



The Garden of Eden: A Modern Landscape

Carol A. Hill*

17 El Arco Drive
carolannhill@cs.com
Albuquerque, NM 87123

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In this paper, I try to apply the findings of modern geology to Gen. 2:10-14. I deduce from the evidence that the four rivers of Eden--the Pishon, the Gihon, the Hiddekel, and the Euphrates--were real rivers which existed on a modern landscape before Noah's flood. The now-dry Wadi al Batin was probably the Pishon River, the Gihon was probably the Karun River, and the Hiddekel (Tigris) and Euphrates Rivers flowed in approximately the same courses as they occupy today. The confluence of these four rivers was located at the head of the Persian Gulf, but a Gulf that may have been inland from where it is today. The spring which "rises up" in Eden could have been supplied by the Dammam Formation, the principal aquifer of the region. Oil-drilling in southern Iraq confirms that six miles of sedimentary rock exist below the biblical site for the Garden of Eden. This same sedimentary rock is the source of bitumen at Hit, a site which may have supplied Noah with pitch for constructing the ark. The question is asked: How could pre-flood Eden have been located over six miles of sedimentary rock supposedly formed during Noah's flood?

While the secular world almost universally assumes that the story of Adam and Eve in the Garden of Eden is legend, many evangelical Christians believe it to be a true story--that Adam and Eve were historical people and that the Garden of Eden was a historical place. One reason for this belief is because the Bible gives its geographic location: two of the names of the four rivers mentioned in Gen. 2:10-14 have been preserved from biblical times. According to the Bible, the Garden of Eden was located somewhere in southern Iraq where the Euphrates and Hiddekel (Tigris) Rivers flowed into the head of the Persian Gulf--that is, they flowed on a modern landscape that is still recognizable today.

What most Christians do not realize is that this biblical identification of Eden on a modern landscape is in direct conflict with Flood Geology, a premise promoted by Creation Science. The basic tenet of Flood Geology is that all (or almost all) of the sedimentary rock on the planet earth was formed during Noah's flood. But modern geologic study has shown (by oil drilling) that the landscape of southern Iraq is underlain by six miles of sedimentary rock. Thus

the question can be asked: How could the Garden of Eden, which existed on a pre-flood landscape existing *before* the flood, have been located *over* six miles of sedimentary rock created *during* the flood?

This paper is organized accordingly. First, I discuss in detail the four rivers of Eden and the geographic features connected with those rivers in order to demonstrate:

1. All four rivers were historical rivers, not mythical rivers made up in the mind of the Genesis writer.
2. All four rivers flowed into the Persian Gulf in the land of Mesopotamia. They were not rivers that flowed in other parts of the world as has been suggested by various authors.
3. All four rivers (or now-dry riverbeds) of Genesis are *still there*; that is, the Genesis writer identified a modern landscape, one which is almost identical to that which still exists in the Iraq-Arabia- Iran area today.

Second, I try to identify the most likely place for the Garden of Eden based on its biblical location at the confluence of these four real rivers. I present evidence from modern geology that this confluence in ~4000 B.C. may have been at a Persian Gulf located inland from where it is today.

Third, I discuss why the Garden of Eden being located on a modern landscape is in direct conflict with Flood Geology. I conclude that the Bible never claims that all of the sedimentary rock on earth was formed during Noah's flood.

The ideas in this paper are based mainly on the geological, archaeological, and theological literature. However, two new ideas never before proposed (to the author's knowledge) are presented herein: (1) the "onyx stone" of Gen. 2:12 may have been mined from the Wadi al Aqiq area in central Arabia, and (2) the river which went out of Eden (Gen. 2:10) may have been a spring supplied by the Dammam Formation, the principal aquifer for the region.

*"And a river went out of Eden to water the garden; and from thence it was parted, and became four heads."The name of the first is Pishon; that is it which compasseth the whole land of Havilah, where there is gold;
"And the gold of that land is good: there is bdellium and the onyx stone.
"And the name of the second river is Gihon; the same is it that compasseth the whole land of Cush.
"And the name of the third river is Hiddekel; that is it which goeth toward the east of Assyria. And the fourth river is Euphrates" (Gen. 2:10-14).*

The Name of the First is Pishon

The Land of Havilah

The Bible mentions two Havilahs in the Table of Nations: Havilah the son of Cush (Gen. 10:7) and Havilah the son of Joktan (Gen. 10:29). The "land of Havilah" has been interpreted by many biblical scholars¹ to be Arabia, and Joktan is considered to be the head of the tribes of Arabia, as most of his sons can be traced to places and districts within what is now Saudi Arabia and Yemen. Apparently the "land of Havilah" referred to a whole region rather than one particular place, since there appears to have been more than one tribe by that name.²

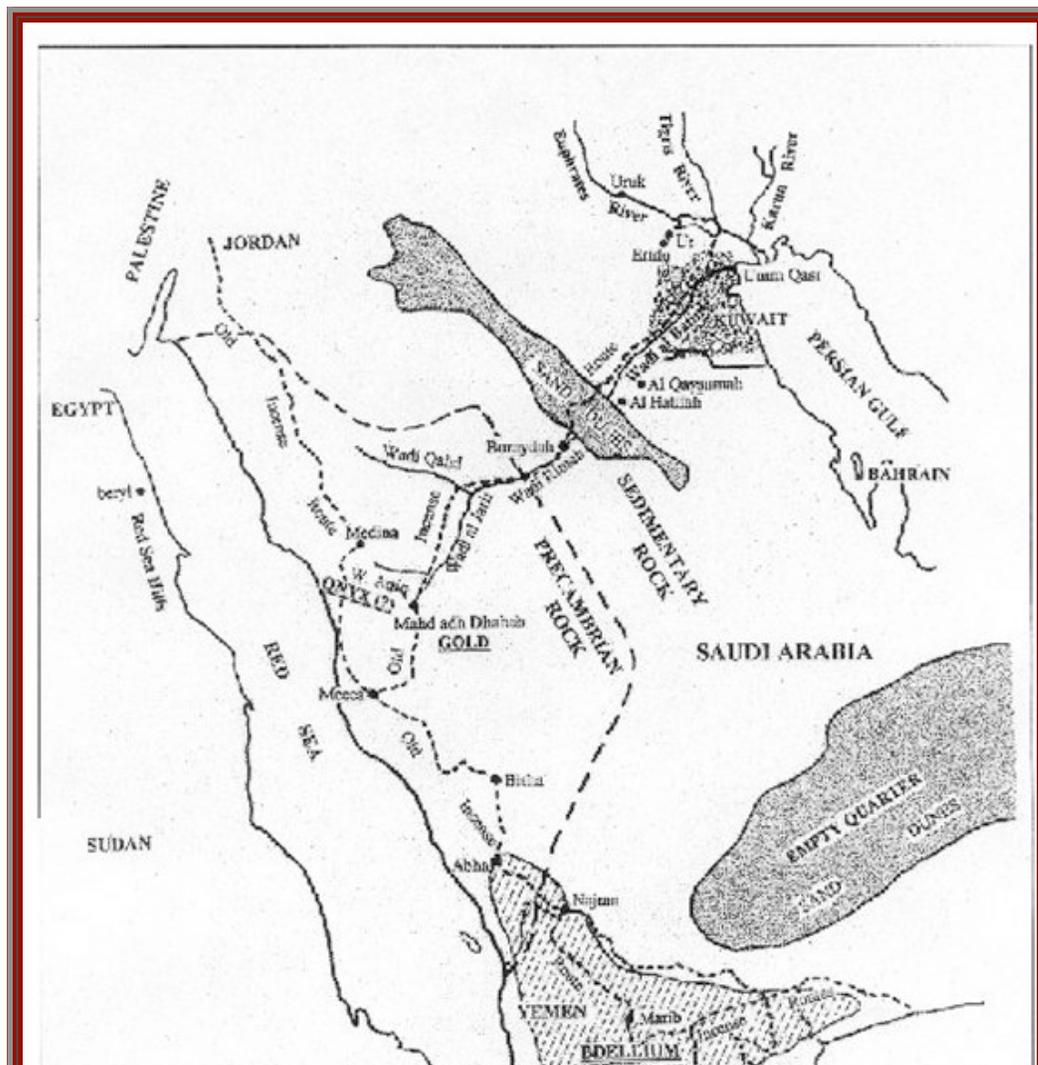
But where is the Pishon River within the land of Havilah? There is no river flowing from the western mountains of Saudi Arabia down to the head of the

