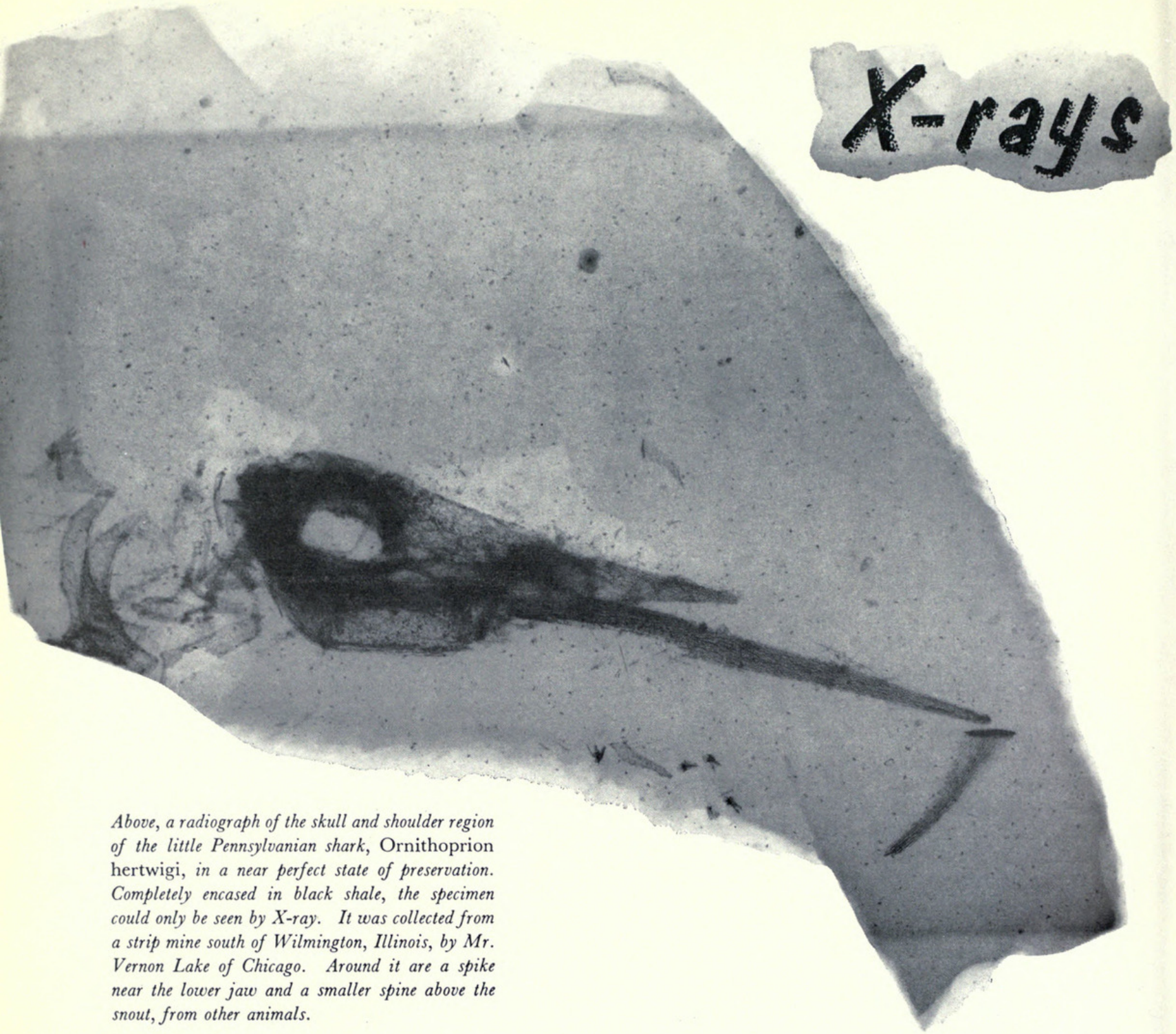


X-rays



*Above, a radiograph of the skull and shoulder region of the little Pennsylvanian shark, *Ornithoprion hertwigi*, in a near perfect state of preservation. Completely encased in black shale, the specimen could only be seen by X-ray. It was collected from a strip mine south of Wilmington, Illinois, by Mr. Vernon Lake of Chicago. Around it are a spike near the lower jaw and a smaller spine above the snout, from other animals.*

