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The Role of Science in Determining the Resting Place of the Ark

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Abstract

The unsuccessful search for Noah's Ark on Mount Ararat (Turkish *Agri Dagh*) has been driven largely by traditions, claimed sightings, and strong belief. Surprisingly, there has been little scientific input into the question of the mountain where the Ark came to rest. This lack of attention to science has greatly hampered the search because science has an important role to play. Application of science shows that Mount Ararat cannot be the place where the Ark rested; however, science does not preclude Mount Cudi.

Introduction

It is about 700 years since the traditions of the location of Noah's Ark moved from Mount Cudi to Mount Ararat (Crouse and Franz 2006). During that time, most of the world has been unaware that previously Mount Cudi had been considered the place where the Ark landed. How belief changed with regard to the Ark's location is a story that involves the history of the Armenians and the changing boundaries of their country over time (Bailey 1989, 58–61). Eventually, Mount Cudi was no longer within the borders of Armenia. But there was a certain logic to the idea that the Ark would have landed on a high and majestic mountain, such as their sacred Masis, the name by which Armenians call Mount Ararat (Dwight 1855; Bailey 1989, 54).

This fervent belief that the Ark is on Mount Ararat has fueled many search expeditions, especially in more recent times. The amount of effort and money poured into these repeated unsuccessful expeditions has been enormous. But we need to ask ourselves: with all the effort that has been poured into the search on Mount Ararat, why has nobody yet found the Ark? If an enormous object like the Ark really is anywhere on Mount Ararat, surely it should have been located by now. Sheer belief can only carry this quest so far. This leads to the dark possibility that the Ararat believers do not want to face: their belief may be misplaced and the Ark may not be on Mount Ararat at all.

It is now time to apply clear scientific thinking to the Ark search. In the scientific method, we must be careful always to distinguish between actual facts and mere assumptions. An assumption is something that we assume to be true without proof. If the assumptions on which our reasoning is built are not correct, it is unlikely that our conclusion will be correct. Therefore, if we first assume that the Ark is on Mount Ararat, and then proceed to search for it on the basis of that assumption, our entire search will be in vain if that prior assumption is wrong.

Furthermore, true science does not permit us to presuppose the conclusion that we want. If we decide what we want to believe (such as where the Ark is), and then cast our net for any possible information that we can find to support that conclusion (while excluding information that does not support it), we are engaging in circular reasoning. In short, we are practicing bad science.

In this paper, "science" will be generally defined in its strict sense, as in "hard" or "natural" science. The various sciences will be mentioned by name as they come up in the material. Archaeology, the category where searching for the Ark is placed, is traditionally not considered a hard science (Bayard 1969).

It will be argued here that the mountain or area where the Ark landed must be supported by hard science. We will therefore follow the scientific facts where they lead, and our conclusions must be based on those scientific facts.

Do Ararat Archaeologists Recognize the Authority of Science?

Ararat believers have persisted in searching for the Ark on Mount Ararat, while rejecting scientific evidences that disprove the possibility of finding the Ark there (we will look at these evidences further on). To a scientist, this rejection of science is somewhat of a mystery. If hard science shows that Mount Ararat did not exist for the Ark to land on, it would seem obvious that nobody would believe that the Ark is there any longer, and search expeditions for the Ark on that mountain would cease. But this has not been the case, as Ark searching on Mount Ararat has continued unabated.

This leads to some questions. Why has anybody ever believed that the Ark rested on Mount Ararat? Do these Ararat Ark explorers simply prefer to adhere to their blind, overpowering belief? Do they not understand the science? Are they choosing to formulate their own private version of science to convince themselves of what they want to believe? Do they give more weight to traditions than to scientific fact?

This last may well be true, because there has been a lot of discussion about the place of oral traditions versus science among archaeologists. The two extremes of possible belief are to reject science altogether, or, alternatively, to reject oral traditions as

containing reliable fact. It is perhaps surprising to a scientist that this argument is even taking place. After all, scientists, not surprisingly, rely on science.

The difference of opinion on this matter has been going on for a long time. As Lowie (1915) wrote,

…I cannot attach to oral traditions any historical value whatsoever under any conditions whatsoever. We cannot know them to be true except on the basis of extraneous evidence…

This drew a strong response in the same issue from Dixon (1915),

Such a statement is quite amazing, and it hardly seems possible that it was intended to be so extreme…Absolutely unqualified statements like that of Dr. Lowie's are usually dangerous.

More recently Whitely (2002), who favors oral traditions as a source of information, says,

Scientific archaeology and indigenous oral traditions have long been estranged…Over-emphasis on hard science risks neglecting vital evidence that might greatly enhance explanation of the past.

However, Thomas and Kelly (2006) would not totally agree. According to them:

"Virtually all modern archaeologists, whether "humanist" or "scientific," subscribe to the basics of science. All of us believe in careful scholarship, in generalizations backed by firm data, in honesty, and in giving full consideration to "negative" evidence (data that run contrary to a hypothesis' predictions).

This latter assessment of modern archaeologists is encouraging from a scientific point of view. In this paper we will take the strict view that oral or other traditions are not a reliable source of information, because we do not know what parts of those traditions may convey actual facts, and what parts are not true.

It is well established that there are a number of opposing traditions with respect to the location of the Ark. For a discussion of eight of these Ark traditions, see Habermehl (2008). Differing views of this sort can stand as acceptable optional beliefs on a given matter if it does not make a difference one way or the other which viewpoint is true. But in the quest for the Ark, we do not have the broad-minded option available to us of saying that it does not matter which Ark site is correct, and that everyone can choose his own belief on the matter. We know that there was only one Noah and he

only built one Ark. That Ark cannot have landed in more than one place. What we want to know is where that one place is. Only one of the various traditions for the Ark's location can be true—or perhaps none of them.

