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Department of
CHEMISTRY

June 7, 1972

Mr. Oscar E. Monnig
29 Chelsea Drive
Fort Worth, Texas 76134

Dear Mr. Monnig:

I am a graduate student working under the direction of Professor M. W. Rowe. From that statement you might surmise my purpose in writing you. I am aware of the request made by Professor Rowe for small samples of the Bells and Crescent meteorites and of your refusal to part with them for paleomagnetic investigation. I would like to present to you some more information about our studies in the hope that you might reconsider.

Relatively little has been done in the past in terms of paleomagnetic studies with the carbonaceous chondrites. These meteorites, however, are ideal species to work with for several reasons. First, of course, is their primitive character. Second is that these meteorites have been heated little since compaction.

In terms of our studies the C-2 carbonaceous chondrites are the most interesting. The small amount of nickel-iron metal they contain is considered by many scientists (e.g. John Wood) to be primordial condensate from the solar nebula. This metal, when present, is juxtapositioned in a matrix of Fe_3O_4. From a magnetic point of view the C-2's represent a two component system.

I am enclosing a preprint of a report to Physical Review Letters which might give you some idea of how beautiful such a two component system can be. We were fortunate in the Murray sample to find that the Murray meteorite was not heated above about 400-450°C after its compaction. For meteorites which contain magnetite and a stable remanent magnetization we can tell if the meteorite was heated above the Curie temperature of magnetite (about 560°C), and if not, then we can tell the temperature to which it was heated. This is in addition to being able to ascertain the magnitude of the magnetic field which caused the remanence.

Studies of this nature have not been possible in the past. Our colleagues in Colorado have developed a system of oxygen fugacity control that permits a meteorite specimen to be heated repeatedly to 800°C without either oxidation or reduction of the ferromagnetic constituents.

Our initial studies indicate that not all of a given class of carbonaceous chondrites have the same magnetic-thermal history. The Mighei and Essebi meteorites appear not to have been heated over about one hundred degrees while the Murray meteorite was heated 400-450°C.

We are anxious to examine all of the C-2 meteorites that we can so that we might understand more fully the thermal histories of these species in relation to each other. I would ask that after reading this letter and the enclosed preprint you would reconsider your decision as to supplying specimens of the Bells and Crescent meteorites.

Sincerely,

J. Marvin Herndon

JMH:dm