radiography, a valuable research tool

X-RAYS, or Roentgenrays (after their discoverer Wilhelm Konrad von Roentgen), are invisible rays of short wavelength that have the ability to penetrate matter. Soon after their discovery, just before the close of the nineteenth century, they were tested in a variety of scientific fields for their potential usefulness in demonstrating hidden structures. For obvious reasons, intense application of radiographic techniques developed in medical diagnosis where x-rays now play a most significant role. It is rather curious to note that in other sciences where x-rays work equally well, namely, in zoology, paleontology and in petrology, radiographic techniques have not become a standard research tool and have in the past been utilized by only a rather small number of

scientists throughout the world. This in spite of a few classic studies that have clearly demonstrated the merits of radiographic techniques as often superior to any others. One of the most distinguished of these is the monograph by Max Küpfer (1931) on the mode of bone formation during development in the legs of horse and donkey.

At Field Museum of Natural History, x-rays have been used for diagnostic purposes as long ago as the middle twenties, when they served the investigation of the contents of mummies. This work culminated in a monograph on "Roentgenological studies of Egyptian and Peruvian mummies" by the noted paleopathologist Roy L. Moodie (*Fieldiana: Anthropology Memoir* 3, 1931).

The equipment available was, by present standards an,

find fossils

by Rainer Zangerl, Chief Curator, Geology

archaic machine called SNOOK that produced excellent pictures to be sure, but was extremely dangerous to operate. From about 1945 on, the machine was housed in the department of geology where it served the study of fossils. Unquestionably, the most significant and extensive use came with the Museum's Mecca and Logan Quarry project in west-central Indiana. There a fascinating fauna of sharks, palaeoniscoid fishes and acanthodians occurs in black (carbonaceous) sheety shales of Pennsylvanian age (280 million years ago). A vast number of specimens was collected from these shales, many of them representing species new to science. The investigation of these shales and their fossil content is almost wholly contingent upon the availability of x-ray equipment because the mechanical preparation of the specimens is not only extremely time-consuming, but moreover injurious to such microscopic structures as the skin denticles of sharks, and small, brittle bones and teeth. These carbonaceous shales, on the other hand, are easily penetrated by x-rays and the enclosed fossils show up very clearly as shadow pic-

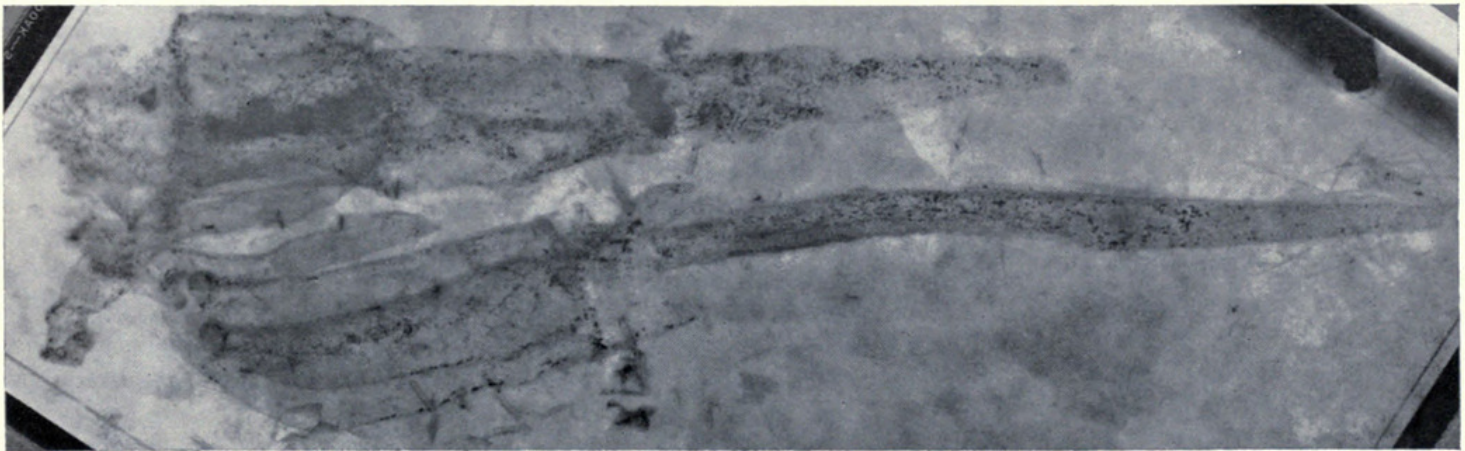
tures. Since it takes only a few minutes to make an x-ray picture, it was both necessary and possible in this case to scrutinize several hundreds of pieces of shale containing fossils.