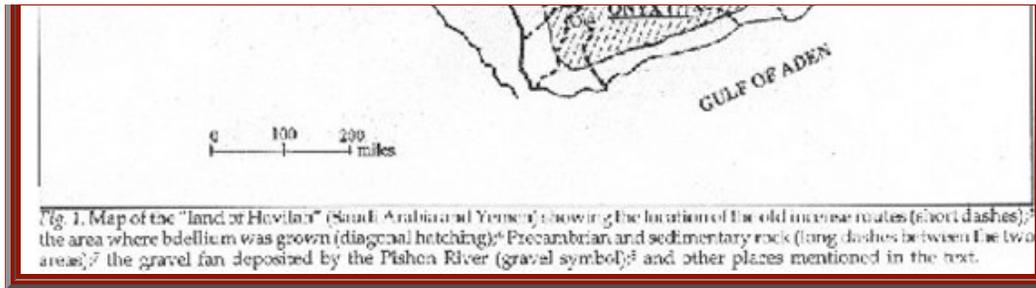
Persian Gulf. There is no perennial river flowing across Saudi Arabia today, but there is evidence that such a river did flow there sometime in the past. Only four inches of rain a year now fall in Saudi Arabia, but during the periods from about 30,000 to 20,000 years B.P. (before present) and from about 10,000 to 6000 years B.P., the climate was much wetter than it is today.³ Even as late as 3500 B.C. (before Christ), ancient lakes are known to have existed in the "Empty Quarter" of Saudi Arabia, which is today the largest sand desert in the world (Fig. 1). A somewhat drier but still moist phase existed from about 4000 to 2350 B.C., followed by a more arid phase from about 2350 to 2000 B.C. It was then, at about 2000 B.C., that the climate turned hyper-arid and the rivers of Arabia dried up.

Has the Pishon River Been Found?

In his article, "The River Runs Dry," James Sauer describes how satellite images have detected an underground riverbed along the Wadi al Batin (wadi means the same thing as arroyo, a dry riverbed).⁴ Sauer identified this river as the Pishon River of the Bible, a river which flowed at a time when the climate was wetter than it is today.

The Wadi al Batin/Wadi Rimah system drains some 43,400 square miles of Saudi Arabia and Kuwait. The now dry Wadi al Batin enters the Persian Gulf at Umm Qasr in Kuwait (Fig. 1), but in the past the Pishon entered the Gulf north of Umm Qasr, in the Euphrates-Tigris river basin. The evidence for this is a triangular, fan-shaped, delta





plain of cobbles and pebbles in the Dibdibah area, which has its apex near Al Qaysumah and which extends northward toward the Euphrates (Fig. 1).⁹ The cobbles and pebbles of this gravel plain are composed of crystalline rock that is characteristic of the western mountains of Saudi Arabia, and they decrease in size as they approach the Gulf area. The geological implication of this is that the source of the cobbles was to the southwest in Saudi Arabia, and that enough water once flowed in the Pishon River to transport rock debris from the Western highlands down toward the Euphrates-Tigris river basin.

From the Persian Gulf at Umm Qasr, the now dry Wadi al Batin can be followed to the southwest, upstream past the borders of Kuwait, and into Saudi Arabia, where it is incised into a Tertiary limestone- sandstone sedimentary rock terrain.¹⁰ Then, just past Al Hatifah, the dry riverbed is engulfed by immense sand dunes and disappears (Fig. 1).

This is where the satellite photos come in. These photos indicate that the Wadi al Batin continues to the southwest, beneath the sand, and emerges as the Wadi Rimah (that is, both wadis were part of the same river system in the past, before being covered by sand dunes). About eighty miles further in the upstream direction, the Wadi Rimah bifurcates into the Wadi Qahd on the northwest, and the Wadi al Jarir on the southwest (Fig. 1). The Wadi al Jarir continues up gradient to the area of the Mahd adh Dhahab gold mine exactly as the Bible says: *"The River Pishon encompasses the whole land of Havilah, where there is gold"* (Gen. 2:11). Sauer remarked in his article: "This implies extraordinary memory on the part of the biblical authors, since the river dried up between about 3500 and 2000 B.C."¹¹

Mahd adh Dhahab: Cradle of Gold

"And the gold of that land is good" (Gen. 2:12).

The gold of that land is indeed good! Mahd adh Dhahab (literally meaning "cradle of gold") was the largest and one of the richest gold mines of the ancient world. It is believed to be the fabled "Ophir" of the Bible, the source of King Solomon's gold. (Ophir was another one of Joktan's sons; Gen. 10:29.) The gold of Ophir is referred to in the following passages: 1 Kings 9:28, 10:11, 22:48; 1 Chron. 29:4; 2 Chron. 8:18, 9:10; Job 22:24; Ps. 45:9; and Isa. 13:12. Based on the number of ancient mine tailings (refuse left over after the ore is treated), geologists have estimated that the Mahd adh Dhahab mine produced more than 950,000 ounces (about 30 metric tons) of gold in antiquity.¹² Also, based on radiocarbon ages, they believe it was mined during the reign of King Solomon (961-922 B.C.) and during the Abbasid Caliphate (750-1258 A.D.).¹³ It has also been mined in modern times.

Assuming that Mahd adh Dhahab is the legendary King Solomon's mine, was it also the source of the "good gold" of Gen. 2:12? After all, Gen. 2:12 refers to a time much older than that of Solomon. There is no way of knowing for certain, but three lines of evidence suggest that gold may have been mined at Mahd adh

Dhahab much earlier than during Solomon's time--even as early as the patriarchal period or before.

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The first line of evidence comes from the Mahd adh Dhahab itself. A trenching program carried on in 1973 showed that the richest ground remaining at Mahd adh Dhahab lies southeast of Mine Hill in several ancient channels on the flanks of Jebel Mahd adh Dhahab and in valleys that drain the jebel (jebel means mountain).¹⁴ These ancient erosion channels could have produced surficial placer and alluvial gold deposits that could have been collected by pre-Solomonic people. This method of collection would have left little or no trace of early mining activity.

The second line of evidence is the reference to Ophir in Job 22:24: "*Then shalt thou lay up gold as dust, and the gold of Ophir as the stones of the brooks.*" The date that the Book of Job was written is uncertain, but some biblical scholars place Job in the patriarchal period, as inferred from his genealogy (Job lived about the same time as Abraham), his stated great age, and the absence of the mention of the law and the Tabernacle or Temple in this book.

