14 miles

Hedrick: 22.5 miles

Packwood: 37.5 miles

Finish: Fairfield – 51 miles



For More Information...

The IDNR Source Water Protection program aims to help communities and other public water supply entities understand their individual needs and provides site-specific information to ensure safe drinking water supplies for all Iowans

<https://programs.iowadnr.gov/sourcewater/>

Stratigraphy and paleoenvironments of Mississippian strata in Keokuk and Washington counties, southeast Iowa

<ftp://ftp.igsb.uiowa.edu/igspubs/pdf/GB-10.pdf>

Digital bedrock geologic map of southeast Iowa

<ftp://ftp.igsb.uiowa.edu/igspubs/pdf/ofm-2004-1.pdf>

Early tetrapods, stratigraphy and paleoenvironments of the Upper St. Louis Formation, western Keokuk County, Iowa

<ftp://ftp.igsb.uiowa.edu/igspubs/pdf/GSI-046.pdf>

USGS National Streamgaging Network

http://ia.water.usgs.gov/ia_gmap.html

RAGBRAI

Day 6

Friday, July 26

2013

Learn about the Land



Iowa DNR - Geological and Water Survey

109 Trowbridge Hall

Iowa City, IA 52242

www.igsb.uiowa.edu

US Geological Survey - IA Water Science Center

400 S. Clinton St.

Iowa City, IA 52240

<http://ia.water.usgs.gov>

Iowa Limestone Producers Association

5907 Meredith Dr., Suite A

Des Moines, IA 50322

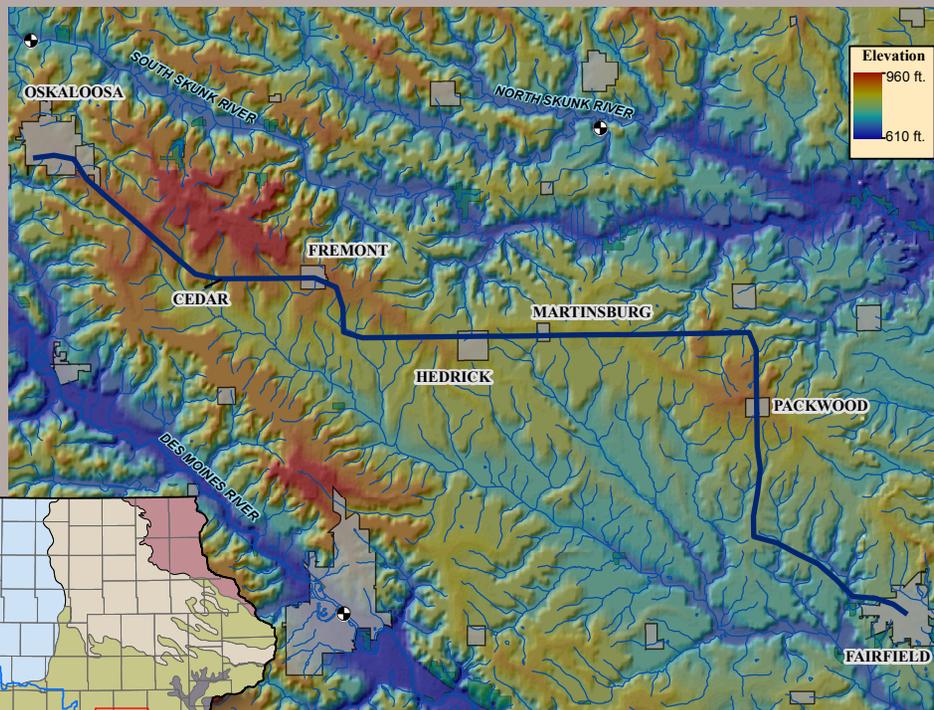
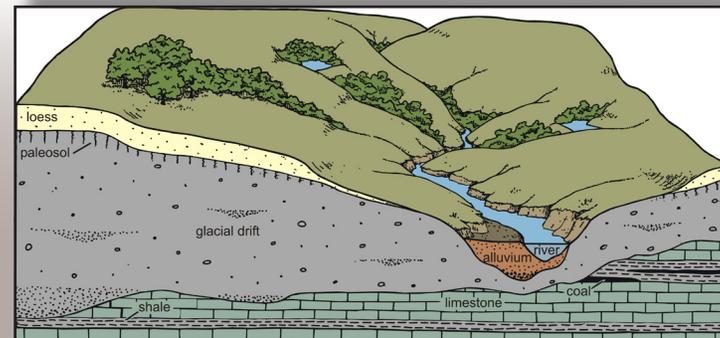
www.limestone.org

Today's ride continues on the **Southern Iowa Drift Plain Landform Region (SIDP)** which riders have been traversing the last several days. However, one quickly notices a big change in the amount of climbing required to peddle to Fairfield. There is approximately 1,500 less feet of climb today while traveling across a broad topographic divide between the Skunk River to the north and the Des Moines River to the south. You might call this "Iowa's Great Divide" or at least it will feel like it as you can take a bit of a breather on Day 6 and enjoy all the host town events and the beautiful southern Iowa landscape.

The Southern Iowa Drift Plain is the largest landform region in the state and represents a time period between 2.5 - 0.5 million years ago when Iowa was glaciated numerous times. These glacial advances left behind a thick package of glacial till that has subsequently eroded. The long period of erosion and landscape development created well-defined river valleys and the highly dissected landscape that riders have biked across for the last several days. More recently, this area was mantled with a thin cover of loess, wind-blown silt that was carried out of former meltwater streams during the last glaciation. As RAGBRAI'ers know, the Missouri River is some distance west but it was still the main source of the thin loess mantling this area. The landscape is characterized by thin loess over deeply weathered Pre-Illinoian glacial deposits.

The Des Moines River has made news recently with record nitrate levels and its use as a supply of drinking water for the city of Des Moines as well as many smaller towns. **High nitrate levels** in drinking water can cause methemoglobinemia or blue baby syndrome, a condition typically found in infants under six months old. The weak stomach acid of infants causes an increase in bacteria that can readily convert nitrate to nitrite (NO₂), which blocks oxygen from entering the blood (causing the 'blueness' of skin). As a result of these health concerns, the Environmental Protection Agency has

set a standard of 10 mg/L of nitrate-N in drinking water. Although nitrate-N levels in the Des Moines River can sometimes be twice as high as the drinking water standard, most cities drawing water from the Des Moines River utilize nitrate removal systems to keep nitrates at safe drinking levels.



USGS streamflow station
Parks and Preserves

While crossing the state of Iowa bikers will primarily be riding on paved roads, but what are they paved with? Some are paved with **concrete** and some with **asphalt**. What is the difference? Well both are composed mostly of aggregate, fragments of crushed limestone or dolomite and sand. It is the material that glues these fragments together that is the primary difference. Concrete (the white or light gray road surface) uses Portland cement to glue the aggregate together. Portland cement is made by firing a finely crushed mixture of limestone, sand, clay, and other materials to 2,600° F in a kiln to produce a clinker that is mixed with gypsum and crushed to a fine powder to make the cement. The cement is mixed with water and the aggregate

and applied to the road base to create a concrete roadway. Asphalt is a viscous petroleum product that is heated, mixed with aggregate and applied to the road base to create an asphalt roadway.

Iowa Limestone Producers Association