In the same way that history is the domain of the historian, and archaeology is the domain of the archaeologist, science is the domain of the scientist. If these various scholars disagree, whose opinion is dominant? If we wish to determine whether the Ark could have landed on Mount Ararat, and not merely argue about it interminably, there can be no doubt that we will need to apply reliable scientific information to the question. Hard science will necessarily trump the other disciplines, as we shall see.

Science and Belief

It is easy to accept a popular idea wholeheartedly. We often assume that because a great many people have believed a certain idea for a very long time, and because many published sources have supported this idea, therefore it must be true. If science then tells us that our long-held belief cannot be true, we resist letting go of that cherished belief. We want to keep believing as we did before, and we are not inclined to let mere facts get in the way of that belief.

It is therefore somewhat discouraging to the scientist, who believes that the facts are clear and obvious, to find that others are unimpressed by those facts and have no intention whatever of changing their minds. For these people, facts are not the powerful arguments that the scientist thinks they should be. The scientist has to accept, however unhappily, that science has limitations as a means of persuasion. As Rosovsky famously said (1990, 259), " Never underestimate the difficulty of changing false beliefs by facts." There can be no question that the history of the Ark search so far has supported Rosovsky.

Here are some examples of common beliefs that are often put forward with respect to the Ark: *The Ark rested upon Mount Ararat*; *the Bible says that the Ark landed on Mount Ararat*; *the Ark landed nearly at the top of a mountain*; *the tops of the mountains became visible because of the lowering of the floodwater level*; *because many people claim to have seen the Ark on Mount Ararat, therefore it must be there*. It is possible that none of these beliefs is true, as Habermehl shows (2008). For example, the tops of the mountains may have become visible to the occupants of the Ark on exactly the first day of the 10th month because a heavy fog suddenly lifted that day (Genesis 8: 5).

When we apply science to a question, we must stay with information that is certain. Otherwise we are guilty of speculating; this is unscientific and may not lead to correct conclusions. The facts that we can be certain of are that the Ark settled in the

mountains of Ararat/Urartu near the end of the Flood, and other mountains became visible after the Ark had been sitting there for more than two months (Gen. 8:4, 5). Not only is no specific mountain named, the biblical account does not even say that the Ark landed on a mountain, but only in a mountainous area (Bailey 1989, 55–58).

Geology and the Possible Ark Sites

We will assign a primary role to the science of geology in examining places where the Ark is claimed to rest. If geology does not support a given location, we will eliminate it from our list.

Geologists have claimed for many years that Mount Cudi is a more likely landing place for the Ark than Mount Ararat. Tasman (1947) says:

The sacred mount Cudi (Joody), the rival of Mt. Ararat in lore as the landing place of Noah's Ark, has geologically a better claim for that distinction. Fringing its steep-dipping southern slopes is a thick section of sand and siltstones, and conglomerates extending part way to Habur Su on the boundary with Iraq. The undoubted fluviatile origin of the greater part of these sediments, together with the proximity of the Tigris and its substantial tributary, lends a scientific background to the Flood and the grounding of the historic vessel that the bold igneous mass emerging from the plains of Igdir, in case of Mt. Ararat, totally lacks.

The limestone of the Cudi Dagh area is well known to geologists (Schmidt 1964; Ziegler 2001). According to Altinli (1966), "Cudi Mountain's limestone is typically gray-black, but buff by weathering, coarsely grained, thickly bedded, highly bituminous." The mountains of Urartu/Ararat, where Mount Cudi is situated, rose because of collision of the Arabian and Anatolian plates (Yilmaz 1993; Kahraman 2010). Because of the forces that would have been exerted on the earth's crust during the global Flood, it is quite reasonable to conclude that this mountainous area would have been already formed by the time the Ark landed, as the Bible says.

However, Mount Ararat was formed in a totally different manner than Mount Cudi. The most striking thing geologically about Mount Ararat is that it falls into a category of volcano known as a stratovolcano, also called a composite volcano (Lambert, Holland, and Owen 1974; Yilmaz, Guner, and Saroglu 1998). It rose, layer by layer, through multiple volcanic eruptions from its beginning right into historical times (Davidson and De Silva 1999, 663–81; Hyndman and Hyndman 2011, 151). Indeed, there are bronze-age human remains under some of the pyroclastic flows, indicating eruption over the Koura-Arax settlement. This would have been a volcanic catastrophe dating to about 2500–2400 BC (Karakhanian et al. 2002, 334–37). Figure 1 below shows the multilayered interior of a typical stratovolcano.

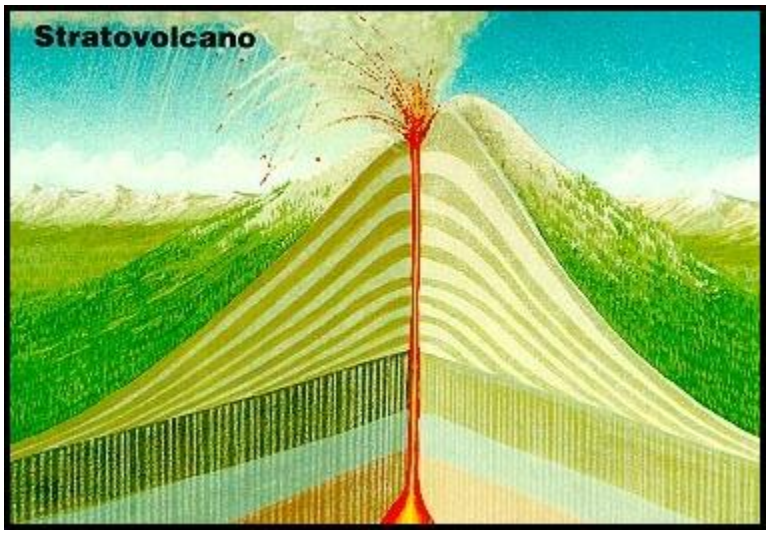

Fig. 1.Cutaway diagram showing the structure of a stratovolcano like Mount Ararat. (Public domain, US Geological Survey)

