

Accuracy in Genesis

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April 2010

Editor H. Daily

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Section One: New Perspectives on Genesis

Chapter One, The Days of Genesis

"And the evening and the morning were the ____ day."

Needless to say much has been written on the subject of the creation days of Genesis. The poetic simplicity of Genesis 1 leaves much to the imagination. Can these days of the creation be different than a literal 24 hour day? First consider Psalms 90:4 and 2 Peter 3:8 that follow which indicate that time to the Lord is very different than time is to man.

"For a thousand years in thy sight are but as yesterday"
when it is past, and as a watch in the night."

"... that one day is with the Lord as a thousand years,
and a thousand years as one day."

Some have taken the two passages above to mean that one day is exactly one thousand years, but it is not a mathematical formula since 1000 years is compared to both yesterday (24 hours) and a 3 hour watch in the night. It appears more likely that they mean that the Lord exists completely outside of our time domain and can look upon all of our life's history at one time simultaneously, as he wishes. He obviously created the universe with our beautiful planet and all its wonderful living things as He wished and on His own time basis.

Let us take a closer look at how the key Hebrew words of concern can be translated since often each Hebrew word has many uses depending upon the context. We will look at selected extractions of the Strong's Exhaustive Concordance and The Interlinear Bible by Jay P. Green, with selected portions placed in red boxes for emphasis.

We start with the Strong's Hebrew and Chaldee Dictionary extract for 3117 "yowm", Fig. 1 below.

3117. יוֹם **yōwm**. *yome*; from an unused root mean. to be hot; a day (as the warm hours), whether lit. (from sunrise to sunset, or from one sunset to the next), or fig. (a space of time defined by an associated term). [often used adv.]:—age, + always, + chronicles, continually (-ance), daily, ([birth-], each, to) day, (now a, two) days (agone), + elder, × end, + evening, + (for) ever (-lasting, -more), × full, life, as (so) long as (. . . live), (ever) now, + old, + outlived, + perpetually, presently, + remaineth, × required, season, × since, space, then, (process of) time, + as at other times, + in trouble, weather, (as) when, (a, the, within a) while (that), × whole (+ age), (full) year (-ly), + younger.

3118. יוֹמָא **yōwmā** (Chald.), *yome*; corresp. to 3117; a day;—day (by day), time.

3119. יוֹמָא **yōwmā** *na-naam'*; from 3117:

Fig1

Note that there can be two uses of the word, as a literal day, or as a figurative day for a period of time to be defined by associated words.

Also we will look at the "Lexical Aids for the Old Testament" edited by Spiros Zodhiates for yowm in Fig. 2 below.

3117. **Yōwm**; day, a number of days, some time, year, life (when in the pl.); today; in the daytime, on the same day; at present, now. A point in time and a sphere of time are both expressed by yōwm. It is the period of light which is not darkness. It can be 24 hours, time in general, a specific point in time, or a year. When used in construction with other Heb. parts of speech, it can mean "when," "on some particular day," "in the time of," "as long as," or "continually." The Heb. syn., *ōwr* (216), "light," and *bōqer* (1242), "morning," are sometimes translated as "day." Daytime was divided by natural phenomena, not regular hourly divisions (Gen. 43:16; 15:12; 18:1; Ex. 18:13). The "day" sometimes begins with evening (Esth. 4:16; Dan. 8:14) and sometimes with morning (Deut. 28:66,67). Yōwm is connected with the sovereignty of God. He existed before eternity began (Ps. 90:4; Isa. 43:13; Dan. 7:19). God created time (Gen. 1:1) and it is under His control (Ps. 74:16). Mankind

Fig2

Note that this author expands on Strong's comments and repeatedly emphasizes that yowm can be a period of time. We look at some of the places early in the Old Testament at which yowm has been translated as time in Fig 3 below. (Over 40 times depending upon the translation.)

time A See also AFORETIME; BEFORETIME; DAY-TIME; LIFETIME; MEALTIME; SOMETIME; TIMES; UNTIMELY.

Ge 4: 3 And in process of *t* it came to pass 3117
 17: 21 shall bear unto thee at this set *t*
 18: 10 thee according to the *t* of life: *6256
 14 At the *t* appointed I will return
 14 according to the *t* of life, and *6256
 21: 2 at the set *t* of which God had
 22 it came to pass at that *t*, that 6256
 22: 15 out of heaven the second *t*,
 24: 11 of water at the *t* of the evening,
 11 the *t* that women go out to draw
 26: 8 when he had been there a long *t*, 3117
 29: 7 neither is it *t* that the cattle 6256
 34 this *t* will my husband be joined 6471
 30: 33 answer for me in *t* to come, *3117
 31: 10 at the *t* that the cattle conceived, 6256
 38: 1 came to pass at that *t*, that Judah
 12 in process of *t* the daughter of 3117
 27 to pass in the *t* of her travail, 6256
 39: 5 from the *t* that he had made him
 11 it came to pass about this *t*, that 3117
 41: 5 he slept and dreamed the second *t*:
 43: 10 we had returned this second *t*. 6471
 18 returned in our sacks at the first *t* 6462
 20 we came indeed down at the first *t*.
 47: 29 the *t* draw nigh that Israel must 3117

Ex 2: 23 it came to pass in process of *t*,
 8: 32 hardened his heart at this *t* also, 6471
 9: 5 And the Lord appointed a set *t*,
 14 will at this *t* send all my plagues 6471
 18 to morrow about this *t* I will cause 6256
 27 unto them, I have sinned this *t*: 6471
 13: 14 thy son asketh thee in *t* to come, 4279
 21: 19 he shall pay for the loss of his *t*, 7674
 29 push with his horn in *t* past, 8543, 8032
 36 hath used to push in *t* past,
 23: 15 in the *t* appointed of the month
 34: 18 thee, in the *t* of the month Abib: 4150
 21 in earing *t* and in harvest thou shalt

Fig 3

As early as Genesis 2:4 we see yowm in the singular with an attached infinitive used to indicate an extended period of time. Strong's does not show this since the King James Versions retain the translation of day, but other translations recognize that in this case yowm refers to the time of the entire creation of the heavens and earth as recognized by the The Bible: An American Translation and others, "At the time when God made the earth and the heavens." See Fig 4 below (remember to read Hebrew from right to left).

Genesis 2:4 ←

4 אלה תולדות השמים והארץ בהבראתם יום עשות יהוה
 Jehovah the in they when the and the genera the these
 of making of day created (were) earth heavens of time (are)

5 אלהים ארץ ושמים: וכל אשר בשרב וכל אשר בשדה
 was it yet not the shrub And God's
 -field of every heavens and earth God's

Fig4

How about evening ('ereb #6153) and morning (boqer #1242), can they be associated with a long time period? They appear in this order only a limited number of times in the Scriptures. In Genesis 1 of course, and a couple of times in connection with Aaron in the tabernacle from evening to morning (Exodus 17:21 and Leviticus 24:3), and once in Psalms (55:17; Evening, and morning, and at noon, ...), and twice in the eighth chapter of Daniel as shown in Fig. 5 below. (Remember to read the Hebrew from right to left.)

Daniel 8:26

26 רבים יעל ערבים יעמד וכאם יד ישר: וימראה
 the And be shall he a with-but shall he rulers the Also many
 of vision broken hand out up stand of Ruler against 6153

הערב והבקר אשר נאמר אמת הוא ואתה סתם החזון
 the Shut But (is) it true, told was that the and the
 vision up lyou morning evening

27 כי למים רבים: ואני דינאי נשתיי ואתה ימים
 .days was I And sick was Daniel, I And many for for
 (for) sick 8074 4428 4399 6213 69, 65

ואקים ואנשה אתימלאכת המלך ואשתים על דמיה
 vision the at was I And the business did and I Then
 amazed .king's arose

Fig5

In this case evening and morning are associated with a "vision" that definitely covers many years. And the best literal translation would seem to be, "And the vision of the evening and the morning that was told, true it is.", even though some translations do us "evenings and mornings". The word evenings appears only once in the King James Version, and not from 'ereb, but from 'arabah (#6160) and the word mornings never occurs. And the above is the only other place that 'ereb and boqer occur in combination with yowm. Here is Young's Literal Translation;

8:26 "And the appearance of the evening and of the morning, that is told, is true; and thou, hide thou the vision, for it is after many days."

And also 'ereb and boqer appear in Daniel 8:14, but without yowm, and in this case the singular words are in connection with a very long time period per Young's Literal Translation;

8:14 "And he saith unto me, Till evening -- morning two thousand and three hundred, then is the holy place declared right."

And the Septuagint, an early translation of the Hebrew Scriptures into Greek adds the word days.

"14 And he said to him, Evening and morning there shall be two thousand and four hundred days; and then the sanctuary shall be cleansed."

And in his commentary on the Book of Daniel by the early Church Father Jerome (347-420AD) also adds the word days.

"Until the evening and the morning, until two thousand three hundred days; and then the sanctuary shall be cleansed."

And below is a composite comparison of the Hebrew of Genesis 1:5, Daniel 8:14 and Daniel 8:26 utilizing the primary English meanings per James H. Strong for #6153 "dusk" (evening), #1242 "dawn" (morning) and #1961 "exist" (there was).



Fig6

So as we see there are really no evidences else where in the Bible that 'ereb and boqer are "defining words" to yowm as many claim. Instead, it would appear most likely that they are descriptive terms concerning the creation process as described in the preceding verses. Now if one considers the probability that they are descriptive terms evening and morning can refer to the "beginning" with "darkness" and the "ending", with the "light" or a dramatic "dawning light" thus giving us the following.

"And the beginning and the ending were the ____ time."

or

"And the darkness and the light were the ____ time."

or

"And the darkness and the dawning light were the ____ time."

Thus the transfer from darkness to light adds the picture of an improvement or a progression in the state of the creation process with each time phase. There is also a figurative translation of boqer as "of bright joy after night of distress" per The Brown-Driver-Briggs Hebrew and English Lexicon.

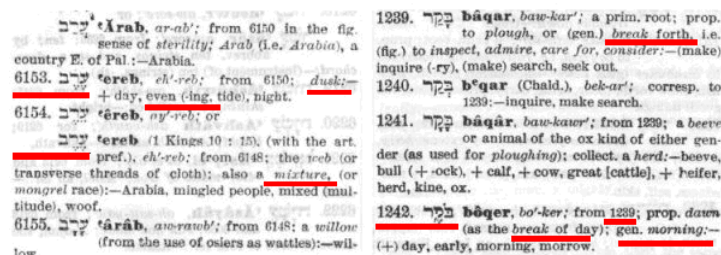


Fig 7

If we use the more basic meanings of the words per the figure above, where evening is called 'ereb because when the sun goes down, vision becomes blurry and disordered and with the break of day it clears. Thus we have;

And the mixing and the breaking forth were the ____ time.

Which has caused some to propose.

"And from chaos/disorder to order, the ____ time."

Therefore the reader can possibly chose from any of the above, which ever seems to connect with them the most. Referring back to Fig 1 from Strong's, you will note that "age" is also a valid translation for yowm, but the authors have used "time" or "phase" since these are our preference.

(To view 2 revised translations of chapter 1 and a paraphrase take a look at Part Two, Chapter One.)

Note

Through out history there have always been a small minority of linguists who have maintained that Hebrew was the mother language from which all languages originated. Needless to say they have been ignored by the secular linguists and also most Christians. But there remains today a number of these linguists. One of them is Isaac E. Mozeson graduate from Yeshiva College. Fig 11 that follows is an extract from his book "The Word" published by Shapolsky Publishers in 1989.

While the Hebrew letter Yod ך/י is more likely to take an *I/i* in Greek, the Yod takes an *A* in AEON as well as in AGONY. Any theological agony over the geological age of the earth is unnecessary, as יום/YOM ["day"—*Genesis 1:5*] is better translated as AEON [an age]. יום/YOM is the term used in phrases like "ancient times" and "the Middle Ages". *Juma* is a week in Swahili; יום/YOM can infer any period of time.

Fig11

While it is often difficult for the amateur to recognize the origin of English words from the Hebrew mother tongue because the two languages seem to be so different. However, the connection between aeon or eon and yom (Strong's yowm) is not so difficult to understand since the sounds are very similar. Therefore, the translation of yowm in the Genesis 1 passages to aeon is also a good choice. We did not use this choice in the body of our discussion since eon or aeon do not appear in the King James Versions and Strong's.

Chapter 2; The Heavens

In the beginning created God the heavens and the earth;
and the earth was without form and empty,
and darkness on the face of the deep;
and the Spirit of God was brooding on the face of the waters.

The above is the word for word translation from "The Interlinear Bible" by J. P. Green except where underlined. We have substituted the translation of "brooding" for "moving gently" which per Strong's is the more basic meaning of Strong's #7363 "rachaph". We prefer the analogy of a brooding hen in that the Lord God created the "egg", or all elements required to develop our miraculous universe, and then in the verses to follow His Spirit is hovering over the surface and guiding the development of our planet into a living ecosystem.

As we will develop further, it is important to note that the surface of the earth is the position from which the Spirit is operating and becomes our reference for all further discussions.

A major question that must be asked is, has he indeed at this time created all of the heavens? We would propose that this must be taken at its face value and that at this time all of the heavens above the earth surface exist, and what is presented in the following verses is the further development of the ecosystem over time. The surface of the earth being in darkness is an indication that the atmosphere is at this point opaque.

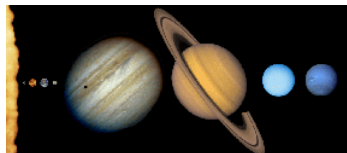


Fig1, the planets scaled in size, but not in spacing.

Then said God,
Let be light and was light.
And saw God the light that good (it was)
and separated God between the light and the darkness.
And called God the light Day. and the darkness He called Night;
and was the mixing and was the breaking forth time one.



Fig2, a sun flare

The requirement for light to become visible from the reference of the earth's surface is for the atmosphere above the earth to go from opaque to at least a partially translucent condition and rotation of the planet is required for the periodic day and night cycle. If the atmosphere was only partially translucent so that little light would be admitted to the surface, the diffusion of the light would not allow the moon and stars to be visible, and the sun, if visible at all, only as a slightly brighter area in the sky.

For a detailed description of the reason for the substitution of "time" for day, "the mixing" for evening and "the breaking forth" for morning look back to Chapter One, the Days of Genesis".

And said God,
 Let be an expanse in the midst of the waters,
 and let it (be) dividing between waters (and) the waters.
 And made God the expanse,
 and He separated between the waters which (were) under the expanse,
 and the waters which (were) above the expanse,
 and it was so.
 And called God the expanse Heavens;
 and was the mixing and was the breaking forth time second.



Fig3, the earth with its clouds and oceans

As the earth's atmosphere is clearing and transmitting more light resulting in more heating of the surface, there would be changes in the nature of the atmosphere. There has been many theories proposed concerning the "waters above", but the fact is, this could just simply be the hydrological cycle forming that we presently have with large amounts of waters contained in clouds at various heights above the earth. A very unique atmosphere for our solar system, no other planet has a atmosphere that is in any way similar to the one on our earth. The forming of the atmosphere of a planet would seem to be controlled by the following conditions.

1. Distance from Sun (surface temperature of planet)
2. Mass and radius of planet = surface gravity = gas escape velocity
3. chemical reactions = different molecules are created and destroyed in various environments, higher temperatures mean faster reactions
4. geological activity = amount of outgassing, more activity = more outgassing = thicker atmosphere
5. living organisms = change the composition through their waste products

All of the above factors had to be delicately balanced by the Designer to achieve the marvelous ecosystem that we presently live in. And many scientists now propose that in the very early days the early atmosphere was radically changed when a mars sized planet impacted the earth and the result was the forming of the moon, an unusually large satellite.

And said God,
 Let be collected the waters under the heavens to place one,
 and let appear the dry land; and it was so.
 And called God the dry land Earth,
 and the collection of the waters He called Seas,
 and saw God good (it was).
 And said God,
 Let sprout the earth tender sprouts (the) herb seeding seed,
 (and) tree of fruit producing fruit after its kind,
 which it (is) in it on the earth;
 and it was so.
 And bore the earth tender sprouts (the) herb seeding seed after its kind,
 and tree producing fruit which its (is) in it after its kind;
 and saw God that (it was) good.
 And was the mixing and was the breaking forth time third.

As per factor 5 above, living organisms are an important part of the development cycle for the atmospheric part of the heavens.

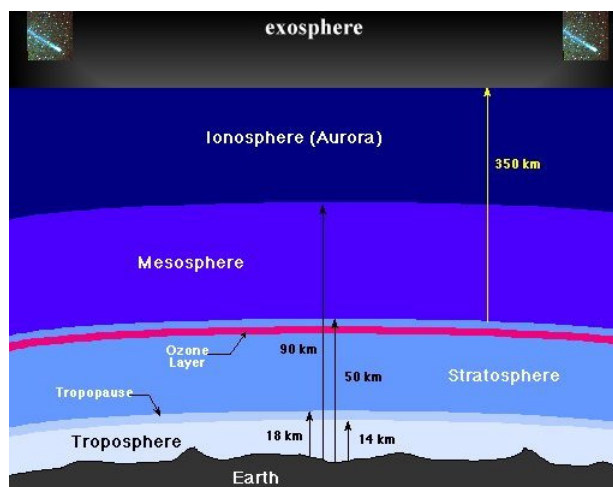


Fig4 , the atmosphere

And said God,
 Let be luminaries in the expanse of the heavens to divide between the day
 and the night and let them be for signs,
 and for seasons and for days and years;

and let them be for luminaries in the expanse of the heavens,
to give light on the earth;
and it was so.
And **brought forth** God, two the luminaries great;
the luminary great for the rule of the day,
and the luminary small for the rule of the night,
and the stars.
And **appointed** them God in the heavens to give light on the earth,
and to rule over the day and over the night,
and to separate between the light and the darkness;
and saw God that good (it was).
And was **the mixing** and was the breaking forth time the fourth.

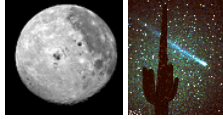


Fig5, the moon -- Fig6, stars and comet

For all the elements of the sky to be fully visible from the surface it is necessary for the atmosphere to complete its development and become in the main part transparent. Except for the frequent cloudy and stormy conditions, of course.

The concept of the "greater light to rule the day" and "the lesser light to rule the night" affirms the surface of the earth as the reference point for the creation record. This concept is appropriate only from or within a relatively limited distance from the surface of the earth. From the outer heavens (space) the lesser light becomes only another rather minor planetary object of our solar system which only reflects the light of the sun. From the majority of all other possible reference points in our small solar system the sun rules! From outside our solar system both become rather minor objects of this expansive universe.

Conclusion: By substituting fully acceptable translations for Strong's #6213 'asah', "brought forth" for "made", and Strong's #5414 "nathan", "appointed" for "set", we believe we have a translation that is more in line with the true meaning of the Hebrew Masoretic text. See the Notes for details, and note that instead of having a very limited leeway for translation, the Hebrew words of interest have a very great range of acceptable English meanings.

(To view a revised translation of chapter 1 and a paraphrase take a look at Part Two, Chapter One)

Note A: Extracts from "The Interlinear Bible" and Strong's "Hebrew and Chaldee Dictionary".

1	776,	776	8064	430	1254	7225
2	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	and	the	God created the in
	earth	earth	heavens	heavens	beginning	
	430	7207	8415	6440	15921	2822
	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	God	the	and	the	on	and
	of Spirit	deep	of face	darkness	empty	form
	1961	216	430	568	4225	6440
3	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	and	light	Let	God	said	Then
	996	430	1214	2896	216	430
	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	be	and	good	that	light	the
	1961	430	1214	2896	216	430
4	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	on	and	without
	2822	3117	1216	430	7121	2822
5	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	on	and	without
	darkness	Day	light	the	God	called
	2822	3117	1216	430	7121	2822
6	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	on	and	without
	darkness	Day	light	the	God	called
	2822	3117	1216	430	7121	2822
7	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	on	and	without
	darkness	Day	light	the	God	called
	2822	3117	1216	430	7121	2822
8	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ	וְהָאֵרֶץ
	the	and	the	on	and	without
	darkness	Day	light	the	God	called
	2822	3117	1216	430	7121	2822

259, 4725, 413, 8064, 8478, 4325, 6960, 430, 559
 9 אָמַר אֱלֹהִים יִקְוּ הַיָּמִים מִתַּחַת הַשָּׁמַיִם אֶל־מָקוֹם אֶחָד
 ,one place to the under the be Let ,God said And
 776 ; 3004 430 heavens 7121 was 1861, 691, 3004 7200
 10 וַתֵּרָא הַיִּבְשֵׁת וְהַיָּבֵשׁ: וַיִּקְרָא אֱלֹהִים אֶת־הַיָּבֵשׁ אֶרֶץ
 ,Earth dry the God And so it and dry the let and
 569 2896 430-1 7200 3220 7121 4325 4723-1
 11 וַלְמַגְוָה הַיָּמִים קָרָא יָמֵים וַיִּרְא אֱלֹהִים כִּרְסוּב: וַיֹּאמֶר
 said And good God and ,Seas He the the and
 (was it) saw called waters of collection
 6529 9086 2233 6212 1877, 776, 1876 430,
 אֱלֹהִים תִּרְשָׁא הָאָרֶץ וְשָׂא עֵשֶׂב מִכֹּרֶס וְרַע עֵץ פֶּרִי
 fruit (land), seed seeding (the) tender the Let ,God
 of tree 1861 776 5921 834 4327 6529 6213
 12 וַתֵּשֶׂא הָאָרֶץ וְרָעוּבֵי אֶשְׁרָו וְרֵעֵבֵי עֵלְהָאָרֶץ וַיִּתְּצָא
 .so and ,earth the on (is) it which after fruit pro-
 was it in kind its ducing
 6213 9086 4327 2233 6212 1877, 776, 3318
 13 פֶּרִי אֶשְׁרָו וְרֵעֵבֵי לְמַגְוָה וַיִּרְא אֱלֹהִים כִּרְסוּב: וַיִּתְּצָא
 And (it) that God and after (is) its which fruit
 was it ,good (was) saw ,kind its in
 1861 2996 430 7200 4327 834 6529
 עֵרֵב וַיְהִי בֹקֶר יוֹם שְׁלִישִׁי:
 ,third day morning and evening
 998 914, 8064 7549 3974 1961 430 559
 14 וַיֹּאמֶר אֱלֹהִים הִי מֵאֲרֶת בְּרִקְעֵי הַשָּׁמַיִם לְהַבְדִּיל בֵּין
 between divide to the in luminaries Let ,God said And
 heavens of expanse be 3995 996 3117
 הַיּוֹם וּבֵין הַלַּיְלָה וְהָיָ לְאֹתוֹת וּלְמוֹעֲדִים וּלְיָמִים וְשָׁנִים:
 ,years and for and for and for let and the and the
 1861 776 days 5921 213 5061 7549 2974 1861
 15 וַיִּתֵּן לְמֵאֲרֶת בְּרִקְעֵי הַשָּׁמַיִם לְהָאָרֶץ עֵלְהָאָרֶץ וְהָיָ
 it and ,earth the on give to the the in for let and
 was 1419 3974 8147 430-1 6213 3551
 16 קָרָא יְיָ אֱלֹהִים אֶת־שְׁנֵי הַמְּאֹת הַגְּדֹלִים אֶת־הַקָּטָן
 luminary the :great the two ,God And ,so
 luminaries made

1419 4475 6996 3974 3117 4475
 הַגְּדֹל לְקַטְנֵת הַיּוֹם וְאֶת־הַקָּטָן לְקַטְנֵת
 of rule the for small luminary the and ,day the of rule the for great
 7549 430 5414 3556 3915
 17 הַלַּיְלָה וְאֵת הַקְּטָנִים: וַיִּתֵּן אֹתָם אֱלֹהִים בְּרִקְעֵי
 the in God them set And ,stars the and ,night the

3915 776 4919 776 216 8064
 18 הַשָּׁמַיִם לְהָאָרֶץ עֵלְהָאָרֶץ: וַלְמַשְׁלַל בָּיּוֹם וּבַלַּיְלָה
 over and the over to and earth the on give to the
 ,night the day rule light heavens
 2596 430 7200 2822 996 216 996 1 4914
 וְלְהַבְדִּיל בֵּין הָאָרֶץ וּבֵין הַחֹשֶׁךְ וַיִּרְא אֱלֹהִים כִּרְסוּב:
 good that God saw and the and the between to and
 (was it) saw ,darkness light 12 42 6153
 19 וַיְהִי עֵרֵב וַיְהִי בֹקֶר יוֹם רְבִיעִי:
 the day morning and evening And
 ,fourth was

7363. רָחַף *râchaph*, raw-khaf'; a prim. root; to brood; by impl. to be relaxed:—flutter, move, shake.