The third line of evidence is archaeological. Gold suddenly appears in the archaeological record of Mesopotamia in the Uruk Period (about 3500 B.C.). (For a chart of the archaeological periods of Mesopotamia, refer to Table 1.) A small variety of gold artifacts have been recovered in southern Iraq that date to about 3500 B.C.; for example, in Uruk those found in the layers underlying the White Temple.¹⁵ However, by the Early Dynastic III Period (about 2500 B.C.), the use of gold, electrum (a mixture of 60-70% gold and 30-40% silver), silver, and copper had increased significantly, as evidenced by the Royal Tombs of Ur where these metals have been found in great profusion.¹⁶

Where did these ancient Mesopotamian peoples get all of the gold and silver that they used for their jewelry and temples? They must have had established trade relations with places where these metals were being mined, since Mesopotamia itself is devoid of metal deposits. The nearest gold-silver mine to Ur and Uruk is Mahd adh Dhahab (Fig. 1).

Gold occurs at Mahd adh Dhahab mostly as electrum (gold-silver) within quartz veins. Besides gold, the mines have also produced a substantial amount of silver, copper, zinc, and lead. The quartz veins containing the gold intrude (cross-cut, or are younger than) the Mahd adh Dhahab Series of Precambrian volcanic and sedimentary rocks.¹⁷ The quartz of the veins is typically banded and shows a cockscomb-like structure of zoned quartz crystals. Chalcedony and chert are commonly associated with the quartz veins, chert being banded and variously colored (red, white, green, gray, and brown).

The Onyx Stone

The "onyx stone" of Gen. 2:12 is not as easy to place. The problem is two-fold. The first is archaeological. The early periods of gold mining at Mahd adh Dhahab have not been adequately investigated; even less has there been a search for the source of precious stones known to have been traded in antiquity. Some biblical passages confirm that precious stones were being brought from Arabia to Israel along with gold and incense. "Precious stones" are mentioned with the

gold of Ophir in 1 Kings 10:2, 10, 11 and 2 Chron. 9:1, 10. The question is, "What were considered to be precious stones in antiquity?" An answer is offered by 1 Chron. 29:2: "... *onyx stones, and stones to be set, glistening stones, and of various colors, and all manner of precious stones, and marble stones in abundance.*" This passage shows that onyx was considered to be precious, although we now consider such stones to be only semiprecious.

The second problem with identifying the "onyx stone" of Gen. 2:12 is linguistic. What exactly was meant by the term "onyx" to the writer of Genesis? In antiquity, many different names were used for stones, even for the same type of stone, depending on color, quality, and appearance.¹⁸ Also in a number of instances, it is apparent that the meaning of these names has changed with time. The Greek word "*onychion*" (onyx) employed as a general term could refer to carnelian, beryl, lapis lazuli, rock-crystal quartz, or even marble, but usually it was used for the banded and variegated subvarieties of chalcedony (agate, onyx, sardonyx). While there is no positive, absolute guide to the proper translation of the word "onyx," a number of possibilities can be reasonably ruled out.

Marble. Marble is metamorphized limestone. While marble is banded like onyx, and while some marble rock does exist in Saudi Arabia, marble is probably not what the Bible is referring to in Gen. 2:12. For one thing, in 1 Chron. 29:2 "marble stone" is mentioned separately from "onyx stone" suggesting that, in the ancient mind, these were two different types of substances. In antiquity, the word "onyx" was usually reserved for very hard silica substances used in jewelry, while "marble" was reserved for calcium carbonate, a softer substance used as a building material.

Lapis lazuli. Lapis lazuli is the mineral lazurite, a commodity which was traded extensively in ancient times throughout Mesopotamia and which was used in the manufacture of jewelry and other items. The source and trade routes of this mineral have been well documented, the agreed-upon source area being the Badakhshan region of Afghanistan.¹⁹ Since lapis lazuli does not occur on the Arabian Peninsula, this mineral can also be ruled out as the onyx stone of Gen. 2:12.

Beryl. Beryl is a beryllium mineral. Emerald (green), aquamarine (blue), rose beryl (rose pink), and golden beryl (golden-yellow) are the most precious types. *Strong's Concordance* states that the Hebrew word for "onyx" in Gen. 2:12 is "*sheham*," from an unused root probably meaning "to blanch" and speculates that "this could be taken for a gem, probably beryl (from its *pale* green color)." However, this identification does not appear likely because there is no indication that beryl has ever been mined in Arabia. The closest beryl to Arabia is found in the Red Sea Hills at the emerald mines of Sikait and Zabara, just to the west of Luxor, Egypt (Fig. 1).²⁰

~5000–4000 B.C.	Ubaid
~4000–3200 B.C.	Uruk
~3200–3000 B.C.	Jemdet Nasr
~3000–2750 B.C.	Early Dynastic I
~2750–2600 B.C.	Early Dynastic II

~2600–2350 B.C.	Early Dynastic III
~2350–2150 B.C.	Dynasty of Akkad
~2350–2000 B.C.	3rd Dynasty of Ur
~2000–1600 B.C.	Old Babylonian

Rock-Crystal Quartz. Rock-crystal quartz is the macrocrystalline (large crystal) variety of quartz. It is found extensively as veins cutting across rock in Saudi Arabia, such as at the Mahd adh Dhahab gold mine, and it is possible that the ancient writer of Gen. 2:12 considered this quartz (mined along with the gold) to be onyx, especially because of its "cockscomb," onyx-like structure.²¹ However, rock-crystal quartz was only used sporadically in Mesopotamia in ancient times,²² and one wonders why the ancient writer would even mention it along with gold and bdellium if it were not an especially desirable commodity.

The "onyx stone" of Gen. 2:12 is not as easy to place.

Onyx, Agate, Carnelian. Onyx, agate, and carnelian are all varieties of chalcedony, a cryptocrystalline (very finely crystalline) variety of quartz. Carnelian (sometimes spelled cornelian) is a reddish-brown to flesh-colored, unbanded variety of chalcedony. It was a prized material in Mesopotamia, ranking second only to lapis lazuli for use in bead making. Carnelian appears early in the archaeological record (3200-3000 B.C.) at Ur and Jemdet Nasr.²³ It also appears in about 20% of the grave sites in Early Dynastic II-III times (2650-2500 B.C.), along with gold, silver, and lapis lazuli.²⁴

Pliny mentioned that "carnelian from Arabia is of the less transparent variety,"²⁵ but it is not known if Pliny's use of the word conveyed the specific meaning of carnelian or the more generic meaning of onyx. Also, while some carnelian is known from western Arabia, it appears that in antiquity, the substance usually came from the Central Plateau region of Iran--to the east of Mesopotamia rather than to the west of it. Trading posts for carnelian are known to have been the ancient sites of Dilmun (what is now Bahrein) and Harappa (in the Indus river valley of Pakistan). Etched carnelian beads of Harappan manufacture were frequent exports to Sumer.²⁶

Onyx and agate are both banded forms of chalcedony. In its strictest mineralogical sense, "onyx" consists of milky-white to white bands alternating with black or deep brownish-black bands, although sardonyx contains white bands alternating with reddish-brown bands. In its linguistic sense, however, "onyx" could refer to either banded chalcedony or agate.²⁷

Onyx, sardonyx, and agate have all been cited as occurring on the Arabian Peninsula, but geologists have not verified this yet. Albertus Magnus (~1280 A.D.), in his *Book of Minerals*, said: "Onyx is said to be a gem of a black color; there is found a better kind of it which is black, streaked with white veins. It comes from Medina and Arabia."²⁸ He also stated in this same book that sardonyx is frequently found in Arabia. Dana's *System of Mineralogy* cites moss agate to be from Mocha in Yemen, which was part of Arabia in ancient times.²⁹

Chalcedony in any form was fancied by the ancients, and has been found in

Mesopotamia in the archaeological levels dating from about 4000-3200 B.C. onward.³⁰ It is known to exist in the Western Desert of Arabia and especially in the area of Mahd adh Dhahab-Wadi al Aqiq (Fig. 1). At Mahd adh Dhahab, cryptocrystalline quartz occurs as chalcedony,³¹ and as the massive, opaque, rock variety called chert.³² Chert is color-banded and may have been considered to be a type of onyx. The fact that "Aqiq" can mean "agate" in Arabian may be especially significant. Why would an area be named "agate" if agate (onyx) mining had not occurred there?