Museum Retires SNOOK

With the internal rebuilding of the Department of Geology in 1965 the old SNOOK had to be retired, since it is against state law to move and reinstall obsolete x-ray equipment. This temporarily stopped work on the Mecca-Logan fauna.

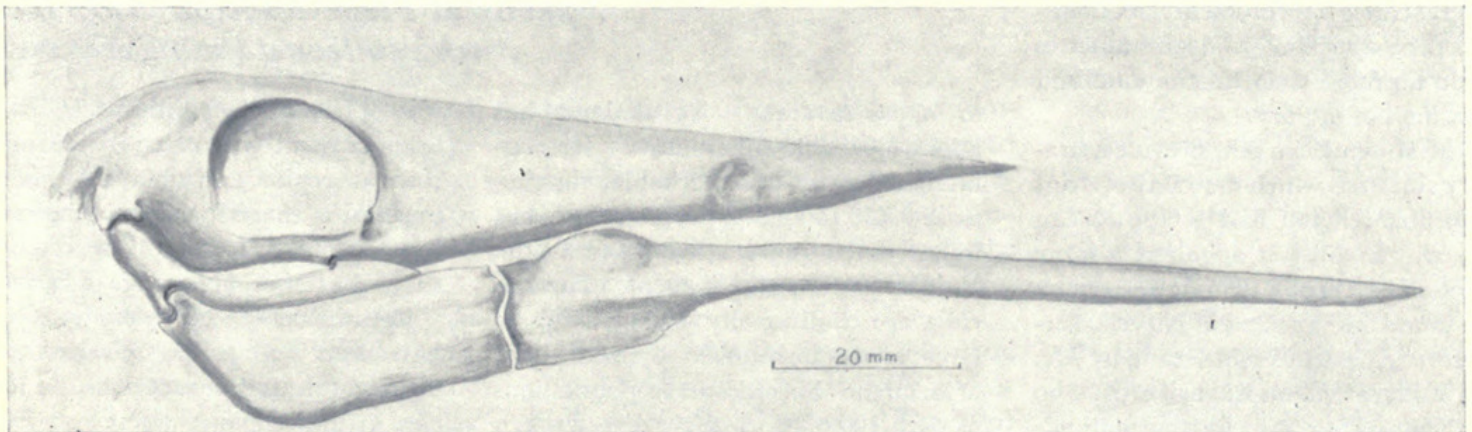
The Department of Geology is now in possession of new x-ray equipment. Through the good offices of a fellow paleontologist, Dr. W. Stürmer, a senior scientist with Siemens AG, of Erlangen, Germany, this firm's Medical Division has presented Field Museum with a HELIODOR-DUPLEX, a diagnostic x-ray machine, equipped with a Pantix tube.

The new equipment will serve several scientists on the Gology staff, but it will be the main research tool in the systematic study of the numerous species of fishes in the Mecca and Logan Quarry shales of Indiana.



Above, a positive print of a radiograph. Another specimen of the same shark, skull slightly disarticulated. Because this specimen contained little pyrite, x-rays revealed more of the major skull structures of the shark, enabling the

author to produce the drawing, below, of the skull of the fish. The drawing was made by studying stereoscopic pairs of X-ray photographs, which permitted three-dimensional visualization.





Zangerl, Rainer. 1967. "X-Rays Find Fossils." *Bulletin* 38(6), 2-3.

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