6213. עָשָׂה *âsâh*, aw-saw'; a prim. root; to do or make, in the broadest sense and widest application (as follows):—accomplish, advance, appoint, apt, be at, become, bear, bestow, bring forth, bruise, be busy, × certainly, have the charge of, commit, deal (with), deck, + displease, do, (ready) dress (-ed), (put in) execute (-ion), exercise, fashion, + feast, [fight-] ing man, + finish, fit, fly, follow, fulfil, furnish, gather, get, go about, govern, grant, great, + hinder, hold ([a feast]), × indeed, + be industrious, + journey, keep, labour, maintain, make, be meet, observe, be occupied, offer, + officer, pare. bring (come) to pass, perform, practise, prepare, procure, provide, put, requite, × sacrifice, serve, set, shew, × sin, spend, × surely, take, × throughly, trim, × very, + vex, be [warr-] ior, work (-man), yield, use.

5414. נָתַן *nâthan*, naw-than'; a prim. root; to give, used with great latitude of application (put, make, etc.):—add, apply appoint, ascribe, assign, × avenge, × be ([healed]), bestow, bring (forth, hither), cast, cause, charge, come, commit, consider, count, + cry, deliver (up), direct, distribute do, × doubtless, × without fail, fasten, frame, × get, give (forth, over, up), grant, hang (up), × have, × indeed, lay (unto charge, up), (give) leave, lend, let (out), + lie, lift up, make, + O that, occupy, offer, ordain, pay, perform, place, pour, print, × pull, put (forth), recompense, render, requite, restore, send (out), set (forth), shew, shoot forth (up), + sing, + slander, strike, [sub-] mit, suffer, × surely, × take, thrust, trade, turn, utter, + weep, × willingly, + withdraw, + would (to) God, yield.

Note B : A "GAP" ?

Some Bible scholars of the seventeenth century, wishing to establish the timing of Satan's fall and the angels' rebellion, had proposed a narrative gap (hence, a time gap of unspecified duration) between the creation of the universe ("the heavens and the earth" of Genesis 1:1) and the events of the rest of the creation (Genesis 1:3-27). Eighteenth century advocates of this view placed the gap precisely between Genesis 1:1 and Genesis 1:2, suggesting that Earth began, perhaps eons ago, as the abode of angels who ravaged and ruined it when they fell. The Genesis 1:3-27 creation, according to this scenario, could be viewed as a period of "restitution," the word originally attached to the gap hypothesis.

This interpretation of the creation story seemed appealing as a simple, adequate answer to each of the problematic issues. No matter what scientists discovered about the age of the universe or Earth, the historical and scientific integrity of the Bible's creation narrative could be defended. At the same time, whatever geologic (or other) catastrophes scientists might find could be comfortably blamed on the prince of darkness and his minions.

Reformed theologians Chambers and Buckland advocated the gap interpretation, as did a few Catholic scholars during the nineteenth century, with limited acceptance. In the early part of the twentieth century, fundamentalists George Pember and Harry Rimmer popularized the view throughout the American church. The largest contributor to its acceptance, however, was—and perhaps still is—C. I. Scofield, whose widely sold study Bible sanctioned the view.

PROBLEMS

- 1) There is NOT ONE Scripture verse that gives the slightest suggestion that the Earth was the abode of "fallen" angels and they ravaged and ruined it!
- 2) There is NOT ONE Scripture verse that even addresses when the angels including Satan "fell"! There is no mention of angels until Genesis 16:7. Therefore, from studying the Scriptures there is NO WAY of knowing when the angels "fell"! To place their "fall" between Genesis 1:1 and 1:2 is pure speculation!
- 3) Examination of the Masoretic Hebrew Text indicates that verse 1:1 is a part of "day one". In addition to the repeated "evening and morning were the ___ day" phrases, in the Hebrew Text there are special spacings and the Hebrew break character "phe" after each "day", after verses of Genesis 1:5, 1:8, 1:13, 1:18, and 1:23. There is NO indication of a break in the Hebrew text after verse 1:1!
- 4) Scholars supporting the "gap" theory argue that Genesis 1:2 can be translated "the earth became formless and void" overlooking a critical distinction in the use of the verb *hayâ* (to be) in the Hebrew text. In the beginning of verse 2, *hayâ* appears without the Hebrew preposition *le*. The combination of *hayâ* + *le* is the form that is translated as "became". An example of this combination is found in Genesis 2:7, appropriately translated, "man became a living being."
- 5) Supporters of the "gap" theory also claim that the Hebrew verb *bara* (create) used in Genesis 1:1 refers to a brand new creation whereas the verbs *asah* (to do) and *hayâ* (to be) used in Genesis 1:3-27 refer only to reconstruction, not creation, losing sight of the fact that *bara* appears in both Genesis 1:21 and 1:27. The claim also is inconsistent with the lexical definitions for *asah* (to do) and *hayâ* (to be) which in no way demand, or even imply, a reconstruction.
- 6) To defend their translation of Genesis 1:2 as "the earth became formless and void," gap proponents claim that the phrase *tohû wabohû* carries a negative or pejorative connotation wherever it appears in the Bible. On this basis, they substitute "deformed" for "formless" and "uninhabitable" for "empty." Justification for such substitutions is difficult to sustain. In Hebrew *tohû* and *bohû* obviously are meant to be alliterative synonyms, each complementing the meaning of the other. Thus, both words convey the idea of formlessness and emptiness. The second term, *bohû*, occurs only three times in the Old Testament: Genesis 1:2, Isaiah 34:11, and Jeremiah 4:23. In each instance, it refers to something's being empty, whether not yet filled or unfillable. Then, the crux of gap theorists' argument rests on the first term, *tohû*. They assert that Genesis 1:2 must be translated as "the earth became formless and empty" (sometime after its creation) because Isaiah 45:18 says, "[God] did not create the earth *tohû*." Unless God built a new creation on the wreckage of the ruined one, these verses, they argue, represent a contradiction. However, the second part of Isaiah 45:18 gives clarification, removing the contradiction. It says that God "formed it [the earth] to be inhabited," implying that the *tohû* of the earth was merely a starting place, not God's ultimate intent. He had a plan, worked out in advance (see Proverbs 8:22-31, Ephesians 2:10, 2 Timothy 1:9), to transform and prepare the earth for human habitation. Thus the *tohû wabohû* of Genesis 1:2 indicates that the biosphere of the Earth had not yet been formed.
- 7) Some gap theorists continue on in verse two of the first chapter of Genesis and interpret the word "darkness" to describe an evil or ungodly condition. This, however, is a meaning forced upon the word by the theory and not apparent from the text. Proceeding on to verse five finds the darkness receiving a name, "Night", and there had been a dividing of light from the darkness by God. There is nothing in the text that would indicate that it is other than a physical darkness and physical light of God's creation. As Psalm 104:20, declares "Thou (God) makest darkness, and it is night: . . ." and then goes on in verse 24, still in context, to declare "O Lord, how manifold are thy works, in wisdom hast thou made them all" (KJV). The reference, of course, is to physical darkness or nighttime, and no evil connotation is implied. To say that an evil condition exists in Genesis 1:2 because of physical darkness is giving a meaning to the word not found elsewhere in the creation story.
- 8) The gap theorists also point to Genesis 1:28 of the King James Version which says, "Be fruitful and multiply, and replenish the earth," this "replenish" they say implies that the earth was previously occupied and that the newly created mankind were to refill the earth. But, *mala* is a primary Hebrew root word having a basic meaning of "to fill" and does not imply a "refilling".

Conclusion:

Chapter 3; After Their Kind

And the earth brought forth grass,
and the herb yielding seed after his kind,
and the tree yielding fruit,
whose seed was in itself, after his kind:
and God saw that it was good.

And God created great wild beasts,
and every living creature that moveth,
which the waters brought forth abundantly,
after their kind,
and every winged fowl after his kind:
and God saw that it was good.

And God made the beast of the earth after his kind,
and cattle after their kind,
and everything that creepeth upon the earth after his kind:
and God saw that it was good.

Much of the history of biological research has been devoted to discovery and classification of a seemingly almost unlimited number of plant and animal species (kind?). In early history this classification had to be based upon physical characteristics of the species being studied. Many biologists then grouped these species according to their evolutionary theories based upon these physical characteristics. However, with the advent and widespread application of molecular systematics in which DNA sequences are used, a large number of surprises are being discovered. Species that would seem to be clustered together due to their structural characteristics are not always genetically similar. Consider a small freshwater fish called the cichlid. They are scattered through out the Southern Hemisphere and numerous examples occur in the African lakes of Malawi and Tanganyika. See figure below.



Close examination of the photos will reveal minor differences, but the overall physical structure of the species are remarkably similar. It could obviously be assumed that these small fish were all close relatives and evolved at a single time when possibly the two lakes were joined into one large fresh water lake. However, recent mitochondrial DNA research reveals that the species in the two lakes are genetically diverse and would have then evolved independently, multiple times, assuming an evolutionary explanation. While all of the species pictured from the same lake are genetic relatives, the look alike species from separate lakes are genetically dissimilar. There have also been located genetically diverse species in different regions of the same lake, Lake Tanganyika. (references, numerous publications by authors Axel Meyer, Melanie Stiassny, Erik Verheyen, Ulrich Schliewen, Lukos Ruber, et al., articles on the cichlids, also "Genetic and developmental basis of cichlid tropic diversity" by RC Albertson and TD Kocher, 2006 Nature Publishing Group)

Consider the Neandertal genetic story. Recently published was the results of a third study of their mitochondrial DNA remains. (author Matthias Krings, et al., Natural Genetics, 26(2000) 144-146; Cell 90 (1997) 19-30; Proceedings of the Nat. Acad. of Sciences, USA 96(1999) 5581-85) The three remains that have been studied to date had been found in Germany, the Northern Caucasus of Russia, and the latest in Croatia. The results from each study indicate that Neandertals did not make any genetic contributions to modern humans, in other words, they were not our evolutionary ancestors. The Neandertals, while structurally similar to humans, originated independently of modern humans and had a genetic diversity very comparable to humans and a population dynamics similar to humans.

As more systematic mitochondrial DNA studies are conducted the same story emerges for many plant and animal genera including mangabey monkeys, river dolphins, anolis lizards, ranid frogs, bats, sticklebacks, and pericallis (a genesis of plants related to the sunflower). There are animal and plant species among each type that have very strong common physical characteristics but genetically they

must have originated separately. They have many common physical characteristics including the same type eye, the same skeletal characteristics, undergo the same type larval sequences, have the same brain structure, identical dental types, etc.. In a recent breeding experiment with the sticklebacks in a laboratory environment, the genetically dissimilar, but physically similar species from different lakes tried unsuccessfully to interbreed. Demonstrating the profound physical and behavioral similarities of the genetically dissimilar species. (Howard D. Randle et al., Science 287(2000) 306-8) In the case of the mangabeys, when the genetic differences were discovered the scientists conducted additional skeletal studies and discovered very minor differences. However, the differences were so slight that it is doubtful that these differences would have been recognized at all, let alone be accepted as evidence for a separate classification. (John G. Heagle, et al., Proceedings of the Nat. Acad. of Sciences, USA 96(1999): 1157-61)

"... No finale can be specified at the start, none would ever occur a second time in the same way, because any pathway proceeds through thousands of improbable stages. Alter any early event, ever so slightly, and without apparent importance at the time, and evolution cascades into a radically different channel." (Stephen J. Gould, " Wonderful Life:..." W.W.Norton & Company, 1989)

How then could an evolutionary process based upon random mutational changes result in remarkable physical similarities among genetically diverse species that theoretically originated through separate evolutionary pathways including different environmental circumstances? How could the eye structure of the cephalopods (nautili, cuttlefish, squids, and octopods) have evolved to be remarkably similar to that of the vertebrates when the first requires a totally aquatic environment and the second a primarily terrestrial environment? The sandlance (a fish) and the chameleon (a reptile) have a similarly unique eye structure in that they both use the cornea of the eye to focus on objects using a specialized cornealis muscle while all other reptiles and fish use the lens of the eye to focus. Again, how do evolutionary theories explain such amazing occurrences of repeated identical physical characteristics due to supposedly diverse evolutionary channels?

Conclusion: Scientists are just beginning to scratch the surface of the true meaning of "after their kind" of the creation record and it is proposed that more and more the Biblical creation record will be verified.

Chapter 4; In Our Image

And God said, Let Us make Man ('adam) in Our image, after Our likeness.

And God made the beast of the earth after his kind,
and cattle after their kind,
and every thing that creepeth upon the earth after his kind:
and God saw that it was good.

And God said,
Let Us make man in Our image, after Our likeness:
and let them have dominion over the fish of the sea,
and over the fowl of the air,
and over the cattle,
and over all the earth,
and over every creeping thing that creepeth upon the earth.
(Genesis 1:25-26)

Human DNA is 98.4 percent identical to the DNA of chimps and bonobos, a lesser-known chimp-like ape.

"What is it in that other 1.6 percent that makes us different from them?

That's the critical question," said de Waal, a renowned primatologist.

"If humans and chimpanzees are over 98% identical base-for-base, how do you make sense of the fact that chimpanzees have 10% more DNA than humans? That they have more alpha-hemoglobin genes and more Rh bloodgroup genes, and fewer Alu repeats, in their genome than humans? Or that the tips of their chromosomes contain DNA not present at the tips of human chromosomes? Obviously there is a lot more to genomics than just nucleotide substitution. But the percentage comparison renders that fact invisible, and thus obscures some of the most interesting genetic questions." (from <http://ist-socrates.berkeley.edu/~jonmarks/aaa/marksaaa99.htm>) "Our DNA is about 75% similar to that of a nematode, which is basically a small soil-dwelling worm. No-one would suggest a nematode is 75% human? Another good example is that during the sixties, American doctors tried to use chimpanzee organs for transplants in humans, but in all cases the organs were totally unsuitable. ... An interesting footnote that shows how complex this issue really is, ... humans differed from most other animals, including chimpanzees, in a small but possibly vital way. In most animals, the surface of every cell, except brain cells, carry glycoproteins that contain one particular member of a family of sugar molecules called sialic acid. In humans, a genetic mutation means this sugar is not present in any cell in the body. Proteins and membrane lipids that have sialic acid take part in many processes. They help cells stick to one another. They may also play a part in disease susceptibility. This might be a reason why Chimpanzees seem far less susceptible for infectious diseases like malaria and cholera. ... This might be one factor in those chimp to human transplants in which organs were rejected." (from <http://www.fromlondon.freeserve.co.uk/cuchimpdna.html>)

A more recent "Study found only 86.7% genetic similarity when segments of human and chimpanzee DNA (totaling 1,870,955 base pairs) were laid side by side. This study also included indels (insertions/deletions) in addition to substitutions." ref: Tatsuya Anzai et al., "Comparative Sequencing of Human and Chimpanzee MHC Class II Regions Unveils Insertions/Deletions As the Major Path to Genomic Divergence," *Proceedings of the National Academy of Sciences*, USA 100 (2003); 7708-13

GENETIC

MATHEMATICS

Human	100 %
Chimpanzee	86.7 %
Nematode	75 %

That puts the Chimpanzee at
LESS than HALFWAY
between a Worm and Human!

And even more recently researchers found that about

**80% of the proteins in the human
and chimpanzee genomes are different.**

This comparison is very significant because proteins are ultimately responsible for an organism's anatomical, physiological, and behavioral characteristics. Therefore, a high degree of genetic similarity doesn't necessarily mean that humans and chimpanzees are closely related organisms. (reference: Galina Glazko, Vamsi Veeramachaneni, Masatoshi Nei and Wojciech Makalowski, "Eighty Percent of Proteins are Different between Humans and Chimpanzees," Gene volume 346 14 February 2005, Pages 215-219)

We say.
!VIVE LA DIFFERENCE!

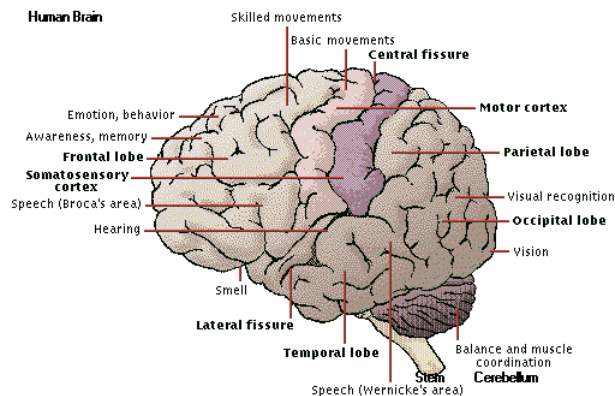
Language is one critical difference. Humans are "left brained" -- the planum temporale that controls language is much larger on the left. (Laymen may know the term because the left brain also controls right-handedness.) Human infants are born as language learning machines. "First, infants begin forming up categories for the common speech sounds they hear, not whole words so much as the little units we call phonemes, less than a tenth of a second in duration. Categories allow them to generalize across speakers, so that the mother's /ba/ sound and the father's somewhat deeper /ba/ sound are treated the same despite their differences. By about a year of age, babies stop hearing many of these differences, having standardized them.

By a year of age, babies are discovering patterns in the strings of phonemes and acquiring six to nine new words every day, just from the examples they hear (long before they begin speaking them). The words acquiring meaning, the phonemes remain meaningless. You can say kids are like 'sponges' soaking up words but that's too passive a notion, one of the reasons I prefer the more active 'acquisitive' as the characterization.

So kids have pyramided words atop the phonemes, and now have compound structures made from building blocks. But then they do it again, discovering patterns in the strings of words they hear and inferring the grammar of that particular language: ways of making plurals and past tenses and nested phrases. This happens between the ages of 18 and 36 months. Then they're off detecting patterns on even longer time scales, that of the collection of sentences we call a story. They infer that a satisfying story has a beginning, middle, and a wrap-up ending - and then they start demanding proper endings for their bedtime stories." (from <http://faculty.washington.edu/wcalvin/2000/SanDiegoSpeech.htm>)



Another great and obvious difference is brain size and function. From our brain comes control of the involuntary and voluntary functions, the sensory perceptions, memory, emotions, consciousness, and intelligence.

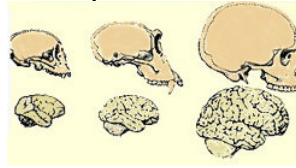


Endocranial Volume (in cm³)
[From Aiello and Dean 1990, Pp. 193]



Species	Lower 95% Limits for Mean	Upper 95% Limits for Mean	Mean
Human	1,159	1,243	1,201
Chimpanzee	391	409	400
Gorilla	452	486	469
Orang	385	409	397

As the primate brain size increases the depth and number of creases and convolutions increase.



How do scientists explain the unusually large human brain? A recent study exposes the difficulty faced by evolutionary biologists as they attempt to account for the emergence of the human brain by naturalistic processes. Researchers studied 214 genes involved in human brain development and showed, from an evolutionary perspective, that these genes must have undergone hyper-fast evolution to produce the large human brain with its advanced cognitive capacities. In the words of one of the investigators involved with the work, "To accomplish so much in so little evolutionary time...requires a selective process that is perhaps categorically different from the typical processes of acquiring new biological traits." This type of rapid and extensive genetic change makes little sense from an evolutionary perspective, given the deleterious effects of most mutations and the extensive complexity and integration of the biological systems that make up the human brain. If anything, this hyper-fast evolution should be catastrophic." Reference: Steve Dorus et al., "Accelerated Evolution of Nervous System Genes in the Origin of Homo sapiens," Cell 119 (2004): 1027-40.

"Among mammals there are two patterns of brain growth. The first pattern is called altriciality. In this pattern the animal is born helpless and extremely immature. The brains of altricial animals are usually half the size of the adult's, and double in size by adulthood. Because of this it takes lots of parental effort to raise the young. Animals following this pattern usually have litters and perform this care for multiple offspring at once. Cats, with their blind and helpless kittens are altricial. The other pattern is precocial. In this pattern the offspring are usually born single and from birth are able to get around quite well. Their brains are nearly adult size at birth. They are alert and all their organs are functioning. An example of this pattern is the horse, the wildebeest etc., where the young will run with the herds within minutes.

