

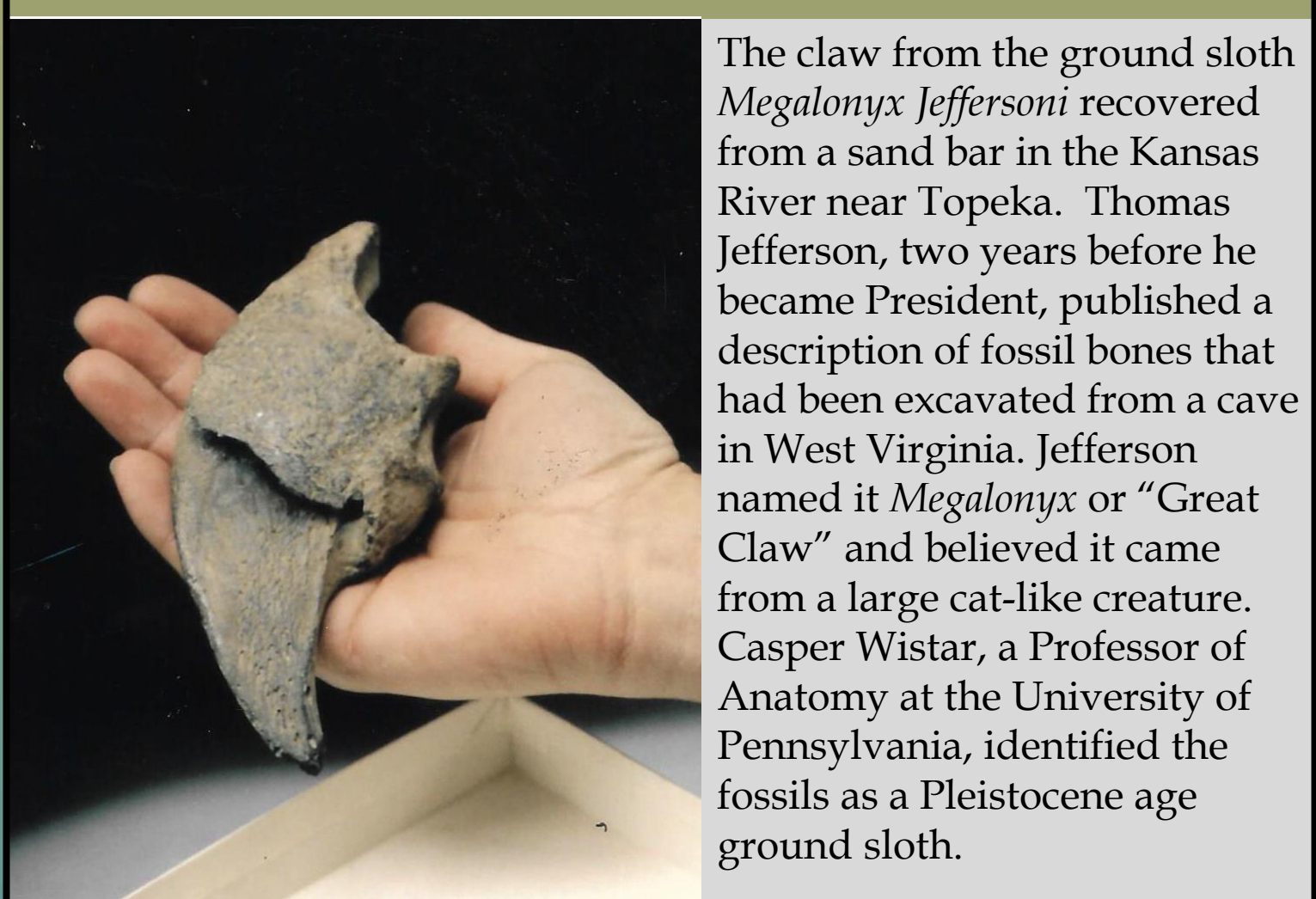
KANSAS CITY DURING THE GREAT ICE AGE



A scene along the Kansas River at the end of the Pleistocene Ice Age, about 11,000-12,000 years ago. A herd of Columbian Mammoths (*Mammuthus columbi*) are migrating south from northern grazing grounds. As the herd fords the river, a young mammoth is caught in the swift current and is being swept to an untimely death. The mother tries to save the little one, but her efforts are in vain. Three Clovis Paleo-Indian hunters on a distant hill are watching the movements of the herd. They are hesitant to come closer, because on the opposite hill, the short-faced bear (*Arctodus*), perhaps the most lethal predator of the Pleistocene is keenly eyeing the herd. The giant ground sloth (*Megalonyx*) is browsing in a mixed forest of deciduous and conifer trees, using its long, flexible tongue to strip tasty leaves from a branch. Meanwhile, the giant beaver (*Castoroides*) nibbles on vegetation growing along the riverbank. (Illustration by John Babcock)



Lower jaw bone and third molar tooth of a juvenile mammoth uncovered in glacial drift, near Lydia Street and First Street in Downtown Kansas City, Missouri. The tooth is 7.6 cm (3 in.) long.



PRAIRIE FIRE MUSEUM, OVERLAND PARK, KANSAS



The Exhibit has been incredibly popular with visitors, teachers and students. The Exhibit opened on November 3, 2017 and over 8,000 visitors had seen the Exhibit by September 2018. The Museum has developed an 18-page guide indexed to the wall illustrations and the fossil specimens in the display cases. A duplicate set of wall illustrations and fossil specimens is being created for permanent display at the Museum. Financed by the William T. Kemper Foundation

