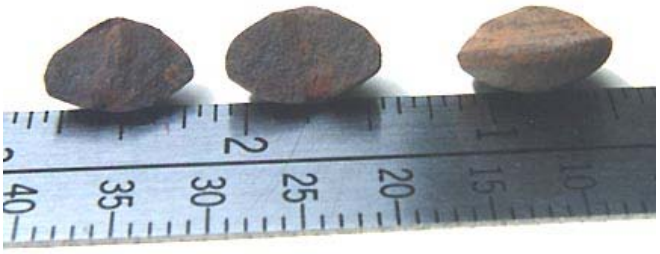
Part 3 - Infrared and Energy Dispersive Spectroscopy on the Corguinho, Brazil Round Stones



Left: The two halves of Stone 2 split by analytical chemist, Phyllis Budinger, for infrared study
and EDS plots. **Right:** Stone 1, in profile to show disk-shape. Stone 1 is 16mm in diameter and weighs
3.2051 grams. Stone 2, before being broken in two, was also 16mm in diameter and weighed 3.3068 grams.
Both Stone 1 and Stone 2 were collected by Brazil businessman, Felipe Branco, on September 15,
2002 after the "rain of rocks" on the Urandir Oliveira farm in Corguinho, Brazil.
Photograph © 2003 by Linda Moulton Howe.

June 6, 2003 Philadelphia, Pennsylvania - On March 2, 2003, I shipped to Phyllis Budinger two of the disk-shaped Corguinho, Brazil stones, which she labeled "Stone 1" and "Stone 2" in her final April 22, 2003 analytical report. Phyllis broke open Stone 2.

She did infrared analysis and wrote in her report: "Specifically identified is a major amount of quartz (SiO2) which is commonly present in sand and sand stone. Another major mineral is present with similarities to montmorillonite [(Na,Ca)0.33(AlMg)2Si4O10(OH)2] This mineral occurs in clay deposits, soils and sedimentary and metamorphic rocks. Iron is present and probably in oxide form. A very small amount of inorganic carbonate is also suggested which is likely in the form of calcite. Qualitatively both exterior and interior of the stone contain the same components; however, quantitatively there is more quartz, and probably iron oxide, on the exterior of the stone. XRD (X-ray Diffraction) analysis is recommended for further analysis of the stones."

Phyllis sent the two parts of Stone 2 to Nick Reiter for energy dispersive spectroscopy (EDS) plots. He also provided the soldering iron test on fabric in Part 1 of these Earthfiles reports. In his report, he speculated that the Brazil stones might be a form of "Moqui Marbles" although no geologist I've talked to has yet confirmed their existence in Corguinho, Brazil or anywhere else outside the states of Utah and Arizona. Nick wrote, "They are formed much like pearls, by accretion of minerals from the water supply around a core that can be anything from a sand grain to a small rock." On page 3 of her report, Phyllis goes along with Nick Reiter's speculation: "The stones are very similar to Moqui Marbles, (and several other names) found in Utah and Arizona. It is conceivable

that there are also clusters of these in Corguinho, Brazil." That speculation has not been confirmed by any one.

Further, at the website rocksandminerals.com, it says "little is actually known about the origins of Moqui Marbles. In the United States, most of them come from the Navajo Sandstone Formation in the state of Utah." Some of the Navajo Sandstone Moqui Marbles, a layer formed between the Triassic and Jurassic time of the dinosaurs, have casts of ancient millipedes and beetles inside them. One geologist's speculation, yet unproved, is their source might be from meteor impacts that heat and melt the soil, throwing it up into the air, and some kind of physical dynamic returns the Moqui Marbles to the ground. Most Moqui Marbles shown in website photos are ball-shaped and have concentric rings inside around sand or sandstone. The Corguinho, Brazil stones have disk-shaped profiles and the one split open has no concentric rings or sand.

Prof. Art Johnson, Ph.D., Professor of Geology, Department of Earth and Environmental Science, University of Pennsylvania in Philadelphia, organized X-Ray diffraction (XRD) analysis of Stone 2 and other Corguinho rocks to be discussed in Part 4. This week he agreed that the interior of Stone 2 and web photographs of Moqui Marble interiors are not similar and said, "There is great room to doubt that the Brazil stones have anything to do with the Moqui Marbles of Utah and Arizona."