Geologists also show that Mount Ararat sits in a fault area (Karakhanian et al. 2002). Mount Ararat is therefore younger than the rock that it sits on (Keskin 2005); that rock consists of sedimentary marine limestone that would have been laid down by the Flood waters (Hill 2002). This means that Mount Ararat did not start to rise above its plane until some time after the Flood, and may even have started to rise only in the early part of the post-Flood Ice Age. There will be more about this Ice Age later on in this paper.

The very shape of Mount Ararat (see. fig. 2) indicates that it rose *subaerially*, that is, in air, and cannot have risen under water. The 700 or so stratovolcanoes around the world formed the same way, and have the same distinctive shape (Davidson and De Silva 1999, 667–68).

Fig. 2. This photo of Greater Mount Ararat (right) and Lesser Mount Ararat (left) shows the distinctive shape
of stratovolcanoes that rose in air. The two Ararats cannot have risen under water during the Flood.
(Photo public domain 2009)

Those who claim that Mount Ararat could have risen during the Flood should note that volcanoes that erupt under water (often called seamounts) have a very different shape and consistency of material than volcanoes that erupt on land (Wessel 2007, 3–25). This is because the hot molten rock that erupts takes what are called pillow shapes when it is cooled by water. (See fig. 3 for a photo of deep-sea lava pillows.) Because of this, pillow lava formations on the surface of Mount Ararat are sometimes offered as "proofs" that this mountain rose under water. However, pillow lava is not formed solely under water, as many sources mistakenly claim. The pillow lavas on Mount Ararat most likely are the result of eruption under ice (Bullard 1984, 303).

Fig. 3. Pillow lava basalts on the south Pacific sea floor. If Mount Ararat had risen under water, it would be largely
composed of pillow lava similar to this. However, its pillow lavas are only on the surface of the mountain.
(Public domain, courtesy of National Oceanic and Atmospheric Administration, USA.)

Marine fossils located high on Mount Ararat have been claimed as evidence that the entire mountain was under water at one time (LaHaye and Morris 1977, 9). But these fossils, if actually proven to be there, would have been most likely ejected in phreatic (steam) eruptions such as the huge one of 1840 when the Ahora Gorge was opened high up in the side of the mountain (Karakhanian et al. 2002). In this kind of volcanic event, pieces of the fossil-containing limestone base on which the mountain sits can be broken off and blown out of the mountain by the force of the steam (Smithsonian 2011). Figure 4 depicts a phreatic eruption.

The science of geology includes the study of ice movement. Scientists cast doubt on any kind of wooden structure surviving, if encased in ice on a mountain. This is because ice on a mountain cap like that on Mount Ararat moves downhill from the forces of gravity, carrying everything with it (Gerrard 1990, 166, 172). The ice moves faster on the surface of the glacier than below the surface; this differential in speed would cause the ice to break up the Ark with time (for a technical discussion of glacier ice movement, see Cuffey and Paterson 2010, 285–398). However, the Ark would already have been as much as 3000 years old or more by the time of Berossus and others who write of pilgrims visiting it and scraping off pitch for amulets (Crouse and Franz 2006). These writers describe remains that are recognizable, indicating that the Ark had not been destroyed by ice. It is also doubtful that those pilgrims could have accessed the Ark if it was very high up on a dangerous mountain, and under ice. However, because most of Mount Ararat has been searched, Ararat believers have fastened their last hopes on locating the Ark under the ice cap, in spite of the unlikelihood of this (e.g., Geissler 2013).

In short, all claimed evidences for supporting Mount Ararat as a possible landing place for the Ark are refuted by science. Because we have shown solid geologic reasons why Mount Ararat cannot have been in existence at the end of the Flood, we might wonder why anyone has ever searched for the Ark there at all. We are forced to conclude that belief that the Ark is there has taken precedence over all other considerations, including science. Because the geology presented here was not included in the equation, that belief took root and has flourished during all these years of Ark search expeditions on Mount Ararat. It is true that Ark searchers have made reference to the Burdick (1967) paper on the geology of Ararat. This paper was

deeply flawed, but nobody noticed this because it supported their belief that the Ark was on Mount Ararat.

Our primary focus is on Mount Cudi and Mount Ararat in this paper, although other mountains deserve mention. For instance, geology has shown that the boat-shaped structure at the much-publicized Durupinar site is a natural formation, one of a number of similar ones in the same area (Snelling 1992). It appears that this particular geologic formation was chosen as the Ark from among the others nearby because it was approximately the right size (Wroe 1994). In spite of being refuted as the Ark on the basis of science (Snelling 1992), it is still considered to be the real Ark by its devotees, notably followers of the late Ron Wyatt (see, e.g., Fisher 2013).

In addition, geology is implicated in examination of Mount Suleiman, a proposed Ark site in Iran (Cornuke 2008). The claimed ancient petrified wood from this "Ark" has been shown by geologists to be most likely metamorphosed rocks (Walker 2006). Further arguments for an Ark landing in Iran have been refuted, and we will not go into those here (Franz 2007).