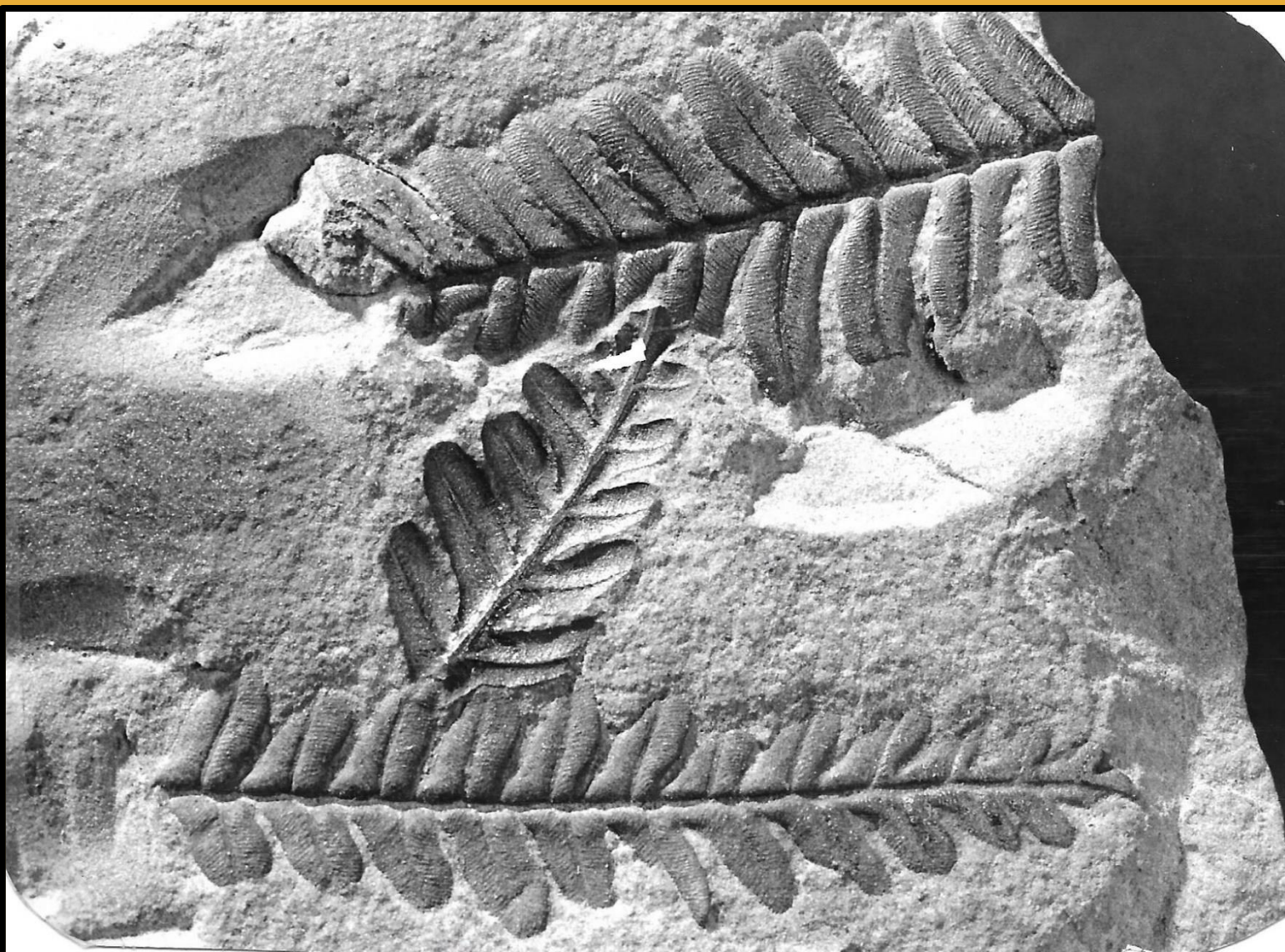


The Museum at Prairie Fire is committed to innovative learning in science, the arts, and natural history. Through a funding collaboration with the American Museum of Natural History in New York City, as well as with other cultural and educational institutions in the nation.

