

## IS THE EARTH'S CORE WATER? PART ONE: THE BIBLICAL EVIDENCE

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*Scientists believe, on good evidence, that part of the earth's core is fluid. This is the first of a series of articles proposing that the fluid is not molten iron as generally thought, but water under great heat and pressure. Here the author examines many scripture passages about the earth's interior and concludes that the Bible strongly suggests such a hypothesis. In later articles, the author intends to show that the hypothesis is consistent with the known experimental data about the earth and water under high pressures, and that it has important scientific implications, concerning (for example) the separation of the continents, the earth's magnetic field, and craters in the solar system.*

### 1. Introduction

Scientists have long thought, on the basis of good evidence, that a portion of the earth's core is fluid, not solid like the crust and mantle above it. This portion, called the "outer" core, starts at a depth of 2900 kilometers below the surface and extends down to a depth of about 5000 km (see Figure 1). On the basis of some questionable assumptions which will be discussed in the second article of this series, most scientists have conjectured that the material in the outer core is molten iron and nickel, although there have been some other theories.<sup>2</sup> This series of articles proposes as a working hypothesis that the outer core consists of water under great pressure and at a high temperature, over four million bars<sup>3</sup> and greater than several thousand degrees centigrade. Water under such conditions is a fluid.<sup>4</sup> It expands to fill its container like steam, but it has the density of a liquid, being two to three times denser than liquid water at ordinary pressures.<sup>5</sup> Part two of the series will discuss the state of the water in greater detail.

This hypothesis of a water core for the earth does not rest upon mere conjecture. Rather, it stems from what the Bible says about the Earth's interior. Creationists regard the Bible as a scientifically accurate account given by the God who created the earth. This part of the series, therefore, seeks out what God says in the scriptures concerning the earth's physical structure, regarding it as data of the highest reliability. The author feels that the data point strongly toward a water core, but he invites the reader to come to his own conclusions. Part two applies the hypothesis to the known experimental data. If the hypothesis is a true representation of what the Bible says, we can be confident that all true scientific facts will fit neatly into it.

The water-core hypothesis should be of great interest to many creationists. It explains where the vast amounts of water for the Flood could have come from when "all the fountains of the great deep burst open" (Genesis 7:11, NASB<sup>6</sup>). It explains many puzzling scriptural expressions such as, "the deep that lies beneath" (Genesis 49:25, NASB). The nature and amount of electrical conduction in a water core could shed additional light on the earth's magnetic field.<sup>7</sup> The violent bursting forth of water and other material from the deep interior could also have a bearing on such diverse topics as separation

of the continents, the mid-Atlantic ridge, mountain building, large salt deposits, the origin of comets and meteoroids, and cratering in the solar system. Part three will discuss these and other scientific consequences in more detail.

### 2. The Waters of Creation

The first two verses of the Bible describe the origin of all water on or in the earth:

In the beginning God created the heavens and the earth. And the earth was formless and void, and darkness was over the surface of the *deep*; and the Spirit of God was moving over the surface of the *waters* (Genesis 1:1, 2, NASB<sup>8</sup>).

These verses show the prominence of water<sup>9</sup> on that first day of creation, but they do not directly say how much water was present. If there was only enough for the seas of the early earth (Genesis 1:9, 10) and its vapor canopy (Genesis 1:6-8), then there would not be nearly enough for the earth's core. But there is another passage of scripture which gives more details about these waters of creation:

For when they maintain this, it escapes their notice that by the word of God the heavens existed long ago and *the earth was formed out of water and by water*, through which the world at that time was destroyed, being flooded with water (2 Peter 3:5, 6, NASB).

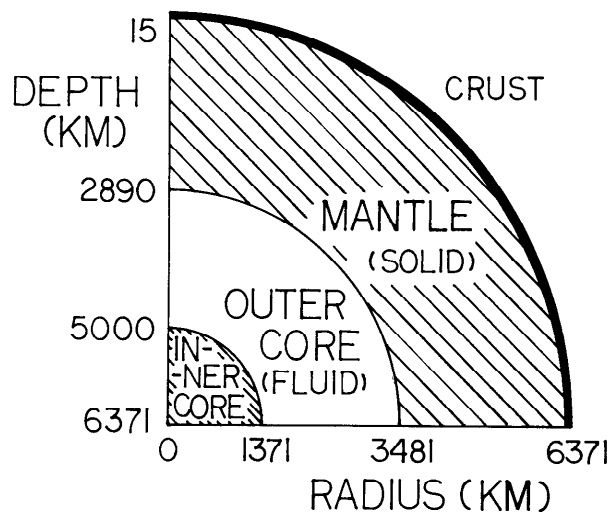


Figure 1. Main features of the earth's interior. Deduced from seismic wave data (Ref. 1).

