

Natural and Cultural Heritage Considerations for Somalia's El Ali Meteorite.
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El Ali is a part of Somalia's Natural and Cultural Heritage. Recognition of its Natural Heritage significance began only recently with its discovery and recognition as an iron meteorite. Our consortium of scientists in the field Meteoritics (the study of meteorites) at University of California at Los Angeles, University of Alberta and University of Arizona have submitted their initial brief report to the Meteoritical Society to be published in its Meteoritical Bulletin. The elemental composition has been measured by advanced Instrumental Neutron Activation Analysis (INNA) and by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Radiometric dating is still in progress.

El Ali's significance to Somalia's Natural Heritage will continue to be explored through a subsequent publication in the Meteoritical Society's journal Meteoritics and Planetary Sciences. That will examine El Ali's elemental, textural and mineral composition in much more detail, a comparison of INNA versus ICP-MS methods, and its relationships to the other iron meteorites in the type "IAB complex irons" group, which currently has 338 members. Age estimates will be presented of the time the meteorite arrived on Earth by measuring the quantities of radioactive Carbon (14C), Beryllium (10B), and Aluminum (26Al) isotopes which remain. Since we have obtained less than 100 grams of the specimen, only 0.00066% of the meteorite's 15,150 kg total mass, and from only one location, more representative samples may provide additional information.

El Ali's significance to Somalia's Cultural Heritage is only beginning to be recognized as the result of three observations. The first, with the knowledge that the peoples of the region near El Ali have carried on traditions referencing that stone in stories, song, poetry and dance for generations. They used it to help fashion their tools. The second, with the revelation from photographs of the giant meteorite *in situ* and in Mogadishu showing that almost the entire exposed surface of the meteorite has been heavily struck and hammered. The third, from photographs of the meteorite *in situ*, that in and around the large indentation is an accumulation of small rocks, likely the result of games played by native peoples. These three observations suggest the social science of Anthropology (including Ethnology and Archaeology) may assist in exploring the culture of the camel herders and in examining the El Ali meteorite itself and its original surroundings for more evidence of its historic and prehistoric use.

With regards to Ethnology, researchers might wish to work with the local herders to archive their dances, songs, stories and poetry with high quality digital cameras and recorders. University faculty, students and volunteers in Somalia could visit these people, sit with them, talk, and collect important data.

Archaeology suggests that more may be learned by revisiting the original site from which El Ali was recovered. The radiometric dating done by Professor Timothy Jull, University of Arizona, tentatively established the age of the fall of El Ali at less than 2 to 3 thousand years. This means that the meteorite would have been available for use by people far back into the Iron and

Bronze Ages. Ethnographic artifacts from Somalia in the British Museum show abundant use of iron, steel, brass, bronze, silver and aluminum. The Nairobi XRF shows an excess Cu and Al on the surface of the stone which may attest to El Ali's human use. A careful XRF study of the surface of the stone may reveal traces of these and other metals. One thousand XRF scans could be done in 10 days. The surfaces, pits, cracks and crevices, and especially the large groove on the side of the meteorite, may contain important clues to other uses. Traces of pigments, organics, minerals and other debris may be recovered. For this reason it is advisable **not** to clean the meteorite excessively. The surface of the meteorite itself should be carefully mapped and digitally modeled by methods including the aid of numerous high-resolution photographs taken from various positions around the meteorite. Also, at the periphery of the meteorite before it was moved, there may be fragments of the metals and other materials that were fashioned on that stone. Further away, Archaeology may reveal evidence dating far back into prehistoric times. A search of Google Earth satellite coverage within a 1 km radius of the presumed *in situ* location of the stone reveals abundant networks of trails and the presence in 2004 of at least 6 house circles and 4 fences, and in 2018 at least 28 house circles and 5 fences. None appear in both 2004 and 2018. If the stone was known as a hub of tool making, we would expect a long record of human habitation and settlement nearby. Careful excavations revealing wood, bone, cloth and charcoal may provide older and more precise dates. The area should be carefully surveyed and mapped with the aid of arial drone photography tied to permanent markers on the ground.

Just as El Ali's relevance to Natural Heritage rests upon present-day recognition of its significance to science, so too does El Ali's relevance to Cultural Heritage rest upon its importance to present-day science and education in Somalia. Its cultural relevance is being re-written now. The individual stories of the prospectors may inspire hope and exploration. The assistance of the international meteorite community may serve as an asset. UNESCO's assistance may be instrumental in organizing and securing funding.

El Ali is the ninth largest meteorite in the world and the third largest meteorite in Africa. The largest meteorite to show extensive cultural use are the Cape York (Greenland) irons. The smaller Campo del Cielo (Argentina) and Mbozi (Tanzania) irons show limited use. El Ali is the fourth largest meteorite in the world to have been utilized intensively by native peoples, and its utilization has been extensive. Existing studies of the native peoples' utilization are few. At this moment it seems that we may have the unique opportunity to lead the way in documenting the cultural utilization of meteorites extending far back into prehistoric times.

El Ali's uniqueness as a cultural object may well surpass its uniqueness as a natural object. Regardless of its acceptance as an object of World Heritage significance, its value will be enhanced by further study. El Ali could be investigated, developed and published through businesses, universities, and schools, through conferences, journals, books, magazines, motion pictures, and still imagery. We may have the opportunity to present much of this material to the international meteorite community at the Meteoritical Society's annual Conference in Chicago, Illinois from August 14-21. Please assist us in doing so.

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