Phyllis reported that Brazil stones 1 and 2 were the same diameter, which is 16mm, or about one-half inch. Stone 1 weighed 3.2051 grams and Stone 2 weighed 3.3068 grams. I have several more stones collected from the "rain of rocks" that all seem to be the same size as Stone 1 and Stone 2. Others are about one-quarter inch or one inch in diameter.

I organized seventy-five of the stones I had been given in Corguinho from people who gathered them after the "rain of rocks" on September 15, 2002.

Photograph in Corguinho, Brazil

In a plastic ice tray I labeled A, most were in the half-inch diameter range and nearly identical in size and weight. Tray A also included some of the quarter-inch stones that were the same shape and color as the half-inch stones. Tray B contained the largest stone, about 1.5 inches in diameter, along with 1-inch diameter stones and a few more of those a quarter-inch in diameter. Tray C contained all three sizes.

Tray A included half-inch and quarter-inch diameter stones gathered by people at the Urandir Oliveira farm in Corguinho, Brazil after the September 15, 2002 "rain of rocks"
at 7:30 p.m. Photographs

Tray B contained the largest stone, about 1.5 inches in diameter.
Tray B and C both contained 1-inch, half-inch and quarter-inch diameter stones.

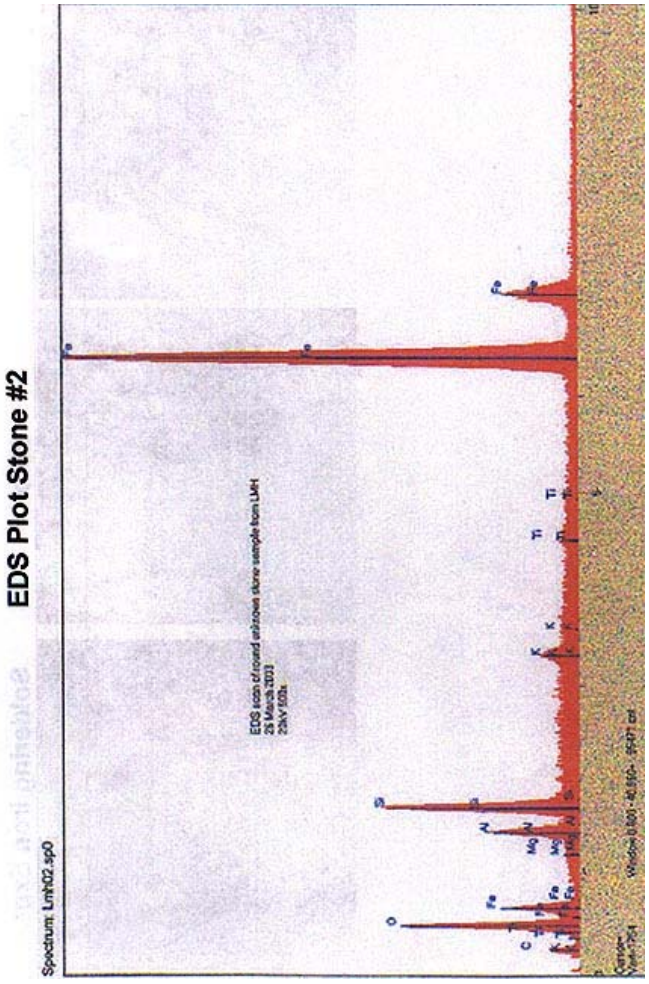
In her report, Phyllis showed exterior photos looking down upon circular Stone 1 and Stone 2 before she broke apart Stone 2. The photographs inaccurately portray their colors as orange. Below the two Brazil stone photographs, Phyllis placed internet photographs of Moqui Marbles. Three of the broken open Moqui Marbles pictured in her report have dark outer shells around an interior ring of light colored material surrounding a round, darker center. Neither Phyllis nor Nick Reiter provided a photograph of the interior of the broken open Stone 2 from Corguinho, Brazil.

Top: Phyllis Budinger's photographs of Stone 1 and Stone 2 (before she split 2) shown from above (orange color incorrect.) **Bottom:** Moqui Marbles photos from internet websites.