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Notice that here God (through Peter) mentions water twice, thereby putting emphasis on, and distinction between, the two phrases "out of water" and "by water." The Greek word translated "formed" is *sunestosa*, which comes from a verb meaning "to place together, to set in the same place, to bring or band together."<sup>10</sup> Perhaps this means God formed the nuclei of silicon, iron, and other elements out of water by banding together the various combinations of neutrons and protons from the nuclei of hydrogen and oxygen atoms of water (nuclear reactions). Then, perhaps, He banded together the various atoms scattered throughout the water into solid material (chemical reactions), as shown in Figure 2. The main point, however, is that this scripture says that water was the means by which God formed all the other materials of which the earth consists. This means that the quantity of water present at creation was very large. In fact, if God used the processes of nuclear and chemical transformation mentioned above, the mass of the water would be somewhat greater than the present mass of the earth, about  $6 \times 10^{24}$  kilograms<sup>11</sup> (or about seven billion trillion tons).

Such a quantity of water present at creation leaves open the possibility of the earth's core being water. Oceans and other water on the surface at present

amount to only about 0.03% of the earth's total mass.<sup>12</sup> The proportions are roughly the same as a thin film of moisture on an orange. If all the earth's water is at the surface, then 99.97% of the earth consists of materials other than water, which would mean that only a scant fraction of the original waters still remains. On the other hand, if the earth's core were water, it would comprise about 7% of the earth's total mass<sup>13</sup> and about 16% of the earth's total volume. So the idea of a water core is more consistent with 2 Peter 3:5 than a core of some other material.

### 3. The Springs of Eden

Before the sixth day of creation, the familiar water cycle of evaporation and rain did not exist:

And no plant of the field had yet sprung up; for Jehovah God *had not caused it to rain upon the earth*; and there was not a man to till the ground; but *there went up a mist from the earth, and watered the whole face of the ground* (Genesis 2:5, 6, ASV<sup>14</sup>).

In the absence of both rain and man, there was no point to God's making agricultural plants (plants of the field) right away.<sup>15</sup> But in this parenthetical remark, God tells us that there was another mechanism for watering the earth in that period, a "mist" that "went up from the earth."

Notice that while the mist was not supplemented by rain prior to Adam's creation, it was abundant enough to water the whole land surface. If the early earth had as much land area and precipitation as it now has, the mist would have to supply about 80 trillion gallons of water per day.<sup>16</sup> An ordinary fog or morning mist could not supply nearly this much water. A fog originates from wet surfaces and so cannot penetrate dry inland areas of a continent. Even where there are fogs or heavy dews, there is hardly enough water to wet the ground, not nearly enough to supply the needs of widespread, lush vegetation. Therefore the "mist" must have been something other than a fog.

The Hebrew word translated "mist," *'ed*, occurs only once elsewhere in scripture, in Job 36:27. There the word refers to the water vapor or droplets in clouds which condense into raindrops. So the mist could be a cloud of water droplets high in the air instead of touching the ground. Such a cloud would still differ from an ordinary raincloud in the manner of its origin; here the mist "went up . . . from the earth", whereas an ordinary cloud originates by evaporation from a large body of water.

There exists a mechanism today which forms clouds above the surface by a mist going up from the earth: geysers. In present-day geysers, water trickles down from the surface to a depth where the rocks are hotter than the boiling point. The water turns to steam and is thrown a few hundred feet into the air. The depths, temperatures, pressures, and amounts of water involved are small compared to what Genesis 2:6 describes. But if the steam originated from a large body of water at a great depth, a much larger amount of steam could be thrown thousands of feet into the air. The steam would form large clouds of mist which could water the sur-

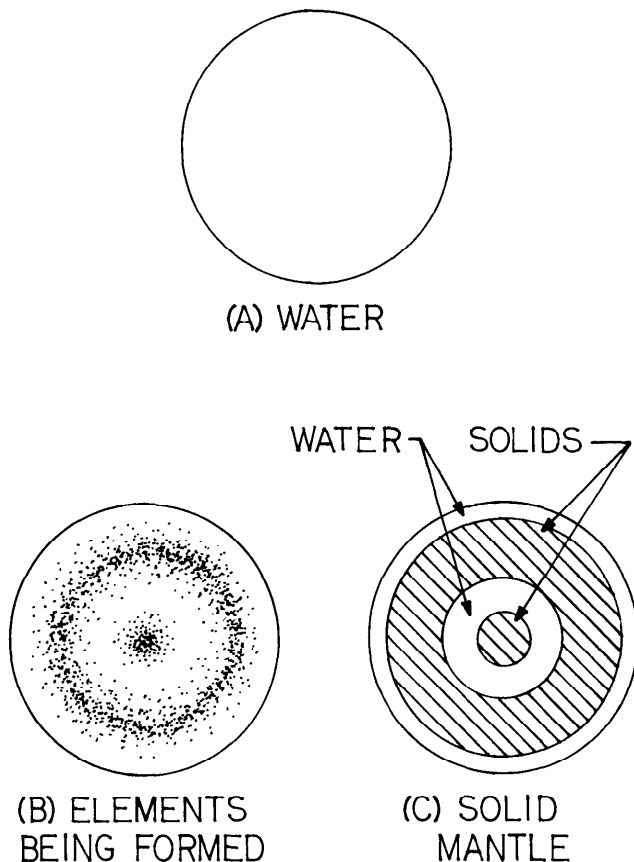


Figure 2. Possible steps in the formation of the earth "out of water and by means of water" (2 Peter 3:5). (A) Earth-sized sphere of pure water. (B) Nuclear, chemical, and physical transformations within the water. (C) Completely formed solid mantle under surface waters and containing core waters. These events could have taken place during the first day of creation (Ref. 9).

rounding areas as efficiently as any present-day raincloud. The water would be quite pure, except perhaps in the immediate vicinity of the geyser, where dissolved minerals could be deposited. A world-wide system of such "supergeysers" could provide the amounts of water required.