There is Bdelium

The last commodity mentioned in Gen. 2:12 is bdellium. Bdellium is a fragrant gum resin obtained from plants of the bursera (balsam) family. Frankincense comes from trees of the genus *Boswellia* of the bursera family, while myrrh and bdellium come from trees of the genus *Commiphora*.³³ Bdellium is a substance somewhat similar to myrrh and is often regarded as myrrh--as it was in ancient times when the distinction between these two types was not clear-cut. Bdellium species known from Arabia are *Commiphora mukul* and *Commiphora schimperi*.³⁴

All of these kinds of gum-resins (frankincense, myrrh, and bdellium) were used in the ancient Middle East for religious (incense), cosmetic (perfume), and medicinal purposes. Mesopotamian cuneiform texts note that myrrh (bdellium) was used in making poultices for the head; for treating ailments of the eyes, nose, and ears; and for other medicinal purposes.³⁵ Also, the Sumerians and Babylonians burned incense as part of their temple purification rites. Incense is created by the burning of a variety of gums, resins, and spices to create fragrant fumes.

The trees from which myrrh and bdellium are extracted grew during ancient times only in southern Arabia and northern Somaliland. Specifically for southern Arabia, myrrh (bdellium) grew within the modern-day country of Yemen from about 18° latitude southward to the Gulf of Aden (Fig. 1), although the Arab geographer al-Maqdisi referred to a bdellium called *muql* which grew in the area of al-Marwah, somewhat north of Yemen.³⁶ Over time, a substantial incense trade developed between south Arabia and Mesopotamia, Egypt, and other parts of the Middle East, such as Israel and Jordan.

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The Great Arabian Incense Road

When frankincense and myrrh (bdellium) first came into general use in the ancient world is obscure, but the trade of these items was intimately tied up with two things: the establishment of the Arabian incense (spice) route and the domestication of the camel. During the heyday of the incense road, huge camel caravans trudged up and down the entire length of the Arabian Peninsula, carrying precious spices and other commodities to the temples, courts, and markets of the north. Thus came the Queen of Sheba to King Solomon's court carrying (by camel) gold, precious stones, and spices (1 Kings 10:1-13). "*And she gave the king an hundred and twenty talents of gold, and of spices of very great store, and precious stones; there came no more such abundance of spices as these which the queen of Sheba gave to King Solomon*" (1 Kings 10:10).

The Queen of Sheba came from Marib (ancient Mariaba, now part of Yemen), the great and prosperous caravan city which was the capital of the ancient Kingdom of the Sabaeans (Saba means the biblical Sheba). Marib was on the ancient trade route, which began in the south along the Gulf of Aden, and which continued northward past Marib and Najran, then to Abha, Bisha, and Mecca (Fig. 1). From Mecca the old incense road split, with its western route going to Jordan, Israel, and Egypt and its eastern route going past the Mahd adh Dhahab gold mines (stopping at Bir Madid, the "well of the mines"), northeast to the Wadi Rimah, down the wadi to Buraydah, and then along the Wadi al Batin (Pishon River) to Mesopotamia. From the land of Havilah and along the Pishon River, the bdellium (from Yemen), the onyx (from the Wadi al Aqiq- Mahd adh Dhabab area), and the gold (from Mahd adh Dhabab) could have been brought to Mesopotamia, as is suggested by Gen. 2:11-12.

Camel Caravans

A pertinent question to ask regarding the commodities mentioned in Gen. 2:11-12 is: When did trade along the Arabian spice route begin? Scholars agree that by 1100 B.C. trade was well underway, with the Queen of Sheba visiting King Solomon sometime around 950 B.C. When trade began along the Arabian incense route seems to hinge on when the camel (*Camelus dromedarius*) was domesticated in Arabia. The incense route covers a very arid and inhospitable terrain, suitable for camels but not for other beasts of burden, such as donkeys. The date of camel domestication is disagreed upon by scholars. Many favor a date of around 1300-1100 B.C., based primarily on the lack of unequivocal archaeological evidence for an earlier date.³⁷ However, other scholars cite evidence which places camel domestication long before this--perhaps as early as 2000-3000 B.C. or before.³⁸

The Bible itself attests to a probable early date for the domestication of the camel, and hence the export of items like gold, precious stones, and bdellium along the Arabian incense route. Job 6:19 hints at a link between the caravan merchants of Sheba and Tema.³⁹ Gen. 12:16 states: "*And he (the Pharaoh) treated Abram well for her (Sarah's) sake: and he had sheep, and oxen, and he-asses, and menservants, and maidservants, and she-asses, and camels.*" The date that Abraham lived has been fairly well established (about 2000 B.C.), and thus this verse implies that domesticated camels were already present in Egypt by this time. Abraham also maintained his camel herd after he left Egypt and came back to Palestine. Gen. 24:10 states: "*And the servant took ten camels of the camels of his master (Abraham) and departed ... (to the city Nahor in Mesopotamia to find Isaac a wife).*" That these camels were domesticated is clear from the text. Abraham's "goods" were carried by these camels to Mesopotamia (Gen. 24:10), and Rebekah drew water for these camels (Gen. 24:19).

Location of the Pishon River

In summary of this section on the Pishon River, it can be asked: What other location besides Arabia and the Wadi al Batin better fits the description of Gen. 2:11-12? Scholars have suggested Egypt,⁴⁰ the Mediterranean,⁴¹ Mongolia, India, Ethiopia, Armenia, Turkey, and even "lost Atlantis."⁴² But do any of these places contain all three commodities (gold, onyx, bdellium) as specified by the Bible? Bdellium only grows in southern Arabia (Yemen) and northern Somaliland, so this item automatically eliminates most of the suggested localities. The headwaters of the Wadi al Batin drain the ancient gold and onyx areas of Mahd adh Dhahab and Wadi al Aqiq, and all three commodities are known to have been transported by camel into Mesopotamia at an early date. Finally, the Wadi al Batin confluences with the Tigris and Euphrates in the land

of Mesopotamia just as the Bible states. All of the above is evidence that the Wadi al Batin is the now dry, ancient Pishon River and that the land of Havilah (the son of Joktan, not Cush) is indeed Arabia.