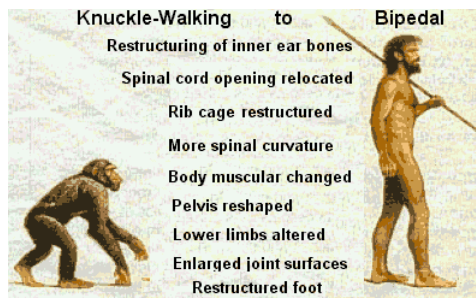
Now, according to Walker and Shipman (1996, pp220-222), altricial species almost never have bigger brains than precocial species. The reason is that for all mammals save one, the brain grows rapidly during gestation but then grows less rapidly after birth. There is a kink in the graph of brain size vs. time which occurs at birth. Altricial species whose immature state at birth and subsequent slow down in the rate of growth forever remain behind the more maturely born precocial species.

What humans seem to have accomplished is the trick of keeping the brain growing at the embryonic rate for one year after birth. Effectively, if humans are a fundamentally precocial species, our gestation is (or should be) 21 months. However, no mother could possibly pass a year old baby's head through the birth canal. Thus, human babies are born "early" to avoid the death of the mother. Walker and Shipman (1996, p. 222) write:

"Humans are simply born too early in their development, at the time when their heads will still fit through their mothers' birth canals. As babies' brains grow, during this extrauterine year of fetal life, so do their bodies. About the time of the infant's first birthday, the period of fetal brain growth terminates, coinciding with the beginnings of speech and the mastery of erect posture and bipedal walking."

This pattern of growth has huge implications. Every other primate doubles their brain weight from birth to adulthood. But due to the early birth of humans, we triple our brain's birth rate. Our last 12 month of fetal growth rate of the brain occurs outside the sensorially deprived womb. The vast quantities of sensory input during the first year of life affects the rate and nature of the neural connections. Because of this year of helplessness, parents must provide close physical and emotional support for the infant. Unlike chimp babies who can cling to their mother's fur, human infants cannot even hang on to mother in spite of having the hand reflex. The mother has no fur because she sweats and she sweats because of a big brain which is why she gives birth to her child early. This early birth then requires the mother to care for the infant and increases the bond between mother and child which partially makes us human." (from <http://home.entouch.net/~dmd/sweat.htm>)

The physical differences are many!



The structural changes to the feet are not simple in that they involve an elaborate plantar aponeurosis, strong plantar ligaments, longitudinal arches, an enlarged musculus flexor accessories, a remodeled calcaneocuboid joint, a long tarsus, reorganization of the neuronal innervation and blood vascularization, an adducted (non-opposable) hallux and shortened toes. Many are quick to point out that primates needed to possess opposable digits so they could grasp, and quickly swing from tree branches. But then, how about the feet, did they devolve, humans have the opposable thumb, but not the opposable big toe?



In his 1999 paper published in the Journal of American Podiatric Medical Association, R. Kidd described the evolution of the feet as follows:

"The evolution of the human foot presents an obfuscation: explanations for its occurrence and the exact nature of the mechanisms of change are still not fully understood."

For more details on the differences between humans and the other primates see Note A & B.

"Richard Klein, professor of anthropological sciences, in his new book, *The Dawn of Human Culture* (John Wiley & Sons, April 2002), proposes a plausible theory for the latest stages of human evolution. "It's a nontestable hypothesis," Klein admits. "The book is about human evolution as I understand the record. My genetic explanation for the major behavioral change 50,000 years ago is the most plausible one, but I can't prove it." For Klein this neural mutation hypothesis is the most economical explanation of why anatomy and human behavior drifted apart. Fossilized skulls reveal little about the brain underneath. But a gene mutation may have changed critical neural processes such as speech and language.

The now widely accepted "Out-of-Africa-2" hypothesis is based on the appearance of anatomically and behaviorally modern humans on a small patch in Eastern Africa as recently as 50,000 years ago. All of a sudden these early modern humans developed a new repertoire of hunting skills, novel forms of social interaction and a sense of art. They became creative innovators expanding their mental and technical capabilities. These new achievements drove the early modern humans out of Africa to spread over Europe and Asia. Within a short period of only about 15,000 years they supplanted the Neanderthals in Europe and other nonmodern humans in other parts of the world.

The cause for the drastic change in behavior in the early modern humans is unknown. But the most plausible explanation for the success of modern humans is a sudden biological change.

"A fortuitous mutation may have promoted the fully modern brain,"

Klein says. As human brains reached today's size hundreds of thousands of years earlier and skull size didn't change drastically, this mutation would have affected cognitive power rather than overall brain structure. ...

Some of the new (and old) evidence is ambiguous, circumstantial, or even contradictory, but this is inevitable in historical science, which has more in common with a criminal trial than it does with a physics experiment. "

(Stanford Report, April 26, 2002, "Anthropologist explores the dawn of human culture in new book" by Christian Heuss and "The Dawn of Human Culture" by Richard G. Klein with Blake Edgar, 2002)

"A fortuitous mutation" , the basis for the entire "theory of evolution", multiplied over and over, from organic slime to the modern human!! "It's a nontestable hypothesis", dosen't this also apply to and describe the entire "theory of evolution"?

It is doubtful that we will ever fully understand the human brain. Some want to say it is no more than a wonderful organic computer, but that seems like a great over simplification. It is a computer that can change and modify its functionality. Tests with people who have had brain surgery and lost some capabilities indicates that over time part or much of the lost functionality can be recovered with non-damaged portions of the brain assuming capability that lost brain sections once controlled. It has "plasticity", it is continually changing. These changes come about by synapses becoming activated or deactivated through the growth or contraction of dendritic spines. And these changes can take place in surprisingly short times. Varying genetic factors combined with varing environmental factors and the "plasticity" of the brain gives us "individuality".

Domination; man was charged to subdue the earth and have dominion over all the life forms that occupy it (Genesis 1:28). Many scientists tell us that the other primates preceded humans by many millions of years, and if this was true, then they had their chance to dominate. And obviously they failed to do so. To

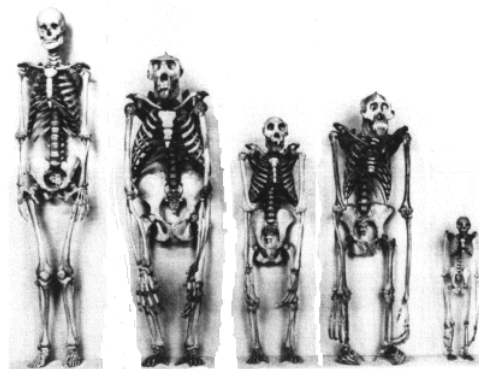
our knowledge there is no evidence that either Cro-Magnon man or Neandertal qualified since there is no apparent evidence that they had dominion. Some will argue that presently humans are royally messing it up, and possibly they have a good point. For as one looks around at the state of the human society at this time, one can see many things that seem to be rather undesirable, and which would seem to be detrimental to the ecology.

Conclusion: Question: Do we understand the full implications of "in Our image, after Our likeness"?
 Answer: Obviously not!!
 But this we do know, the differences between humans and the other primates is wonderfully great!
 Only man has what it takes to "have dominion" !!

Notes: Physical Primate differences

(from:<http://www.dla.utexas.edu/depts/anthro/people/faculty/cbramblett/ant301/seven.html>)

Human Skeletal and Dental Anatomy



Man-Gorilla-Chimpanzee-Orangutan-Gibbon

Humans are contrasted with chimpanzees to illustrate the unique features of our anatomy. Other primate species are included when they are needed to demonstrate a point.

Dental Elements

Primates have four types of teeth - incisors, canines, premolars and molars. Incisors are like tiny shovels or spatulas that cut food. Canines are generally pointed, stabbing teeth that can serve as weapons in most primates. Premolars and molars have large crown surfaces that shear and crush food during mastication.

The number and type of teeth are summarized by listing only elements on one side from incisor, canine, premolar to molar (mesial to distal) for each jaw. Thus the primitive mammalian formula represents a hypothetical mammalian ancestor with 44 teeth. Whatever the ancestral condition, no living primate has more than three incisors or three premolars on each side in either maxilla or mandible. Prosimians and Platyrrhines have three premolars; Catarrhines have only two. Third molars are often absent in some primate genera. Once a tooth is lost in a species, it is usually not reproduced again. Thus ancestral forms generally may have more teeth, but not fewer teeth of a particular kind than their descendants.

A tooth consists of a crown, the portion covered with enamel, and a root of dentine covered with cementum. The interior of the tooth is the pulp chamber that contains soft cellular tissue. The primary mineral in both bone and dental structures is crystals of apatite - a form of calcium phosphate. Dentine is a bone-like substance (about 75% mineral) but enamel is much more heavily mineralized (96% mineral by weight). Cementum, whose composition differs only slightly from that of dentine, attaches the tooth to its periodontal ligament and provides a dynamic interface between tooth and surrounding bone, while enamel forms a crystalline cap over the working surface of the crown.

Primates have two sets of teeth during their lives, a deciduous set that is replaced by permanent teeth during childhood and adolescence. The human dental formulas are:

	Deciduous	Permanent
Maxilla	2 1 2	2 1 2 3
Mandible	2 1 2	2 1 2 3

Note that humans have no deciduous molars. Substantial individual variation occurs in tooth number, but most often the variant is the loss of a tooth at the boundary between tooth kind (incisor/canine/premolar/molar). Infrequently there can be supernumerary teeth or additional teeth near a boundary. In traditional notation the most mesial permanent premolars and the most distal incisors are lost in primates. Consequently the premolars of primates are designated the second, third, and fourth premolars -- presumably homologous to the primitive mammalian second, third, and fourth premolars. Humans are also missing fourth premolars, leaving us with premolars three and four. For example, the notation pm3 refers to mandibular third premolar, the premolar next to the canine on the lower jaw.

The greatest differences between humans and chimpanzees occur in the canine teeth. Small peg-like human

canines do not project from the tooth row. In contrast, chimpanzee canines are much larger, robust, and project far above their tooth row. Diastemas, gaps in the tooth row of the maxilla allow projecting mandibular canines to pass the opposing canine and incisor during occlusion. The maxillary canine passes the buccal side of its opposing pm3, allowing the lingual surface of the canine to make contact with a blade-like sectorial surface on the premolar. Humans lack the large diastema and the human pm3 is non-sectorial. Human anterior teeth (canines and incisors) are greatly reduced in size and human incisors are positioned close to a transverse plane that passes through the canine teeth. Chimpanzee incisors are positioned well forward of this plane. Consequently the parabolic or elliptical human dental arcade contrasts sharply with the U-shaped arcade of chimpanzees. Human molars tend to be rounder and more compact than chimpanzee molars. Occlusal molar surfaces of human teeth are relatively flat, and quickly become even flatter with attrition

Skeletal Elements

Skull

The skull consists of 28 bones that are conveniently described as the bones of the calvarium (supporting and surrounding the brain) and those of the face. Tiny bones of the middle ear, the conchae and vomer in the nose, and the ethmoid of the orbital vault are not easily seen. Although usually not considered part of the face, the hyoid bones form a skeletal element for the larynx. In addition to the openings that represent the eyes, nose, mouth and ears, the skull has numerous foramina for the passage of nerves and vessels. The bones of the cranium (the skull minus the mandible) are joined by irregular sutures that are obliterated after growth ceases.

Seven major differences between humans and chimpanzee skulls include:

(1) brain volume -- The human skull has a three -fold greater endocranial volume - reflecting a larger brain size, about 1200 cc in human and about 400 cc in chimpanzees. The larger size of the human calvarium allows ample surface area for the attachment of the powerful M. temporalis. Fibers from this muscle attach to the skull in the fossa temporalis and pass behind the zygomatic arch to insert on the coronoid process and anterior margin of the ascending ramus of the mandible. The temporal lines or temporal crests on the calvarium mark the terminal fibers of M. temporalis. If brain volume is small, producing a small calvarium (as in a chimpanzee), there may not be enough surface area on the calvarium for M. temporalis fibers to attach. Where fibers from the opposite muscle meet, a bony crest, in this case a sagittal crest is formed. Crest formation usually signifies a small calvarium relative to muscle size.

Endocranial Volume (in cm³)
[From Aiello and Dean 1990, Pp. 193]

Species	Lower 95% Limits for Mean	Upper 95% Limits for Mean	Mean
Human	1,159	1,243	1,201
Chimpanzee	391	409	400
Gorilla	452	486	469
Orang	385	409	397

The larger human brain volume also means that the calvarium is large relative to the size of the face. As the brain expands (comparing chimp and human), it appear to flex on an axis around the pituitary fossa. This produces flexion of the cranial base, a downwards shift in the posterior part of the cranium, and a forward rotation of the foramen magnum.

Expansion of the occipital lobes and cerebellum balloons the posterior cranial fossa, that in turn correlates typically with an asymmetrical cranial venous sinus system. In the human, a superior sagittal sinus drains venous blood in a transverse sigmoid route to the internal jugular veins. Enlarged occipitomarginal sinus systems typical of humans are infrequent in chimpanzees. The human middle cranial fossa expands with enlarged temporal lobes of the brain expanding the mid-section of the calvarium outward above the petrous portion of the temporal bone and the glenoid fossa. In chimpanzees, the calvarium is narrower than the cranial base but the human calvaria has its maximum width high on the parietal eminences rather than low at the cranial base. The anterior cranial fossa expands with the human frontal lobes. Consequently humans lack the postorbital constriction that occurs in chimpanzees and humans exhibit frontal eminence (forehead) above a greatly less obvious supraorbital torus (eyebrow ridge). Olfactory nerve tracts pass through the cribriform plate, a sieve-like structure in the middle of the ethmoid bone. In humans the median plane of the cribriform plate is the site of a process, the crista galli. This process is diminutive or absent in chimpanzees.

Ballooning of the calvaria in the temporal and occipital areas associated with the expansion of brain volume produces an apparent forward shift in the relative position of the foramen magnum. The human foramen magnum lies on a line, the bitympanic line, that connects the most inferior points on the lateral end of the right and left tympanic plates. The chimpanzee foramen magnum lies well behind the bitympanic line.

(2) nuchal crests -- Muscles that attach to the cranial base serve to position, move, and stabilize the head and cervical vertebrae. From a functional perspective, the skull is also the most superior point of origin for muscles (such as M. trapezius) that provide movement and stability to the back and shoulder. Consequently, some of the powerful muscles that attach to the skull have large attachment surfaces. The human occipital is a cup-like bone with a noticeable eminence, the external occipital protuberance. It is marked by nuchal lines and markings that represent attachment surfaces. The nuchal crests of the chimpanzee are more extreme. Its small skull combined with a much more robust musculature produces strong crests. Due to the flexion of the cranial base with expanded endocranial volume, the superior nuchal line is lower on the human skull.

(3) mastoid process -- The human mastoid process, the attachment surface of the sternocleidomastoid muscles, is distinct and separated from the outline of the occiput by a digastric fossa.

(4) premaxilla -- The smaller human incisivum, a homologue of the chimpanzee premaxilla, unites with the maxilla near the time of birth. The chimpanzee premaxilla is expanded to support the large and forward projecting incisors. It unites with the maxilla postnatally and the suture between it and the maxilla becomes obliterated.

(5) facial prognathism -- The projection of the face beyond the calvaria is greater in chimpanzees than humans. Flat faces are called orthognathic and projecting faces are called prognathic. The craniofacial angle, the angle between the most anterior point on the maxilla, the most anterior point of the sphenoid bone and the most anterior point of the foramen magnum, is used to quantify the extent to which the face projects beyond the neurocranium. Since this angle can not readily be measured on intact skulls, the angle that a sellion-prosthion line makes with the Frankfort plane serves as a convenient measure of facial projection. [The "Frankfurt plane" is the plane that passes through porion (right and left) and orbitale (right and left).] The porion is the most lateral and superior point of the external auditory meatus. The orbitale is the lowest point on the infraorbital margin. The sellion is the deepest point in the hollow beneath the glabella in the median plane. The glabella is the most anterior point in the median plane on the supraorbital torus. The prosthion is the most anterior point on the maxilla in the median plane.]

(6) chin -- The human mandible is reinforced by a bar of bone, the mental protuberance, that strengthens the symphysis, the union of right and left halves of the bone. The lingual or posterior surface of the symphysis bears a pair of genial tubercles that represent muscle attachment sites for M. genioglossus and M. geniohyoid. The ape mandible lacks a mental protuberance and is reinforced by an inferior transverse torus or "simian shelf". Viewed from above, the contrasting shape of the dental arcades is distinct.

(7) hyoid -- The human hyoid is a U-shaped bone just above the larynx. The stylohyoid ligament attaches the lesser horn of the hyoid to the styloid process of the temporal bone. Generally, these styloid processes point to the lesser horns of the hyoid bone. The chimpanzee hyoid is expanded anteriorly to accommodate a laryngeal air sack, and is located higher in the neck

Vertebral Column

The human vertebral column consists of 33 vertebrae divided into five functional regions.

1. Seven cervical vertebrae, easily recognized by their transverse foramina, form the skeleton of our neck. The joints (articular surfaces) between cervical vertebrae are very mobile.
2. Twelve thoracic vertebrae, mobile only in the coronal plane, support the ribs.
3. Five robust lumbar vertebrae in the lower back are tightly articulated to withstand the weight of the torso.
4. Five sacral vertebrae fuse to form the sacrum, the component of the axial skeleton in the pelvis.
5. Four caudal vertebrae extend downward from the sacrum. In adults these caudal vertebrae unit to form the coccyx, a hidden human tail that partially blocks the inferior pelvic aperture.

Viewed from the side, humans have a series of four curvatures. The dorsal outline of the cervical and lumbar regions are concave while the thoracic and sacral regions are convex. The forward curve of the lumbar region is called lordosis and that of the thoracic region is called kyphosis.

Chimpanzees generally have one more thoracic, one less lumbar vertebra, and one less caudal vertebra than do humans. Both normally have seven cervical vertebrae and normally the combined thoracic, lumbar, and sacral regions consists of 22 vertebrae. Chimpanzees lack the extreme curves of the human column, and the angle between the lumbar and sacral region is more acute .

Average Number and Range of Number of Vertebrae in Humans and Chimpanzees (after Schultz 1961)

Species	Thoracic	Lumbar	Sacral	TLS	Caudal
Human Mean	12.0	5.0	5.2	22.2	4.0
Chimpanzee Mean	13.2	3.6	5.7	22.5	3.3
Human Range	11-13	4-6	4-7		2-5
Chimpanzee Range	12-14	3-4	4-8		2-5

Thorax

The human chest consists of 12 paired ribs that articulate with the vertebral column. Ribs I through VII attach ventrally to the sternum. Ribs VIII through X terminate in cartilage extensions that eventually fasten to the sternum. Ribs XI and XII have free distal ends. The sternum is composed of six flat bones that fuse in adults to three units, the manubrium (segment I), body (segments II through V), and xiphoid process (segment VI). In some persons, especially in old age, the three units of the sternum may fuse to each other.

Consistent with their extra thoracic vertebra, chimpanzees usually have one extra rib (13 pairs). The human rib cage is slightly broader for its depth than the chimpanzee and the human thorax is less funnel-shaped. Chimpanzee ribs are also somewhat rounder in cross-section than human ribs

Pectoral Girdle

The shoulder is formed by the humerus, clavicle and scapula. The clavicle attaches firmly to the manubrium and acts as a strut to hold the shoulder joint away from the chest. Distally, the clavicle articulates with the acromion process of the scapula, a large triangular flat bone in the back of the shoulder. The glenoid cavity of the scapula articulates with the head of the humerus.

The most striking difference between the chimpanzee and human shoulder is in the proportions of the scapula. Human arm strength, much less powerful in movements when in a raised position, is reflected in the shape of the scapula that provides attachment surfaces and lever arms for muscles

Arm

The upper arm is a single bone, the humerus. The forearm is formed medially by the ulna, which articulates firmly by a hinge joint to the humerus, and laterally by the radius which is firmly attached to the hand. The radius pivots on the humerus and ulna to supply hand rotation (pronation) and is attached to the ulna by powerful interosseous muscles and ligaments.

The head of the humerus is useful in identification of gender of a mature unknown cadaver. If the maximum diameter of the head is greater than 45 mm, the individual is probably male. If the head diameter is less than 42 mm, it is probably female.

The chimpanzee distal humerus contrasts with the human. The human lacks the robust lateral supracondylar ridge, a high and robust lateral epicondyle, and the steep, sharp, lateral margin of the olecranon fossa. The chimpanzee forearm is relatively long in comparison to humans. Chimp radius and ulna are more curved than in humans and the chimpanzee distal radius has a radiocarpal joint surface that diverges medially. The major differences between human and chimpanzee limbs are contrasts in relative proportion. Chimpanzees have large powerful arms, slightly longer than their very short legs. Human arms are about 70% as long as human legs.

Long bone indices of Humans and Chimpanzees

[From Aiello and Dean 1990, Pp. 249]

Species	Intermembral Index	Humerofemoral Index	Brachial Index	Crural Index
Human (male)	69.7	71.4	77.9	82.4
Human (female)	68.5	69.8	77.0	81.3
Chimpanzee (male)	108.0	101.1	91.9	79.8
Chimpanzee (female)	109.4	102	92.4	80.4
Pygmy chimpanzee (male & female)	102.2	98.0	91.9	82.6

where:

Intermembral index = $[(\text{humerus} + \text{radius}) \times 100] / (\text{femur} + \text{tibia})$

Humerofemoral index = $(\text{humerus} \times 100) / \text{femur}$

Brachial index = $(\text{radius} \times 100) / \text{humerus}$

Crural index = $(\text{tibia} \times 100) / \text{femur}$

Hand

The hand has three skeletal regions: (1) The carpus, a series of eight carpals, form the wrist. (2) The hand consists of five metacarpal bones. (3) Phalanges form the skeleton of the fingers. The thumb, digit I has two phalanges (proximal & distal), while digits II through V have three phalanges (proximal, middle and distal).

The chimpanzee hand is notably different from the human hand in the relative length of its digits. The chimp thumb is much shorter than in humans, phalanges exhibit much more robust insertion areas for flexor tendons, and metacarpals have transverse ridges across their heads that limit dorsiflexion

Pelvic Girdle

The pelvic girdle is formed by the sacrum, coccyx, and the two coxae. Each coxa is attached by strong ligaments to the sacrum and to each other at the pubic symphysis. A coxa is formed by the fusion of three bones, the ilium, ischium, and pubis, which meet in the acetabulum or hip socket.