Some study of the rivers of Eden can shed additional light on these underground water sources:

Now a river flowed out of Eden to water the garden; and from there it divided and became four rivers. The name of the first is Pishon; it flows around the whole land of Havilah . . . And the name of the second river is Gihon; it flows around the whole land of Cush; and the name of the third river is Tigris; it flows east of Assyria. And the fourth river is the Euphrates (Genesis 2:10-14, NASB).

Although these rivers must have been destroyed by the Flood, Noah (or his descendants) apparently named two post-Flood rivers after the original Tigris and Euphrates. There must have been some similarities between the post-Flood rivers and their pre-Flood namesakes. The Euphrates today is the longest river in western Asia, about 1700 miles,<sup>17</sup> while the Tigris is about 1150 miles long.<sup>18</sup> It is difficult to imagine Noah or his sons naming two such large rivers after some remembered pre-Flood creeks or streams. It is likely, then, that the original Tigris and Euphrates were great rivers, of the order of a thousand miles long. The other two rivers, Pishon and Gihon, were probably also large, since they flowed around the "whole" lands of Havilah and Cush (see Figure 3).

The modern Tigris and Euphrates discharge over 100 billion gallons of water per day into the Persian Gulf at springtime.<sup>19</sup> The four rivers from Eden must have had similar flow rates, so their existence points to an abundant source of water in Eden. Nowadays the ultimate source of river water is rain or snow, but neither of these could have provided the water during creation week, because: (a) no rain fell then (Genesis 2:5), and (b) the climate in Eden was too warm for snow, being temperature enough not to require clothing for Adam and Eve (Genesis 2:25). It is very likely, then, that the source of water for the rivers was the same as that of the gey-

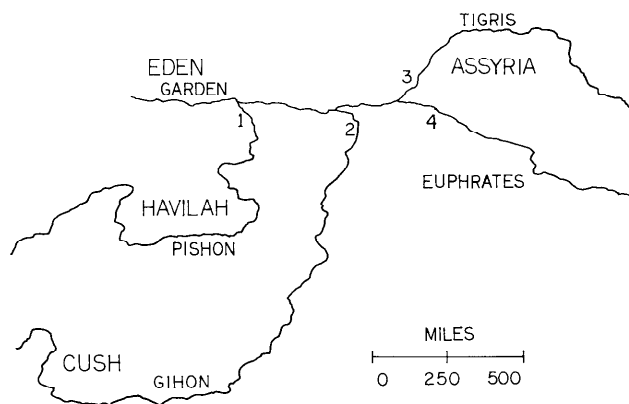


Figure 3. Pre-Flood rivers from Eden (writer's conception). Their existence points to an abundant source of water in Eden. Based on Gen. 2:10-14 and post-Flood locations of Assyria, Cush, Havilah (Gen. 25:18), Gihon (1 Kings 1:33), Tigris, and Euphrates.

sers, a large reservoir of water at great depth. The river water could have been runoff from the geysers alone, or there might also have been a supplementary system of springs.

In summary, both the mist and the rivers point to a large high-pressure, high-temperature source of water deep underground. The wisdom of God, personified, confirms this in an extensive passage about creation:

When there were no *depths*, I was brought forth, when there were no *fountains abounding with water* . . . . When he established the heavens, I was there: When he set a circle upon the face of the *deep*, when he made firm the skies above, when the *fountains of the deep* became strong . . . . (Proverbs 8:24-28, ASV).

This passage shows that fountains supplying water abundantly were an important part of creation, and it connects them with the same "deep" (Hebrew *t<sup>e</sup>hom*) as in Genesis 1:2. If the source of the water for the fountains were a huge reservoir at the earth's core of the primeval waters, we can see the appropriateness of the word "deep" to describe it. In the light of such an understanding, God's creation of such strong fountains becomes an awesome act, worthy of mention by the angel who will proclaim:

Fear God, and give him glory; for the hour of his judgement is come: and worship him that made the heaven and the earth and sea and *fountains of waters* (Revelation 14:7, ASV).

#### 4. The Fountains of the Great Deep

Creationists are familiar with a verse which indicates the great size and depth of the underground waters supplying the fountains of the early earth:

In the six hundredth year of Noah's life, in the second month, on the seventeenth day of the month, on the same day, *all the fountains of the great deep burst open*, and the floodgates of the sky were opened (Genesis 7:11, NASB).