***The Wadi al Batin is the now dry, ancient Pishon River
and the land of Havilah ... is indeed Arabia.***

The Name of the Second is Gihon

The second river of Genesis 2 (the Gihon) is not as easily identified as the Pishon. The problem revolves around the identity of the "land of Cush," which in the King James Version of the Bible was translated "Ethiopia." Not only is this translation questionable, it also does not make sense. A river in Ethiopia would flow to the Red Sea, to the Mediterranean Sea, or to the Indian Ocean, not to a confluence of the Euphrates and Tigris Rivers as stated by the Bible. According to Speiser in the *Anchor Bible Commentary*, the "land of Cush has been mistakenly identified with Ethiopia, rather than with the land of the Kassites."⁴³ The Kassites (or *kaššû*) people lived to the east of Mesopotamia in the Old Babylonian Period (1800-1600 B.C.; Table 1). Before then, however, this area was known as the land of Elam or Susiana, where the inhabitants of the Plain of Susa lived (Fig. 2). If the Cush intended by the Hebrew word *kush* is the territory of the Kassites, as Speiser claims, then the river referred to in Gen. 10:13 must have come from the east of Mesopotamia, or what today is western Iran.

It Compasseth the Whole Land

The major rivers that run through western Iran (formerly Susiana) are the Karkheh and the Karun (Fig. 2). The Karun is by far the longer of the two, and Iran's only navigable river. These two rivers provided a route of communication between the heart of Susiana and southernmost Mesopotamia. In the third millennium B.C., caravan routes along both rivers went through Susiana to Sumer and Akkad.

This important trade route would be familiar to people in the region. Perhaps this is why the writer of Genesis mentioned the Gihon River. Also, the Sumerians were constantly at war with the Elamites, and this is another reason why the Genesis writer would have been apt to mention this river. Everyone living then would have known where the "land of Cush" was located.

Following this reasoning, the most likely candidate for the biblical Gihon River is the Karun. The word "compasseth" in Hebrew means "to revolve, surround, or border, or to pursue a roundabout course, to twist and turn."⁴⁵ That is exactly what the Karun River does. It is a meandering river with great bends. Its course is 510 miles long, but its distance (in a bird's-eye view) is only 175 miles long.⁴⁶ Since the sedimentary rocks of the Zagros Mountains are folded into great anticlinal and synclinal structures, they create a zigzagging, "roundabout course" for the river as it follows them. Today the Karun contributes most of the sediment which is forming the delta at the head of the Persian Gulf,⁴⁷ and it must have done likewise in ancient times. Less likely, the Gihon could have been the Karkheh, which also winds through the land. M'Causland identified the Gihon as the "Gyudes" of the ancients, which is the equivalent of the modern Karkheh joined by the Kashkan river in the region of Kush, later called Khuzestan.⁴⁸

The most likely candidate for the biblical Gihon River is the Karun.

In antiquity, the Karun River formed an estuary with the Karkheh. Until the tenth century A.D., the combined rivers flowed directly into the Persian Gulf at Salaymanan, the location of which is now unknown.⁴⁹ Most certainly these rivers would have flowed into the Gulf somewhere east of the Tigris River, or they would have joined in confluence with the Tigris at the Persian Gulf.

The Name of the Third is Hiddekel

The third river of Genesis 2 is the Hiddekel, which is the Hebrew name for Tigris. The Tigris River rises on the southern slopes of the Taurus Mountains in eastern Turkey and cuts a bed almost 1160 miles long on its way to the Persian Gulf. On its journey to the sea, it is joined by a number of tributaries flowing from the Zagros Mountains: the Khabur, Great Zab, Little Zab, Nahr al 'Uzaym, Diyala, Karkheh, and lastly the Karun (Fig. 2). Arriving at Mosul, the river flows through a piedmont region of rather low hills. While the course of the upper Tigris appears not to have changed substantially over the last five thousand years, its lower course has been very unstable (for example, one of its ancient courses was called "Idiqlat" by the Sumerians; Fig. 2).

The Tigris was the great river of ancient Assyria.

The Tigris River floods annually due to the spring melting of snows in the Taurus Mountains. Its waters first begin to rise in March, reach their peak in May, and normally recede in June or July. At Baghdad, the river is about one-quarter mile wide, with a depth at high water of twenty-six feet and at low water of about four feet.⁵⁰ The current in flood is about four miles per hour and at low water it is one and one-quarter miles per hour. The river below Baghdad is navigable by boats of some size, while the upper Tigris is more difficult to navigate. The Tigris is capable of flooding over vast areas of land. For example, an overflow of the Tigris River in 1954 submerged the low-lying Babylonian plain for hundreds of miles.

The Tigris was the great river of ancient Assyria. On its banks stood many of the cities mentioned in the Bible, including Nineveh, Nimrud and Asshur (Fig. 2). Gen. 2:14 identifies it as "*that which goeth toward the east of Assyria*," or the land of Asshur, who was the grandson of Noah (Gen. 10:11). And the Tigris does (and did) flow east of ancient Asshur (now a mound, spelled Ashur; Fig. 2), just as stated in the Bible.

The Fourth River is Euphrates

The Euphrates is identified in Gen. 2:14 as being the fourth river of Eden. The Euphrates drains the western part of Mesopotamia. It starts in the highlands of Turkey, flows southeastward over a limestone hill terrain in northern Iraq, and enters its delta at Hit (about 80 miles west of Baghdad; Fig. 2). Overall, it winds its way over a meandering 1700-mile path on its way to the Persian Gulf. South of Hit, the river has an extremely low gradient. Hit is located more than 500 miles upriver from the Gulf, but is only 175 feet above sea level.⁵¹ At An Nasiriyah, the water level of the Euphrates is only 8 feet above sea level, even though the river still has to cover a distance of more than 95 miles to Basra (Fig. 2). Once Ash Shamiyah is passed, the water of the Euphrates is lost in an

immense marshland region, and during spring floods this whole region, from the Euphrates east to the Tigris, can become severely inundated.⁵²

The course of the Euphrates River has constantly changed channels in its lower portion. Today the Euphrates flows west of where it did in the third to second millennium B.C. At this time the lower Euphrates (then called by the Sumerians "Purattu") flowed from the ancient city of Sippar, to Kish, to Nippur, to Shurruapak (supposedly Noah's home town), to Uruk, to Ur, and then into the Persian Gulf (Fig. 2).

In summary, geological and biblical evidence suggests that the four rivers of Eden from west to east were the Pishon (Wadi al Batin), the Euphrates, the Hiddekel (Tigris), and the Gihon (the Karun and/or the Karkheh). And while the identification of the Pishon and Gihon Rivers must still be considered as somewhat tentative, the certain identification of the Tigris and Euphrates leaves no doubt as to the approximate location of the Garden of Eden. These rivers locate the Garden of Eden as on a modern landscape at the head of the Persian Gulf-- but not the *present-day* head of the Persian Gulf.

Ur, a Seaport?

Sea level throughout geologic time has not remained constant, but has changed depending on whether the ocean water is tied up in the earth's ice caps during glacial periods, or whether the ice caps melt during interglacial periods. Prior to 70,000 B.P., when an interglacial existed in Europe, sea level was about 20-25 feet above today's level and the Persian Gulf must have covered much of what is today the Mesopotamian plain. At about 70,000 B.P., the last ice age (the Würm) began. At the maximum of this ice age (~20,000 B.P.), sea level was 350-400 feet lower than it is today and the entire Persian Gulf (all the way to the Strait of Hormuz) was a dry river valley.⁵³ Then, at about 8000 B.C. (10,000 B.P.), a warmer, moister climate ensued and sea level rose again. It reached a maximum at about 3500 B.C., when it was approximately six to ten feet higher, and about 150 miles inland from where it is today.⁵⁴ Since then, sea level has retreated to its present position in the Persian Gulf.