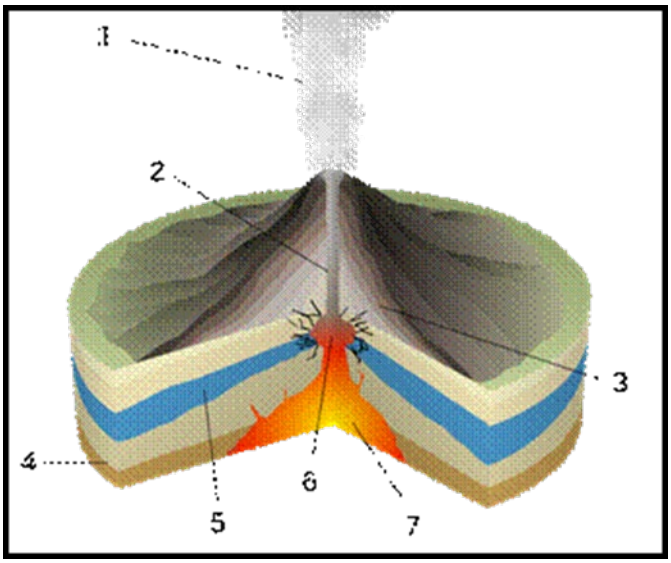

Fig. 4. Schematic drawing of a phreatic (steam) eruption in a stratovolcano like Mount Ararat.
1. Water vapor cloud. 2. Magma conduit. 3. Layers of ash and lava. 4. Stratum. 5. Water table.
6. Explosion. 7. Magma chamber. (Drawing: Semhur 2012, Wikipedia.)

Other Sciences That Apply to the Ark Search

Petrification (or petrifaction) is a scientific process that gets mentioned periodically with respect to claimed sightings of the Ark. Some of the eyewitnesses claim that the object they saw was made of petrified wood; one well-known example is Hagopian (Geissler and Crouse 1999, 374). It is unlikely that the Ark was ever petrified in view of the conditions needed for this, as pointed out by Scurfield and Segnit (1984) and Walker (2006). The Ark would have had to be completely surrounded by a mineral-rich solution that got absorbed into the pore structure of the wood. It is difficult to see how that process could take place in a structure sitting on the surface of a mountain. It is more likely that the Ark's timber would have been exposed to rain and snow, which would not contain the necessary minerals to petrify it. Also, in the case of an intact "Ark" (which some witnesses, like Hagopian, claim), the pitch coating would have prevented the water solution from infiltrating the wood. It seems more likely that the structures in these alleged sightings actually consisted of basaltic rock, which can look surprisingly like wood grain (Walker 2006).

The science of chemistry applies to the question of wood deterioration over thousands of years. It is unlikely that the Ark was high on a mountain protected under ice, based on historical reports of pilgrims climbing to see it without much trouble (Crouse and Franz 2006, 100). The pitch that coated the Ark inside and outside, whatever it was, would not have prevented the wood from decaying over the years if pilgrims scraped it off for amulets, and carried pieces of the wood away, as the literature references suggest (Crouse and Franz 2006, 100, 105). Perhaps the Ark's remains are now buried, silted over by the sedimentation of the ages, and covered by vegetation and trees. We cannot say. If we think scientifically, we must be realistic and consider that by now there may be almost nothing of the Ark left. Indeed, we may need to know where it is in order to find it, a sort of catch-22 situation. ("Catch-22" is a figure of speech used to show an impossible loop of circular logic. It originated with the book, *Catch-22*, by Heller (1961)).

Satellite imaging has developed into a useful tool for archaeology. It has been used in recent times to look for the Ark, especially on Mount Ararat (Lovett 2005), although to date there have been no results from it. Of special interest is development of remote sensing that can peer below the surface of the ground to "see" buried structures. For an excellent history and overview of the subject of satellite remote sensing, and discussion of at least a dozen different satellite image types, see Parcak (2009). Also recommended is the recently published book by Lasaponara and Masini (2012), an extensive volume on all aspects of the subject. As Kvamme predicted earlier (2005, 468), "remote sensing is sure to occupy a more central stage in the future of archaeological research and practice."

The science of carbon dating has been widely used in determining the age of organic matter (Snelling 2010). But can it be used in determining whether wood could be old enough to come from the Ark? At first glance, it would appear that we should be looking for ^{14}C dates of 3,300–2,300 BC (biblical timeline–more about this further on) for pre-Flood wood. However, scientists believe that there would have been less ^{14}C in the pre-Flood vegetation than there is now. Based on this assumption, they calculate that ^{14}C dating of pre-Flood wood should yield much higher dates in the range of 50,000–20,000 BP. A detailed discussion of this subject is offered by Snelling (2011) with respect to laboratory ^{14}C dates on wood samples from the Chinese "Ark" on Mount Ararat. Snelling concludes that the date of 2800 BC claimed for their oldest sample is far too young for the wood to have come from the Ark. It is important to note that this same science applies to the ^{14}C date of 4500 BC for the decayed wood samples that Bender dug up on Mount Cudi in 1953 (Bender 1956), making this wood also far too young to have come from the Ark.

Biblical Versus Secular Chronologies

We now turn to the role of science in examining the chronology of the Flood and post-Flood events, including the Ice Age. This subject is relevant to the Ark search because archaeological remains or wood artifacts that are dated, whether by ^{14}C or other means, must be placed correctly on the timeline of history.

First we begin by distinguishing between two differing timelines: the secular timeline and the biblical timeline. The former is the timeline that we find in the standard history books. Some points on this timeline are: 3000 BC, beginning of the First Dynasty of Egypt; 10,000 BC, melting of ice at the end of the Last Ice Age; 700,000 BP, beginning of Palaeolithic Period (Shaw 2000, 481; Mithen 2003, 4).