This verse described the sources of the great Flood which destroyed the earth in Noah's time. The Hebrew word translated "burst open" (*baqa'*) carries the idea of violent splitting and breaking forth,<sup>20</sup> which is the effect we would expect from the high temperatures and pressures at great depth. The vertical channels of the fountains, quite narrow to begin with, would only need a small fracture to start a rupturing process, allowing high-pressure steam to force its way upward. The rock containing the channels would split open in the directions of greatest weakness, probably toward other channels, and allow huge quantities of steam to burst violently out of the earth. If the core were indeed the source, the steam would penetrate to the upper atmosphere and beyond (see Figure 4), as the third article of this series will show. Much of the water would precipitate as heavy rain. It would also violently disrupt the vapor canopy and perhaps cause it to precipitate. Perhaps this is the reason scripture mentions the fountains of the deep before it mentions the "floodgates of the sky."

Notice that here God calls the source "great"; there might have been other deeps on or in the earth, but He

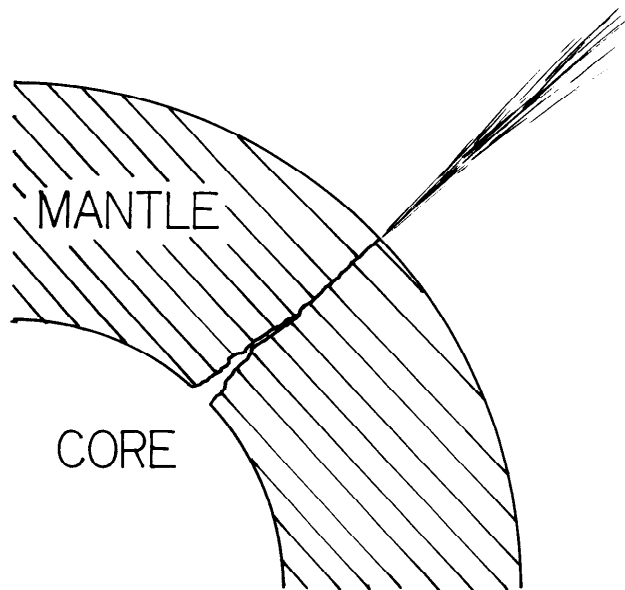


Figure 4. The bursting of the fountains of the great deep at the beginning of the Flood (Genesis 7:11).

calls one of them “the great deep.” As Morris and Whitcomb point out,<sup>21</sup> much (if not most) of the water in our present oceans came from the Flood. Much (if not most) of the new water must have come from the “great deep”, since scripture puts it on an equal basis (at least) as the “floodgates of the sky”<sup>22, 23, 24</sup> (Genesis 7:11 and 8:2). We can conclude that the fountains of the deep provided a large portion of the water in the seas of today. Since scripture says that the fountains of the deep “were closed” (Genesis 8:2), not “dried up”, there is the implication that the great deep has more water left in it. And since ordinary fountains usually have a lot more water available from their sources than they ever pour forth at the surface, we could similarly expect that the fountains of the great deep had a source much larger than our surface oceans.

### 5. The Deep that Lies Beneath

It is important to pursue the implication of Genesis 8:2 that the great deep was not emptied by the Flood, but continued to exist afterwards. If there were huge quantities of water in the earth even after the Flood, then the water should still be there today, because scripture records no catastrophes on the scale of the Flood occurring after Noah up to the present time. And if the water exists today, it must lie deeper than the crust since underground water in the crust is not nearly as great as the waters of the oceans.

There are a number of scriptures which point to the continued existence of the great deep, some of them occurring in the most unexpected places. Jacob blessed Joseph as follows:

... With blessings of heaven above,  
blessings of *the deep that lies beneath*,  
blessings of the breasts and of the womb . . . .  
(Genesis 49:25, NASB).

The word for “lies” (*ravats*) suggests lying in a stretched-out position,<sup>25</sup> which would imply that the

deep has some horizontal extent. The passage does not say explicitly what it is that the deep is lying under. But the previous part of the verse, “blessings of heaven above”, helps us to understand. Usually when a man speaks of the heavens above, he is thinking of himself as the reference point; the sky is above him. But if Jacob is the reference point for the heaven above, then he should also be the reference point for the deep beneath. The heavens were above Jacob, and the deep was beneath him. One could suppose that he was speaking of the heavens above the oceans and the oceans beneath the heavens, but that interpretation is not as straightforward, being not the most normal way of speaking.

Taking the more straightforward interpretation, then, leads us to the conclusion that there was a subterranean deep in existence during the time of Jacob,<sup>26</sup> after the Flood. Some other possible references to subterranean water are: Exodus 20:4, Deuteronomy 5:8, Psalm 135:6, and Ezekiel 31:14-16 (ASV). The last reference, in speaking of a “deep” near “the nether [lower] parts of the earth” says that it has “great waters.” Some of these verses have seemed obscure to some people, and the author will not attempt a detailed exposition of them here. But after careful study, most readers should share the author’s opinion that one concept which would make these verses clearer is the idea of a great quantity of water physically existing deep within the earth, even to this day.