This last sea level rise and final decline is supported by both the geological and archaeological record. Marine clays and silts (found at a number of localities between modern Fao on the Gulf and Amara about 150 miles inland from the Gulf; Fig. 2) show that a marine or estuarine embayment extended perhaps as far as Amara during the period between 4000-3000 B.C.⁵⁵ Alluvial sediments overlying these marine clays document the regression of the Gulf to its present level. An embayment is also supported by archaeological evidence. The Mesopotamian city, Eridu, has been explicitly described in Sumerian inscriptions as "standing upon the shores of the sea," and Ur (Abraham's hometown, situated only a few miles away from Eridu) was also described as having quays (landing docks) where oceangoing vessels changed their cargos.⁵⁶ Both of these cities now lie about 150 miles inland from the Gulf (Fig. 2). As stated by Moorey: "When ancient texts speak of Ur and Eridu as being 'on the sea,' they may well have meant just that, rather than an extended lake tortuously linked with the sea by channels through marshy swamps, as some scholars have argued."⁵⁷ After about 2000 B.C., the sea level dropped and the Persian Gulf retreated to its present-day position, leaving former seaports--one after another--high and dry.

Garden of Eden

So exactly where was the Garden of Eden? Assuming a traditional,

biblical-genealogy date of about 4000 B.C. for Adam and the Garden of Eden, the four rivers would have confluenced at the Persian Gulf at a position somewhat inland from where the Gulf is today.⁵⁸ The Pishon River (Wadi al Batin) now enters the Persian Gulf at Umm Qasr, but the cobbles and pebbles from this fossil river system once extended as a fan from southern Kuwait northward to the vicinity of Ur (Fig. 1).⁵⁹ From about 5000 to 2000 B.C., Ur was possibly a seaport located at the confluence of the Euphrates River with the Persian Gulf, and it is also possible that the Pishon River flowed into the Gulf at or near this locality.

Despite much speculation concerning the exact location of the Garden of Eden, it does seem likely that it was located somewhere about one hundred miles northwest of the present-day Basra in Iraq.

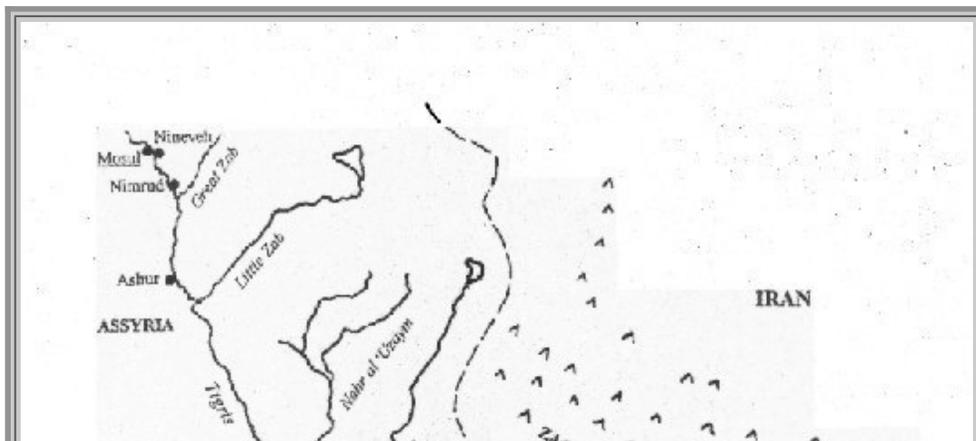
The location of the Tigris and Karun Rivers at this time is uncertain. Pliny's *Natural History* states that, during the conquest of Alexander the Great (~340 B.C.), the confluence of the Tigris and Karun Rivers was at Charax, at a distance of one and one-fourth miles from the coast, and that after that time the Karun appears to have shifted its center of deposition to the southeast.⁶⁰ Charax was located about eighty miles southeast of Ur, and for a short time represented the location of a temporary seaport on a retreating Gulf.

Despite much speculation concerning the exact location of the Garden of Eden, it does seem likely that it was located somewhere about one hundred miles northwest of the present-day Basra in Iraq. At the latitude of An Nasiriyah, the landscape is dotted with numerous mounds representing ruins of ancient cities, but south of An Nasiriyah, no mounds exist--presumably because the Persian Gulf extended this far inland and the land south of these cities was submerged (Fig. 2).⁶¹ Of all of these ancient mounds, Eridu is archaeologically one of the oldest settlements known in southern Mesopotamia, dating to about 4800 B.C.⁶² According to ancient Mesopotamian tradition, Eridu ranks as the oldest city in the world, and it was also regarded as a sacred city. On Sumerian tablets found at Nippur, a list of ten "pre-flood" kings ending in Ziusudra (the Sumerian name for Noah) described Eridu as:

When the kingship was lowered from heaven the kingship was in Eridu.

In Eridu, Alulem became King ...⁶³

The mound of Eridu is located about twelve miles southwest of Ur (Fig. 2).



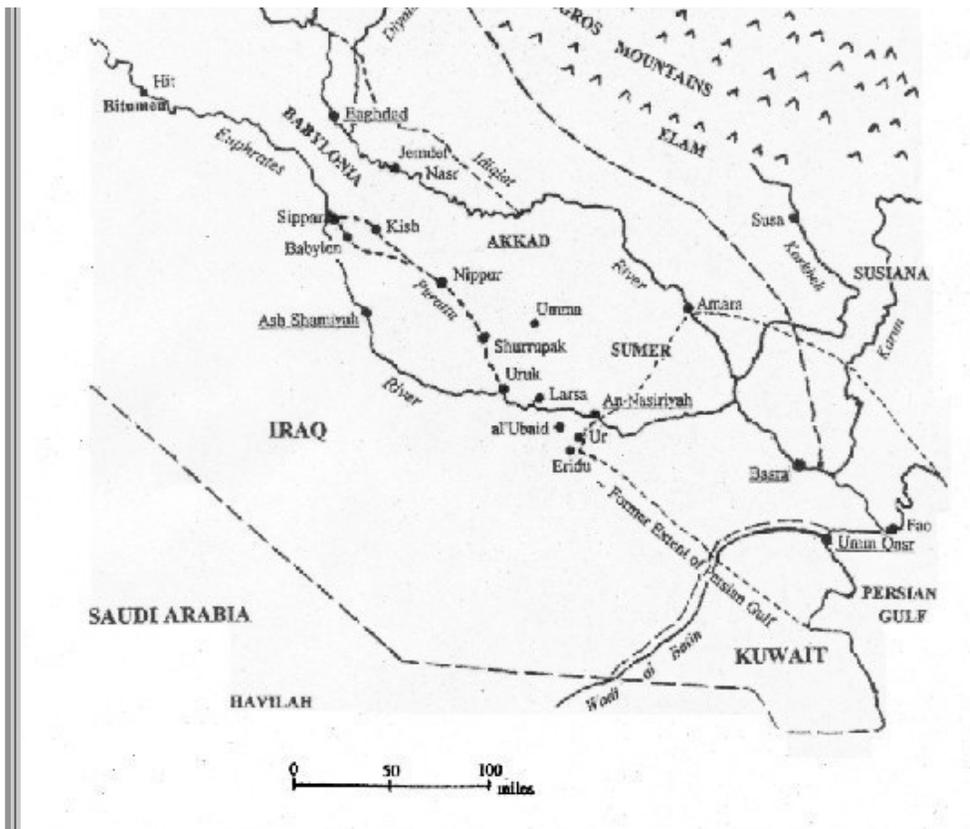


Fig. 2. The Ancient regions and cities of Mesopotamia. Present-day cities are underlined. The former courses of the ancient Euphrates (Purattu) and Tigris (Idiqlat) Rivers, and the former approximate extent of the Persian Gulf are denoted by short dashes. Long dashes denote present day boundaries between countries.