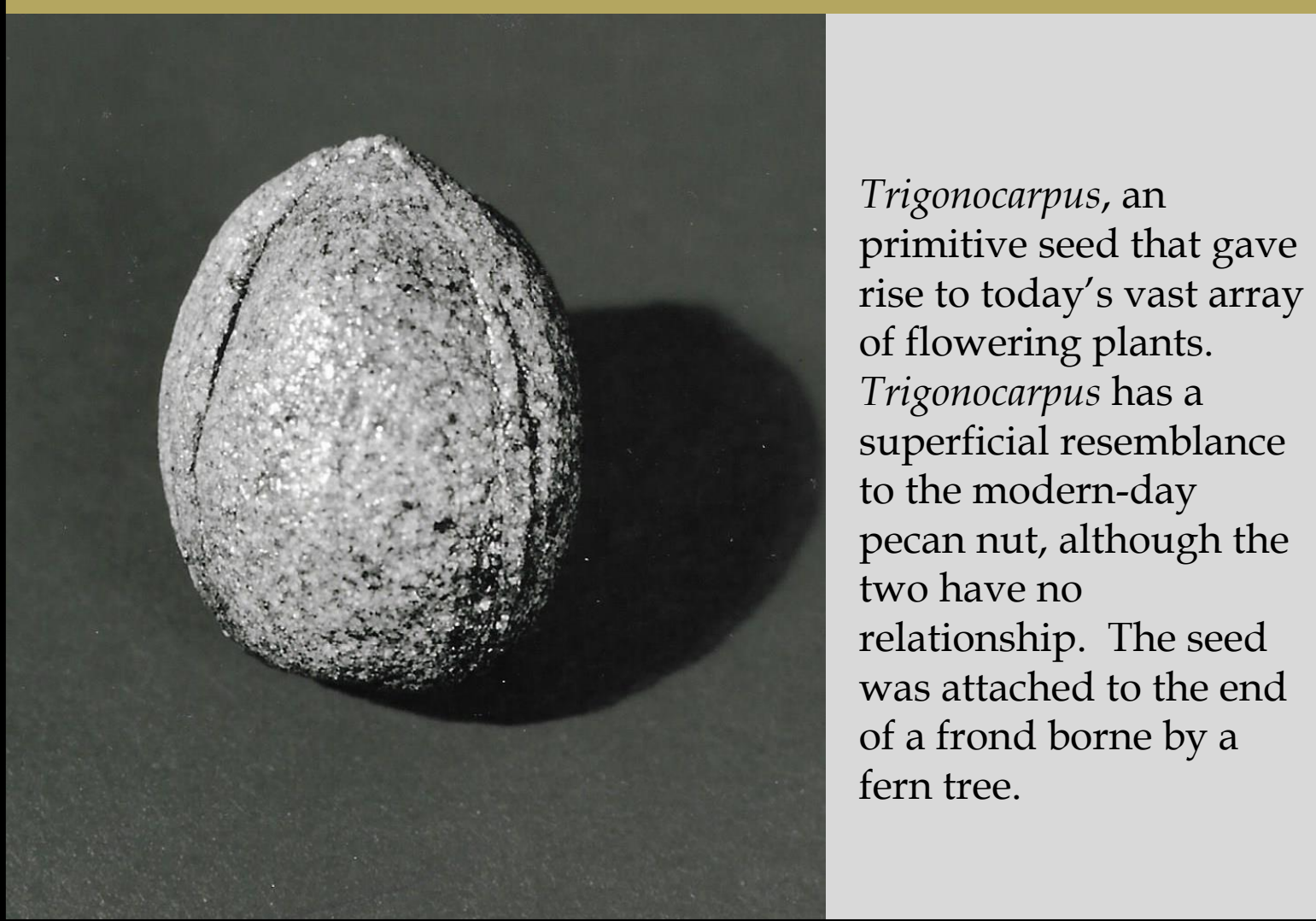
TROPICAL KANSAS CITY



Kansas City was a vast swampy lowland upon which grew great rain forests at times of sea retreat during the Pennsylvanian Period. Many of the rain forest plants were giants in size. The modern day descendants of these plants are ferns, horsetail rushes and club mosses, and comprise a small and insignificant part of present day floras. They represent only "the tip of a complex evolutionary iceberg submerged in an ocean of geologic time" (Niklas, 1996, p 51). (Illustration by John Babcock)



