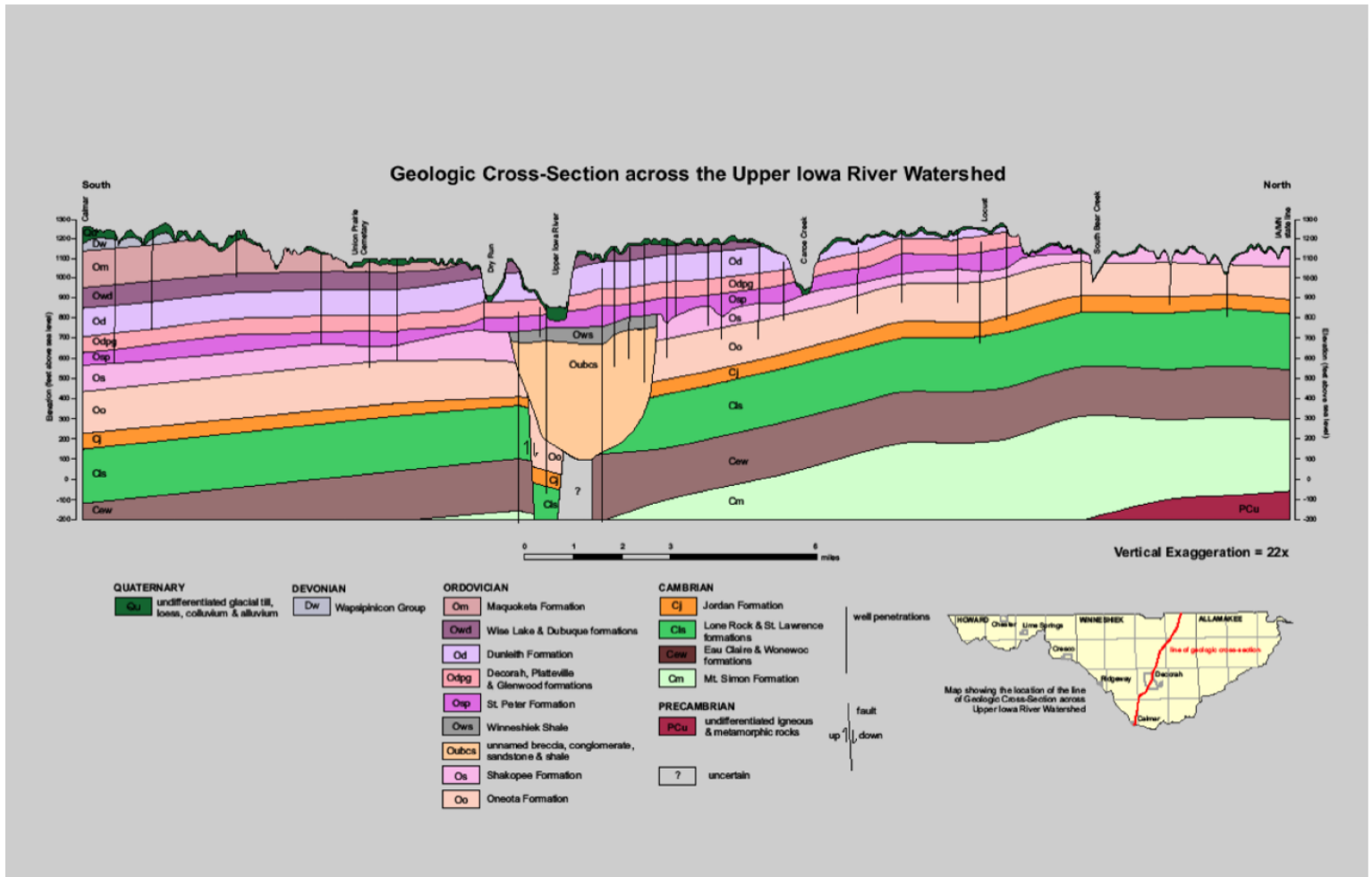


DECORAH IMPACT CRATER

THE DISCOVERY

Almost all of the Decorah Crater's distinctive features are now buried under many layers of sedimentary rock, so how did geologists figure out that the crater was formed by an ancient meteor impact? How did they know that it existed in the first place?