### 6. The Foundations of the Earth

The scriptures listed in the previous sections are not very clear about the location of the great deep. There are others which are more specific, but to understand them we must first understand some of the scriptural terms for the various parts of the earth.

Figure 5 shows the earth’s outer structure as deduced from seismic-wave studies.<sup>27</sup> The crust, thin under the oceans and thicker under the continents, is quite different from the material underneath it, the mantle. This abrupt change in materials, called the Mohorovičić discontinuity,<sup>28</sup> occurs at depths varying from 5 to 60 kilometers, depending on the location. Scripture appears to similarly distinguish between the crust and mantle with the terms “earth” and “foundations of the earth”, as the following verses will show.

While the Bible often uses the word translated “earth”, *'erets*, in a general sense to mean the whole

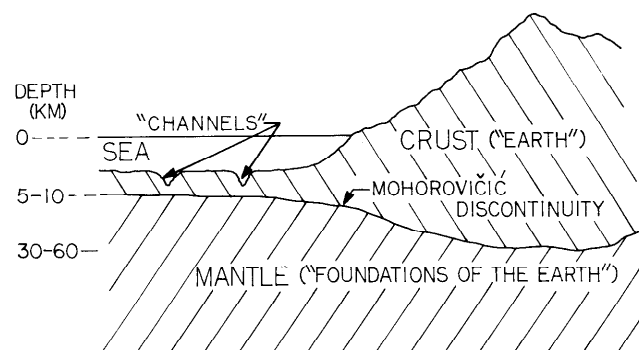


Figure 5. Crust and upper mantle of the earth (Ref. 27).

planet, God also defined the term in a more limited sense to mean the continents:

And God called the dry land Earth . . . (Genesis 1:10, NASB).

This would lead us to identify "the earth" in its limited sense with the continental crust,<sup>29</sup> and "the foundations of the earth" with the material which supports the crust, namely the mantle. The Holy Spirit, speaking by David, appears to confirm this idea in a song reminiscent of the Flood:

Then the channels of the sea appeared,  
*The foundations of the world were laid bare,*  
 By the rebuke of the Lord,  
 At the blast of the breath of His nostrils  
 (2 Samuel 22:16, NASB).

The "channels of the sea" here seem to be the deepest canyons<sup>30</sup> of the ocean floor, some of which today penetrate to within only 5 km of the mantle.<sup>31</sup> Since the Flood must have deposited much of the sediment and rock which now make up the ocean floor, the sea bottom before the Flood must have been even thinner than it now is. So it is very likely that, at the beginning of the Flood, the "channels of the sea" reached down into the mantle itself. Thus it was the mantle that was "laid bare", and we can identify the "foundations of the world" as including the mantle.<sup>32</sup> Being thick and strong, the mantle well fits the scriptural description of the "enduring foundations of the earth" (Micah 6:2, NASB).

The question now arises as to how far down the "foundations of the earth" extend. Do they include the total interior structure of the earth down to its center? God answers this question by a question he asked Job about the earth's foundations:

Where were you when I laid the foundation of the earth!  
 Tell Me, if you have understanding,  
 Who set its measurements, since you know?  
 Or who stretched the line on it?  
*On what were its bases sunk?*  
 Or who laid its cornerstone . . .  
 (Job 38:4-6, NASB).

These are not supposed to be unanswerable questions, since other questions in the list have definite answers (for example, Job 39:1, 2). Rather, they are questions which have answers, though Job may or may not know them. So the italicized question implies that there is some real material into which the bases of the earth's foundations were sunk, meaning that there is some depth at which the foundations cease and some other substance begins.

The general picture in this passage is that of the construction of a house. The word translated "bases" here (*eden*) is used mainly of the socketed metal bases which supported the pillars and boards of the tabernacle (Exodus 26:15-25, etc.). They supported the weight of the structure, giving it the strength and rigidity required, although the bases themselves rested on the soil. In general, a foundation rests on some softer material which can support the weight, if properly spread, but which cannot supply the needed rigidity. In the same way, then, we would expect the foundations of the earth to be

rigid themselves but resting on some less rigid substance. God asked Job: What is that substance?

### 7. Water Under the Foundations

God appears to answer his own question in one of David's psalms:

The earth is the Lord's and all it contains,  
 the world, and those who dwell in it.  
 For *He has founded it upon seas,*  
*And established it upon rivers*  
 (Psalm 24:1, 2<sup>33</sup>).

