

Foreword

This is a book about our knowledge of Early Man. There are two subplots: Early Man in the Old World and Early Man in the New World. Much is known about Early Man in the Old World, where new discoveries continue to expand our knowledge base. Unfortunately, in the New World our knowledge is largely limited to Clovis and younger cultures. The study of potential pre-Clovis sites is not encouraged, and those who report a possible pre-Clovis site do so at significant risk to their career. An important part of this book reviews what is known about an Early Man site along the shore of Valsequillo Reservoir south of Puebla in central Mexico. It is a fascinating tale with a lot of data-- which are accepted by most geologists and not accepted by most archaeologists.

As a scientist I am embarrassed that it has taken over thirty years for archaeologists and geologists to revisit the bone and artifact deposits of Valsequillo Reservoir. In the late 1960's and early 1970's, data were presented that suggested Early Man had been in the New World much earlier than anyone had previously thought. Rather than further investigate the discoveries, which is what should have been done, they were buried under the sands of time, in the hope that they would be forgotten. My idea of science is to investigate anomalous data and hopefully learn something new. Unfortunately, the "Clovis First" mentality was so ingrained in North American archaeology that no further work was undertaken.

My first contact with the bone and artifact deposits of the Valsequillo Reservoir came in the early 1970's, when I was asked if I would date zircons from some tephra units (layers of volcanic pumice and ash) that overlay the artifact-bearing beds. I agreed to take on the study as I was aware of the controversy regarding the age of the site. At the time I was sharing an office with Barney Szabo, the geochemist who had provided the uranium series dates that started the controversy. His ages suggested that the artifact beds were in excess of 200,000 years old. This did not sit well with the archeologist in charge of the project. The original paper by Szabo, Malde, and Irwin-Williams (1969, *Earth and Planetary Science Letters*, v. 6, p. 237-244) sets the stage for the controversy--

geochronology versus archaeology. This is the only paper of which I am aware where one coauthor submits a rebuttal in the midst of an otherwise straightforward scientific paper.

Additional data suggesting an old age for the deposits came shortly after the Szabo paper. Virginia Steen-McIntyre, while studying the characteristics of the overlying tephra units, discovered two things that suggested an old age. While neither of the techniques she used provides a direct age in years, the results can be compared with similar material of known age and thus an age for the unknown deposits can be inferred. She found that hypersthene crystals in the tephtras were deeply etched. Rather than being pristine, well-formed crystals, they looked more like a picket fence. Hypersthene crystals from a 24,000-year-old tephra in a similar climatic environment elsewhere in Mexico displayed minimal evidence of etching, suggesting that the age of the Valsequillo tephtras is greatly in excess of 24,000 years. Her second piece of evidence is from tephra-hydration dating, based on the amount of water absorbed by the volcanic glass shards in the tephtras. When volcanic glass shards form, they typically contain minute gas bubbles. With time the glass gradually absorbs water. The greater the amount of water in the glass, the older is its age. Eventually, the gas bubble cavities begin to fill with water. This is known as superhydration. Bubble cavities in the two Valsequillo tephra layers that could be dated by this method contain water. Comparison of the percentage of water in the bubble cavities to the percentage in tephtras of known age suggests an age of about 250,000 years for the Valsequillo tephtras. Thus by the time I got my zircons to date, three lines of evidence suggested that these deposits are greater than 200,000 years old.

I determined fission-track ages on zircons from two of the tephra units overlying the artifact beds. The Hueyatlaco ash yielded a zircon fission-track age of $370,000 \pm 200,000$ years and the Tetela brown mud yielded an age of $600,000 \pm 340,000$ years. There is a 96% chance that the true age of these tephtras lies within the range defined by the age and the plus or minus value. Now, there were four different geological dating techniques that suggested a far greater antiquity to the artifacts than anyone in the archaeological community wanted to admit.

Virginia Steen-McIntyre presented all of the results on the geology and age of the deposits at a symposium on New World archaeological geology in 1973. The following quote from a summary of the conference (Geology, 1974, p. 77) has been on my wall ever since: “C. Irwin-Williams, who did the original archaeologic work, believes that such a great age is virtually impossible, and that sources of error must be sought in the dating methods.”

With the exception of a few papers by Virginia Steen-McIntyre in the geological literature, the unique and exciting discovery of an old Early Man site in North America ceased to exist. In my mind this is where the scientific method failed. There were geologic indicators that someone had been here 200,000 or more years ago. Unfortunately the existing paradigm was that no one preceded the Clovis culture to the Americas and that it was a waste of time and resources to even look for pre-Clovis sites. Through the scientific method of investigating the world around us, many paradigms have come and gone, being replaced with newer ones: such as, the earth and other planets circle the sun, the earth is spherical, the continents have drifted, and evolution explains the great diversity of species. The idea of Clovis being the first New World culture needs to be tested, not just accepted.

I was pleasantly surprised a few years ago when I learned that Marshall Payn was going to revisit the Valsequillo deposits. A lot of new and exciting data have come from this renewed interest. Perhaps the most exciting are the data presented by Sam VanLandingham on diatoms (microscopic fossils) from within the artifact beds and overlying (younger) beds. He finds species of diatoms that became extinct about 80,000 years ago. That is another piece of geological evidence that indicates an old age for these deposits.

So now we have at least five independent geological age estimates that all indicate an old, pre-Clovis age for the Valsequillo site. The factors that affect the accuracy of each of these techniques are so different that it is highly unlikely that all five

techniques could fortuitously significantly overestimate the age. One of my colleagues always tried to interpret geological processes using the principal of “Occam’s Razor”-- the simplest explanation is usually correct. In this case we have the choice of accepting the results of five independent geological techniques as correct and concluding that the artifacts are greater than 200,000 years old or, alternatively, arguing that, for very different reasons, there is something significantly wrong with each of the geological age estimates.

I think that the readers of this book will find that the Clovis First paradigm is listing badly and quite possibly has sunk against the rocks of renewed scientific inquiry.

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