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An Iron Fulgurite from Nebraska

C. M. Riley

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ABSTRACT

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C. M. RILEY

From the time of the ancients man has been impressed with the force of lightning and its effect on the rocks at the surface of the earth. It was Saussure in 1786 who first wrote a scientific account of a true fulgurite, and a wealth of literature has been written about the subject since this time. Many unusual fulgurites have been described, some of which may not truly be the result of lightning. The iron fulgurite is a strange conical object about 3 inches high composed mainly of tiny spheres and filaments of metallic iron intermixed with a small amount of nonmetallic soil minerals. It is believed that a bolt of lightning hit an iron object lying in a farmyard, instantly melted it, and somehow sprayed the molten iron into the soil where it solidified. The power needed by a lightning bolt to instantly melt a mass of iron this size was computed at 2050×10^6 watts.

CONTRIBUTION OF *the Department of Geology, College of Arts and Sciences, and the Division of Geology of the Museum.*

Riley[1]

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Introduction

Mankind has always held in awe the fearful power and mystery of lightning. Early writers considered lightning bolts the weapons of the gods, and Pliny writes of two kinds of stones, the *ceraunia* and the *glossopetra* which supposedly could only be found where lightning had struck. Many fossils and artifacts found during the middle ages were attributed to the effect of lightning. The *ceraunia* were thought to be excellent charms to protect the wearer from lightning or severe storms, and when taken internally they provided a cure for several diseases (Adams, 1938).

Barrows (1910), in his excellent review of the literature on fulgurites, tells of Horace Benedict Saussure who wrote in 1786 what was probably the first scientific account of the effect of lightning on rocks from the summit of one of the outlying peaks of Mount Blanc. Petty (1936), in his historical review of the subject, credits a Pastor David Hermann with having found fulgurite tubes for the first time in Germany in 1706. Since then there have been a great number of papers concerning fulgurites. Most of these are merely descriptions of the locality and the nature of particular fulgurite finds, but Julien (1901)

[1] Asst. Professor of Geology and Consultant, Division of Geology in the Museum at time paper was prepared, now employed by Humble Oil and Refining Company, Houston, Texas.

gives a comprehensive petrographic report and classifies fulgurites as either: 1) superficial—glassy crusts on rock surfaces, or 2) internal—actual tubes in unconsolidated material. At the present there is such a wealth of evidence, even eye-witness accounts, that no one can doubt the lightning origin for these objects. However, even from the time of Saussure this conclusion has been strengthened by laboratory experiments which created fulgurites in a variety of materials by comparatively feeble sparks (Petty, 1936).

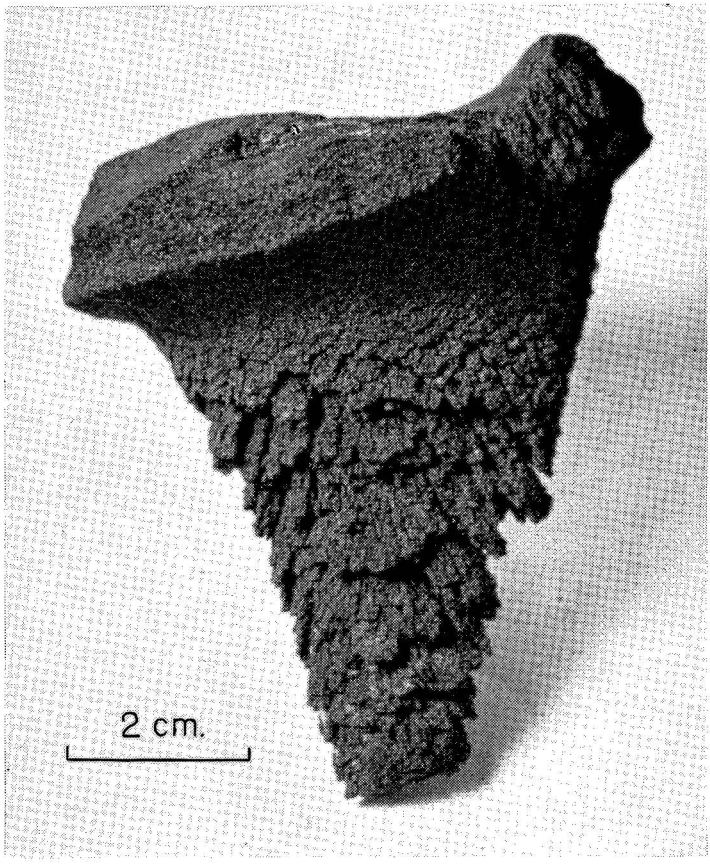

FIG. 1—The iron fulgurite, University of Nebraska State Museum Cat. No. G-19.

Most fulgurites are from sandy areas such as beaches or dunes. In such localities shifting sands quickly uncover the tubes and buried "roots" are easily dug out. However, fulgurites have been reported from nickel-bearing serpentine (Ash-

ton and Bonney, (1896), on a variety of igneous and metamorphic rocks (Julien, 1901), and even from a concrete sidewalk (Hill, 1947). An unusual occurrence is reported by Cook (1925). He describes fulgurites which consist of nearly 50% manganese dioxide. This writer has had an opportunity to examine these specimens and must admit their striking external similarity to sand fulgurites. However, their structureless nature, their thickness, and the absence of any fused quartz (lechatelierite) makes one wonder whether the filling of root cavities in the soft Oligocene rocks could not have produced the so-called fulgurites.

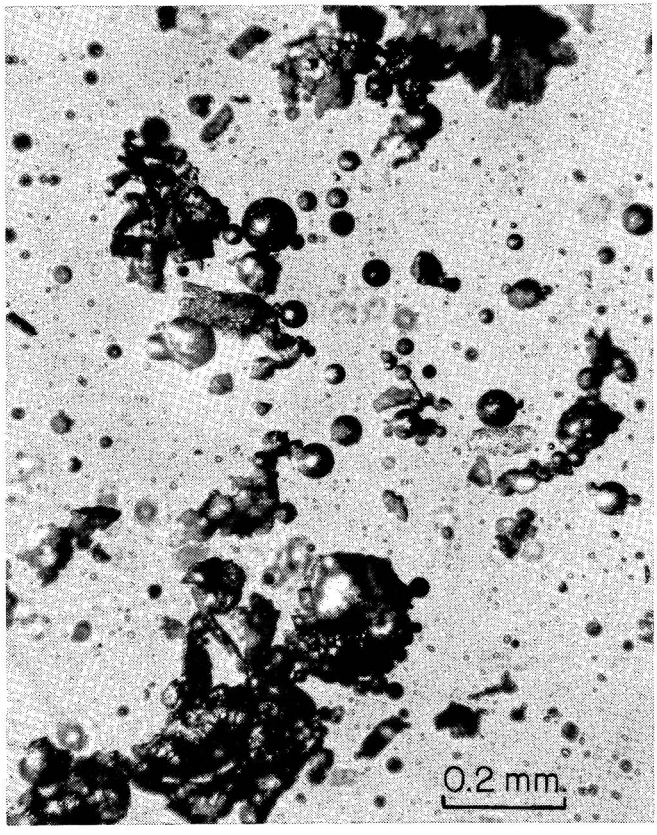

FIG. 2—Photomicrograph of grains from iron fulgurite showing spheres, filaments, and irregular masses of iron.

THE IRON FULGURITE

The specimen (University of Nebraska State Museum Catalogue Number G-19) was brought to the University of