The Hebrew word for "founded" here is the same verb (*yasad*) translated as "laid the foundation" in Job 38:4. So God is saying that He laid the foundations of the earth, including the 1800-mile thick mantle, upon "seas" and "rivers", that is, upon water. The word translated "seas" (*yammim*) can refer to a single large body of water divided into arbitrary subsections, as it does in Genesis 1:10. The word for "rivers" (*n<sup>e</sup>haroth*) can similarly refer to currents<sup>34</sup> within a large body of water, as in Jonah 2:3. We use similar terminology in English when we refer to the Sargasso "sea" and describe the Gulf Stream as an undersea "river." The fluid part of the earth's core certainly has great currents circulating within it due to heat convection and the earth's rotation, so it seems appropriate to think of it as being divided into seas and rivers.

In summary, Psalm 24:2 says that there is water under the foundations of the earth. This fact, plus the identification of the earth's mantle as the "foundations" in the previous section leads us to identify the fluid under the mantle as water. Figure 6 compares scriptural and geological terms for the various parts of the earth's interior.

Actually, when God asked Job what material the bases of the earth's foundation were sunk into (Job 38:6), He gave Job a broad hint that the substance was water, just a few verses later:

Or who enclosed the *sea* with doors,  
 When, *bursting forth, it went out from the womb;*  
 When I made a cloud its garment,  
 And thick darkness its swaddling band,  
 And I placed boundaries on it,  
 And I set a bolt and doors,

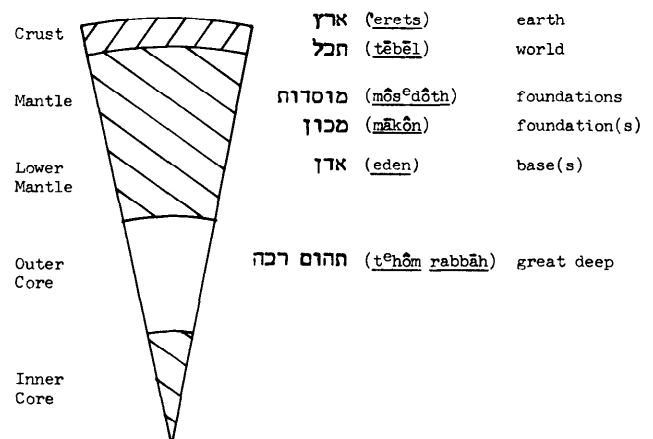


Figure 6. Scriptural and geological terms for interior parts of the earth.

And I said, "Thus far you shall come, but no farther;

And here shall your proud waves stop?"  
(Job 38:8-11, NASB).

Since most of our present sea originated from the bursting of the fountains of the great deep (as remarked in section 4), we can see that these verses describe the Genesis Flood in poetic metaphors. Here God compares the bursting forth of waters from the womb of a woman in childbirth with the bursting forth of waters from the great deep (Genesis 7:11). It is an apt comparison for several reasons: (a) The amniotic fluid in the womb is warm, salty water; the waters in the great deep would be extremely hot and salty, as part two of this series will show. (b) The womb (Hebrew *rechem*) is a strong, muscular organ in the innermost parts of the body; the mantle is similarly a thick, strong enclosure for the fluid in the innermost parts of the earth. (c) The amniotic fluid often bursts forth with violence during birth pangs as did the fountains of the great deep. "Usually the bag of waters ruptures at the height of a strong pain and the fluid escapes with a gush . . ."35 The violent bursting forth of waters (as steam) from the earth's core would wrap the earth in clouds like a garment, being so thick that it would swathe the newborn sea in darkness, just as verse nine describes. It was God himself who stopped the flow by closing up the ruptured fountains, verse ten. These verses establish the connection between the sea, the Flood, and subterranean waters so deep that God compares their location to that of a womb.

### 8. Conclusion

In the previous sections the writer examines in detail eleven passages of scripture which point to the idea that the earth's core consists of water. Many other passages, while not definitive by themselves, fit in better with the idea of a water core than with any other the author can think of. The concept removes a great deal of mystery from some otherwise incomprehensible verses, helps us to understand the tremendous violence of the Flood, and makes the power and majesty of God even clearer. If there is no scripture which weighs against it (and the author knows of none such), there is nothing to prevent us from adopting it as a working hypothesis for further scrutiny.

One of the first questions which comes to mind is: How well does the hypothesis fit in with the known experimental data about the earth's interior and about water at high pressures? The next article will deal with this question in detail, but it can be summarized by saying that there are no experimental data that the writer knows of which does not fit into the hypothesis of a water core. The third article of the series, as presently planned, will show the fruitfulness of the idea in the scientific realm by showing how it sheds light on some previously unexplained facts about the earth and the solar system.

I personally have found the idea to be fruitful in the spiritual realm. For example, I had always wondered what Old Testament scripture or idea Jesus was referring to when He spoke of the Holy Spirit flowing like water from the innermost being of a believer. Perhaps

He had in mind the womb of the sea and the rivers of Eden when He cried out to all:

If any man is thirsty, let him come to me and drink.  
He who believes in Me, as the scripture said, *Out of his belly shall flow rivers of living water* (John 7:37, 38, NASB, margin<sup>36</sup>).