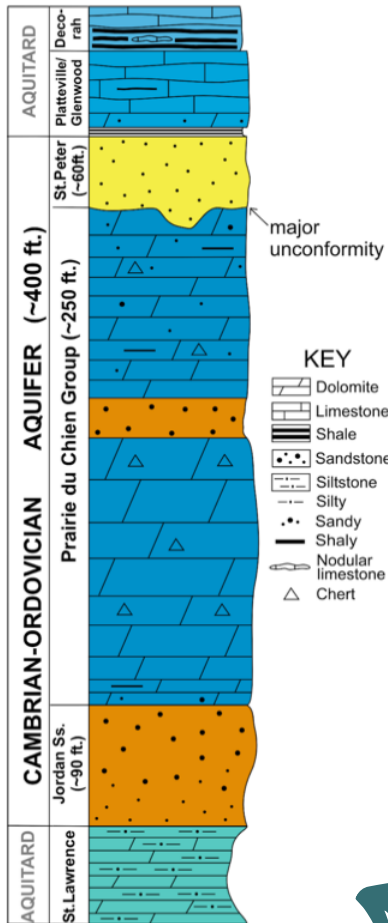


The Decorah Crater might still be undiscovered if not for the curiosity and persistence of local resident Jean Young. Through her work for the Iowa Geological Survey, Jean became intrigued by the unusual features documented in some of the well driller's logs in the Decorah area. Well logs record the types of rocks encountered as wells are dug and they are archived for many years.

While reviewing logs in the late 1990s, Jean noticed that logs around Decorah showed that the typical transition from St. Peter Sandstone to Shakopee Dolomite, which is common throughout the region, was in some places interrupted by layers of dark shale. Underneath that was a layer of fragmented rock called breccia.

DECORAH IMPACT CRATER

THE DISCOVERY



TYPICAL SEQUENCE OF ROCKS
VS
THE SEQUENCE ENCOUNTERED
IN THE DECORAH CRATER



Though other well loggers had apparently noted these unexpected features before (they appear on well logs dating back to the 1960s), and early Freeport (an unincorporated community neighboring Decorah) residents even appear to have found a small surface outcropping of the dark shale, no one before Jean Young seems to have persisted in investigating these odd occurrences.

Decorah Public Opinion.

DECORAH, WINNESHIEK COUNTY, IOWA, WEDNESDAY, MARCH 22, 1922

IN BUSINESS HERE FOR 35 YEARS F. J. Rosenthal, Well Known Local Merchant, Celebrating His Anniversary Today. NOW WILL BE J. ROSENTHAL & SONS Fitting Reception for the Young Men Who Have Been Valued Assistants for Number Years. On March 22, 1887, F. J. Rosenthal, one of Decorah's well known pioneer merchants joined the ranks of Decorah business men and has been one of the prominent merchants meeting here all these years and today he is celebrating his thirty-fifth anniversary.	PAVING GOES AT \$2.45 SQ. YARD Fifteen Miles on Grant Highway in Buchanan County Let at Cheap Price. SHOWS CONTRACTORS ARE COMING DOWN Fourteen Bids Were Entered for the Job, and Concerns all of High Standing. The Buchanan county board of supervisors last week awarded the contract for hard surfacing 15.56 miles of the Grant highway, or between Winthrop and Jesup, according to the Independence Bulletin-Journal, the winning contractor being the Western	COAL VEIN STRUCK AT FREEPORT Decorah Man Prospecting for Coal Strikes Vein 2½ Feet Thick at Old Paper Mill Dam. DRILLING STARTED LAST FRIDAY Coal Appears to be of Good Quality And Burns Well According To Reports. It looks like old Winneshiek county is going to prove one of the leading mining centers of the country, with oil and coal prospects in view. During the past week Mr. Chas. Mollart of Decorah, who recently secured the right to drill on the	OUR 1922 TAXES ARE HIGHER Iowa Taxes Have Increased Seven Million Dollars or About 8 Per Cent Past Year. SCHOOL GET A BIG SHARE Nearly Half of the Taxes Are Raised For School Purposes Figures Show. Taxes in Iowa have increased \$7, 771,310.01 or about 8 per cent in the past year, according to R. E. Johnson, secretary of the state executive council, who has compiled a table showing the increase in each class of	THE C STAI Tomorrow And Gas At 1 BIG CROW Machinery Rea
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JEAN YOUNG