The human female has a larger birth canal than does a male. Consequently there is a constellation of characters that can be used to identify the gender of an unknown pelvis. The pelvic inlet of females is larger and has a greater absolute circumference. The superior ramus of the pubic bone is longer, increasing the pubic/ischium ratio. The greater sciatic notch is wider and forms a longer angle. The increased pubic length and laterally displaced ischia result in a wider subpubic angle. The growth and remodeling of the pubis produces extra bone at the symphysis, leaving a concave inferior ramus, a ventral arc that represents a previous border of the symphysis, and a narrow inferior pubic ramus. The female pubic symphysis is likely to be longer in its superior-inferior diameter and smaller in its dorsal-

ventral diameters than is that of a male. Females are more likely to have a well-developed preauricular sulcus, and those who have borne children may have pits or guttering along the dorsal border of the pubic symphysis. Since they have smaller femurs, females have smaller acetabula.

Sexual Dimorphism in the Primate Pelvis

(After Schultz 1949 and A & D 1990)

Species	n	Mean	Min	Max
Human (male)	50	79.9	71.0	88.0
Human (female)	50	95.0	84.0	106.0
Chimpanzee (male)	21	86.2	69.7	95.2
Chimpanzee (female)	30	87	78.9	98.9

Differences in the pelvis reflect the differences between the habitual bipedal locomotion of humans and quadrupedal movements of chimps. The pelvis of the two primates have radically different form and locomotor function. The relative width of the iliac blade (width/length x 100) is much larger in humans (125.5) than in chimpanzees (66.0). The human ilium is broad and low, while the chimp ilium is narrow and high. The human has a barely noticeable iliac pillar or thickening which extends from the iliac tubercle to the acetabulum. The human has an anterior inferior iliac spine. The human acetabulum is larger, reflecting the larger head of the femur, and the superior border of the acetabulum is reinforced to sustain the pressure of bipedal walking. The inferior border of the ilium near the auricular surface forms a greater sciatic notch in humans. The auricular surface is larger in the human. The ape sacrum is long and narrow

Leg

The femur, the bone in the thigh, articulates ball and socket fashion in the acetabulum of the coxa. The lower leg contains a large medial bone, the tibia, which articulates with the femoral condyles to form the knee. Lateral to the tibia, the fibula is a small, irregular bone that provides attachment surfaces for muscles. Projections on the distal ends of tibia and fibula, the medial and lateral malleolus, form a secure slotted proximal structure for the ankle joint.

As in the head of the humerus, a maximum diameter of 45mm or greater for the femur head indicates a male gender.

The human femur is longer than the chimp femur and usually has an elevated pilaster that supports the linea aspera down the shaft. The angles of the head, shaft, and condyles contrast markedly with those of the ape. The load axis never intersects the shaft in a chimpanzee femur. The femoral condyles of the human are larger and more elliptical than are those of the chimp. The human femur has a larger articular surface and mid-shaft circumference when compared to the arm than does the chimpanzee. The chimpanzee has a similar ratio between femur length and tibia length but the chimpanzee leg (including both femur and tibia length) is much shorter relative to the arm. The chimpanzee proximal tibia is smaller, less well supported by the shaft, and has condyles that are more convex than is usual in humans

Foot

Like the hand, the foot has three anatomical regions: (1) The seven bones of the tarsus form the ankle and proximal half of the foot. (2) The middle portion of the foot consists of five metatarsals. (3) Phalanges, the skeletal elements of the toes, have the same number and arrangement as in the fingers.

The primary difference between the human and chimp foot is the contrast between prehensile functions of the ape foot and the anatomy of bipedal striding in the human. The chimpanzee foot has an opposable hallux and long phalanges. The human foot has greatly reduced digits, with all metatarsals parallel and an increase in the lever arm of the tarsus for striding. In the human foot, a longitudinal arch provides a shock absorbing and weight distribution system. The orientation of the ankle joint allows the tibia to take a straighter path over the foot during walking

Skeletal Maturation

The bones of the limbs and vertebral column are endochondral, that is, they are first formed as cartilage that is gradually replaced with bone. Centers of ossification in the cartilage gradually enlarge to form the bone. The body or shaft in long bones is called the diaphysis, or primary center of ossification. The ends of long bones have secondary centers of ossification, called epiphyses, that are separated from the diaphysis by cartilage plates. Eventually, the cartilage plates, the epiphyseal cartilage, are replaced by bone and the epiphyses unite with the diaphysis to form a single bone. The flat bones of the skull, mandible, and clavicles are intramembranous bones, formed from membranes, and generally do not have epiphyses

Locomotor Anatomy

Much of primate anatomy reflects habits of movement and commonly utilized substrate. Since the powerful legs of most primates are slightly longer than their arms, the pelvis is normally higher than the head when standing quadrupedally. However a few species exhibit extreme locomotor specialization, emphasizing arms for arm-swinging, legs for leaping, or arms and legs comparable in length for quadrupedal climbing or walking on the ground. Thus, limb length (Intermembral Index or IM = Length of Humerus + Radius x 100/ Length of Femur + Tibia) can serve as an index of the relative emphasis upon the arm versus the leg for propulsion:

1. Short limbs with leg and arm comparable - quadrupedal and arboreal

These animals walk on larger horizontal tree branches as if they were pathways. Short, usually robust, arms and legs lower their center of gravity. IM index is usually about 80 but approaches 100 in howler monkeys. Other characteristics include moderately sized fingers and toes; very prehensile hands and feet; and relatively mobile shoulder joints located and directed sternally on the thorax. Some species, especially those which perform spectacular leaping feats, have flexible, elongated backs (with extra vertebra) and powerful musculature associated with the back and hind limb. A few species in the Americas have somewhat prehensile tails that serve to anchor the animal when it feeds near the ends of branches.

2. Long limbs with leg and arm of equal length - quadrupedal and terrestrial

Terrestrial quadrupeds tend to have shortened digits and elongated, robust tarsal and metatarsal elements. IM index is above 90. The shoulder joint, lying alongside the narrow and laterally flattened thorax, is oriented toward the ground. The weak clavicular-sternal joint is easily dislocated from the segmented sternum. Arms and legs, modified for powerful sagittal motions, have a relatively small range of movement. The humerus bears a prominent deltoid process (the attachment surface for the M. deltoideus) and the ulna has a large olecranon process, the insertion point of the M. triceps brachii, a powerful forearm extensor. Hands are pronated when in contact with the ground. One species, the patas monkey, is digitigrade (like a cat), with specialized anatomy for terrestrial running in which only fingers and toes make contact with the ground.

3. Very long limbs with leg and arm of comparable length - quadrupedal and arboreal with an emphasis on quadrupedal climbing and suspension

A few primate species in the Family Loriscidae combine quadrupedal suspensory climbing with quadrupedal arborealism, requiring great joint mobility and wide range of movement. IM index is about 90. Their hands and feet are particularly prehensile.

4. Arm longer than leg - brachiation and arboreal

Brachiation (arm swinging) is a special form of locomotion in which the body is suspended below branches. It allows utilization of small branches near the fringe of a tree canopy since the brachiator is suspended beneath its handholds. In contrast, a large bodied quadruped that tries to walk on a small branch has difficulty balancing as the supporting tree limb bends. A brachiator can easily exploit the very fringe of a tree canopy by dispersing its weight to the ends of several branches. New World brachiators use their prehensile tail as a fifth prehensile limb to further disperse weight. Most rapid brachiation is attained by using gravity to convert vertical height to speed. IM index is 100 or above.

Brachiation generally is associated with major alterations in the arm, hand, and thorax. The shoulder joint is positioned laterally and cranially on a barrel-shaped thorax. Robust muscles attach to the sternum, vertebral column, head, and rib cage, stabilizing the shoulder. The more powerful the arm movements, the more robust the stabilizing musculature must be. The clavicle acts a strut to stabilize the shoulder joint against a sternum whose segments unite to form a single bone. This clavicular-sternal joint is very strong and is not easily dislocated. A relatively round head of the humerus reflects a very wide range of motion. Additional elbow strength results from a more distinct separation of the radius and ulna on the articular surfaces of the distal humerus. The olecranon process of the ulna is small, allowing full extension of robust forearms. Brachiators tend to have reduced thumbs. If a thumb is present, it is folded out of the way against the palm where it does not interfere with elongated fingers that hook or snag handholds. The lumbar region of the vertebral column is shortened and stabilized, and a very mobile hip joint allows the foot to grasp anchorage in a wide range of positions.

There are several types of brachiators. Gibbons and siamangs, who use arm swinging as a major means of travel, are the best brachiators. Chimpanzee, gorillas, and humans are capable of this type of brachiation, but do not practice it as a primary means of locomotion. The orangutan combines quadrupedal climbing and brachiation, but like chimpanzees and gorillas, is typically a terrestrial quadruped.

At least one New World primate, the spider monkey, practices a variation of brachiation in which the body is kept vertical while brachiation is performed by hands, feet and sometimes the tail. This requires unusually long legs and mobile hips. When moving at slower speeds or while feeding, the spider monkey behaves as an arboreal quadruped. Its tail is the most prehensile of any primate.

5. Arm longer than leg - quadrupedal knuckle-walking and fist walking

Knuckle-walking is quadrupedal locomotion with the hands pronated and fingers flexed resulting in dorsal surfaces of the middle phalanges contacting the ground, supporting the weight on the knuckles. Gorillas and chimpanzees are habitual knuckle-walkers, whereas orangutans usually move quadrupedally with the hand made into a fist. IM indexes for the chimpanzee, gorilla, and orangutan are 102, 116, and 139, respectively.

6. Leg longer than arm - leaping and arboreal

A special class of leaping locomotor behavior, in which the body is positioned vertically at rest, is called vertical clinging and leaping. It requires powerful hind limbs to propel the leap as well as to break the impact of landing. Most (but not all) vertical clinging and leaping species have a tail that is used maintain attitude control during leaps. Rapid movements are so well-coordinated during flight that the animal transits the crown of a tree without appearing to make contact with branches. This visual impression of suspending the laws of gravity fueled many "ghost" myths associated with vertical clinging and leaping primates. There is a tendency toward elongation of tarsal elements, especially calcaneus and navicular. Posterior elongation of tuberosity of the calcaneus serves as a robust lever arm for M. gastrocnemius and M. soleus, powerful flexors of the foot. The tendency for fusion of the tibia and fibula is fully expressed

only in the tarsier. IM index is below 70.

7. Leg longer than arm - bipedalism

Though obligate bipedalism is found only among humans, many other primate species are capable of facultative bipedalism. Foot specializations for bipedalism include an enlarged and robust tarsal region, greatly reduced phalanges, and strong ligaments that bind tarsals and metatarsals into shock-absorbing longitudinal and transverse plantar arches. A large calcaneus tuberosity acts as a lever arm for plantar flexion. The most unique character of the long, robust legs is the placement of the knees (when in anatomical position) close to the median sagittal plane, functionally beneath the body's center of gravity. The knee itself is adapted to locking in full extension with deep grooves to stabilize the patella, a bone that forms in tendons of the quadriceps muscle. The broadened hip becomes a primary weight-bearing joint, characterized by an enlarged femur head as a weight-bearing surface. Pelvic anatomy is dramatically rearranged. A relatively broad sacrum positioned above the hip joint transfers weight to femur head via a wide and robust ilium. A shortened ischium places the ischial tuberosity relatively close to the acetabulum. The vertebrae, increasing in size progressively from skull to sacrum, are arranged in a ventral-dorsal S-shaped curve above the pelvis. Though free of locomotor tasks, the arm retains the range of movement seen in brachiators. IM index is 70.

8. Climbing by nails

Elongated and laterally compressed nails of callitrichines have the functional attributes of claws. Although they climb by grasping small branches, they are able to use these specialized nails to cling to relatively flat, vertical surfaces of larger trees. IM index ranges from 70 to 80

Primate Vision

Color vision is a primate characteristic that presumably reflects our arboreal ancestry. There two types of photoreceptors in the primate retina: rods which function better at low light levels (scotopic vision), and cones which respond to much higher light intensities (photopic vision). The eyes of most diurnal mammals have cones more numerous toward the center of the retina (the region of sharp focus) and more rods toward the periphery. Nocturnal primates have only rod photoreceptors in the retina. The retina of higher primates has a macula lutea (yellow spot) of cones. The fovea, a small depression in the center of the macula in which there is only a single layer of cones, is the area of keenest vision and the target of focusing by the lens.

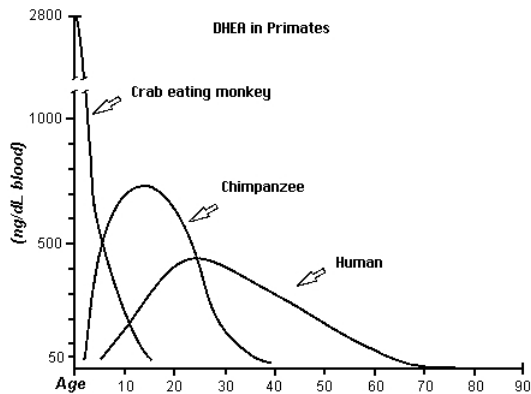
Color vision is produced by photosensitive pigments that differentially absorb wavelengths. Color perception depends upon the relative degree to which each pigment is stimulated. Primates have three different pigments, producing trichromatic vision.

Anthropoid vision is stereoscopic; that is, the eyes are positioned forward, allowing an overlap of most of the fields of vision with the optic axes parallel. An object is focused on both retinas simultaneously. The optic nerve tracts that pass information from retina to the brain meet at the optic chiasma. In most vertebrates and marsupials the fibres of the optic nerves cross at the chiasma and pass to the opposite of the brain. However in mammals, some of the fibres do not cross over so information from each eye is processed on both hemispheres of the brain

Note B: More on Differences

"I'm not interested in what I share with the mouse; I'm interested in how I differ from our closest relatives, chimpanzees," says Svante Pääbo, a geneticist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. Such comparisons, he argues, are the only way to understand "the genetic underpinnings of what makes humans human." With the human genome virtually in hand, many researchers are now beginning to make those comparisons. At a meeting here last month, Pääbo presented work by his team based on samples of three kinds of tissue, brain cortex, liver, and blood from humans, chimps, and rhesus macaques. Pääbo and his colleagues pooled messenger RNA from individuals within each species to get rid of intraspecies variation and ran the samples through a microarray filter carrying 20,000 human cDNAs to determine the level of gene expression. The researchers identified 165 genes that showed significant differences between at least two of the three species, and in at least one type of tissue. The brain contained the greatest percentage of such genes, about 1.3%. It also produced the clearest evidence of what may separate humans from other primates. Gene expression in liver and blood tissue is very similar in chimps and humans, and markedly different from that in rhesus macaques. But the picture is quite different for the cerebral cortex. "In the brain, the expression profiles of the chimps and macaques are actually more similar to each other than to humans," Pääbo said at the workshop. The analysis shows that the human brain has undergone three to four times the amount of change in genes and expression levels than the chimpanzee brain ... "Among these three tissues, it seems that the brain is really special in that humans have accelerated patterns of gene activity," Pääbo says." (from <http://www.sciencemag.org/cgi/content/full/292/5514/44>)

Another known chemical difference is the use of DHEA through out the longer life span of the human as compared to the chimpanzee and a monkey. The use of DHEA may be a main factor in the growth of the brain. In the competition for DHEA among tissues, nervous tissues capture DHEA better than other tissues. Brain tissue naturally contains 6.5 times more DHEA than is found in other tissues. Also DHEA along with testosterone may be a factor in hair growth.



This figure is derived from the first chart (human DHEA); Journal of Reproduction and Fertility 1985; 74: 347, from Text-fig. 5, page 355 (monkey); and J. Repro. Fert. Supplement No. 28; 1980, from Text-fig. 5, page 137 (chimpanzee) (from James Michael Howard <http://www.anthropogeny.com>)

Studies of the usage of the antioxidants have revealed another difference. Antioxidants may be a major factor in health and longevity.

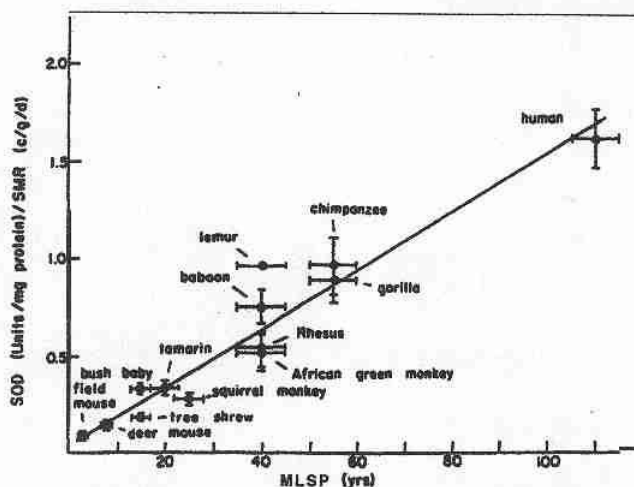


FIG 2. Superoxide dismutase concentration per SMR in liver of primate species as a function of MLSP. Reprinted with permission from Cutler [12].

The studies will continue as the evolutionists search for the ultimate proof that man and chimps evolved from a common ancestor!! But, as more and more differences are discovered, which is proved, the theory of evolution, or the creation record of the Scriptures?

Chapter 5; Adam Named the Eagle and the Lion?

Genesis 2:19-20 "And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them:

and whatsoever Adam called every living creature, that was the name thereof.

And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field;" ... (KJV)

This all happens before the creation of Eve in Genesis 2:22 and before the "fall" as described in Genesis 3:6 !

Looking in Strong's Hebrew Dictionary at a few Biblical Hebrew names for common animals we find;


	Strong's #	
Lamb, a Sheep	#7716	"the idea of pushing out to graze"
Horse	#5483	"as leaping"
Sparrow	#6833	"a little bird (as hopping)"
Bird	#5775	"as covered with feathers"
Dove	#3123	"from the warmth of their mating"
Serpent	#5175	"a snake (from its hiss)"
Ant	#5244	"from its almost bisected form"
Fox	#7776	"as a burrower"
Lion	#738	"in the sense of violence"
Cormorant	#7994	"from casting itself into the sea"
Hawk	#5322	"from its flashing speed"
Night Hawk	#8464	"from it's violence"
	#5404 Hebrew,	

Eagle	{nesher}, Chaldee, {neshar}, Syriac, {neshro}, Arabic, {nesr}, Aramaic, {nishra}	"to lacerate ... large bird of prey"
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Thus we see that the names derive from observable physical characteristics of the animals or their observable behaviors. The cormorant is named due to its diving into the water in pursuit of its prey. And that the names of the lion, night hawk (perhaps an owl) and eagle relate to their violent preying nature ! H. W. F. Gesenius in his Lexicon provides a more graphic description for the eagle; "to tear in pieces with the teeth, to rend (as a bird of prey)".

Conclusion: Either the Biblical Hebrew names for the lion, cormorant, night hawk and eagle are not the same as those that Adam gave; or Adam observed violent animal behavior before the creation of Eve and the "fall", contrary to the teaching of some scholars that there was no death and violence before the "fall" !

Ref: "A concise Dictionary of the words in the Hebrew Bible; with their renderings in the Authorized English Version by James Strong, S.T.D., L.L.D. (copyright, 1890, by James Strong, Madison N.J.)

<p>Eagle, common name for a number of diurnal birds of prey, some of which are the largest members of their family which also includes kites, hawks, buzzards, and certain vultures. The name eagle is somewhat loosely applied, as several of the groups are not particularly closely related to one another, and some birds called hawks are larger than some called eagles.</p> <p>Microsoft® Encarta® Encyclopedia 2000. © 1993-1999 Microsoft Corporation. All rights reserved.</p>	
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<p>Lion, one of the largest members of the cat family. The lion's size and strength have captured human imagination since ancient times, giving these animals the nickname king of beasts. Lions are also known for their mighty roar, a fearsome sound that can be heard by humans more than 8 km (5 mi) away. Lions once ranged over vast areas on many continents. Fossil evidence shows that until about 10,000 years ago, lions lived throughout Africa, Europe, the Middle East, and into Asia as far as southern India and the island of Sri Lanka. They also lived in North America and northern South America. "Lion," Microsoft® Encarta® Encyclopedia 2000. © 1993-1999 Microsoft Corporation. All rights reserved.</p>	
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Chapter 6; Adam and Eve will Surely Die, Sudden Death?

There are some significant differences in the Hebrew words that have been translated as "die" and "surely die" in the recording of the communications of the Lord, Adam, Eve, and the serpent. The quote from the Scriptures that follow are Word by Word translations from the "Interlinear Bible" by J. P. Green and following each passage there is a magnified selection from the "Interlinear Bible" which is included to show in detail the recorded Hebrew words that are translated as die in each Passage. (Remember that Hebrew is read from right to left.)

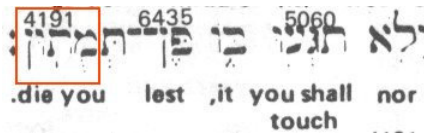
"... Of every tree of the garden surely you may eat;
 but of the tree of the knowledge of good and evil
 not you shall eat from it;
 in the day of your eating from it
 surely you shall die". (Genesis 2:16-17)

4191	4191	698	3117	וּ
:תמות	מות	ממנו	אכלך	ביום
.die	it	eating	of day	for

Notice that the Hebrew word (Strong's # 4191) is repeated which is a technique often used in the Hebrew for emphasis and the last of the passage is often translated more literally as "dying thou shall die". A less literal translation is "for as soon as you eat of it, you shall be doomed to die". For we know from reading the rest of the story the penalty was not sudden physical death, but as soon as the disobedience occurred

Adam and Eve's relationship with the Lord was drastically changed and they were reduced to hiding in the bushes, the penalties were soon announced, and they were banished from the garden to continue the rest of their life in toil and sorrows.

"And said the woman to the serpent.
Of the fruit of the trees of the garden we may eat,
but the fruit of the tree in the middle of the garden had said God,
not shall you eat of it, nor shall you touch it,
lest you die." (Genesis 3:2-3)



Notice that Eve did not repeat the form of the Words of the Lord! Instead she varied the Hebrew word translated as die and did not use the repeated word form used for emphasis. She also added the phrase about not touching it. The word form she used is unusual and similar forms appear only in Numbers 16:29 and Isaiah 22:14 and in both of these occurrences it appears to mean a physical death under conditions of judgment. It would appear that in her statement she was possibly showing her uncertainty or lack of full understanding as to exactly when and what would be the result of disobedience and the seriousness of the penalty. Eve would seem to have no way of knowing about death unless she had witnessed the physical death of a plant or an animal.