Impression of the fern *Alethopteris* beautifully preserved in sandstone



GEORGE OWENS NATURE PARK MUSEUM, INDEPENDENCE, MISSOURI

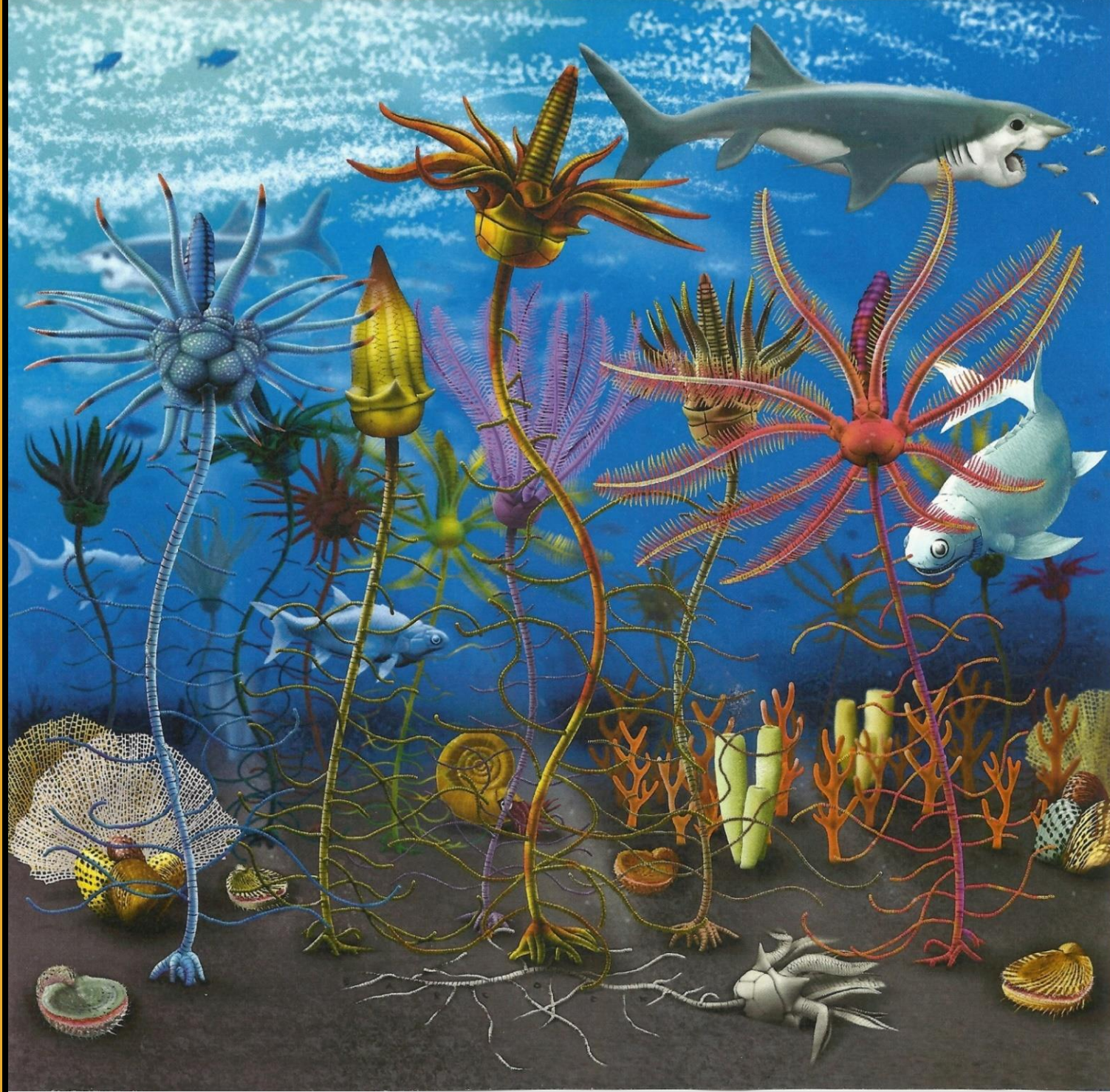


The Exhibit went on display on opening night December 2016 in the Nature Park's newly constructed museum. In the ensuing months, Dr. Gentile gave instructional tours to 60 Earth Science teachers from Independence, MO primary and secondary schools. As a result, a number of the teachers are using the Exhibit as a class project. Jeff Umbreit, Recreation Program Supervisor, estimates that an additional 6,000 visitors have seen the Exhibit. A duplicate set of wall illustrations and fossil specimens is being assembled for permanent display at the Museum. Financed by the William T. Kemper Foundation.

REFERENCES

- Gentile, Richard J., 2016. Rocks and fossils of the Central United States, with special emphasis on the Greater Kansas City area: University of Kansas, Department of Geology and Paleontological Institute, Lawrence, Special Publication #8, 2nd ed., 219 p., www.paleo.ku.edu
- Niklas, K.J., 1996. How to build a tree: Natural History, vol. 105, no. 2, p 48-52.
- Walker, J.D., Geiseman, J.W., Brown, S.A., and Babcock, L.E., compilers, 2018, Geologic Time Scale v.5.0: Geological Society of America, one sheet.