Biblical dates are quite different than these because the biblical and secular timelines diverge greatly, especially in the early times before Abraham. According to calculations based on the biblical genealogies of Genesis 5 and 11, the worldwide Flood would have occurred around 3200 BC in the Greek Septuagint (LXX) version of the Bible, or about 2350 BC in the Hebrew Masoretic (MT) version of the Bible (Habermehl 2013) (these two biblical versions differ in the figures given for ages to fatherhood in Genesis 5 and 11). Habermehl (2013) shows that, based on formation of the Nile Delta at the end of the Ice Age, the post-Flood Ice Age would have ended around 2500–2200 BC on the biblical timeline, in comparison with 10,000 BC on the secular timeline (Mithen 2003, 4). For further discussion of placing this Ice Age after the Flood and before the Predynastic era of Egypt, on a biblical timeline, see Habermehl (2013). More detailed information on this Ice Age is offered by Oard (1990, passim) and Snelling (2009, 769–78). The Ice Age is believed by creation

scientists to have been essentially one event, although there may have been fluctuations in its severity and extent.

Some scholars would extend the biblical timeline beyond the Genesis genealogies on the basis that the biblical genealogies are not necessarily complete (e.g., Whitcomb and Morris 1961, 474–83), but this is a minority view. Habermehl (2013) discusses the problems inherent in making this claim.

We have placed the biblical global Flood before the Ice Age in an approximate place on the biblical timeline, but what about the secular timeline? This presents clear difficulties. The earliest secular ice age is called the Huronian, and is believed to have started about 2400 million years BP (Melezhik et al. 2013, 1059–1110). This would place the Flood and Ark an unbelievable 2400+ million BP. Recognizing that this is hardly possible, biblical believers in an old earth (defined as billions of years old), who accept the secular chronology, solve this problem by defining the Flood as only local in extent (the preferred place for their local flood is Mesopotamia). A major proponent of this view is Hugh Ross, who chooses to date the Flood around 50,000 BP (Bontrager 2011). There are difficulties that arise because Ross has to claim that Noah spent a lot of time building the Ark (at God's command, Genesis 6:14–16) to merely float around in this small geographical area. Scientific logic dictates that the Ark would not have been necessary at all if the Flood covered only a small part of the earth; Noah, his family, and the animals could have simply walked out of the area that was to be flooded.

Clearly it does not make scientific sense to accept the secular chronology and at the same time maintain belief in a worldwide flood and a literal Ark. Essentially, if we believe that there really was an Ark, we have to believe that the earth is young (less than 10,000 years old) and that the great Flood covered the entire earth.

Archaeology and Post-Flood Timeline

The dates that archaeologists put on ancient remains are largely secular ones; as already shown, these will differ markedly from biblical dates. When the two timelines are not distinguished, confusion will inevitably result. An example of the chronological problem that can arise appears in this statement with respect to archaeological sites in the Ararat area (Basaran, Keles, and Geissler 2008):

Estimates of the time periods of these Chalcolithic sites include the Amuq E/Early Amuq F of the early to middle fourth millennium BC …which is obviously close to the timeframe of the Flood.

In fact, the middle 4th millennium BC in this context is not anywhere close to the Flood; it is about 6500 years *after* the standard secular date of the end of the post-Flood Ice Age (10,000 BC). The mistake that the authors have made here is that they do not realize that the secular date of these 4th-millennium BC archaeological sites is not on the same timeline as the biblical date of the Flood. The middle of the 4th millennium BC would actually lie somewhere in the vicinity of 2000 BC on the biblical timeline (Habermehl 2013).

To put this era into perspective, on the standard secular timeline the 4th millennium BC lies within the known history of mankind. In Egypt, this falls within the Predynastic Period (Shaw 2000, 481). At the same time in India a pre-Harappan culture was forming (Sen 1999, 24–25). The city of Catal Huyuk in Turkey was even older, going back to the 6th millennium BC (McNeese 1999, 6). These are all human cultures that developed after the dispersion of mankind from Babel, and well after the end of the Ice Age. The end of the post-Flood Ice Age is a useful marker in determining where in human history most archaeological remains fit.

This argument also applies to the wood samples from the Chinese "ark" and the Bender excavation, mentioned earlier. The dates of 4800 and 6500 BP respectively are secular ages for these pieces of wood; on the secular timeline they are therefore from trees that grew long after the end of the Ice Age, in known historical times.

Based on the earlier discussion of the secular timeline, and the placing of the Flood 2400+ million years ago on it, we would conclude here that it is essentially impossible to use secular dating to determine whether any archaeological artifacts or ruins could date anywhere close to the Flood. This conclusion is especially significant because of efforts by some Ark searchers to use the age of archaeological remains to claim that earliest human habitation after the Flood was near Mount Ararat.

Implications of Scientists' Claims that Mount Ararat Rose After the Flood

There can be major consequences of making scientific claims, and this is certainly true of the geology of Mount Ararat. Below are some implications of recognizing that Mount Ararat is a young volcano that began to rise only after the Flood.

1. *The Ark is not on Mount Ararat*. No matter who claims otherwise, and no matter what reasons are given, the Ark is not there. We must understand that the widely held belief that the Ark landed on Mount Ararat is ultimately based on absolutely nothing but belief itself. Science supersedes that belief.

2. *All claimed sightings of the Ark on Mount Ararat are false*. Whatever anyone claims to have seen that looks like the Ark, they didn't see the Ark because it isn't

there. There is no need to wonder whether "witnesses" like Davis (Geissler and Crouse 1999, 393–406) or Hagopian (LaHaye and Morris 1977, 71–76) saw the Ark or not, and there is no need to give anyone lie detector tests. The so-called Porcher Taylor anomaly visible high on Mount Ararat isn't the Ark (Taylor 1996), and if ever this anomaly is examined at close range it will most likely turn out to be a rock, as some experts claim (Green 2010). Others who believe that this must be a manmade formation will be disappointed (see Simmons 2001); although theoretically it could be a manmade structure, it is not the Ark.

