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SOUTHWEST CENTER FOR ADVANCED STUDIES

POST OFFICE BOX 30365
DALLAS, TEXAS 75230

(214) ADAMS 1-1471

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Al Mitchell, Director, Public Affairs

TEXAS SCIENTIST SEEKS 300-MILLION-YEAR-OLD PLANT SPORES IN IOWA;
USES SUPERIOR ELECTRON MICROSCOPE IN ROCK-AGE RESEARCH

DALLAS, Texas --

Much of eastern Iowa is a rich Devonian geology layer-cake, to put science into bakery terms.

Cities and towns in an inverted triangle with its tip at Iowa City, running to Spillville in the northeast and to Mason City on the northwest, owe much of their growth to the 40-million-year history of Devonian rocks and shales that are more than 300 million years old.

Their building stones, cement and clay products and sugar refining all have depended to some extent on the Devonian period. Even the printing of bright circus posters had a Devonian touch.

The Devonian layer-cake is being re-tasted in a Dallas suburban city, and in a new way. At the Southwest Center for Advanced Studies, a privately-founded research and graduate education institute in Richardson, Texas, Dr. James B. Urban is conducting research in palynology.

His field of research is almost "new." But its name comes from such Greek and Latin roots as palynein, meaning to sprinkle, and pollen, meaning fine flour -- as well as referring to the stuff that brings sneezes and tears about this time of the Iowa summer. Outside the oil industry, palynologists are uncommon.

Doctor Urban's studies aren't directly concerned with the modern and sneezy products of ragweed and goldenrod. He's studying microscopic-sized fossils that represent the spores of some of the oldest vascular, or fluid-carrying plants.

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Spores are tiny reproductive bodies from things like ferns and mosses that produce new plants directly without being fertilized.

Collection of Devonian spores will bring Doctor Urban back into Iowa during the period August 12 to about August 16. Starting at Iowa City, where he will confer with State Geologist H. Garland Hershey, he'll be looking into several Devonian sections as he works his way north through Independence, to Spillville, and then travels west to visit the brick and tile plants at Rockford and Sheffield.

Geologists generally define the Iowa Devonian formations under four names. Wapsipinicon is the oldest, relating to the middle Devonian period. Cedar Valley, Shell Rock, and Lime Creek, in that order, are younger. They are upper Devonian.

The names come from the four rivers that flow through the triangle from northwest to southeast from Minnesota and near-Minnesota origins. The Wapsipinicon goes independently to the Mississippi; Lime Creek meets the Shell Rock at Rockford, and they join with the Cedar river southwest of Janesville, later to meet the Iowa near Columbus Junction and the Mississippi east of Wapello.

Modern map-makers may object to the name "Lime Creek." On the other hand, some of the older residents in and near Mason City may never have learned to refer to the Winnebago river by any other name, although the change was made more than 30 years ago (except for geologists).

Each formation has several principal members. Solon, Rapid, and Coralville are members of the Cedar Valley; Mason City, Rock Grove and Nora are found in the Shell Rock; and Juniper Hill, Cerro Gordo and Owen in the Lime Creek formation.

To define Devonian geology and palynology, you have to imagine what life was like 300 million years ago, when water covered much of the continents. Thick sediments formed and later became rock. Skeleton structures of simple animal life and the plant spores were trapped in the sediments, to be lithified in the evolving rocks.

The shallow seas and lagoons covered North America's lowlands in a long arc

from what is now southern Alaska to the present-day eastern Great Lakes. To the east, and in Canada, there were mountains and volcanoes. Fishes were the common large life. The first vascular plants grew in the swampy soil and in a mild climate.

Dinosaurs, flowering plants and mammals (including man) were still millions of years in the future. The ages of ice were to come seven geological periods later, bringing four glacial sweeps into Iowa to smooth the surface and leave the deep drift that became some of the most fertile topsoil in the world.

Doctor Urban's work in Texas is aimed at decoding the ages of the rock beds with greater accuracy.

The Devonian plants evolved fairly fast. They "soon" (in the geological sense) became ferns and the earliest forests of cone-bearing trees, as the warm Carboniferous period succeeded the Devonian, all within the Paleozoic era that covered some 400 million years.

The first-~~and-last~~ ^a appearances of the many kinds of Devonian spores are the key to ~~d~~efining rock ages. Eventually, Doctor Urban hopes to index their many varieties by age, with cross-referencing to animal fossils and other rock-age systems.

Spore fossils are dust fine. They are not something you scrap off a rock wall and identify on the spot, then put into the microscope for a better look. After Doctor Urban takes his Iowa rock samples, there's still a long process ahead. He'll have to crush the rocks, dissolve them in acids, and make first identifications of spores with an optical microscope.

Then, some of the spores will be gold-plated and sit for their portraits in the first scanning electron microscope to be used exclusively for geological research in the United States. It's a revolutionary instrument, built in Japan, that works somewhat like a television or radar system. The Southwest Center for Advanced Studies installed it less than a year ago.

Research scientists can see details they never saw before; better than that,

they can make photographs that have three-dimensional qualities, at magnifications of 30 to 50,000 times.

Up to now, palynologists have been able to record what they saw only through hours-on-end work by research artists, glued to high-powered optical microscopes with stereo lenses.

The scanning microscope sends a probing beam of electrons across a specimen. It's a very narrow beam, between 100 and 200 Angstroms in diameter. An Angstrom unit is one hundred-millionth of a centimeter. If you string hydrogen atoms, the simplest kind, together like beads, 10 of them would stretch across six Angstroms.

The impact of electrons in the beam causes new electrons to jump out of the surfaces of the fossil spores. These are trapped by detectors, amplified like television signals, and painted on picture tubes by a second beam in a mosaic pattern of lights and darks. Short time exposures, with a camera attached to the picture tube, capture the beautiful detail of the fossils. The brightness of the pictures is improved by gold-plating the tiny spores before they go into the microscope.

Doctor Urban is a native of Oklahoma, and University of Oklahoma Ph.D., a former research geologist with the Continental Oil Company, and a former head of the geology department at Central State College in Warrensburg, Missouri.

As mentioned, he's making a return trip to Iowa, after a 1966 visit that covered the area from Spillville to Garner. This was in connection with the 30th Annual Tri-State Geological Field Conference, which headquartered at Mason City. It was arranged by the Iowa Geological Survey. Doctor Urban is still singing the praises of Iowa geologists and operators of quarries who aided in the earlier research trip. He's eager to return to the hospitable Hawkeye state.

North Iowa especially reflects the history of industry in its Devonian formations. High-calcium limestone, in a ledge near Mason City, has been the base for cement manufacturing and sugar refining. In nearby Floyd county, the Coralville-Cedar Valley limestone was what built "Lithograph City," which is now gone from

the maps.

The smooth, porous stone was used in printing plants some 50 years ago. Artists drew bold, circus-poster pictures and other printing on its surface with greasy crayons. Dampened with water, and covered with oily inks, the stone faithfully returned the crayon design to paper pressed on the surface.

Until metal and plastic plates fitted to high speed presses appeared, the "Lithographic City" business thrived so well that some of the early Hart-Parr (now Oliver) tractors were used to haul wagon-trains of stone to rail shipping points at Charles City.

A geologist may have tried to memorialize the importance of Devonian stone and shale in northern Iowa. There is -- or was -- a small community named Devon on the Great Western railroad in central Chickasaw county. And, Lithograph City itself was called Devonia by some map-makers.