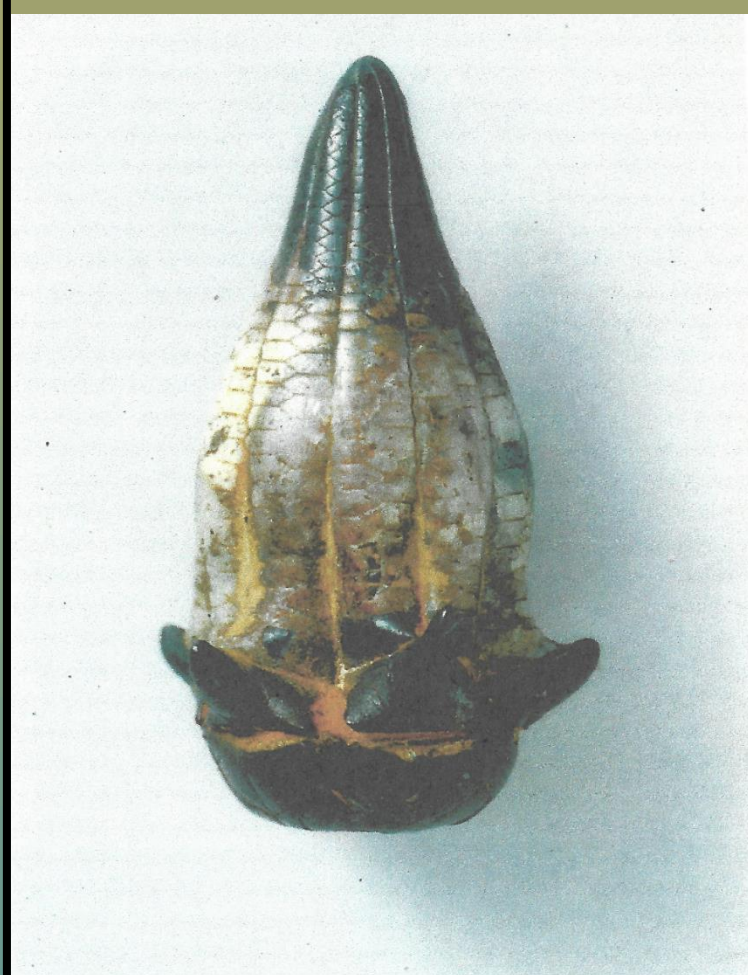
UNDER SEA LIFE



Life in the Central United States about 300 million years ago, during the Pennsylvanian Period of Earth's history. A shallow sea teemed with life. The skeletal remains of this vast and strange array of creatures is entombed in the layers of rock that underlie the Kansas City area and environs. (Illustration by John Babcock)



The fossil crinoid *Aesiocrinus magnificus* recovered from a basement excavation in Downtown Kansas City in 1889 (courtesy Smithsonian Institute, Washington D.C.). The crinoids are the most impressive and beautifully preserved invertebrate fossils found in rocks of the Greater Kansas City area.



Delocrinus missouriensis, an extraordinary specimen of the calyx and the arms in closed position, almost flawless and mineralized to shades of white, pink and brown. The specimen formed the nucleus of a concretion.

SCIENCE CITY AT UNION STATION, KANSAS CITY, MISSOURI



The lower jaw with 3 teeth of a wooly mammoth was on display at the entrance to a dinosaur exhibit from June 29, 2018 until March 24, 2019. Many of the 125,000 visitors stopped by to see the jaw and several other skeletal remains of the mammoth, a permanent part of the Traveling Geology Exhibit.

ACKNOWLEDGEMENTS

The Traveling Geology Exhibit is made possible by a generous grant from the William T. Kemper Foundation, Commerce Bank, Kansas City, Missouri.

- Jonathan Kemper, Chairman and CEO, Commerce Bank, Kansas City, Missouri.
- R. Crosby Kemper, III (deceased) Chief Executive Officer, Kansas City Public Library System
- Samuel Bennett, Foundation Program Manager, Commerce Bank
- Robin Trafton, Curator, The Box Gallery
- Henry Fortunato, Director of External Affairs, Kansas City Public Library
- John Babcock, Illustrator and Designer, Owner, Illustration and Design Company
- Jeff Rosenblatt, Director of Exhibits, Science City and Union Station
- Kathryn McKinney, Director of Education, Museum of Prairie Fire, Overland Park, Kansas
- Jeff Umbreit, Recreation Program Supervisor, George Owens Nature Park, Independence, Missouri