A River Rises in Eden

"And a river went out of Eden to water the garden; and from thence it was parted, and became four heads" (Gen. 2:10).

This passage has been problematical for all biblical scholars. The long-established, widely-held view is that a great river rose in Eden and after leaving the garden, split into four rivers including the Tigris and Euphrates. Therefore, some scholars have interpreted the biblical text to mean that Eden was located somewhere in Armenia near the source of the Tigris and Euphrates.⁶⁴ However, this locality does not fit with the Pishon River most likely being in Arabia (as discussed previously). And, it also does not fit with an alternate translation of the text. According to the *Anchor Bible Commentary*, Gen. 2:10 should read: *"A river rises in Eden to water the garden; outside, it forms four separate branches."*⁶⁵ A river "rises in," not the traditional "went out of" (the wrong tense), is how the Hebrew should be translated according to Speiser. A river that "rises in" Eden strongly suggests ground flow or the rise of subterranean waters (i.e., a spring). And the word "outside" (which in the Hebrew literally means "from there") has the sense of being "beyond it" (Eden). Also, the term "heads" has nothing to do with streams into which the river breaks up after it leaves Eden, but instead designates four separate branches which have merged *within* the vicinity of Eden.

All four rivers--the Pishon, Euphrates, Tigris, and Gihon--once converged near the (then) head of the Persian Gulf to create a fertile land fit for a garden.

A spring rising forth in Eden makes sense. All four rivers--the Pishon, Euphrates, Tigris, and Gihon--once converged near the (then) head of the Persian Gulf to create a fertile land fit for a garden. Not only was this garden located near the junction of these four rivers, but a spring also rose up in the garden to water it. Then the river created by the spring flowed out from the garden to where it met with the confluence of the four great rivers. But what evidence is there for a spring rising in the vicinity of Eridu, a possible locality for Eden?

There is geologic evidence. The Dammam Formation is the principal aquifer (water-bearing rock) for all of Kuwait, Saudi Arabia, and Bahrain. The Dammam Formation is composed of sedimentary limestone rock that covers an extensive part of western Iraq, occurring both on the surface and in the subsurface west of the Euphrates River. The formation is known to crop out only a few miles southwest of Eridu.⁶⁶ Thus, a spring in the vicinity of Eridu (Eden?) would not be at all surprising, geologically speaking.

Implications for Flood Geology

So far in this paper, I have argued that the Bible locates the Garden of Eden at the confluence of the four rivers of ancient Mesopotamia. The Bible correctly identifies the Pishon River as draining the land of Havilah (Arabia), from whence came gold, bdellium, and onyx stone. The Bible also correctly identifies the Euphrates and Tigris, both of which are modern rivers which drain approximately the same area of Mesopotamia as they did in ancient times. The Gihon, while not positively identified, is probably the Karun (and/or Karkheh), which "encompasses" (winds around) the whole land of Cush (western Iran). Thus, the Bible locates the Garden of Eden as somewhere near where the head of the Persian Gulf may have existed some 6000 years ago-- that is, on a modern landscape similar to that which exists in southern Iraq today.

Six Miles of Sedimentary Rock Below Eden

This interpretation of the Garden of Eden as existing on a modern landscape presents a major conflict between what the Bible says and what flood geologists say.⁶⁷ The reason is this: there are *six miles* of sedimentary rock *beneath* the Garden of Eden/ Persian Gulf. How could Eden, which existed in *pre-flood* times, be located *over* six miles of sedimentary rock supposedly deposited *during* Noah's flood? What flood geologists are implying is that the Garden of Eden existed on a Precambrian crystalline basement and then Noah's flood came and covered up the Garden of Eden with six miles of sedimentary rock. But this is not what the Bible says. It says that Eden was located where the four rivers confluenced on a modern landscape. It says that the Garden of Eden was located *on top of* six miles of sedimentary rock, and thus this sedimentary rock must have existed in pre-flood times.

[The Bible] says that the Garden of Eden was located on top of six miles of sedimentary rock, and thus this sedimentary rock must have existed

in pre-flood times.

The fact that six miles of sedimentary rock exist beneath the Persian Gulf area is well known by geologists, since this area has been extensively drilled for oil, down to the Precambrian basement. The fact that the Persian Gulf is located in an area of oil recovery is equally as evident to the layperson who, in 1991, witnessed on television the numerous oil fires set off in Kuwait during the Gulf War. The six miles of sedimentary rock below the Garden of Eden area include Tertiary, Cretaceous, Jurassic, Triassic, and Paleozoic rock up to a depth of about 32,000 feet before the Precambrian basement is encountered.⁶⁸

A schematic cross-section of rock that exists below the Persian Gulf/Garden of Eden area is shown in Fig. 3. Note in this figure that Precambrian rock is exposed at the surface in the western part of Saudi Arabia (geologists call this the Arabian Shield), and that this rock becomes progressively overlain by a thicker and thicker sedimentary rock cover north- eastwards, toward Iran. Point A indicates the approximate location of the Garden of Eden according to the Bible and modern geology, and Point B indicates its approximate location according to Flood Geology, since no sedimentary rock supposedly existed at the time of Noah's flood.

Pitch for the Ark

If the above were not evidence enough, there is another Bible passage which confirms a pre-flood Mesopotamian world on a modern landscape. The Bible records that Noah used pitch in construction of the ark: *"Make thee an ark of gopher wood; rooms shalt thou make in the ark, and shalt pitch it within and without with pitch"* (Gen. 6:14).

Pitch is a thick, tarry, oil product composed of a mixture of hydrocarbons of variable color, hardness, and volatility. Bitumen mixed with two or three parts of mineral and/or vegetable matter makes asphalt or pitch, a crude but versatile adhesive. Bitumen is a natural petroleum product derived from kerogen. It can be encountered by oil drillers in the subsurface, or it can move up cracks and faults and make its way naturally to the surface in the form of bitumen seepages.