"And said the serpent to the woman,
Not surely you shall die." (Genesis 3:4)



The reply of the serpent is phrased negatively and returns to the repeated word form but uses the same word form as the Lord for the first word and the word of Eve for the second word. This repeated word form is unique and appears no where else in the Scriptures. Therefore, the reply seems to be directed to how Eve had phrased her answer and to be correcting her statement or adding special emphasis in a negative way. There surely must be meanings within these Hebrew word changes that are not fully revealed by the translations. Looking in Strong's "Dictionary of the Words in the Hebrew Bible" we find the following.

4191. מוּת, mûwth, mooth; a prim. root: **to die**
(lit. or fig.); causat. to kill:— × at all.
× crying, (be) dead (body, man, one), (put to, worthy of) death, destroy (-er), (cause to, be like to, must) die, kill, necro [-mancer], × must needs, slay,
× surely, × very suddenly, × in [no] wise.

Note that there is also the possible meaning, especially for the repeated word form, of a very sudden death. None of the translators have included the possibility that there is a sudden time implication in the words. Looking in "The Word" by Isaac E. Mozeson we see the following.

עָה / KHAT, it too is a CUTTING term. There is a range of TMTIME words in Hebrew. תָּם / TUM is to be finished, to be destroyed, to cease, or to be "spent" in Numbers 26:20. Reversing this term brings מָת / MAT (to die) and מָתִי / MATĪ (when?). תָּמֹל / TIM(ĪL) is "formerly" or "yesterday"—Genesis 31:2. On the contrary, תָּמִיד / TĀM(ĪD) means "always" and "continuity" (Exodus 28:29).

Indicating that the words translated as die are in a family of words whose variations can also indicate a timeliness. The short two letter form is found a number of times in the later part of Genesis as shown in the selection below from Genesis 50:5.



It would appear that Eve is either being corrected or gaining new information concerning the result of disobedience. Possibly the recorded serpent's reply could be more literally word for word translated as:

"Not dying shall you die suddenly"

This would be contrary to what many have concluded, in that they have proposed that the serpent was contradicting the Lord. Instead it is proposed that the serpent as "wise" or "subtil" was communing in

truth, that is partial truths. The apparent confusion on Eve's part causes us to wonder if she fully understood all of the terrible consequences of disobedience.

It would appear that Eve by using the short form of to die, with the added vowel connected n consonant, was saying that she believed that if she touched the fruit of the tree of knowledge she at that moment would die. While the Lord was using a softer form of to die which did not necessarily indicate a sudden death. The serpent was then possibly informing her that the tree of knowledge was not about death, but as its name implied was about knowledge only. No information was given to explain how severely the act of disobedience would be punished. Eve then saw that the fruit was pleasant to the eye and some how even saw that it was good to eat. How she saw that it was good to eat is not explained. Could it possible be that she witnessed the fruit being eaten, possibly even being eaten by the serpent?? And then
"she took of the fruit thereof, and did eat,
and gave also unto her husband with her; and he did eat.

CONCLUSION: An alternate translation of the communication between the serpent and Eve is proposed which is believed to be more in line with the Masoretic Text and as suggested by Strong's dictionary. The new translation changes the serpent's answer to Eve from a direct contradiction to the Words of the Lord to that of informing Eve that the result of her disobedience will not be sudden physical death. A less literal variation of the translation could be

"You will not very suddenly die".

Note: Does the Hebrew require that the serpent speak vocally?

Answer: NO!

Verse 3:8 says that Adam and Eve heard the voice/sound of the Lord in the garden and 3:17 says Adam listened to the voice of Eve. However, the Hebrew word used in the verses concerning the serpent, the Hebrew word usually translated as said, and transliterated as "amar" (Strong's #559) per Strong is a primary root, to say, but "used with great latitude". This translation latitude includes "said in his heart" of Genesis 17:7 and 27:41. "Think" of II Samuel 13:33 and of II Chronicles 13:8. And "commune" of Psalms 4:4. Therefore the Hebrew word can cover communications from vocal speech to private thoughts of the heart. We are told that the "serpent" was more "subtil/wise/cunning/clever" of all the "wild beasts". Ask any pet owner that has a "clever" pet and most usually they will say that they can know what their pet is thinking and wants from its owner. Even many wild animals not considered as being so clever have a way of communicating with humans. The editor recently had an experience when they were watering their garden inside a six foot high fence on a very hot evening and there appeared a wild hen turkey and three babies just outside the fence, and even though being far from one "who talks with the animals", we could readily see that the birds wanted water and sprayed a puddle on the ground outside the fence from which the birds rapidly quenched their thirst.

We have already discussed that quite possibly Eve saw the serpent eating of the fruit and possibly this was the primary way in which the temptation occurred. (By the way, the Hebrew word for serpent (from its hiss) is used in Isaiah 27:1 to describe the monster Leviathan, so it is possible that the serpent's appearance was not that of a common snake.) It is then quite possible that the serpent "communed" with Eve totally without using vocal speech! Many scholars have seen it proper to assume that Adam and Eve were of superior intelligence and that the "mother of all living" would have a heightened sense of understanding for the animal kingdom. Visualize the serpent in or under the forbidden tree, eating of the fruit and obviously enjoying its self and then looking directly at Eve and continuing to joyously eat away. Could not this scenario easily communicate to Eve that the fruit is beautiful, good tasting and non-poisonous? But we still have the problem of how she saw that it was "a tree to be desired to make one wise". Eve said "of the tree that is in the midst of the garden", did she know that it was the "tree of the knowledge of good and evil" and understand the implications thereof due to instructions from Adam, or did she assume it was a fruit for making one wise due to her knowledge of the "cleverness" of the serpent and assume that the fruit was the source of its wisdom? Strong informs us that as with many Hebrew words, the word "raah" (#7200), which is translated that Eve saw, can be literal or figurative and therefore could be translated as she discerned or perceived.



**Chapter 7; The Curse,
because of you the ground shall be cursed!**



"And to the man He said,
Because you have listened to the voice of your wife you have eaten of the tree
about which I commanded you, saying, you shall not eat from it,
cursed shall be the ground because of you;
in sorrow you shall eat of it all the days of your life.
And thorns and thistles it shall bring forth for you,
and you shall eat the plant of the field.
By the sweat of your face you shall eat bread until you return to the ground;
for out of it you have been taken;
for dust you are, and to dust you shall return. (Genesis 3:17-19)

And said Jehovah God, Behold!
The man has become as one of Us, to know good and evil.
And now, lest he put forth his hand and take also from the tree of life,
and eat and live forever,
therefore sent him Jehovah God out of the garden of Eden
to till the ground which he was taken from.
And He drove out the man...." (Genesis 3:22-24)

"And he called his name Noah, saying,
This one shall comfort us from our work and the toil of our hands
from the ground which has cursed Jehovah." (Genesis 5:29)

The above are the word by word translations from the "Interlinear Bible" by J. P. Green

From the William Whiston translation of Flavius Josephus's "Antiquities of The Jews" we find
"... the ground should not henceforth yield its fruits of its own accord, but that when it should be harassed
by their labour, it should bring forth some of its fruits, and refuse to bring forth others."

There have been proposed many theories concerning the extent of the curse and its consequences to mankind. Following being driven out of the Garden of Eden man left behind the fabled "paradise" and began his life in the "cursed" world. What were the differences? We know that the soil of today is quite varied over the surface of the earth. With some areas being quite fertile and having very deep rich top soil. While other areas have no top soil and nothing will grow. Also the watering conditions vary considerably with areas that are water soaked marsh lands to the deserts where nothing can grow. However, many of the desert areas need only to be watered and they will grow crops abundantly. Also the soil chemistry varies considerably from area to area to the extent that some areas would seem to grow almost any plant to areas that are poisoned by salts. Some plants like the chemistry of one area and other plants like the chemistry of another area. The color of the blooms of some plants are a function of the chemistry of the soil. Some plants like cool or cold areas while other plants like moderate or hot climates. Some like the desert and others thrive only in high humidity. As we know it today the most fertile soils are quite often those that contain a higher percentage of dead and decayed organic materials.

Adam was commanded to "dress it and keep it ", however it seems logical to assume that in the garden the amount of work necessary was relatively minimal for plants to grow abundantly and that the soil, watering and temperature conditions were "very good" for the plants that the Lord choose to provide therein. The climate also being very moderate since the occupants were unclothed at the beginning. This has caused some scholars to postulate a "vapor canopy" condition such that the climate would be much more moderate and more humid all over the earth. However, there was probably a daily heating and cooling effect since from 3:9 we find "And heard they the sound of Jehovah God walking up and down in the garden at the breeze (or cool) of the day," Therefore if the "canopy" was in effect there was still enough sun heating to provide a noticeable difference between the day and the evening.

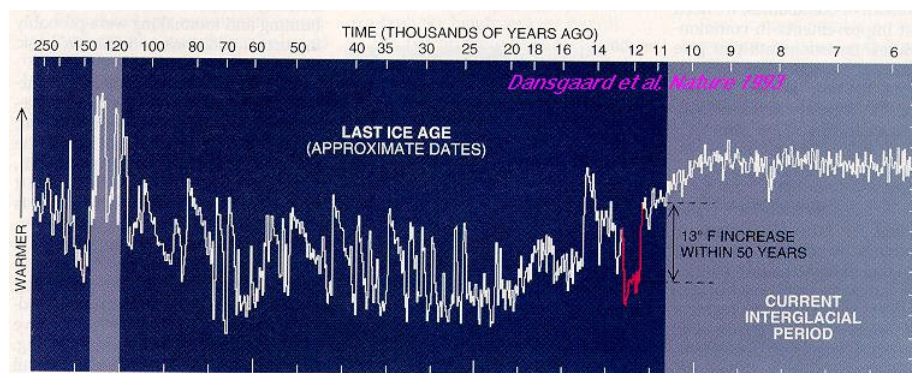
One factor that greatly effects the soil of today is erosion, whether by water or wind. Heavy rains cause leaching conditions that result in some areas being depleted of beneficial minerals and with other areas having mineral concentrations. We know that thousands of acres of farm land are lost every year due to erosion caused by poor farming practices. Also large storms cause temporary flooding and massive erosion. This again leads many scholars to postulate a more moderate climate with only gentle winds and a very gentle watering of the soil. If Adam and Eve had been placed in a rain forest, the taller vegetation could have provided the climate modifying "canopy". These wonderfully bountiful forests are being rapidly depleted by unwise practices of humans today. Where these forests have existed some communities of people who have used wise conservation practices have lived a wonderfully bountiful existence for centuries.

In Genesis 1:31 the Lord observes that the creation of the "6 days" was "very good". The Hebrew word translated as "good" is transliterated as "towb" (Strong's #2896), which is translated in a wide sense in many other places in the Scriptures as beautiful, bountiful, pleasant, precious, well favored and a number of other similar terms. However, it is never translated as "perfect". If it was the intention to imply that all

was perfect there are other Hebrew words that could have been used such as "tamiym" (Strong's #8549) which is used in Genesis 6:9 to describe Noah's generations and in 17:1 where Abram is exhorted to "walk before me, and be thou perfect". "tamiym" is also translated as being whole, without blemish, complete, and undefiled. The point is that many have postulated that there was no death and decay in the garden and in the entire creation at this time before the "first sin" in the garden, and the Hebrew wording would not necessarily support this theory. Also, if there had been no death and decay of plants before and while the garden was occupied by man, its soils would have to have been "bountiful" without the benefit of organic compost which is so much a part of the soil fertility of today and the best tool of all organic gardeners.

CONCLUSION: There have been many theories proposed concerning the nature of "the curse" by many students of the Scriptures. And to date most of them seem to be less than fully satisfying. To Adam and his offspring the main effect was that they had to work and sweat to obtain their food. It would appear that this effect could have been the result of nothing more complicated than a more severe climate than that of the garden. It did not necessarily take an extreme change in the "laws of physics" to accomplish the results of "the curse", as some have theorized.

Note: Can Ice Core data give us an indication of when the Curse was?



The above plot shows the sudden climatic change (in red) which has become a topic of considerable study and theorizing for the scientific community and has been named the Younger Dryas climatic change. Also a while before it we have a warming "spike" called Bolling by the scientific community. As they indicate the dates are "approximate" and data from seven studies including tree rings, varves, coral dating, and Greenland ice cores indicates the termination of the Younger Dryas to be within a range from 10,447 to 11,700 yr. B.P. (avg. 11,074 +/- 627) (from Paleo 122(1996)p.114, Table 2). We are here proposing that there is a possibility that the garden of Eden existed during the warming period of the Bolling between 15,000 to 14,000 yr. B.P. and the "curse" began with the termination of Bolling and ended with the termination of Younger Dryas and the flood.

... cursed is the ground for thy sake;
in sorrow shalt thou eat of it all the days of thy life;
(Genesis 3:17 KJV)

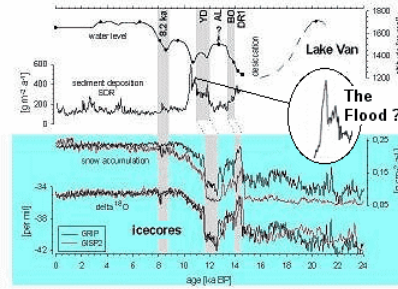
And he called his name Noah, saying,
This same shall comfort us concerning our work and toil of our hands,
because of the ground which the Lord hath cursed.
(Genesis 5:29 KJV)

... I will not again curse the ground any more for man's sake;
for the imagination of man's heart is evil from his youth;
neither will I again smite any more every living thing,
as I have done.
(Genesis 8:21 KJV)

To the ancients the main effect of the "curse of the ground" was that they had to toil harder to get the necessary food to sustain their life. And one possible way to make it more difficult to grow and harvest plants would be simply for the climate of the earth to become more severe. Genesis 8:21 is the last mention of the "curse of the ground" in the Scriptures.

Therefore for the proposed theory to possibly be a reality the following conditions must be correct.

- 1) The garden of Eden would have been planted and man created and put in the garden during the Bolling period when the earth was in a warming trend.
- 2) With the "curse of the ground" the severe climatic condition was started (Genesis 3:17) and Adam and Eve put out of the garden. At approximately 14,000 yr. BP with the termination of Bolling per the data charts above and below.



(modified fig. 3 from <http://www.tu-darmstadt.de/fb/geo/gpi/landmann/abstract/gusdvs.htm>)

The plot above indicates that after the Bolling period the climate around Mt. Ararat was considerably cooler and drier, evidenced by the stopping of the filling of Lake Van, and subsequent lowering over the years to levels more than 300 meters below its present level. (Again there are dating problems and questionable lake level data areas as indicated.)

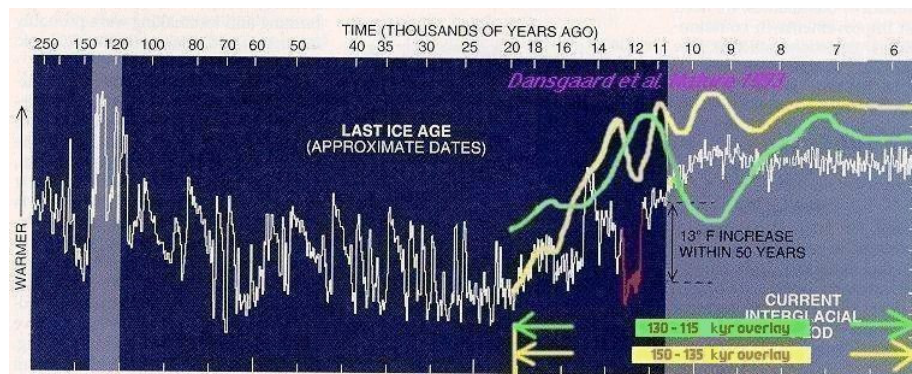
3) The Younger Dryas was ended and shortly after was the flood. At approximately 11,000 yr. BP.
 4) The end of the Younger Dryas and the flood was also the end of the "curse of the soil" as per Genesis 8:21.

Note that per the data plots, since the Younger Dryas was over, the earth continued its warming trend and the human species has been living in a very nice climatic condition ever since. Many are concerned that this wonderfully climatic condition will soon end either by man's pollution of the earth, a natural disaster, or at the hand of God.

Conclusion: The above proposal is made knowing that very few will be convinced by the above, but, the possibility has surfaced due to recent studies and is there by presented for all that read this to consider. Knowing that for many to consider the possibility they will have to consider making many changes to their concepts of the Genesis record!

Note B: Global Warming

The news media is always giving us lots of information about "global warming" and it has become a strong banner to be waved by the politically correct. But if we take another look at the top data plot from the note above we see that much earlier in the lightened band to the left there are warming spikes with temperatures reaching higher values than those of the present warm cycle. To put them more in perspective we have overlaid a representation of them on the more current period starting at 20,000 years.



And as we see they are not extremely different from the current pattern except that the past peaks were at higher temperatures. This perspective puts into question the contentions of the politically correct of today that actions of mankind are the cause of "global warming" as many are shouting. Many diverse scientific theories have been proposed as to why the earth's environment undergoes such warming and cooling trends and to date most of them seem to be lacking. There are many diverse cycles, some rather short lived and of low amplitude, and others longer lasting and of more significant amplitude and the influence of the Sun is probably the most dominant factor.

Chapter 8; Farming

The Evidences for a Recent Dating for Adam, about 14,000 to 15,000 years Before Present

A recent genetic study of human genes related to the brain concluded that possibly there appeared a "microcephalin variant (that) could have arisen anywhere from 14,000 to 60,000 years ago" and an "ASPM variant ranged from 500 to 14,000 years" ago and "roughly correlating with the development of written language, spread of agriculture and development of cities" ([see below](#))

Now if one assumes that the "microcephalin variant could have arisen anywhere from 14,000 to 60,000 years ago", possibly could correspond to the "Big Bang" or "Fortuitous Mutation" that Richard G. Klein refers to in his book "The Dawn of Human Culture" and says occurred about 50,000 years ago. Then, what about the "ASPM variant

ranged from 500 to 14,000 years" ago and "roughly correlating with the development of written language, spread of agriculture and development of cities" as proposed.

The Bible repeatedly says that Adam and his immediate offspring were farmers

Genesis 2:15 And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it."

Genesis 3:23 Therefore the Lord God sent him forth from the garden of Eden to till the ground from whence he was taken."

Genesis 4:2 And Abel was a keeper of sheep, but Cain was a tiller of the ground."

Here is a review of some of the findings by archaeologists concerning farming:

"The great majority of the cultivated plants of the world trace their origin to Asia. Out of 640 important cultivated plants, about 500 originated in Southern Asia. In Asia alone we have established five of the principle regions of cultivated plants.... The fifth region of origin in Asia is the Southwestern Asiatic centre and includes Asia Minor, Trans-Caucasia, Iran and Western Turkmenistan. This region is remarkable, first of all, for its richness in numbers of species of wheat resistant to different diseases... There is no doubt that Armenia is the chief home of cultivated wheat. Asia Minor and Trans-Caucasia gave origin to rye which is represented here by a great number of varieties and species....

Our studies show definitely that Asia is not only the home of the majority of modern cultivated plants, but also of our chief domesticated animals such as the cow, the yak, the buffalo, sheep, goat, horse, and pig... The chief home of the cow and other cattle, the Oriental type of horse, the goat and the sheep is specifically Iran....

As the result of a brilliant work of Dr. Sinskaya, the discovery was recently made that the home of alfalfa, the world's most important forage crop, is located in Trans-Caucasia and Iran....

From all these definitely established facts the importance of Asia as the primary home of the greatest majority of cultivated plants and domesticated animals is quite clear."

(Vavilov, N. , "Asia: Source of Species" in *Asia*, February 1937, p. 113.)

More recent studies conducted by Melinda A Zeder and Brian Hesse (*Science* 287 (2000) 2254-57) place the initial domestication of goats to the Zargos Mountains at about 10,000 years ago. And Manfred Heun's (*Science* 278 (1997) 1312-14) studies indicate that large scale wheat cultivation began from 8,000 to 9,000 years ago near the Karacadag Mountains. Both areas are very near where the Tigris and Euphrates Rivers come close together.

"The cradle of agriculture generally has been placed in the Jordan Valley of the southern Levant (today's Israel and Jordan). But work by Simcha Lev-Yadun of Israel's Agricultural Research Organization and colleagues suggest the first farms may have been farther north, between the Tigris and Euphrates rivers in what is today northeastern Turkey and northern Syria.

Wild progenitors of the main Neolithic founder crops (einkorn wheat, emmer wheat, barley, lentil, pea, chickpea, bitter vetch, and flax) are found together only in this small core area of the Fertile Crescent.

Lev-Yadun reports that wild chickpea especially is extremely rare, yet it was a staple crop of Neolithic life 10,000 years ago. Agriculture, therefore, probably began in an area where chickpea is native. Archaeological evidence shows that the earliest known farming settlements of the Fertile Crescent were in this core area. Also, the limited genetic variability of these crops implies that they were domesticated only once — rather than by several different cultures at roughly the same time. Evidence of domesticated crops in the core area dates to about 10,000 years ago, while the earliest signs of farming elsewhere are about 9,300 years ago.

Neolithic sites discovered in the core area indicate that a society with plenty of food thrived there. In sites such as Cayonu, Novali Cori, and Gobekli Tepe, impressive architecture, images, and artifacts have been found. Settlement sites are also larger in this area than many others of the same time in other parts of the Fertile Crescent. ..." (From "The Cradle of Agriculture? New Evidence Moves the World's First Farmers into Turkey" by Reagan Duplisea, <http://www.discoveringarchaeology.com/articles/060100-turkeyfarm.shtml>)

Genesis 11:2 And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar, and they dwelt there.

"It is known that agriculture spread from the Middle East to Europe during the Neolithic period about 12,000 years ago, but for many years archeologists have debated how this occurred. Was it due to the movement of people or to the movement of ideas? Previous genetic analysis of people living today suggests a migration - that the people moved - but critics have questioned this view. The latest study reinforces evidence of a migration in which people brought their ideas and lifestyle with them." (from <http://www.sciencedaily.com/releases/2002/09/020911072622.htm>)

Genesis 11:9... "the name of it called Babel; because the Lord did there confound the language of all the earth; and from thence did the Lord scatter them abroad upon the face of the earth.