- Gil Parker, Paleontology Preparator, Parker Paleontological Enterprises, Inc.

THE GEOLOGIC TIME SCALE												
eon	era	period	epoch	million years ago	important events of world history							
phanozoic	cenozoic	quaternary	holocene	0015	modern world unfolds							
			pleistocene	2.6	ice age ends extinction of many large mammals repopling of north america neanderthals homo							
						ice age begins						
			tertiary	pliocene	5.3	isthmus of panama closes extensive grass lands antarctic ice cap forming antarctica separates from s.a.						
		miocene		23								
		oligocene		34	red sea opens							
				eocene	56	interval of global warming uniform climate, warm oceans large mammals evolve extinction of dinosaurs tyrannosaurus rex great plains a vast seaway australia and s.a. separate						
		palaeocene			66							
		mesozoic		cretaceous			first snakes first flowering plants first birds giant plant-eating dinosaurs atlantic ocean forming south america & africa separate					
			jurassic		145							
	triassic		201		gulf of mexico forming pangaea breaking apart first mammals first dinosaurs widespread extinctions							
			permian		253							
	palaeozoic		carboniferous	299	southern hemisphere glaciation continent of pangaea forming sea advances and retreats first reptiles vast rain forests first conifers first flying insects							
				mississippian	323	abundant marine invertebrates extensive seas						
						359	first amphibians & bony fish first forests, insects first seed-bearing plants coral reefs widespread aridity					
				devonian	419	first jawed fish first land plants						
			silurian		443	evolution of jawless fish greatest sea advance						
				ordovician	485							
	cambrrian	541	evolution of shelled animals first soft-bodied invertebrates									
		proterozoic	precambrian or cryptozoic	635	extensive glaciation life with advanced cells oldest red beds increase in atmospheric oxygen							
2500	first life, blue-green algae nuclei of continents forming oldest dated earth rocks meteorites bombard the earth oldest dated moon rocks origin of the earth											
4000												
4600												