PAUL LIU



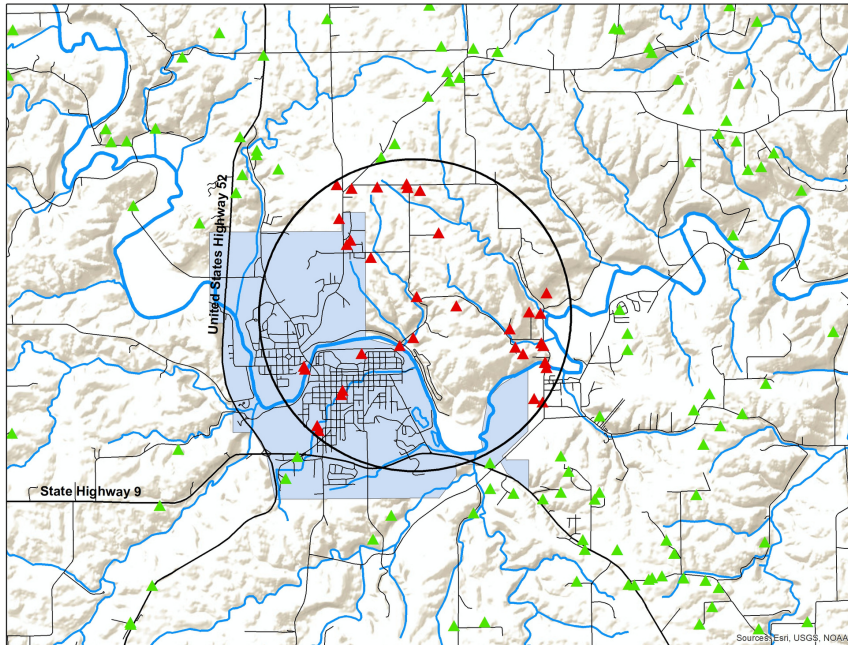
BOB MCKAY

Jean collaborated with Bob McKay and Paul Liu at the Iowa Geological Survey to learn more. Eventually, the team gathered all of the evidence from existing well logs and two drill cores and determined that the unusual shale layer (now called the Winneshiek Shale) and the breccia occurred only within a confined area forming a roughly circular basin. This observation gave rise to the initial hypothesis that it was an impact crater with the layer of breccia at the bottom of the crater made up of rocks fragmented by the force of the meteor impact and the layer of Winneshiek Shale deposited in the depression created by the impact.

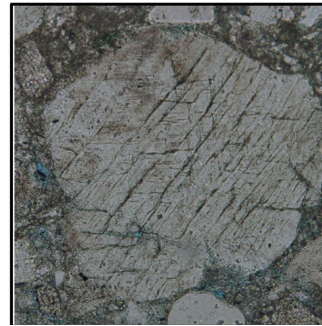
DECORAH IMPACT CRATER

THE DISCOVERY

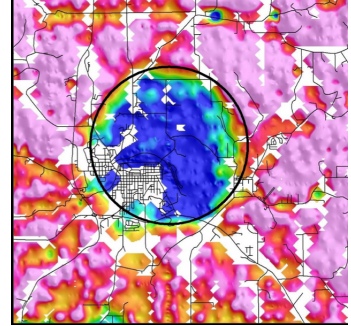
Definitive evidence that the crater was formed by a meteor impact came from the discovery of shocked quartz grains. Small grains of quartz from sandstone rock in the impact breccia found within the well logs, obtained by drilling beneath the surface, show internal deformation that provides irrefutable evidence of an impact event, which is the only naturally occurring process with enough energy to deform quartz grains at the atomic level.



UNUSUAL BLACK SHALE RECORDED IN WELL LOGS



SHOCKED QUARTZ



ELECTROMAGNETIC
ANOMALIES

Unrelated geophysical studies in the area also detected the underground presence of the impact crater, which shows up thanks to the very low electrical resistivity of the Winneshiek Shale formation compared to the other surrounding rock types.

Even though almost all of the Winneshiek Shale and all of the impact breccia are now far underground, the story of the Decorah Crater's discovery shows how much geologists can learn through careful observation and collaboration. Though Jean Young passed away before the Decorah Impact Structure was officially recognized, it is thanks to her that we now understand the extraordinary event that occurred right here so many years ago.