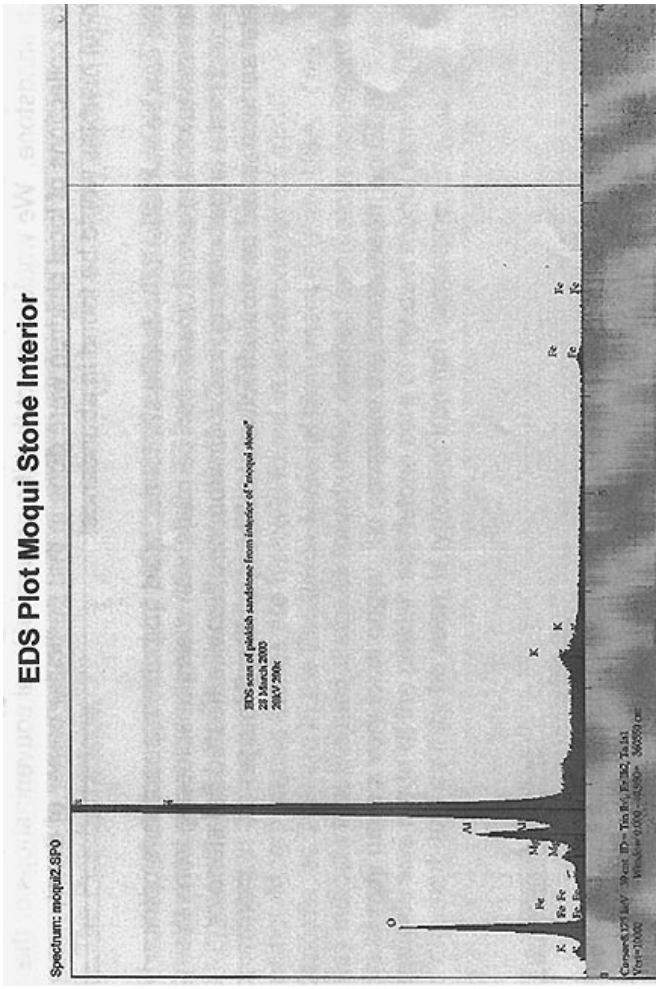
Upon return of the stones and material samples to me on May 6, I took photographs of Stone 2's interior and exterior, a side profile of Stone 1 and grouped them with a piece of the normal pinkish Corguinho control rock. Stone 1 and Stone 2 are disk-shaped and Stone 2's interior is dark brown, with scattered rust tints. The exterior of Stone 2 is a dark brown-rust color, a bit lighter than the interior.

Top Photograph: Left, normal Corguinho pink rock. Middle, both halves of Stone 2. Right, Stone 1 concentric ring exterior. **Middle Photograph:** Stone 1 is turned in profile. **Bottom Photograph:** Group shown from other side so exterior of Stone 2 can be seen. Photographs © 2003 by Linda Moulton Howe.

Nick Reiter's EDS Plot of Stone 2 does not indicate in what part of Stone 2 the EDS was made, but Phyllis Budinger told me by phone she thought it was "2mm down from the exterior of Stone 2." Also shown is the EDS plot labeled "Moqui Stone Interior" for comparison of the interiors. The immediate difference is that Stone 2 shows a lot of iron (Fe) and has titanium (Ti) peaks. Neither the Moqui stone interior nor the normal Corguinho control rock had any titanium and very little iron. The Moqui stone exterior had iron.



Above: EDS plot "2mm down from exterior" on Stone 2 interior shows high iron (Fe) and some titanium (Ti).
Below: EDS Plot Moqui Stone Interior shows very low iron (Fe) and no titanium (Ti).
Avalon Foundation EDS Plots by Nick Reiter 20kV 200x, 28 March 2003.



In studying the EDS spectra, what jumped out to biophysicist W. C. Levengood were the titanium peaks in Stone 2. There are no titanium blips in the Moqui Marble exterior or interior and none in the common pink rock from Corguinho.

Levengood said, "The normal control rock from Brazil is essentially iron oxide, FE2 O3, also known as hematite. If titanium is present in hematite, with heating and the right oxidation reduction, one of those iron (Fe) atoms can be chemically replaced by a titanium (Ti) atom that forms a new compound, FeTiO3, which is ilmenite. Hematite is not magnetic. But after titanium enters, the new compound can become magnetic and instead of being red, the color will change to a black, shiny crystalline substance. I have found the round disk-shaped stones from Brazil that you sent me are weakly magnetic, so they might contain ilmenite which is quite different from either the control rock or the Moqui Marbles. Whatever the source of the September 15, 2002 rock fall in Corguinho was, the stones are not common iron or common rock."

Continued in **Part 4.**

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