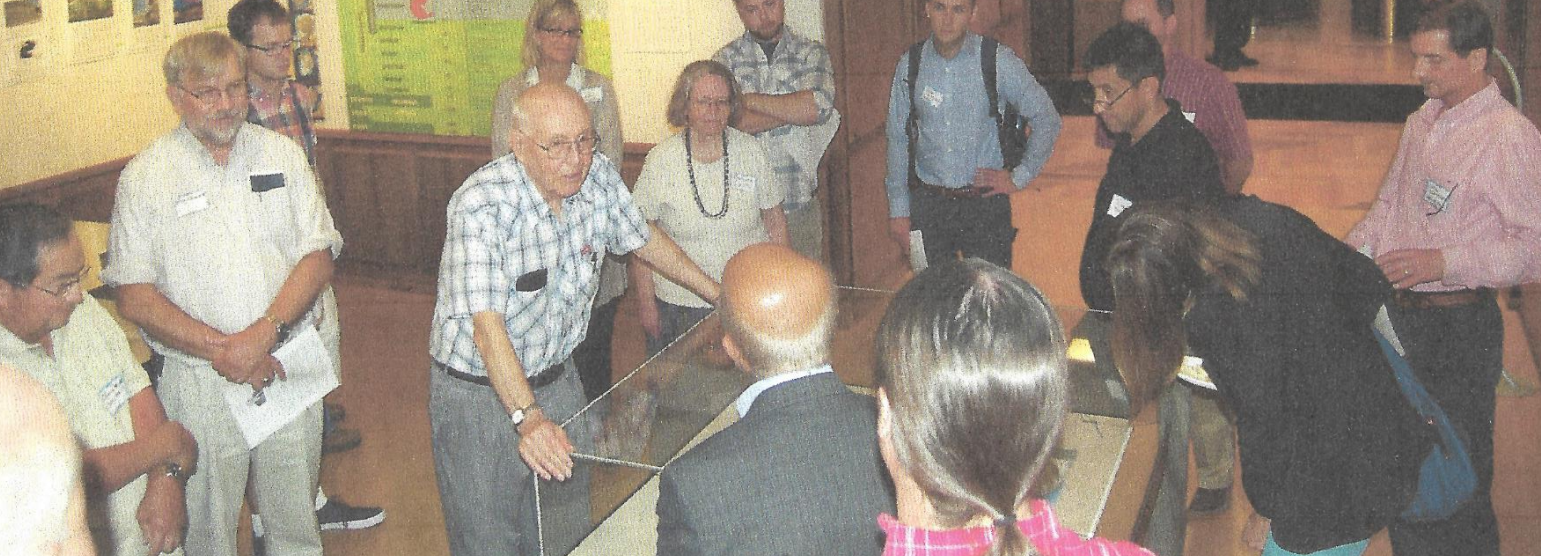
The Geologic Time Scale shows the subdivisions of geologic time with emphasis placed on the Pennsylvanian and Quaternary Periods. The sequence of physical and biologic events that occurred in the Greater Kansas City area from the end of the Late Pennsylvanian and the beginning of the Quaternary are lost forever because the rocks are missing as a result of erosion and/or non-deposition of sediment representing about 300 million years of Earth's history.

CENTRAL LIBRARY, DOWNTOWN KANSAS CITY, MISSOURI



The geology of the Greater Kansas City area, the major theme of the Traveling Geology Exhibit, was presented to an audience of 115 by Dr. Gentile on April 9, 2013.