### References

- <sup>1</sup>Bullen, K. E. 1977. Earth, interior of, in *Encyclopedia of science and technology*, Vol. 4. McGraw-Hill Book Co., New York, pp. 376D-381.
- <sup>2</sup>Hazard, C. 1977. The earth's core, *Nature*, 267(5613):670-671.
- <sup>3</sup>A "bar" is the standard unit of pressure, defined as one million dynes per square centimeter, and is about equal to one unit of atmospheric pressure, i.e., one atmosphere. More precisely, one bar is equal to 0.987 standard atmospheric pressure and is equal to 1.0197 kilograms-force per square centimeter.
- <sup>4</sup>The word "fluid" in its technical sense can describe either a gas or a liquid, and so it is an appropriate word to describe water above its critical temperature, 374 °C, where there is no longer any distinction between liquid water and steam. A more technical word is "super-critical" water.
- <sup>5</sup>Franck, E. U. 1968. Supercritical water, *Endeavour*, 27(101):55-59.
- <sup>6</sup>All scripture quotations labeled NASB are from the New American Standard Bible, Lockman Foundation, 1971, Foundation Press Publications, La Habra, California.
- <sup>7</sup>Barnes, T. G. 1972. Young age versus geologic age for the earth's magnetic field, *Creation Research Society Quarterly*, 9(1):47-50.
- <sup>8</sup>All italics in the scripture references are added for emphasis by the author. Also see note 6.
- <sup>9</sup>It is of interest to note that the Hebrew word translated "heavens", *shamayim*, contains in its second syllable the Hebrew word for "waters", *mayim*, correctly spelled. The first syllable, *sham*, occurring by itself means "there." So a root meaning of "heavens" could be "there, waters", or "a space containing waters." This would explain more fully the origin of the water; when God created the heavens, He created a space which surrounded and contained waters.
- <sup>10</sup>Thayer, J. H. 1889. Thayer's Greek-English lexicon of the New Testament. Reprint. Associated Publishers and Authors, Inc., Grand Rapids, Michigan, p. 605.
- <sup>11</sup>Wilson, J. T. 1969. Earth, in *Encyclopedia Americana*, Vol. 9. Americana Corporation, New York, pp. 533-542.
- <sup>12</sup>*Ibid.*, p. 539.
- <sup>13</sup>This mass estimate is based on two assumptions: (a) that the entire core is water, and (b) that the density decreases linearly from 3 grams/cc at the center down to 2 grams/cc at the core-mantle boundary. The inner core occupies only about 6% of the total core volume, so the type of material in it does not greatly affect the estimate.
- <sup>14</sup>All scripture references labeled ASV are from the American Standard Bible. 1901. Thomas Nelson and Sons, New York.
- <sup>15</sup>Keil, C. F., and F. Delitzsch. 1971. Biblical commentary on the Old Testament. Vol. 1. W. B. Eerdmans Co., Grand Rapids, Michigan pp. 77, 78.
- <sup>16</sup>The average annual rainfall in the United States is 29.22 inches (*Encyclopedia Americana*, *Op. cit.*, Vol. 23, p. 189), and the total land area of the world today is 148.892 million square kilometers (Howell, B. F. 1977. Earth, in *Encyclopedia of science and technology*, Vol. 4. McGraw-Hill Book Co., New York, pp. 362-367). Assuming similar conditions for the early earth then gives us a rainfall of 79.97 trillion gallons per day.
- <sup>17</sup>Gresswell, R. K., and A. Huxley. 1965. Standard encyclopedia of the world's rivers and lakes. G. P. Putnam's Sons, New York, p. 93.
- <sup>18</sup>*Ibid.*, p. 273.
- <sup>19</sup>Lloyd, S. H. F. 1977. Tigris-Euphrates river system, in *Encyclopedia Britannica*, Macropaedia Vol. 9. Encyclopedia Britannica, Inc., Chicago, pp. 402-406.
- <sup>20</sup>Holladay, W. L. 1971. A concise Hebrew and Aramaic lexicon of the Old Testament. W. B. Eerdmans Co., Grand Rapids, Michigan, p. 46.
- <sup>21</sup>Whitcomb, J. C., and H. M. Morris. 1961. The Genesis Flood. Baker Book House, Grand Rapids, Michigan, p. 121.
- <sup>22</sup>Actually, it is difficult to imagine any non-supernatural model for a vapor canopy having more than roughly thirty feet (equivalent thickness of liquid) of water, because of physiological limitations on the

atmospheric pressure and limitations on the amount of sunlight absorbed. For a more complete discussion of the physics involved, see reference 23. For a good discussion of the scriptures involved, see reference 24. It would seem that, while the original waters of the canopy could have supplied only a small fraction of the flood water, the spouting steam from the fountains of the deep could easily have supplied the rest of the rainfall.

<sup>23</sup>Kofahl, R. E. 1977. Could the Flood waters have come from a canopy or extraterrestrial source? *Creation Research Society Quarterly*, 13(4):202-206.

<sup>24</sup>Udd, S. V. 1975. The canopy and Genesis 1:6-8. *Creation Research Society Quarterly*, 12(2):90-93.