3. *Hoaxes will no longer be possible when it is understood that the Ark is not on Mount Ararat.* One hoax was perpetrated in the 1950s by Navarra, who was suspected of buying old wood and planting it to be "found" on the mountain. The wood was later tested in the 1980s and determined to be about 1500 years old, impermeated with a modern coating material **(**LaHaye and Morris 1977, 168–172; Irwin 2012, 18–21). Another example is George Jammal, who claimed convincingly to have climbed on Mount Ararat and brought a piece of wood from Noah's Ark back to California (Lippard 1994). In fact, he had taken a piece of wood, soaked it in teriyaki sauce, and baked it. In another example, the "ark" that is the subject of the Chinese film, *The Days of Noah—Apocalypse*, appears to have been nothing but small room segments constructed under the ice in recent times from wood carried up the mountain. See Price and Patton (2010) and Beam (2012) for detailed information on this "ark" that is being promoted by the film makers as the real thing, but appears to qualify as a major hoax. None of these hoaxes would have been so successful if the truth about Mount Ararat had been known.

4. *Simple logic would dictate that Ark search expeditions on Mount Ararat should cease.* Obviously, these searches will not ever yield the Ark and it makes no sense to keep looking for the Ark where they will not find it.

5. *All Ark search expeditions on Mount Ararat have been entirely without value and an unnecessary waste of effort.* This is an especially difficult reality to face. Those who have spent years of their lives on this quest are not going to be willing to admit that it was all in vain.

6. *A great deal of money could have been saved over all these years of Ark search expeditions on Mount Ararat*. How much money have all these fruitless expeditions up Mount Ararat cost since that first Smith exploration of 1949 (LaHaye and Morris 1977, 128–34)? There is no real way to know. But there are hints here and there, and the cost keeps rising. Price (2011) claimed that preparation for his team's 2011 expedition would cost in the high hundreds of thousands of dollars, besides laboratory costs and future expedition expenses.

7. *Ancient historical references to the location of the Ark are clarified.* As an example, 12th-century Rabbi Benjamin of Tudela, Spain, refers to "Mount Ararat" near Jezireh ben Omar (modern Cizre, Turkey) (Horne 1917, 402). This city lies at the foot of Mount Cudi, and clearly this latter mountain is meant. Mount Ararat believers cannot claim that the writer made a geographical error.

8. *Looking for earliest post-Flood human archaeological remains around Mount Ararat is in vain*. Earliest people did not fan out from Mount Ararat but from another mountain (most likely Mount Cudi), and then moved en masse to the plain in Shinar. From there mankind dispersed in all directions (Genesis 11:1–9). Habermehl (2011) shows that Babel, the city in Shinar from where they dispersed, is most likely in the Khabur river triangle in the Al-Hasakah governorate of Syria.

9. *Ceasing expeditions on Mount Ararat would open the way to allocating resources for looking for the Ark on Mount Cudi.* Because essentially all efforts to locate the Ark have been concentrated on Mount Ararat up to now, Mount Cudi has been rather left out of the process. An important shift in focus can now be made.

Conclusions

Science has an important role to play in the search for the Ark. According to science, the Ark cannot be on Mount Ararat, where so much search effort has been expended over so many years. It is reliance on traditions and belief that has led Ark searchers to keep looking for the Ark on Mount Ararat, while application of science would have avoided a great deal of wasted effort. The entire argument about Mount Ararat can be framed as two opposing sides, the scientists versus the believers. When science clashes with belief, as in whether or not the Ark could be on Mount Ararat, science must take priority and prevail. But merely showing that the Ark did not land on Mount Ararat does not automatically prove that the Ark landed on Mount Cudi. The case for Mount Cudi will have to be made on its own merits. This is where the future of Ark search lies.

List of Abbreviations

BP = Before present
BC = Before Christ
MT = Masoretic Bible version
LXX = Septuagint Bible version

References

Altinli, I.E. 1966. Geology of eastern and southeastern Anatolia. *M.T.A*. (*Mineral Research and Exploration Institute of Turkey*) Bulletin 66:35–76.

Bailey, L. R.1989. *Noah: The person and the story in history and tradition*. Columbia, South Carolina: University of South Carolina Press.

Basaran, C., V. Keles, and R. Geissler. 2008. Mount Ararat archaeological survey. *Bible and Spade* 21 (3): 70–96.

Bayard, D.T. 1969. Science, theory, and reality in the "new archaeology." *American Antiquity* 34 (4): 376–84.

Beam, A.L. 2012. The Kurdish guides and the Noah's Ark discovery fraud. Retrieved July 6, 2013, from http://www.michaelsheiser.com/PaleoBabble/Kurdish

%20Guides%20Noahs%20Ark%20by%20Amy%20Beam%2020120224.pdf.

Bender, F. 1956. Wood remains from the 'landing site of Noah's ark' nearly 6500 years old. *The Bible and Spade* 19 (4): 112–13 (2006). Originally published in *Umschau-Kurzberichte aus Wissenschaft und Technik* 72 (1) (1956). Translated from the original German by W. Pasedag.

Bontrager, K. 2011. Biblical foundation for RTB's Flood model. *Reasons to Believe*. Retrieved June 26,2013, from www.reasons.org/articles/biblical-foundation-for- rtb's-flood-model.

Bullard, F. M. 1984. *Volcanoes of the earth.* Second revised edition. Austin, Texas: University of Texas Press.

Burdick, C. L. 1967. Ararat, the mother of mountains. *Creation Research Society Quarterly* 4 (1): 5–12.