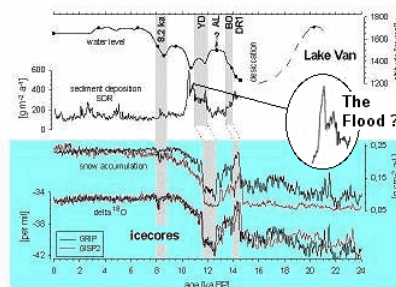
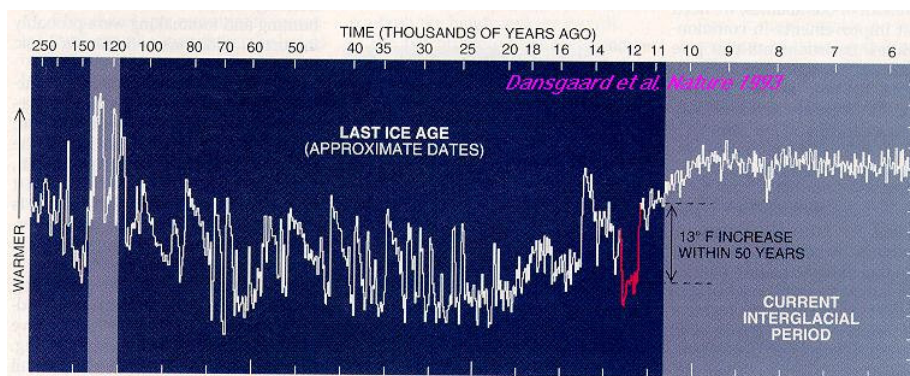
"A family tree of Indo-European languages suggests they began to spread and split about 9,000 years ago. The finding hints that farmers in what is now Turkey drove the language boom - and not later Siberian horsemen, as some linguists reckon. ... Around this time, farming techniques began to spread out of Anatolia - now Turkey - across Europe and Asia, archaeological evidence shows." (From "Language tree rooted in Turkey" by John Whitfield, http://www.nature.com/nsu/nsu_pf/031124/031124-6.html) ([see below](#))



Are there any other evidences ?

Genesis 5:29 And he called his name Noah, saying,
This same shall comfort us concerning our work and toil of our hands,
because of the ground which the Lord hath cursed.
Genesis 8:21 ... I will not again curse the ground any more for man's sake: ...
 ... neither will I again smite any more every thing living, ...

Looking at the Greenland ice core data and Lake Van varve data as follows.



(note: the gray band shifts show "a time difference of 570 (GRIP) or 730 (GISP2) years between the Late Pleistocene chronozones" for the varve data." and "At around 10,500 yr B. P. (this date also has a time shift error) a conspicuous layer, consisting of 7-10 dark brown, thick varves ..., was deposited in Lake Van. Biomarker analyses of this organic carbon rich layer ... showed, that the lipid fraction consist mainly of longchain alkenones ... The author concludes that Prymnesiophyceae were the primary producers and suggests that a mixing event, following a long time of stagnation, led to the enrichment of nutrients in the lake water." (from Palaeo 122(1996)p.115))

We see a brief warm period from about 15,000 to 14,000 years ago, followed by a cooling period and then the even greater cooling of the Younger-Dryas period from about 13,500 to 12,000 years ago. Now what would greatly increase the toil of a group of farmers more than a period of severe climate? So it would seem that one could conjecture that the period of the garden of Eden was the relatively warm period of about 15,000 to 14,000 years ago when Adam started farming and then this was followed by the cool period of from 14,000 years ago to about 12,000, "the curse of the ground" a period in which farming was more difficult. Then about 12,000 years ago the warming up begins and farming becomes easier and proliferates.

How about the location?

As already shown the data on the farmers indicates that the after the flood Genesis history took place in the Ararat area and that the area is also the origin of many of the known farm crops and domesticated animals. Also all four of the rivers of Eden listed in Genesis 2:11-14 can be readily identified, the "Perath, Hiddekel, Gihon and Pishon"

"Perath is simply the Hebrew version of Arabic Firat and Greek Euphrates;

"Hiddekel is Hebrew for Sumerian Idiglat from which the Greek Tigris derives."

Gihon; "... the River Aras, flowing into the Caspian Sea from the mountains north of Lake Urmia, was once called the Gaihun. By checking the writings of the Islamic geographers who accompanied the Arabic

invasion of Persia in the 8th century, I was able to confirm that this was indeed the case. Moreover, even as late as the last century, Victorian atlases and encyclopaedias were still naming the river as the Gaihun-Aras. The Gaihun is therefore the missing biblical Gihon."

"Pishon - "Hebrew (West Semitic) name derived from the old Iranian Uizhun, where the Iranian vowel 'U' had been converted into the Semitic labial consonant 'P'. Thus we have Uizhun to Pizhun to Pishon. Strange as it may seem, such switches do occur between the two language groups. For instance, one archaeological site in Iran is known by its Arabic (West Semitic) name of Pisdeli whereas its ancient (Iranian) name was Uishteri. The river Uizhun (the modern Qezel Uzun) - thus identified as the biblical Pishon - flows down from the mountains of Kurdistan and empties into the southern basin of the Caspian Sea."

See "[The Road to paradise](#)" below for more information.

All people are related, but "In the article in the November 2001 issue of The American Journal of Human Genetics, Ariella Oppenheim of the Hebrew University of Israel wrote that this new study revealed that **Jews have a closer genetic relationship to populations in the northern Mediterranean (Kurds, Anatolian Turks, and Armenians)** than to populations in the southern Mediterranean (Arabs and Bedouins)." (from http://www.barzan.com/kevin_brook.htm)

Conclusion:

We have summarized some of the data that seems to indicate that there was a cultural shift for humans that was brought on by the development of the farming society possibly allowed by the ASPM gene variant as early as 14,000 years ago. By examining the available archaeological data on the development of this farming community and comparing it to the Biblical Genesis description of Adam and his descendants we have attempted to demonstrate how this data provides us with an approximate time line for the Biblical Adam, the first man by Biblical definition, a farmer. Thus by farming man demonstrates his ability to;

... let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.
Genesis 1:26

And God said, Behold, I have given you every herb bearing seed, which is upon the face of the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat.
Genesis 1:29

YAHOO! NEWS

AP Associated Press

Genes Show Signs Brain Still Evolving

By LAURAN NEERGAARD, AP Medical Writer *Fri Sep 9, 1:21 AM ET*

The human brain may still be evolving. So suggests new research that tracked changes in two genes thought to help regulate brain growth, changes that appeared well after the rise of modern humans 200,000 years ago.

That the defining feature of humans — our large brains — continued to evolve as recently as 5,800 years ago, and may be doing so today, promises to surprise the average person, if not biologists.

"We, including scientists, have considered ourselves as sort of the pinnacle of evolution," noted lead researcher Bruce Lahn, a University of Chicago geneticist whose studies appear in Friday's edition of the journal *Science*.

"There's a sense we as humans have kind of peaked," agreed Greg Wray, director of Duke University's Center for Evolutionary Genomics. "A different way to look at it is it's almost impossible for evolution not to happen."

Still, the findings also are controversial, because it's far from clear what effect the genetic changes had or if they arose when Lahn's "molecular clock" suggests — at roughly the same time period as some cultural achievements, including written language and the development of cities.

Lahn and colleagues examined two genes, named microcephalin and ASPM, that are connected to brain size. If those genes don't work, babies are born with severely small brains, called microcephaly.

Using DNA samples from ethnically diverse populations, they identified a collection of variations in each gene that occurred with unusually high frequency. In fact, the variations were so common they couldn't be accidental mutations but instead were probably due to natural selection, where genetic changes that are favorable to a species quickly gain a foothold and begin to spread, the researchers report.

Lahn offers an analogy: Medieval monks would copy manuscripts and each copy would inevitably contain errors — accidental mutations. Years later, a ruler declares one of those copies the definitive manuscript, and a rush is on to make many copies of that version — so whatever changes from the original are in this presumed important copy become widely disseminated.

Scientists attempt to date genetic changes by tracing back to such spread, using a statistical model that assumes genes have a certain mutation rate over time.

For the microcephalin gene, the variation arose about 37,000 years ago, about the time period when art, music and tool-making were emerging, Lahn said. For ASPM, the variation arose about 5,800 years ago, roughly correlating with the development of written language, spread of agriculture and development of cities, he said.

"The genetic evolution of humans in the very recent past might in some ways be linked to the cultural evolution," he said.

Other scientists urge great caution in interpreting the research.

That the genetic changes have anything to do with brain size or intelligence "is totally unproven and potentially dangerous territory to

get into with such sketchy data," stressed Dr. Francis Collins, director of the National Human Genome Research Institute.

Aside from not knowing what the gene variants actually do, no one knows how precise the model Lahn used to date them is, Collins added.

Lahn's own calculations acknowledge that the microcephalin variant could have arisen anywhere from 14,000 to 60,000 years ago, and that the uncertainty about the ASPM variant ranged from 500 to 14,000 years ago.

Those criticisms are particularly important, Collins said, because Lahn's testing did find geographic differences in populations harboring the gene variants today. They were less common in sub-Saharan African populations, for example.

That does not mean one population is smarter than another, Lahn and other scientists stressed, noting that numerous other genes are key to brain development.

"There's just no correlation," said Duke's Wray, calling education and other environmental factors more important for intelligence than DNA anyway.

The work was funded by the Howard Hughes Medical Institute.

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nature

scienceupdate

Language tree rooted in Turkey

Evolutionary ideas give farmers credit for Indo-European tongues.

27 November 2003

John Whitfield

A family tree of Indo-European languages suggests they began to spread and split about 9,000 years ago. The finding hints that farmers in what is now Turkey drove the language boom - and not later Siberian horsemen, as some linguists reckon.

Russell Gray and Quentin Atkinson, of the University of Auckland in New Zealand use the rate at which words change to gauge the age of the tree's roots - just as biologists estimate a species' age from the rate of gene mutations. The differences between words, or DNA sequences, are a measure of how closely languages, or species, are related.

Gray and Atkinson analysed 87 languages from Irish to Afghan. Rather than compare entire dictionaries, they used a list of 200 words that are found in all cultures, such as 'I', 'hunt' and 'sky'. Words are better understood than grammar as a guide to language history; the same sentence structure can arise independently in different tongues.

The resulting tree matches many existing ideas about language development. Spanish and Portuguese come out as sisters, for example - both are cousins to German, and Hindi is a more distant relation to all three.

All other Indo-European languages split off from Hittite, the oldest recorded member of the group, between 8,000 and 10,000 years ago, the pair calculates¹.

Around this time, farming techniques began to spread out of Anatolia - now Turkey - across Europe and Asia, archaeological evidence shows. The farmers themselves may have moved, or natives may have adopted words along with agricultural technology.

The conclusion will be controversial, as there is no consensus on where Indo-European languages came from. Some linguists believe that Kurgan horsemen carried them out of central Asia 6,000 years ago. "No matter how we [changed] the analysis or assumptions, we couldn't get a date of around 6,000 years," says Gray.

"This kind of study is exactly what linguistics needs," says April McMahon, who studies the history of languages at the University of Sheffield, UK. It shows how ideas about language evolution can be tested, she says: "Linguists have always been good at coming up with bold hypotheses, but they haven't been terribly good at testing them."

But the technique is still fraught with difficulties, McMahon warns. There is lots of word-swapping within language groups. English took 'skirt' from the Vikings, for example, but 'shirt' is original. Linguists must separate the shared from the swapped, as any error will affect later studies.

The Kurgan might not be out of the picture entirely, says McMahon - they may have triggered a later wave of languages. "This isn't going to knock the debate on the head," she says.

Biology and linguistics can learn a lot from each other, comments geneticist David Searls of GlaxoSmithKline Pharmaceuticals, based in King of Prussia, Pennsylvania. "There may be some fundamental principles of evolution of complex systems, such as languages and organisms," he says.

References

1. Gray, R. D. & Atkinson, Q. D. Language-tree divergence times support the Anatolian theory of Indo-European origin. *Nature*, **426**, 435 - 439, doi:10.1038/nature02029 (2003).

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(copied from http://www.nature.com/nsu/nsu_pf/031124/031124-6.html)

The Road to Paradise

Published in the Express on Monday, February 8, 1999

The snow-covered dome of the Mountain of God, shrouded in billowing clouds, towered above the old Mongol village known

locally as 'the honeycomb'. Earlier that morning I had set out on a pilgrimage to the Exalted Throne of Yahweh where Adam's god dwelt. Within an hour the noise and chaos of Tabriz had been left far behind, as our four-wheel drive ascended out of the alpine valley of the Adji Chay onto the plateau of the Sahand massif, with imposing volcano at its heart. Now I found myself at the entrance to one of our world's most extraordinary places - the troglodyte village of Kandovan.

Ambling down the cobbled street - only just wide enough to take a donkey and cart - I turned up a steep side alley, all the time stalked by a clutch of free-roaming chickens. The alley soon morphed into a roughly sculpted flight of steps which twisted and turned between huge canine teeth of lava. Each was a home - a dwelling from a bygone age with rickety wooden door and tiny mullioned windows. In this Dysneyesque landscape of cave-dwellers, I almost expected Pinocchio to appear around the next bend.



Kandovan - 'The Honeycombe'.

My long journey, starting in the research libraries of London University, had led me to the Mesopotamian flood plain and on up into the mountains of Kurdistan, finally to reach the place the Book of Genesis calls the Garden of Eden.

There is no straightforward way to explain how an Egyptologist, used to working in the dry heat of the north African deserts, should end up traversing the Zagros mountains of western Iran in search of the earthly paradise. I had begun my studies in the Departments of Egyptology and Ancient History at University College, London, with a major interest in the complex chronology of Egyptian civilisation. My PhD work to radically revise that chronology had inevitably drawn me into the world of biblical history - so closely bound up with the land of the pharaohs. Years of research had led me to the conclusion that many of the stories in the Old Testament were based on real historical events: the Israelite sojourn in Egypt, the Exodus, the conquest of the Promised Land - all were attestable within the archaeological record once the correct chronology had been applied.

But why was I now delving into the Book of Genesis - that most mythological and hoary of the biblical texts? Surely it would have been better to leave well alone? But that is not my way. The simple fact is that ancient stories and legends have always fascinated me and the chance to uncover the historical reality behind the greatest legend of them all was just too tempting an opportunity to pass by.



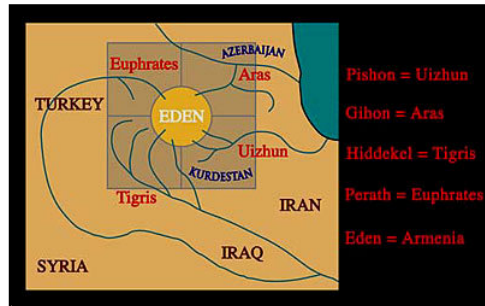
The 'Temptation Seal' on display in the British Museum.

Back in 1987 I had been sent a short, privately published paper by amateur historian, Reginald Walker (1917-1989), which proposed a location for the Garden of Eden in north-western Iran. The main thrust of Walker's argument was that the four rivers of Eden, described in Chapter Two of Genesis, were to be found in that region. All four had their sources (the Bible refers to them as 'heads') around the two great salt lakes of Van and Urmia.

Ever since the time of the Jewish historian Josephus, a near contemporary of Christ, scholars have tried to use Genesis 2 to locate Eden. But the problem has always been the identification of the rivers themselves. The Bible calls them Perath, Hiddekel, Gihon and Pishon. The first two are no problem: the Perath is simply the Hebrew version of Arabic Firat and Greek Euphrates; similarly the Hiddekel is Hebrew for Sumerian Idiglat from which the Greek Tigris derives. The remaining two rivers, however, have always been a mystery. Clearly, in order to locate Eden precisely, we need to find the sources of all four - and that's where Walker's research comes in.

He showed that the River Aras, flowing into the Caspian Sea from the mountains north of Lake Urmia, was once called the Gaihun. By checking the writings of the Islamic geographers who accompanied the Arabic invasion of Persia in the 8th century, I was able to confirm that this was indeed the case. Moreover, even as late as the last century, Victorian atlases and encyclopaedias were still naming the river as the Gaihun-Aras. The Gaihun is therefore the missing biblical Gihon.

The fourth river - the Pishon - was more difficult to find. Walker suggested that this Hebrew (West Semitic) name derived from the old Iranian Uizhun, where the Iranian vowel 'U' had been converted into the Semitic labial consonant 'P'. Thus we have Uizhun to Pizhun to Pishon. Strange as it may seem, such switches do occur between the two language groups. For instance, one archaeological site in Iran is known by its Arabic (West Semitic) name of Pisdeli whereas its ancient (Iranian) name was Uishti. The river Uizhun (the modern Qezel Uzun) - thus identified as the biblical Pishon - flows down from the mountains of Kurdistan and empties into the southern basin of the Caspian Sea.



The four rivers of Eden.

Bringing all this together we find that the sources of all four rivers originate in the highland area which Alexander the Great knew as Armenia and we know today as eastern Turkey and western Iran.

An extra-biblical Sumerian epic known as 'Enmerkar and the Lord of Aratta' relates the tale of a journey made by the envoy of Enmerkar, King of Uruk, from his home city in southern Mesopotamia, through the seven high passes of the Zagros range and down into the magical kingdom of Aratta - the 'Eldorado' of the ancient world. Enmerkar was the second ruler of Uruk after the Flood, according to the Sumerian King List. A crucial line in the epic describes the envoy descending from the last of the seven mountain passes (the Sumerians called them 'gates') and crossing a broad plain before arriving at the city of Aratta with its red-painted city wall.

The envoy, journeying to Aratta, covered his feet with the dust of the road and stirred up the pebbles of the mountains. ... Five gates, six gates, seven gates he traversed. ... Like a huge serpent prowling about in the plain, he was unopposed. ... He lifted up his eyes as he approached Aratta. [extracts from 'Enmerkar and the Lord of Aratta']

Here, the Sumerian word for 'plain' is edin which some scholars believe is the source of the word Eden in Genesis.

So, combining Walker's discovery of the four rivers together with the Sumerian location of Eden, it seemed as though the whereabouts of the lost Eden and its fabled garden was near to being resolved. I decided to set out for the ancient city of Susa (burial place of Daniel of the lions' den) in the south-western flood plain of Iran (Iraq was off bounds for obvious reasons) from where I determined to retrace the Sumerian envoy's route to paradise.



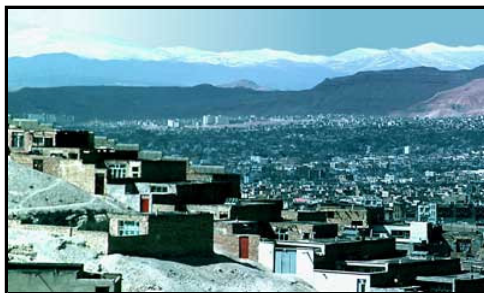
The location of Eden (red shading) in Western Iran and Eastern Turkey.

Following the ancient track through the seven 'gates', I eventually reached the Miyandoab plain to the south of Lake Urmia. The journey had taken four days by car but would have taken the envoy the best part of four months by donkey. The edin remains today one of the lushest regions of the Middle East: thick soil, fruit orchards and vineyards, lazy meandering rivers. This, I am sure, was the original heart of Eden which, over time, became a much wider area, including both the salt lakes and the Garden of Eden itself. The Bible describes the latter as being 'east in Eden' - in other words to the east of but still within the wider territory of Eden.

My driver and I continued eastwards, between the south-eastern shore of Lake Urmia and the towering volcanic peak of Mount Sahand. An hour's drive along the highway brought us into a long west to east valley, the slopes of which were terraced with 'every kind of tree' smothered in spring blossom

God planted a garden in Eden, which is in the east, and there he put the man he had fashioned. From the soil, God caused to grow every kind of tree, enticing to look at and good to eat. [Genesis 2:8-9]

All around a high snow-laden ring enclosed the valley, nurturing its warm micro-climate. The nearest mountain to the north glowed bright red in the low evening light - a pile of pure red ochre. At its foot sprawled the regional capital of Tabriz, squatting at the centre of the valley where Adam and Eve (whoever they were) once lived according to biblical tradition. The first thing which came to mind was paradise lost. Nothing of the earthly garden and its settlement could have survived beneath these bustling streets. But then, away from the city, I soon discovered that there was much that remains of Adam's Neolithic culture.



Paradise Lost - the sprawling city of Tabriz.

This was the region where Man first began to settle down to sedentary life; where he learnt to domesticate animals and plant his crops; and where he began to bury his dead in graves, the bones painted in red-ochre. Adam's name means the 'red-earth' man. According to Sumerian mythology, Man was crafted by the gods from the clay of the earth, just as a potter throws his red clay pots on the wheel. The creation of Man in Genesis is much the same.

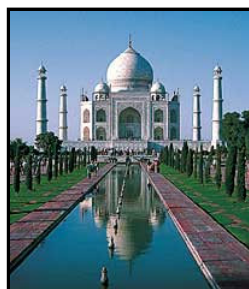
Yahweh God shaped Man (Heb. Adam) from the dust (Heb. aphar) of the earth (Heb. adamah) and blew the breath of life into his nostrils, and Man became a living being. [Genesis 2:7]

... return to the earth (Heb. adamah), as you were taken from it. For dust (Heb. aphar) you are and to dust (Heb. aphar) you shall return. [Genesis 3:19]

Here the word 'dust' is a poetical translation. The understanding of Hebrew aphar is the earth from which clay is made, or simply clay itself, and I believe the clay which gave Adam his name was sourced in the red mountain looking down on Tabriz. Throughout many prehistoric cultures (and including the later Mesoamerican civilisations such as the Maya) the daubing of human bones in red paint or powder was a substitute for the life-blood which had been lost with the decaying flesh.

The Hebrew word for 'garden' used in Garden of Eden is gan which has the meaning 'walled' or 'enclosed garden'. The enclosed valley of the Adji Chay is just that - a rich-soiled paradisiacal haven protected by high mountain walls. The Greek version of the Old Testament calls the Garden of Eden 'Paradise' (paradeisos) after the ancient Persian pairidaeza meaning 'enclosed parkland'. The great Meidans (royal squares) of Islamic Persia, particularly the beautiful Meidan-e Imam of Isfahan, are symbolic representations of the original Garden of Eden with their high enclosures and formal gardens containing fountains and pools.