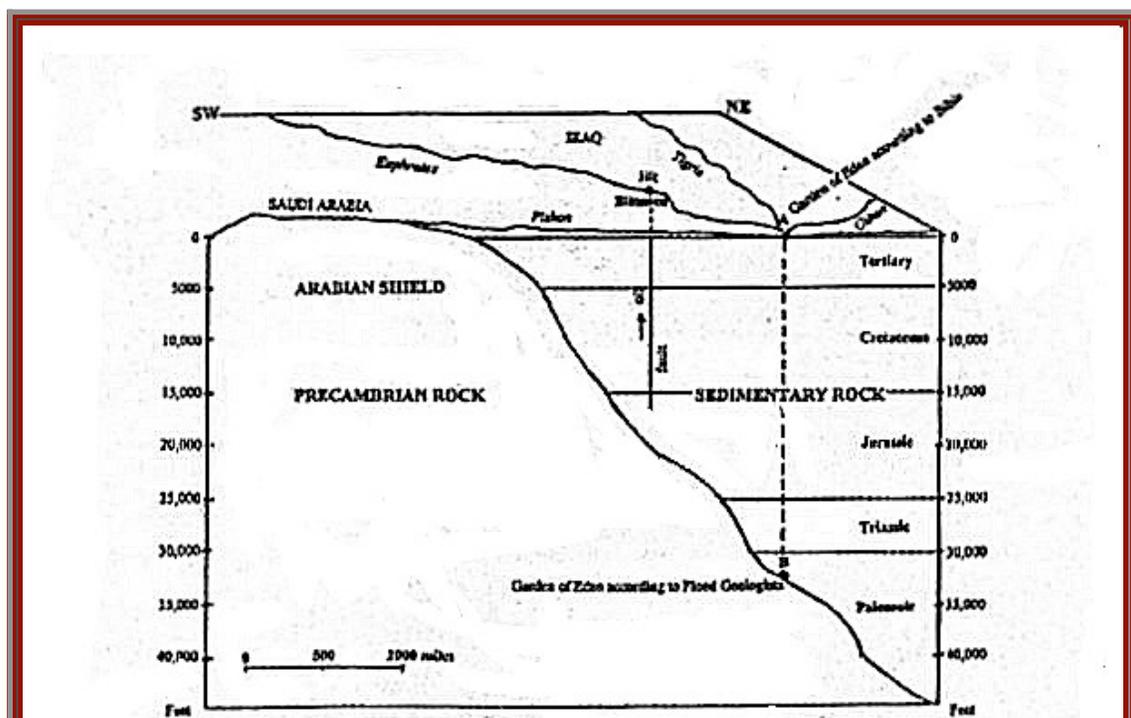


Fig. 3. Idealized diagram of the subsurface geology beneath the Persian Gulf/Garden of Eden area.⁷² If all sedimentary rock formed at the time of Noah's flood, as claimed by Flood Geologists, then the Garden of Eden would have had to exist on Precambrian basement rock 32,000 feet (six miles) below where the Bible says it was located.

Many bitumen seeps exist in the Middle East.⁶⁹ Bitumen was used extensively by the ancient peoples of Mesopotamia for every type of adhesive-construction need, including the waterproofing of boats and mortar for buildings (e.g., "slime" for mortar; Gen. 11:3). The center of bitumen production in Mesopotamia was (and still is) at Hit, located along the Euphrates River about eighty miles west of Baghdad (Fig. 2). The Hit bitumen occurs in "lakes" where lines of hot springs are welling up along deep faults.⁷⁰ This water is sometimes accompanied by so much gas that the latter will burn. In the water, "snakes" of asphalt collect together, and the Iraqis consolidate them into lumps. It is likely that bitumen was collected in this same manner in ancient times, because similar lumps of asphalt have been found at Ur in levels dating from about 3000 B.C.⁷¹ Sir Leonard Woolley's famous expedition to Ur found a lump of bitumen just above his "flood layer" which had an imprint of a reed basket on it. Even today, bitumen is packaged into reed baskets and floated down the Euphrates in boats.

The bitumen from Hit has been utilized by the people of southern Mesopotamia for thousands of years, as recorded at numerous archaeological sites. The earliest evidence of bitumen use is at al'Ubaid (5000-4000 B.C.), where reed matting plastered with a mixture of earth and bitumen was found during the excavations of Woolley.⁷³ Later in the Ubaid Period (Table 1), bitumen-covered headdresses of clay figurine goddesses were made at Ur. However, while some bitumen has been found at very early sites such as these, the bitumen industry (where bitumen was extensively traded) had its beginnings between 3500-3000 B.C.⁷⁴ Hit is known to have been the major source of bitumen in southern Mesopotamia because chemical analyses of bitumen collected at archaeological sites compares with that from Hit and not with that collected from sites along the tributaries of the Tigris.⁷⁵

Bitumen was used extensively by the ancient peoples of Mesopotamia for every type of adhesive-construction need, including the waterproofing of boats and mortar for buildings ...

The Sumerians (as noted in their cuneiform writings) definitely connected bitumen with subterranean water.⁷⁶ This is because oil oozes up deep faults together with artesian water. These deep faults connect the surface with the source of hydrocarbons at depth--the source being *sedimentary rock* (Fig. 3). In southern Iraq, oil and gas are produced from the limestone and sandstone sedimentary rocks of the Jurassic Najmah Formation; the Cretaceous Yama- ma, Zubair, Nahr Umr, Mishrif, and Hartha Formations; and the Miocene (Tertiary) Fars and Ghar Formations.⁷⁷ In fact, hydrocarbons almost always originate in sedimentary rocks.⁷⁸

The essential point of the above discussion on bitumen now becomes evident. How could Noah have obtained bitumen from sedimentary rock for building his ark, if (as claimed by flood geologists) no sedimentary rock existed on earth? One cannot have it both ways. Either Adam and the pre-floodites lived on a

Mesopotamian terrain that was vastly different from what exists today, or they lived over a terrain of sedimentary rock. The Bible identifies Eden with four rivers which flowed *over* and *cut into* sedimentary rock. The Pishon River (when it flowed) cut into Tertiary sedimentary limestone and sandstone rock near the border of Saudi Arabia and Kuwait. The gold of Havilah is in quartz veins that cut across sedimentary-metamorphic rock. The Karun (Gihon?) River winds around folded and faulted sedimentary rock in western Iran, and the Tigris and Euphrates Rivers encounter sedimentary rock throughout their drainage systems, from the mountains of Turkey to the Persian Gulf. And, the spring of Eden (Eridu?) may have been fed by water from a limestone sedimentary-rock aquifer. All of this is evidence for sedimentary rock being present on earth *before* Noah's flood rather than it being formed *by* the flood.

Conclusions

1. The Bible indicates that the Garden of Eden was located on a modern landscape, over which all four rivers of Mesopotamia flowed.
2. The now-dry Wadi al Batin was probably the Pishon River which once drained the eastern side of Arabia (the land of Havilah) when the climate was wetter than it is today.
3. The gold of Gen. 2:11-12 was probably obtained at Mahd adh Dhahab, one of the richest gold mines in the ancient Near East.
4. The source of the onyx stone of Gen. 2:12 may have been the Wadi al Aqiq ("aqiq" can mean agate), which is located near Mahd adh Dhahab and along the Arabian incense route.
5. The bdellium of Gen. 2:12 most likely came from Yemen.
6. Gold, onyx, and bdellium were transported by camel along the Arabian incense road to Sumer. This trade route was probably already established by the time Genesis 2 was written, so the location of the Pishon River (and Eden) was identified for the reader of Genesis by citing these commodities.
7. The Gihon is most likely the Karun River, or less likely the Karkheh, both of which encircled the land of the Kassites (Cush) in western Iran.
8. The Hiddekel (Tigris) and the Euphrates are essentially the same rivers today that existed in Mesopotamia 6000 years ago.
9. Six thousand years ago, the Persian Gulf may have been located as much as 150 miles inland from where it is today, and it might have been at this inland position where the four rivers confluenced near Eden.
10. The river that "rises in" Eden could have been a spring, possibly supplied with water from the Dammam limestone aquifer.
11. Bitumen at Hit was a likely source for the pitch used by Noah in building the ark.
12. The four rivers of Eden *cut across* sedimentary rock. The pitch for the ark was supplied *by* sedimentary rock; therefore sedimentary rock must have existed in pre-flood time.
13. The Bible never claims that *all of the sedimentary rock on the face of the earth was formed at the time of Noah's Flood*. Only flood geologists make this claim.

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