Cornuke, B. 2008. The Ark of Noah in Iran? *BASE Institute*. Retrieved June 16, 2013, from http://www.baseinstitute.org/index.php?option=com_content&view= article&id=51&Itemid=65.

Crouse, B., and G. Franz. 2006. Mount Cudi—true mountain of Noah's Ark. *Bible and Spade* 19 (4): 99–111.

Cuffey, K.M., and W.S.B. Paterson. 2010. *The physics of glaciers*. 4th edition. Waltham Massachusetts: Academic Press.

Davidson, J., and S. De Silva. 1999. Composite volcanoes. In *Encyclopedia of Volcanoes,* ed. H. Sigurdsson, B. Houghton, H. Rymer, J. Stix, and S. McNutt, 663–81. Waltham, Massachusetts: Academic Press.

Dixon, R.B. 1915. Oral tradition and history. *American Anthropologist* 17 (3): 599–600.

Dwight, H.G.O. 1855. Armenian traditions about Mt. Ararat. *Journal of the American Oriental Society* 5 (1855–1856): 189–91.

Fisher, K. 2013. Frequently asked questions. *Ark Discovery International*. Retrieved from http://www.arkdiscovery.com/faq.htm.

Franz, G. 2007. Did the BASE Institute discover Noah's Ark in Iran? *Associates for Biblical Research*, Feb. 16, 2007. Retrieved June 16, 2013 from http://www.biblearchaeology.org/post/2007/02/Did-the-BASE-Institute-Discover-Noahs-Ark-in-Iran.aspx.

Geissler, R. 2013. NoahsArkSearch.Com. Retrieved August 14, 2013, from http://www.noahsarksearch.com/ararat.htm.

Geissler, R., and B. Crouse. 1999. Noah's Ark sources and alleged sightings. In *The explorers of Ararat*, ed. B.J. Corbin, 333–468. Long Beach, CA: Great Commission Illustrated Books.

Gerrard, A.J. 1990. *Mountain environments: An examination of the physical geography of mountains*. London, England: Belhaven Press.

Green, L. 2010. Noah's Ark hoax doesn't deter believers. *FoxNews.com*, April 30, 2010. Retrieved July 12, 2013, from http://www.foxnews.com/world/2010/04/30/noahs- ark-hoax-claim-doesnt-deter-believers/.

Habermehl, A. 2008. A review of the search for Noah's Ark. In *Proceedings of the sixth international conference on creationism*, ed. A.A. Snelling, 485–501. Pittsburgh, Pennsylvania: Creation Science Fellowship.

———. 2011. Where in the world is the Tower of Babel? *Answers Research Journal* 4:25–53.

———. 2013. Ancient Egypt, the Ice Age, and biblical chronology. In *Proceedings of the seventh international conference on creationism*, ed. M. Horstemeyer, Social

sciences and the humanities (CD-ROM only). Pittsburgh, Pennsylvania: Creation Science Fellowship.

Heller, J. 1961. *Catch-22*. New York, New York: Simon & Schuster.

Hill, C. A. 2002. The Noachian flood: Universal or local? Originally printed in *Perspectives on Science and Christian Faith* 54 (3): 170–83. Retrieved June 30, 2007 from http://www.asa3.org.PSCF/2002/PSCF9-02Hill.pdf.

Horne, C.F. 1917. The travels of Benjamin of Tudela. In *The sacred books and early literature of the East, Vol. 4*, ed. C.F. Horne, 381–428. New York and London: Parke, Austin, and Lipscom, Inc.

Hyndman, Donald W., and David W. Hyndman. 2011. *Natural Hazards and Disasters*. Belmont, California: Brooks-Cole.

Irwin, M. 2012. *The unsolved mystery of Noah's Ark*. Bloomington, Indiana: WestBow Press.

Kahraman, A.O. 2010. Diagenesis of Cudi Group formations from Dincer-1 and South Dincer-1 wells, SE Anatolia Turkey. Thesis submitted to the Graduate School of Natural and Applied Sciences of Middle East Technical University. Retrieved March 14, 2013, from http://etd.lib.metu.edu.tr/upload/12612779/index.pdf.

Karakhanian, A., R. Djrbashian, V. Trifonov, H. Philip, S. Arakelian, and A. Avagian. 2002. Holocene-historical volcanism and active faults as natural risk

factors for Armenia and adjacent countries. *Journal of Volcanology and Geothermal Research* 113:319–44.

Keskin, M. 2005. Domal uplift and volcanism in a collision zone without a mantle plume: Evidence from Eastern Anatolia**.** Retrieved Mar. 15, 2013, from http://www.mantleplumes.org/Anatolia.html.

Kvamme, K. L. 2005. Terrestrial remote sensing in archaeology. In *Handbook of archaeological methods*, V*ol. 1*, eds. D. G. Maschner and C. Chippindale, 423– 77. Lanham, Maryland: Altamira Press.

LaHaye, T.F., and J.D. Morris. 1977. *The Ark on Ararat*. New York, New York: Pocket Books, Gulf & Western Corporation.

Lambert, R.S.J., J.G. Holland and P.F. Owen. 1974. Chemical petrology of a suite of calc-alkaline lavas from Mount Ararat, Turkey. *The Journal of Geology* 82 (4): 419–38.

Lasaponara, R. and N. Masini, eds. 2012. *Satellite remote sensing: A new tool for archaeology,* Vol. 16 in series, Remote sensing and digital image processing. New York, New York: Springer.

Lippard, J. 1994. Sun goes down in flames: The Jammal Ark hoax. *Skeptic* 2 (3): 22–23.