When the descendants of the Mongol chieftains who had invaded Persia in the 13th century moved on into India to become the Mogul emperors of the 16th to 19th centuries, they took the Persian ideas relating to the Garden of Eden with them. So it was that Shah Jehan built the Taj Mahal for his beloved queen, Muntaz Mahal, not simply as a mausoleum but as a representation of heaven itself - with the mausoleum functioning as the Throne of God. Jehan was effectively recreating the paradise on earth which had been lost to humanity following the expulsion of Adam and Eve from the Garden of Eden. A study of the Koranic inscriptions around the arches of the Taj, undertaken by Professor Wayne E. Begley of Iowa University, has shown that this was the hidden secret of the building - the sacred knowledge of Eden brought out of Sufic Iran.



The Taj Mahal - an architect's reconstruction of Eden.

However, now that the landscape of Eden and its garden have finally been identified, I believe we are in a position to read much more into this extraordinary 17th-century monument to one man's vanity.

I shall scale the heavens. Higher than the stars of God I shall set my throne. I shall sit on the Mountain of the Assembly far away to the north. I shall climb high above the clouds; I shall rival the Most High. [Isaiah 14:13-14]

The Taj Mahal's glistening white dome, can be seen as a representation of the snow-capped Mount Sahand - the original exalted throne of God. The formal gardens in front of the Taj mirror the garden of paradise with the central pool (representing Lake Urmia) and the four water channels (representing the four rivers of Eden) flowing out from the centre of the complex. The ornamental arch leading into the enclosed garden of the Taj Mahal represents the mountain pass or 'gate' leading into Eden which was ferociously guarded by the cherubim and the Fiery Flashing Sword. The symbolism is striking.

But, back in the real Garden of Eden, we still have much more to discover. Even further to the east of the Adji Chay valley and Tabriz, beyond a high pass leading out of the Garden of Eden, is the land of Nod into which Cain was exiled after he had murdered his brother Abel. The area is still today called Upper and Lower Noqdi and many villages bear the epithet Noqdi ('belonging to Nod').

In the same region we find the town of Kheruabad. The name means 'settlement of the Kheru-people' and the Kheru were the Kerubim (Cherubs) of Genesis who protected the eastern entrance into Eden. The volcanic peak which guards the eastern gateway back into the Garden of Eden is a good candidate for the 'Fiery Flashing Sword' associated with the Kerubim. When I travelled over the pass beneath Savalan volcano for the first time, the vehicle was pounded by a violent electrical storm. To the ancients, used to the metaphor of jagged peaks as divine swords or spears, it would have been easy to envisage the angry mountain, casting down its bolts of lightning, as the Fiery Flashing Sword of Genesis.



The Garden of Eden in Western Iran.

I returned to Eden from Nod by a different route, travelling along the valley of the Ahar Chay - the next river basin north of the Adji Chay. The Ahar Chay is a major tributary of the Gaihun-Aras/Gihon which, according to Genesis 2 'winds all through the land of Cush'. My map confirmed once more that we really were in the primordial landscape of Adam and Eve. Separating the Ahar and Adji valleys, and acting as the northern wall of the Garden of Eden, stretched a high snow-capped ridge named Kusheh Dagh - the 'Mountain of Cush'.

Long after nightfall I was back in my Tabriz Intercontinental Hotel bed, dreaming of an early morning climb up to the Mountain of God.

The troglodyte village of Kandovan seems as old as the mountain to which it clings. We can certainly record its history back to the Mongol invasion of Persia in the 13th century when a group of settlers occupied the village. But none of today's locals have memories beyond the arrival of their Asiatic ancestors. Did the village exist before that time? It seems highly likely, given the complex agricultural terracing which covers the steep-sided valleys around the holy mountain. Assyrian war annals of the 8th century BC mention towns in the vicinity of Mount Uash (the Assyrian name for Sahand volcano) and these population centres would have required considerable agricultural produce which must have been eked out of the volcanic soil clinging to the slopes of Sahand. Beyond the 8th century BC we cannot go with any certainty, but Neolithic occupation around Lake Urmia and Mount Sahand has been confirmed by limited archaeological investigations. Of the thousands of ancient occupation mounds surveyed in this region only a tiny percentage have been excavated. We have just begun to scratch the surface in the land where human civilisation began.

Whatever the ancient history of Kandovan, the soul of the place is timeless. Hardly anything has changed over the centuries - until very recently, that is, when electricity was piped up from Tabriz. The only other concession to the modern world is a fag shop and a picnic area for Tabrizi weekend tourists. They come up the mountain armed with plastic containers to collect the water which flows down from the nearby summit of the mountain. This water is regarded as having magical properties: it cures the sick and prolongs life. Many a grandma or grandpa in Tabriz are fed the holy water of Mount Sahand to keep them fit and strong. The reason for this veneration is all to do with the sacred source of the river which runs through the Garden of Eden.

At the summit of one of the two peaks of Sahand the extinct volcanic chimney overflows with ice-cool water as if from a bottomless well. The locals call it Jam Daghi - 'Mountain of the Chalice'. The water which gurgles from the tiny lake joins other streams, flows past Kandovan and on down into the Adji Chay valley, eventually forming a marshy delta on the eastern shore of Lake Urmia.

A river flowed from Eden to water the garden, and from there it divided to make four streams (Hebrew roshim meaning 'heads'). [Genesis 2:10]

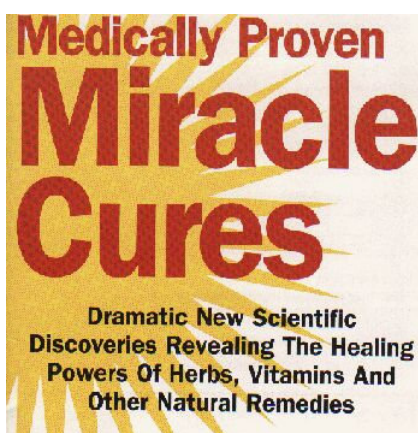
In Sumerian theology spring-water lakes on top of mountains were regarded as holy places where humans might communicate with the great god of the underworld ocean of sweet water upon which the earth floated. Such an interface between the worlds of the living and dead was called an abzu, from which we get our word abyss. The god of the abzu was known to the Sumerians as Enki ('Lord of the Earth') - the creator of humankind and the 'friend of Man'. The Akkadians and Babylonians knew him as Ea (pronounced Éya) and it was this Ea who warned the Mesopotamian hero of the flood of the impending destruction of mankind by the storm-god, Elil (Sumerian Enlil). Could Ea, god of the Sahand abyss, have been the deity worshipped by Adam and Noah? You will have to wait for another day for the story of the flood when I will reveal the hidden name borne by the god of the Israelite ancestors.

Meanwhile, the troglodyte village of Kandovan with its volcanic spires was as close as I could get to Adam's world. I had travelled over one thousand kilometres from the Mesopotamian plain to the Garden of God. I had crossed seven mountain ridges, through the ancient lands of Kuzestan, Luristan and Kurdistan. I had followed in the footsteps of Enmerkar's weary envoy as he crossed over into the mysterious land of Aratta and, beyond, I had found myself in the primeval world of Adam and Eve. I was literally in Seventh Heaven. My journey had come to an end just below the summit of God's holy mountain. The Exalted Throne of God was within reach, a thousand metres above me, but sadly not this time. Dark clouds had enveloped the mountain and falling snow began to shroud the way forward. My meeting with God would have to wait for another time. I headed down the mountain, leaving Pinocchio and his friends to their own devices.

Son of Man, raise a lament ... You were in Eden, in the Garden of God ... I made you a living creature with outstretched wings, as guardian, you were upon the holy Mountain of God, you walked in the midst of red-hot coals. ... I have cast you down from the Mountain of God and destroyed you, guardian winged creature, amid the coals. [Ezekiel 28:11-19]



Chapter 9; Herbs



The above title for a book indicates that the American public has finally discovered herbs which most ancient cultures knew of many millenia ago. You can read multitudes of testimonials as below:

"Her doctor suggested Elizabeth try St.-John's wort instead of drugs. In no time at all, she snapped out of her depression. "I feel tremendously normal, it is a wonderful feeling. I wake up in the morning with a smile on my face.""

One pill for the digestive system contains the following:

Herb Blend Formula		
Alfalfa	Fenugreek	Ginger
Fennel	Yarrow	Hawthorne
Licorice	Marsmallow	Peppermint
Red Raspberry	Safflower	Scullycap
Burdock	Chickweed	Mullein
Papaya	Black Cohosh	Cayenne
Irish Moss	Kelp	Plantain
Slippery Elm	Yellow Dock	Milk Thistle
Echinacea	Ginko Biloba	Echinacea
Dandelion	Horsetail	Red Clover

Fig 2

A powdered natural food supplement contains the following:

Food Supplement		
Wheatgrass	Carrot	Pineapple
Alfalfa	Spinach	Papaya
Soy Lecithin	Bean Sprout	Wheat germ
Bee pollen	Celery	Vitamin E
Royal Jelly	Tomato	Acerola Berry
Honey Extract	Diakon	Licorice root
Spirulina	apple pectin	Brown rice
Chlorella	Banana	Red beet
Aloe vera	Reishi mushroom	Ginger root
Green tea	Cat's claw	Bilberry

Fig 3

One list of super foods shown below contains only one non plant food item.

SUPER FOODS		
Broccoli	Apple	Garlic
Carrots	Pinneapple	Tea
Chili peppers	Kiwi	Beans
Spinach	Mangos	Soybeans
Mushrooms	Citrus fruits	Salmon
Tomatoes	Apricots	Oats
Papaya	Bananas	Yams

Fig 4

But is plant food for every creature?

And to every beast of the earth, and to every fowl of the air,
and to every thing that creepeth upon the earth, wherein there is life,
I have given every green herb for meat: and it was so.
And God saw everything that he had made,
and, behold, it was very good.
Genesis 1:30-31

Many have concluded from the above that when first created all animals were vegetarians only. However, possibly the intended meaning is that plants are the basic source for all growth and energy. Those animals who eat flesh get it secondarily from the flesh they eat, for somewhere within the food chain there is a vegetarian animal. Eagles eat many rodents and rodents live on plants, seeds and nuts, and the same goes for wolves, coyotes, etc. Some species are just without doubt designed to eat flesh and other species are designed to very efficiently utilize plant food, as is the cow which many people love to eat.

Plants are the most efficient source for food and energy for many species, for it takes many pounds of plant source food to generate a pound of flesh. But when plant food is directly turned into energy within the digestive track of many species the process is much more efficient pound for pound than getting the same amount of energy from flesh food. In other words, if the human species ate mostly plant food, more people could be fed properly from the same farming acreage and with less expended energy (see note A).

And as we have already indicated, in addition to growth and energy from plants, they are the basic source for many many healing vitamins, minerals, enzymes and other organic compounds. More and more every day we read and hear of the result of medical studies that show that eating plant based foods provides for increased health for the human species. For example one recent study by a Swedish medical group showed that in a group of women who ate just one half a carrot each day and ate less fat there was up to 68-percent lower risk for breast cancer. Some experts have estimated that 60 percent of the illnesses in the United States are due to poor diet (see note B).

And the Lord God planted a garden eastward in Eden;
and there he put the man whom he had formed. ...
And the Lord God commanded the man, saying,
Of every tree of the garden thou mayest freely eat. ...
(Genesis 2: 8 , 16 KJV)

To support his evolutionary hypothesis "The Obligate Fruigivore", in which he explored "the relationship between diet, bipedalism, mothering, and how these factors enabled our superior cognitive development", J. S. Coleman setup and ran a "Kohonen self-organizing map (SOM) is a neural network designed to categorize data sets into alike groups based on corresponding similarities in data magnitudes". The purpose was to "establish the affinity between human breast milk and other raw foods by grouping according to similarity of their nutrient profiles. We would expect the relative proportions of nutrients of an animals milk to reflect in the nutritional value of the foods eaten by a species as an adult, otherwise a smooth transition during weaning would be too difficult, and cellular requirements would not be sufficiently matched for optimum cellular metabolism and therefore survival."

"These results seem to support the suggestion that human milk and a variety of fruits have statistically similar nutrient proportions. This in no way indicates that they are a suitable replacement for each other or that any particular fruit is an ideal food on its own. These data could also support the hypothesis that commercial fruit is of similar nutritional value to the ancestral fruits that may have occurred in our evolution, though we now know that wild fruits are generally richer in protein and fats, and in minerals."
(quotes from <http://venus.nildram.co.uk/veganmc/origins.htm>)

The results were that first just behind mother's milk was raw peaches followed by raw grapefruit and then raw European grapes. Possibly one of these three was the famed forbidden fruit of Eden? Possibly not, it is doubtful that the analysis would be that exact! Apples came in at places 9, 28 and 29. There are also traditions that it was the pomegranate or the apricot and they came in at places 46 and 44 respectively. And then there is the obviously question, why would the best food in the garden be forbidden? And as one would expect, the first 89 places were taken up by the fruits, vegetables, and their juices. A total of 41 fruits and vegetables were rated in the same category as mother's milk, with the vegetables being at the bottom of this category. The vegetables in the top category were tomatoes, cabbage, squash, carrots, cucumber and eggplant. The first non plant food was wild raw oysters at number 90 and the bottom of the list, places 124 through 230, are taken up by the various forms of non plant foods, with the eggs being first. It should be noted that not all the known beneficial nutritional compounds were/could be considered and therefore some of the results are puzzling, such as the known super food broccoli coming in at the 108th place, therefore it must be assumed that its most beneficial ingredients were not among the 24 factors considered.

Has J. S. Coleman scientifically demonstrated one of the secrets of the Garden of Eden, RAW FRUIT? It would seem that way!

Conclusion:

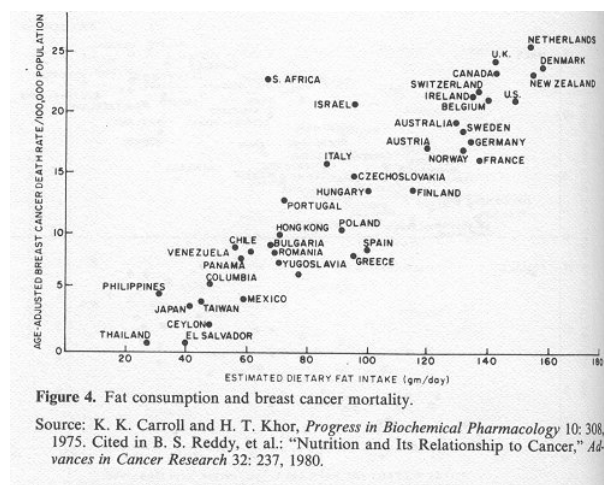
And God said, Behold, I have given you every herb bearing seed,
which is upon the face of all the earth, and every tree,
in the which is the fruit of a tree yielding seed; to you it shall be for meat (food).

Note A: Food calories produced per calorie of fossil fuel input, for some plant and animal foods. Note that US produced feedlot beef is the least efficient.

Food	Food calories produced per calorie of fossil fuel energy input
Corn (Mexico)	83.33
Sorghum (Sudan)	38.46
Rice (Philippines)	9.50
Wheat (India)	9.06
Oats (U.S.)	2.47
Potatoes (U.S.)	2.18
Corn (U.S.)	1.80
Wheat (U.S.)	1.71
Soybeans (U.S.)	1.45
Rice (U.S.)	1.25
Beef (rangeland, U.S.)	0.28
Eggs (U.S.)	0.25
Lamb (rangeland, U.S.)	0.16
Milk (U.S.)	0.14
Broilers (U.S.)	0.07
Catfish (U.S.)	0.04
Beef (feedlot, U.S.)	0.03

SOURCES:
(a) D. Pimentel and M. Pimentel, *Food, Energy and Society* (New York: John Wiley and Sons, 1979), pp. 56 and 59.
(b) Table 1 and Table 6.
(c) U.S. Department of Agriculture, *Nutritive Value of American Foods*, Agriculture Handbbook No. 456 (Washington, D.C.: U.S. Government Printing Office, 1975).

Note B: National relationships of breast cancer mortality rate in proportion to dietary fat consumption. Note that the less developed countries with the highest rate of vegetarian diet are the healthiest.



Note C: Wrinkles

"Scientists conducted a study of elderly people living in Greece, Australia, and Sweden and found that those people whose diets included high amounts of fruits, and vegetables, and legumes had fewer wrinkles. In contrast high intakes of meat, dairy products, and butter were linked to more wrinkled skin.

Across the board, the study subjects in each country who had the least skin wrinkling and damage followed diets that included low intakes of butter, margarine, milk products, and sugar products in conjunction with high intakes of vegetables and legumes. Researchers also noted that three specific dietary staples -- prunes, apples, and tea -- accounted for a significant advantage in skin condition among a smaller subgroup of Australians. (note: Australia as a country on the whole, due to their predominately outdoor life style, has a very high incident of severe skin cancers.)

Antioxidants get the credit for these antiaging benefits. The study team suggests that these foods, rich in antioxidant vitamins A, C, and E, help block damage from the sun and other environmental exposure. (reference: J. Am. Coll. Nutr. 20:71-80, 2001 and Dr. McDougall Newsletter) Also per the Journal of the American College of Nutrition the legumes (especially broad beans and lima beans), asparagus, celery, onions, leeks, garlic, nuts, olives, cherries, melon, dried fruits, pears, eggs, yogurt and water all significantly helped to prevent wrinkles. The foods associated with enhanced wrinkles include milk, meat (especially processed meat), potatoes, soft drinks, cakes, pastries, and sweetened fruit drinks.

Also, it's not often that you find a food that will do so many things due to its antioxidant and anti-inflammatory activities including improve your skin, cleanse your liver, help to halt tumor growth, and is heart healthy, that food is the carrot. To repeat, the Swedish study showed that women who ate just half a carrot a day, and ate less fat, enjoyed up to 68 percent lower risk for breast cancer. Eating a couple of medium-sized carrots a day is one of the simplest and least expensive ways to improve the health in many ways. It would take a couple of pages just to list the various beneficial nutritional components found in the carrot. (reference: Dr. David Williams newsletter)

So it seems that the age-old search for the Fountain of Youth would have been better spent harvesting the "Garden of Youth" which is in reality eating the food of the Garden of Eden.

Chapter 10; Rain

Adam, Plants and Rain

With Genesis 2:4 the creation narrative changes some what in nature. The first chapter is a sequential period by

period account of the creation. The second chapter does not necessarily keep to the time step order and back tracks now and then to review what has already been recorded. We will use the word by word translation as published by J. P. Green in the "The Interlinear Bible".

4) These (are) the generations of the heavens
and the earth when they (were) created in the day (#3117)
of the making of Jehovah God's earth and heavens.

This introduction uses the Hebrew word most often translated as day (yowm) to indicate the time period of the entire creation and other translations render the phrase "in the day" as "in the time".

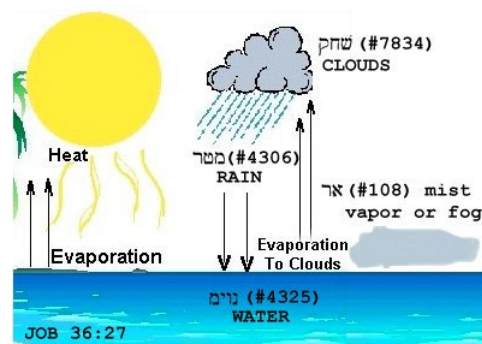
5) And every shrub of the field not yet it was on the earth,
and every herb of the field not yet it had sprung up,
for not had rain (#4305) sent Jehovah God on the earth,
and a man was not to till the ground.

Here we back track some to a time when there was a solid ground but no shrubs and herbs, it had not rained, and man was not around. This would appear to be a time in the day (also translated time, age or aeon) three of chapter one when the land had appeared in the midst of the waters, but the herbs and shrubs were not yet present since there was no rain to irrigate them. Three conditions that the Lord Jehovah was to change in the next four verses. These three changes are the same as occurred in the latter part of day three and day six of chapter one.

6) And a mist (#108) went up from the earth
and watered all the face of the ground.

Here the Lord first provides watering up from the ground which indicates that the ground is well soaked since this is the condition necessary for a mist, vapor, or fog to form over the land. The Hebrew word translated as mist can also be translated as fog or vapor as we have indicated and only appears again in Scriptures in Job 36:27 where the hydrologic cycle is described as follows.

Job 36:27) For He draws up the drops of water,
they distill rain (#4306) into mist (#108),
which drip down the clouds
and drop upon men abundantly.



Contrary to the many theories that have been proposed concerning the condition of the hydrological cycle before the flood, there is here no indication that this cycle differs greatly from that of today. The condition of there being no rain is described only in conjunction with the time when plants and man also did not exist. And then the hydrologic cycle is initiated with no indication that it differs significantly from that of today. The Hebrew word for rain does not appear again until Genesis 7:4 when the Lord says;

Gen 7:4) I will cause to rain (#4305) on the earth forty days and forty nights

But, no where between Genesis 2:6 and 7:4 do we have any indication that the hydrologic cycle is any different than that described in Job 36.

7) And formed Jehovah God the man (of) dust from the ground,
and blew into his nostrils breath of life;
and became the man a soul living.
And planted Jehovah God a garden in Eden, to the east;
and put there the man whom He had formed.
And made spring Jehovah God from the ground every tree
pleasant to the sight and good for food.

Here the Lord has completed the job and placed on the earth all three parts than were noted as not present in verse 5, rain, plants and man. The chapter goes on and describes the rivers that watered the garden, but the geographical description seems different from that of today since not all four "rivers" can be located today by name. Needless to say there has been much discussion concerning the location of the garden and what four rivers these might be! (see the topic Ararat) Also we have added the concept of a special garden with special trees (the Tree of life and the Tree of Knowledge of Good and Evil). We wish that much more detail was provided concerning the garden and its climate and the rest of the world outside of the garden and its climate, but unfortunately such details are not provided. Did the earth outside of the garden have "bad" weather, did thorns and thistles exist outside of the garden? We could speculate, but we will not!

But the total job of the creation as described in Genesis 1 is not completed yet.

19) And formed Jehovah God from the ground
every beast of the field and every bird of the heavens,

and brought to the man to see what he would call it,
and all which might call it the man
(each) soul living that (was) its name.

22) And formed Jehovah God the rib
which He had taken from the man into a woman.
and brought to her in the man.