LINDA HALL LIBRARY OF SCIENCE, ENGINEERING AND TECHNOLOGY, KANSAS CITY, MISSOURI



The Traveling Geology Exhibit was displayed in the West Gallery during the summer and fall of 2015, and was held over several months past the scheduled closing date. Several hundred visitors enjoyed the display including members of professional organizations such as the Kansas City-Omaha section of the Association of Environmental and Engineering Geologists shown in the photograph above.

THE TRAVELING GEOLOGY EXHIBIT - BRINGING GEOLOGY TO THE PEOPLE



Richard J. Gentile
Robyn L Daniels



Department of Geosciences, University of Missouri-Kansas City
Contact Information: GentileR@umkc.edu

Prepared for the Geological Society of America combined South-Central, North-Central and Rocky Mountain Section Meeting, Manhattan, Kansas, March 25-27, 2019.

The Exhibit recreates the geologic history of the Central United States with special emphasis on the Greater Kansas City area. In its entirety, the Exhibit consists of 40 wall illustrations (dioramas, photos, sketches, etc.), and an equal number of fossil specimens. The poster features only a limited number of illustrations and is complimented by photos of the most impressive fossil species. The Traveling Geology Exhibit has been a success beyond our most optimistic expectations. Over 125,000 visitors have seen the Exhibit at six locations since it opened in 2013. A large number of the participants are Earth Science teachers from the Greater Kansas City school districts who have adopted the Exhibit as a class project. We hope the Exhibit will act as a model to inspire educators to create similar exhibits in other cities.

The surface rocks in the Greater Kansas City area were laid down during two intervals of geologic time (a) the Pennsylvanian Period and (b) the Quaternary Period, shown on the geologic time scale (Walker et al., 2018). The Pennsylvanian rocks form the bedrock upon which the Greater Kansas City area is built and are about 300 million years old. During the Pennsylvanian Period of Earth's history, Kansas City was located near the paleoequator. Vast, warm seas that teemed with life, mostly invertebrates and primitive fish, repeatedly transgressed and regressed across much of midcontinent North America. The seas withdrew at times and were replaced by vast, swampy lowlands upon which grew great rain forests of primitive plants, and many were giant in size. The Quaternary rocks overlie the Pennsylvanian rocks and were deposited during the Pleistocene Epoch, a subdivision of the Quaternary Period, and are less than a million years old. The Pleistocene Epoch, referred to as the Great Ice Age, was an interval of time when continental glaciers advanced and retreated numerous times across much of the Northern Hemisphere. A continental ice sheet set the course of the Missouri River and entered Downtown Kansas City. The Pleistocene was the age of large-sized mammals, including mammoths, grizzly bear-sized ground sloths, and giant beavers. The physical and biologic events that occurred during these two widely separated intervals of geologic time are recorded in the surface rocks that underlie Kansas City and environs. The events that occurred in the Greater Kansas City area during the interval of time between the Pennsylvanian and the Quaternary Periods, representing about 300 million years of Earth's history, is lost forever because the rocks are missing as a result of erosion and/or non-deposition.

The Exhibit is based on the book, *Rocks and Fossils of the Central United States with special emphasis on the Greater Kansas City area*, authored by Richard J. Gentile, illustrated by John Babcock, edited by Jill Hardesty and Denise Mayse, and published by the Department of Geology and Paleontological Institute, University of Kansas, 2016, (2nd ed.) Special Publication 8, 216 p. www.paleo.ku.edu

The Exhibit was made possible by a generous gift from the William T. Kemper foundation, Commerce Bank, Kansas City, Missouri.

THE BOX GALLERY, COMMERCE BANK BUILDING, KANSAS CITY, MISSOURI



The Traveling Geology Exhibit on display at the Box Gallery, 2nd floor, Commerce Bank Building, Kansas City, Missouri



One of the display cases with representative specimens of Pleistocene (Great Ice Age) animals



The Exhibit was on display from March 1 to June 1, 2013 and was well attended by classes of school children, teachers, professional organizations and the public. The Exhibit was scheduled to close on April 30 but was held over until June 1. It has been one of the Box Gallery's best-attended displays.