<sup>25</sup>Holladay, W. L. *Op. cit.*, p. 331.

<sup>26</sup>Keil, C. F., and F. Delitzsch. *Op. cit.*, p. 408.

<sup>27</sup>Richter, C. F. 1958. Elementary seismology. W. H. Freeman and Co., San Francisco, pp. 252, 253.

<sup>28</sup>*Ibid.*, pp. 252, 278. The discontinuity is named after the man who

established its existence in 1909.

<sup>29</sup>Another scriptural term for the continents seems to be "the world", *tebel*, as in 1 Samuel 2:8. See Holladay, W. L. *Op. cit.*, p. 386.

<sup>30</sup>Holladay, W. L. *Op. cit.*, p. 25, listed under '*aphiq*'.

<sup>31</sup>Bullen, K. E. *Op. cit.*, p. 376D.

<sup>32</sup>Whitcomb, J. C., and H. M. Morris. *Op. cit.*, p. 221.

<sup>33</sup>This is the same as the NASB translation, except that the author has left out the definite article before "seas" and "rivers", the articles not being present in the Hebrew text. The absence of the definite article leaves more room for the possibility that the seas and rivers being referred to may not be familiar sights to men.

<sup>34</sup>Holladay, W. L. *Op. cit.*, p. 230.

<sup>35</sup>Cooley, D. G., editor. 1973. Family medical guide. Better Homes and Gardens Books. New York, p. 893.

<sup>36</sup>The present tense of the Greek verbs can include both the idea of an initial coming and drinking, and a continual coming and drinking repeated indefinitely. See marginal note, NASB.

## A PRIMROSE WITH PERCEPTION

WILLIS E. KEITHLEY\*

A flower with forethought? Or rational reasoning?

Well, I suppose there are some exceptional "green thumbs" who would agree that flowers have responsive personalities. And there are a few theorists around today who insist that plants are even psychic. But beyond that, we usually think of flowers being beautiful but dumb.

Yet in the desert, where the faculties for survival must be honed to a vital keenness, we find this little primrose. It seems absurd to expect sweetness in the harsh environment of the desert; yet the aroma of this flower permeates the barren wilderness with the redolent bouquet of its delicate fragrance. In fact its name *Oenothera caespitosa* says that it is a tufted plant with a wine-like odor.

But to return to its resources of reason. While it may be rather tenuous to attribute its powers of perception to intelligence, yet this amazing plant has the astonishing ability to measure rainfall to one tenth of an inch before its seeds will germinate. Then that moisture must come from above, not below, for it can even tell the direction from which that water must come!

While the secret of this insight may not lie in reflective thought, the real factors that influence its behavior are just as intriguing. Each seed is covered with a hard coating that inhibits germination, thus insuring that it will not sprout until the conditions favor its survival. As the rainfall slowly percolates through the soil, it leaches out the necessary chemicals that will dissolve the inhibitor coating. Obviously the water must come from above, and its cumulative effect may take several years before there is enough moisture to assure sustenance.

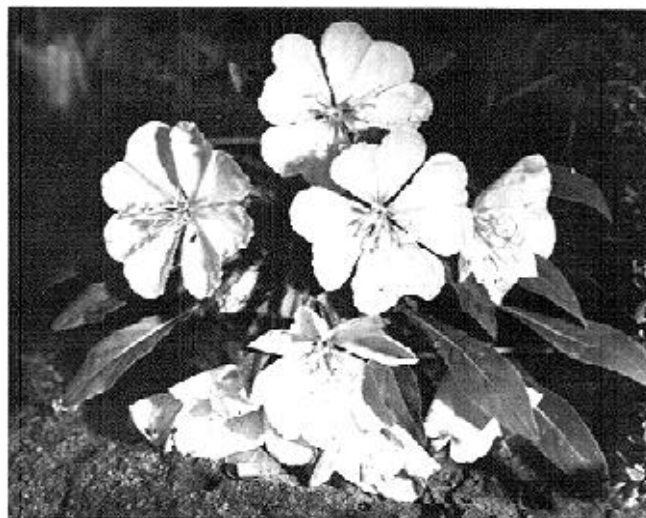
No, we cannot attribute soul or spirit to this bonny blossom, despite its powers of deduction; yet behind every living thing there has to be a Mind. For life could

not arise of its own volition. Thus every organism must be traced back to a Prime Intellect.

Were this not true, our only alternative would be to assign mental powers to the plant kingdom. We would be forced to assume this flower had a knowledge of chemistry; for even the much touted factors of selection and survival could have spelled disaster if the wrong formula were chosen for that seed coat. It could have been too soft, too hard or too toxic for survival. It had to be exact in formulary and formulation.

So far no one has produced any conclusive evidence that a vegetative seed has any powers of wit or wisdom. That platitude of prudence is glibly credited to some dubious "Mother Nature." And delegating to her that omniscience of God is surely pressing women's lib too far.

Absurd? No more than limiting the creative Mind of God to the hypothetical and the hypocritical.



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