Lovett, T. 2005. Is the Ark on Ararat? *WorldWideFlood.com.* Retrieved Jul 1, 2013, from http://www.worldwideflood.com/flood/ararat/ararat.htm.

Lowie, R.H. 1915. Oral tradition and history. *American Anthropologist* 17 (3): 597–99.

McNeese, T. 1999. *History of civilization—the ancient world*. Dayton, Ohio: Milliken Publishing Company.

Melezhik, V.A., G.M. Young, P.G. Eriksson, W. Altermann, L.R. Kump, and A Lepland. 2013. Huronian-age glaciation. In *Reading the archive of earth's oxygenation*, V*ol. 3, global events and the Fennoscandian Arctic Russia—drilling early earth project*, ed.-in-chief V.A. Melezhik, 1059–1110. New York: Springer.

Mithen, S. 2003. *After the ice: A global human history 20,000–5,000 years ago*. Cambridge, Massachusetts: Harvard University Press.

Oard, M.J. 1990. *An ice age caused by the Genesis Flood.* El Cajon, California: Institute for Creation Research.
Parcak, S. H. 2009. *Satellite remote sensing for archaeology*. Abingdon, United Kingdom and New York, New York: Routledge.

Price, R. 2011. 2011 Ark search update by Dr. Randall Price. *World of the Bible News & Views* 13 (1). Retrieved July 18, 2013, from http://www.worldofthebible.com/Documents/Summer2011.pdf.
Price, R., and D. Patton. 2010. A critique of the claim by Noah's Ark Ministries International of a discovery of Noah's Ark on Mount Ararat. *World of the Bible Ministries*. Retrieved July 6, 2013, from http://www.worldofthebible.com/

Documents/Fall2010.pdf.

Rosovsky, H. 1990. *The university: An owner's manual*. New York, New York: W.W. Norton.
Schmidt, G. 1964. A review of Permian and Mesozoic formations exposed near the Turkey/Iraq border at Harbol. *M.T.A*. (*Mineral Research and Exploration Institute of Turkey*) Bulletin 62:103–18.

Scurfield, G., and E.R. Segnit. 1984. Petrifaction of wood by silica minerals. *Sedimentary Geology* 39 (3–4): 149–67.

Sen, S.N. 1999. *Ancient Indian history and civilization*. New Delhi, India: New Age International (P) Limited, Publishers.

Shaw, I. 2000. Chronology. In *The Oxford history of ancient Egypt*, ed. I. Shaw, 480–89. New York, New York: Oxford University Press.

Simmons, R. 2001. The Ark on Ararat? The treasure of Agri Dagh. In *Far out adventures: The best of World Explorer Magazine*, ed. D.H. Childress, 279–91. Kempton, Illinois: Adventures Unlimited Press.

Smithsonian. 2011. *Violent earth*. New York, New York: DK Publishing.

Snelling, A. A. 1992. Special report: Amazing "ark" expose. *Creation Magazine*, 14 (4): 26–38. Online at http://

www.answersingenesis.org/creation/v14/i4/report.asp.

———. 2009. *Earth's catastrophic past, geology, creation and the Flood, Vol. 2.* Dallas, Texas: Institute for Creation Research.

———. 2010. Carbon-14 dating—understanding the basics. *Answers* 5 (4): 72–75.

———. 2011. Is the wood recently found on Mt. Ararat from the Ark? *Answers in Genesis* Nov. 9, 2011. Retrieved June 14, 2013 from http://www.answersingenesis.org/articles/aid/v6/n1/mt-ararat-wood.

Tasman, C.E. 1947. Paleozoic-Mesozoic section in southeastern Turkey. Geological notes. *Bulletin of the American Association of Petroleum Geologists* 31 (8): 1500– 11.

Taylor, P. 1996. The origin of and planned search for the Mount Ararat "anomaly" in Turkey. *NoahsArkSearch.Com*. Retrieved July 8, 2013, from http://www.noahsark

search.com/porcher.htm.

Thomas, D.H., and R.L. Kelly. 2006. *Archaeology*. Belmont, California: Thomson Wadsworth.

Walker, T. 2006. Caution about "Ark" discovery. Retrieved April 22, 2007, from http://www.creationontheweb.com/content/view/4471/.

Wessel, P. 2007. Seamount Characteristics. In *Seamounts: Ecology, Fisheries & Conservation*, eds. T.J. Pitcher, T. Morato, P.J.B. Hart, M.R. Clark, N. Haggan, R.S. Santos, 3–25. Oxford, England: Blackwell Publishing Ltd.

Whitcomb, J.C., and H.M. Morris. 1961. *The Genesis Flood: The biblical record and its scientific implications*. Phillipsburg, New Jersey: Presbyterian and Reformed Publishing Company.

Whiteley, P.M. 2002. Archaeology and oral tradition: The scientific importance of dialogue. *American Antiquity* 67 (3): 405–15.

Wroe, M. 1994. 'Arkologists' claim to have found Noah's Ark. *The Observer (London)* 16 Jan. 1994. Retrieved June 16, 1994, from http://www.arksearch.com/najudi.htm.

Yilmaz, Y. 1993. New evidence and model of the evolution of the southeast Anatolian orogen. *The Geological Society of America Bulletin* 105 (2) doi: 10.1130/0016-7606(1993)105<0251:NEAMOT>2.3.CO;2.

Yilmaz, Y., Y. Guner, and Y. Saroglu. 1998. Geology of the Quaternary volcanic centres of the east Anatolia. *Journal of Volcanology and Geothermal Research* 85:173– 210.

Ziegler, M.A. 2001.Late Permian to Holocene paleofacies evolution of the Arabian Plate and its hydrocarbon occurrences. *GeoArabia* 6 (3): 445–504.