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An Ordovician-age scorpion-like fossil from northeast Iowa was featured on the National Geographic Channel on January 31st, 2016 as part of “The Strange Truth” television series (Fig. 1). This fossil is highly renowned because it is the oldest (465 million years) and the largest (5-6 feet) Ordovician eurypterid in the fossil record. For the television show, the National Geographic reconstructed a life-size model of the creature. The so-called “sea scorpion” is one of many unusual fossils discovered by geologists of the Iowa Geological Survey from a local shale unit near Decorah. This shale has been named the Winneshiek Shale, and its only known exposure was partly excavated in 2010 (Fig. 2).

This Middle Ordovician Winneshiek Shale is considered a Lagerstätte deposit, and was named the Winneshiek Lagerstätte. A Lagerstätte is a fossil site exhibiting extraordinary preservation and often faunal diversity. The Winneshiek Lagerstätte is characterized by abundant well-preserved natural conodont assemblages, a variety of arthropods, early jaw-less fish, algae and many others, including some soft tissues and structure details. Many taxa from the Winneshiek Lagerstätte are new. Because fossil component of the Winneshiek fauna differs significantly from normal marine shelly faunas, this discovery provides a new picture of Ordovician life, and was considered “the discovery of the decade in early Paleozoic paleontology” by reviewers.

Fig. 1: The model, discoverers, and land owners of the Ordovician eurypterid were celebrating the fossil home-coming in Decorah. This celebration was arranged and filmed by National Geographic Channel.

Fig. 2: The Winneshiek fossil site excavation and sample collection.
Paleoenvironmental studies of the Winneshiek fauna led to the discovery of a new meteorite impact structure. Results from well data studies suggest that the Winneshiek Shale is confined to a circular basin with a diameter about 5.6 km in the Decorah area (Fig. 3). Multiple lines of geological evidence indicate that this circular basin was formed by a meteorite impact. The shape and dimension of the crater has been confirmed by aerial geophysical surveys conducted by the U.S. Geological Survey (Fig. 4). This crater has been named the Decorah Impact Structure, which is the second meteorite crater recognized in Iowa.

The meteorite impact resulted in the formation of a deep enclosed basin where the bottom water had very low oxygen level, thus was inhospitable to benthic lifes. This created the appropriate conditions for the exceptional fossil preservation that characterizes the Winneshiek Lagerstätte.

The Winneshiek project, which consists of the research on both Winneshiek fossils and the Decorah Impact Structure, was financially supported by the National Science Foundation (NSF). This project has yielded many results and publications that are scientifically important and beneficial for public education. Research on the Winneshiek materials is ongoing. Please contact the Iowa Geological Survey for more details.