In verse 19 we back track to day five and six of Genesis 1 and the animals and birds are formed and then finally finish the work of day six of Genesis 1 in verse 22 of Genesis 2 when the woman is formed.

We have skipped a number of the details for a later research topic.

Conclusion: The more detailed creation account of Genesis 2 differs in form and adds more detail than Genesis 1, but in no way provides any discrepancies. In this chapter there is presented no evidence that the climate and hydrologic cycle differs significantly than that of today. Such possibilities are just not included.

Notes:

You ask, why use a word for word translation with its word arrangements that are not considered as good English structure? That is because during the authors' studies we have come to the conclusion that very often when the Hebrew is put into good English form the translators do not retain in some cases the true sense of the Hebrew.

Concerning the often discussed vapor canopy theories, recent computer simulations indicate that a thin canopy is theoretically possible and could provide a more even and moderate climate all over the globe. But if the vapor layer is not of optimum characteristics it could either provide too much of a green house effect and extremely high temperatures, or too much vapor and you have a cooling effect of course. However, vapor layers of optimum characteristics for climatic conditions do not hold enough water to provide a significant percentage of the total amount of water to flood the total globe to the depth required by the Genesis account. Therefore, the vapor canopy theories do not seem to provide a totally satisfactory explanation for the flood. There also must be a significant contribution from the "fountains of the deep".

Chapter 11; Ararat, the Cradle of Civilization?

The Sumerians, an ancient peoples and one of the first civilizations in the world called Ararat, Arrata. In their great epic poems of Gilgamesh and Arrata, they tell of the land of their ancestors, the Arratans in the Highlands of Armenia. The Sumerians also in the epic poems describe the Great Flood and the rebirth of life after the terrible deluge that fell from the Highlands of Armenia unto the lands of Mesopotamia and the Fertile Crescent. The Sumerians had a very close connection with the ancestral Land of Ararat and considered it as their ancestral homeland (many historians and archaeologists are convinced that the Sumerians initially lived in Northern Mesopotamia and Armenian Highland). The Greeks believed that the people who first worked with bronze and iron came from the same area, they called them Khaldi.

"The great majority of the cultivated plants of the world trace their origin to Asia. Out of 640 important cultivated plants, about 500 originated in Southern Asia. In Asia alone we have established five of the principle regions of cultivated plants.... The fifth region of origin in Asia is the Southwestern Asiatic centre and includes Asia Minor, Trans-Caucasia, Iran and Western Turkmenistan. This region is remarkable, first of all, for its richness in numbers of species of wheat resistant to different diseases... There is no doubt that Armenia is the chief home of cultivated wheat. Asia Minor and Trans-Caucasia gave origin to rye which is represented here by a great number of varieties and species....

Our studies show definitely that Asia is not only the home of the majority of modern cultivated plants, but also of our chief domesticated animals such as the cow, the yak, the buffalo, sheep, goat, horse, and pig... The chief home of the cow and other cattle, the Oriental type of horse, the goat and the sheep is specifically Iran....

As the result of a brilliant work of Dr. Sinskaya, the discovery was recently made that the home of alfalfa, the world's most important forage crop, is located in Trans-Caucasia and Iran....

From all these definitely established facts the importance of Asia as the primary home of the greatest majority of cultivated plants and domesticated animals is quite clear."

The above quotes from the book by Vavilov, N. , "Asia: Source of Species" in *Asia*, February 1937, p. 113, indicate a long held belief by many that cradle of civilization was in the hills of Armenia. Also the location of the Garden of Eden and the location of the flood and the landing place of the Ark of Noah!

More recent studies conducted by Melinda A Zeder and Brian Hesse (Science 287 (2000) 2254-57) place the initial domestication of goats to the Zargos Mountains at about 10,000 years ago. And Manfred Heun's (Science 278 (1997) 1312-14) studies indicate that large scale wheat cultivation began from 8,000 to 9,000 years ago near the Karacadag Mountains. Both areas are very near where the Tigris and Euphrates Rivers come close together.

"The cradle of agriculture generally has been placed in the Jordan Valley of the southern Levant (today's Israel and Jordan). But work by Simcha Lev-Yadun of Israel's Agricultural Research Organization and colleagues suggest the first farms may have been farther north, between the Tigris and Euphrates rivers in what is today northeastern Turkey and northern Syria.

Wild progenitors of the main Neolithic founder crops (einkorn wheat, emmer wheat, barley, lentil, pea, chickpea, bitter vetch, and flax) are found together only in this small core area of the Fertile Crescent.

Lev-Yadun reports that wild chickpea especially is extremely rare, yet it was a staple crop of Neolithic life 10,000 years ago. Agriculture, therefore, probably began in an area where chickpea is native. Archaeological evidence shows that the earliest known farming settlements of the Fertile Crescent were in this core area. Also, the limited genetic variability of these crops implies that they were domesticated only once — rather than by several different cultures at roughly the same time. Evidence of domesticated crops in the core area dates to about 10,000 years ago, while the earliest signs of farming elsewhere are about 9,300 years ago.

Neolithic sites discovered in the core area indicate that a society with plenty of food thrived there. In sites such as

Cayonu, Novali Cori, and Gobekli Tepe, impressive architecture, images, and artifacts have been found. Settlement sites are also larger in this area than many others of the same time in other parts of the Fertile Crescent. ..." (From "The Cradle of Agriculture? New Evidence Moves the World's First Farmers into Turkey" by Reagan Duplisea, <http://www.discoveringarchaeology.com/articles/060100-turkeyfarm.shtml>)

The emphasized areas of the above quote are indicators that this part of the Fertile Crescent was settled and developed first, consistent with the Genesis record.



Fig1

Location of Eden

In the area a number of rivers have their source, including the Tigris and Euphrates. One of the four rivers named is said to flow about the land of Cush, but this is only one of several localities named Cush which are known to have existed. The best known of these later came to be identified with Ethiopia. But Ethiopia was not the only Cush. There was evidently one locality of this name in the Highland Zone. Pison has been identified with a certain river Phasis known to the ancient Greeks, which rose in the Caucasus and flowed into the Black Sea. Havilah is perhaps that area known by this name between the Black Sea and the Caspian Sea, where gold and precious stones have been found. Jason, whose name is associated with the "Golden Fleece" (probably a sheepskin used to filter the gold from the streams of that area) went to Colchis, a district through which the river Phasis (Pazhum or Uizhum) flowed. Gihon is more obscure, but possibly could be the Araxes or Aras river which originates in the highlands and flows into the Caspian Sea.



"The edin remains today one of the lushest regions of the Middle East: thick soil, fruit orchards and vineyards, lazy meandering rivers." (from <http://www.nunki.net/PerDud/TheWorks/Express/Paradise.html>)

The art of Urartu contained abundant depictions referring to the sacred tree, images of sacred trees guarded by seraphim and genii and sometimes attended by a king or kings. See Fig 2 and 3 below.



Fig 2 & 3 Sacred Tree images on Helmet and Jar

The Flood

We find considerable evidence today of progressive desiccation turning what was quite recently a well-watered area into a dry one. Rendle Short, referring to the findings of George Frederick Wright, had this to say: (Short, A. Rendle, *The Bible and Modern Research*, Marshall, Morgan and Scott, London undated, 2nd ea., p. 63.)

There is plenty of proof that the early home of the human race, Northern Persia, Armenia and the neighboring countries, has been under water at a comparatively recent date geologically speaking--certainly since the Ice Age.

At Trebizond, on the Black Sea, there is a raised beach of 750 feet up the mountain. The Caspian, the Sea of Aral and Lake Balkash have no outlet, but their waters are still comparatively fresh. Therefore, they must be of recent origin.

The significance of Rendle Short's last remark is apparent when it is remembered that the Dead Sea is anything but fresh,

because it, too, has no outlet. The water accumulates the salts carried into it by various means, and the evaporation of the water serves only to concentrate these salts. That the Caspian Sea should still be fresh could be taken to mean that it has not been there any very great length of time, or that it has been flushed out, or that it has been added to very considerably.

Vere Gordon Childe remarks upon this same circumstance, although he attributes it solely to a much heavier rainfall at one time. (Childe, V. G., *Fresh Light On the Most Ancient East*, Kegan Paul, London, 1935, p. 24.)

On the Iranian Plateau the precipitation (which he predicates), though insufficient to feed extensive glaciers, filled the great hollows that are now salt deserts with shallow inland seas whose presence tempered the severity of the climate...

In Persia and Baluchistan the high strand lines encircling the old lakes bear witness to the flooding of these inland seas, and into them flowed many streams that are now lost in the desert.

In the same vein another authority, J. C. Curry, made the following observation: (Curry, J. C., "Climate and Migration" in *Antiquity*, September 1928, p. 295.)

There are several strands at varying heights along the southern shores of the Caspian, among the most clearly marked of which are those 600, 250, and 150 feet above the present level. Their weak development shows that, as a rule, the Sea did not stand at any one level for a long time. The state of their preservation shows that they are of very recent origin.

As a reference, it is estimated that present day sea levels are 400 feet above their ice age lows, and if all the polar ice caps were to melt, the sea levels would rise only an additional 275 feet. Then it seems that ice melting would not account for the water levels evident in the area.

The Resting Place for the Ark

There have been many ancient and modern reports of sightings of the ark. Most center around two sites, the modern Mt. Ararat (Agri Daugh, "mountain of pain") in the northern portion, and Mt Cudi (Judi Dagh "highest")in the southern portion. Many books, articles and videos have been prepared on the search for the ark in recent times. In ancient times sightings were reported by Berossus, the Samaritan Pentateuch, Targums, Josephus, Nicholas of Damascus, Hippolytus, Eusebius, the Pershita, Fautus of Byzantium, Epiphanius, Isidore of Seville, Euty chius, Al Masudi, Ibn Haukal, Zarariys ben Muhammad al Kazwine, and Benjamin of Tudela, covering from approximately 400 BC to the 13th century.

A rather interesting tradition is that the Christian sect called the Nestorians had a monastery called "The Clositer of the Ark " reportedly built of wood from the ark and it was destroyed by lightning in 766 AD. The center of the Nestorian territory was just east of Mt. Cudi. (Photo at right of the monestery taken by Gertrude Bell, May 1909)



(See Note A below and also <http://origins.swau.edu/papers/global/noah/default.html> for a more extensive discussions of the proposed ark landing sites.)

Conclusion: The evidence is rather compelling that the area that consists today of far eastern Turkey, northwestern Iran and Armenia was the cradle of civilization and where much of the saga of the early Genesis account took place.

Note A: from <http://www.baseinstitute.org/research.html>

The Search for the Real Mountains of Ararat

One of the world's most provocative and controversial mysteries is the search for the remains of Noah's Ark. Ark searchers have risked their lives ascending Mount Ararat in Turkey where the remains of Noah's Ark are believed to rest. A multitude of eyewitness accounts has attested to the fact that the Ark still exists. These reports often depict an old wooden structure sticking out of the snow and ice near the summit of Mount Ararat. In spite of numerous media reports attesting to the Ark's survival on Mount Ararat, there is no evidence that the ancient boat exists.

The biblical narrative and ancient historical records lead us elsewhere for the location of the mountains of Ararat. No where in the Bible does it mention the words *Mount Ararat*. The writer of Genesis says the Ark of Noah came to rest upon the mountains of Ararat (plural). This indicates that the Ark of Noah came to rest on a range of mountains and does not identify a specific mountain. The traditional Mount Ararat, known as "Agri Dagh," is a single mountain in a vast plain in eastern Turkey; it is not a region of mountains as the Bible specifies.

The Bible gives us a compass direction for the landing location of the Ark, and it is not in the direction of Turkey. The Bible says that the survivors of the flood journeyed "from the east" and, subsequently settled in "Shinar" (a region generally known as Babylon). Genesis 11:1 (NKJV)

Now the whole earth had one language and one speech, and it came to pass as they journeyed from the east that they found a plain in the land of Shinar and they dwelt there.

If the survivors of the flood journeyed from the east, they would have come from the land in the direction of present-day, central Iran. Some Bibles have different translations for this verse: "journeyed in the east" or "eastward," which adds confusion to the actual direction from where the survivors of the flood traveled. Dr. Roy Knuteson, Ph.D. in New Testament Greek writes:

The Septuagint translation of the Hebrew Bible into Greek in 250 BC reads: from the east. This is significant since these Greek-speaking Hebrews knew the exact equivalent of the Hebrew into the Greek and chose a preposition (apo) that only means "from," not "in," or "towards," or "eastward." I would, therefore, choose the KJV translation for the correct rendering and head for the east of Babylon for the mountain with the Ark.

Another scriptural reference describing the location of Ararat is found in Jeremiah 51:27-28 (NKJV).

Call the kingdoms together against her; Ararat, Minni, and Ashkenaz. Appoint a general against her. Cause the horses to come up like bristling locust. Prepare against her the nations with the Kings and the Medes, its governors and all its

rulers, all the land of his dominion.

This verse tells us that the kingdoms of Ararat, Minni and Ashkenaz formed an alliance against Babylon. This would indicate that these regions were located in the dominion of the Medes. The NKJV study guide describes the location of the Medes as being *from the Zagros Mountains in present-day, central Iran.*

The Bible gives us a third reference to the location of Ararat. II Kings 19:36 says,

Now it came to pass, as he (Sennacherib) was worshiping in the temple of Nisroch his god, that his sons Adrammelech and Sharezer struck him down with the sword; and they escaped into the land of Ararat. Then Esarhaddon his son reigned in his place.

The ancient writings of Esarhaddon described his pursuit of the assassins into Ararat. He writes, "I reached the dyke of the Tigres as it if were a wide canal." This description alludes that he chased the assassins across the Tigres in the south where dykes were common in the Mesopotamian Valley. This would mean that the assassins probably went into what is known today as Iran and not north into Turkey.

The belief that the great boat (Ark) in which a family had escaped the waters of a worldwide flood could still be viewed at its original landing site began to be attested in the Near East in the late pre-Christian period. Reports of its survival continued through the Middle Ages and have intensified in the Christian West in the last century. It has become very popular to search Mount Ararat in Turkey even though this is an unlikely candidate for the Ark's resting place.

Around the beginning of the Christian era, readers of Genesis would probably understand the word "Ararat" in terms of the geography of their own day, rather than that of the Genesis narrator. That is, they might restrict the term to the small district on the Araxes, the Ararat of their time, rather than with the much larger ancient Kingdom of Urartu. Urartu could at times be considered the entire mountainous region north of Syro-Mesopotamia. The result would be that one tall mountain in this area, Agri Dagi (traditional Mount Ararat in Turkey), rising dramatically from the plain of the Araxes, would be considered the real Mount Ararat. By the time of the conversion of Armenia to Christianity (fourth century) and the introduction of an alphabet, so that the Bible could be translated into Armenian (fifth century), Armenia was a semi-independent kingdom whose religious and administrative centers were concentrated in the northern part of the country. Thus, when some persons read in the early translations that the Ark had come to rest in the "the mountains of Armenia," and when Armenians in particular read this in their own Bible, they might understand it in a much more restricted sense than the writer of Genesis intended. Attention would be focused too narrowly toward Agri Dagi in the north. It should be noted here that Armenian literature of the 5th through the 10th centuries knows nothing of any Ark story. It is not until the 13th century that the Ark legends began to appear in Armenia, and by the 14th century these stories became popular.

In the first century AD, Josephus discussing the royal family at Adiabene, remarks:

...{in} a district called Carra {Carron} in Adiabene-roughly between the upper and lower Zab Rivers, tributaries of the Tigris...the remains of the Ark in which report has it that Noah was saved from the flood...to this day are shown to those who are curious to see them.

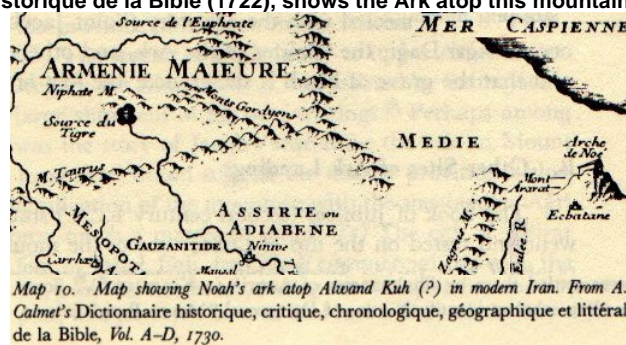
Josephus added that this land is rich with Amomom, an herb which grows there (known to grow in the mountains of central Iran). In the third century Hippolytus wrote:

The relics of this Ark are ...shown to this day in the mountains called Ararat, which are situated in the direction of the country of the Adiabene {Iran}.

And possibly Julius Africanus, also writing in the third century, has this location in mind:

...and the Ark settled on the mountains of Ararat, which we know to be in Parthia {Iran}.

Another tradition locates the Ark in Persia (modern Iran). It was said to have landed in the area of Ecbatana (Hamadhan). A map in Calmet's Dictionnaire Historique de la Bible (1722), shows the Ark atop this mountain, which it calls "Mont Ararat."



Ancient writings of the Assyrians tell of Assurnasirpal fighting a battle on Mount Nisir (Mount Ararat) which the Lullumi call Kinipa. The Lullumi and Zamua are from the same region. This region is in western Iran in the Zagros Mountains east of the lower Zab River.

The Ark is said to have rested upon the mountains of Ararat, i.e. in the mountainous region of Armenia, the plural showing that the mountain peak known as Ararat (in Turkey) was not referred to. This peak is of volcanic origin and lies outside the general region. It is only in comparatively modern times that the present name (Mount Ararat) has been given to it.

(International Standard Bible Encyclopedia)

The Ark's landfall was probably in southern Uratu {Iran}.
(NIV Study Bible)

Several ancient historians write about the great ship of Noah. Most do not place the Ark in the region of Agri Dagi in Turkey,

but in areas far to the south. None of the ancient writers claim to have seen the Ark or any part of it, or to have visited a landing site-or even to have conversed directly with anyone who has. They only quote someone else, usually ending with the clichè, "It is said that the remains of the Ark are to be seen to this day." This they report, even if centuries have passed since the original source.

Have we solved the mystery of Noah's Ark on Ararat? Certainly not to the satisfaction of all Ark-searchers and other interested persons.

Recently, Bob Cornuke traveled to Iran to research the possibility of Ark legends in that country. He drove over 1,000 miles across rutted and dusty roads. He conducted countless interviews, asking the question "Is Noah's Ark on a mountain in Iran?" He received a negative response every time he posed the question. However, when he traveled to a province in western Iran, he received an overwhelming, "Yes," the Ark rests on a high mountain in that region. He was told that something is on top of this mountain, and he climbed as high as possible but was turned back by local tribesmen who said demons live on top of the mountain, and wild animals would harm him if he attempted to climb further. He was told that in order to see what is on top he would need more than a day to climb, and it would be difficult without ropes. He was alone in Iran on this research mission and wasn't prepared for intense climbing. Bob was further discouraged from his investigation by the local tribesmen; one even shooting his rifle over Bob's head twice as a gesture to go no further. He was intrigued that a living legend exists concerning the Ark. Bob reports, "Those who claim to have seen the old boat say that it has square edges and that it is the color of the soil."

Basically one just has to ask the question, WHY would the Lord set Noah and his friends down on a 17,000 foot high mountain?

Therefore, the Armenian traditions would seem to be favored as being the most realistic.

"NAKHICHEVAN, or NAKHJEVAN, a city of Russian Armenia, in the government of Erivan, 85 m. S.E. of the town of Erivan (Yerevan) . "Armenian tradition claims Noah as the founder of Nakhichevan (the Naxuana of Ptolemy), and a mound of earth in the city is still visited by many pilgrims as his grave." (from <http://71.1911encyclopedia.org/N/NA/NAMAQUALAND.htm>)

One of the proposed early names of the area is, 'Nuh chikhan'(the place where Noah landed). (from <http://www.fortunecity.com/campus/purdue/47/naxcivan.html>)



Therefore, the authors are proposing that the most likely scenario was as follows:

- a) Noah lived in the Aras (Araxes) river valley and there he built the famous Ark.
- b) When the flood came, and when "Fifteen cubits upward did the waters prevail" the Ark with its passengers were floated on a severely flooded Aras river.
- c) That when the flood receded the Ark finally settled somewhere around the rim of the Aras valley, not far from where it started its journey.
- d) Then after the flood Noah and family settled in the area of Nakhichevan (Naxcivan).

There are two traditional landing spots in the area, the Ilandagh (Snake mountain) chain (peak at 7825 ft. (2385 m))(from <http://www.faik.00server.com/index.html>) and also Gagicig mountain as follows.

Culture Minister Hamzayev: 'Noah's Ark is in Nakhichevan'

There are claims that the tomb of Noah and his sister, as well are also to be found in the region

Turkish Daily News

Ankara- The tomb of the prophet Noah and his sister may be resting in the region of Nakhichevan, the minister of culture for that location, Nizami Hamzayev, told the Anatolia news agency.

The Kohnekale (or old fortress) district, where the tombs are believed to be, is known among the people of the region as "Noah worshipper."

According to the minister, the famed Noah's Ark, sought for centuries in vain by scores of scientists, is also hidden in Nakhichevan.

Hamzayev said that during "Noah's Typhoon," which lasted a decade according to some history books, the Ark stayed above water for 10 months and came to rest on the Gagicig mountain, between the eastern province of Agri in Turkey and Nakhichevan, where marks believed to be made by the vessel can still be found.

But Hamzayev is not the only one that believes Noah's tomb is in Nakhichevan. The belief is widely held among the people in the region who often visit the tomb and pray at the site.

As well, acclaimed 16th century Arab writer Al-Sherefi and 19th century French traveler and writer Dubua de Monpere wrote that the tombs of Noah and his sister were in the Nakhichevan region.

Praising the cultural and historical richness of his lands, Hamzayev said they have undertaken to make gains for their state through tourism.

The minister also claimed that Noah's mother is buried in a mosque in Iran and that the people who settled in Nakhichevan and Iran are the people that left the Ark after the typhoon. (from http://www.turkishdailynews.com/old_editions/02_20_97/for.htm)

Chapter 12; The BIBLICAL FLOOD, Noah's Flood.

Presenting Biblical research into the Biblical flood including scientific evidences and Biblical Hebrew and Biblical Greek meanings.

**"The water having poured over the terrestrial disk,
 human dwellings disappeared. The wind carried them away.
 They fastened several boats to one another.
 The waves traversed the Rocky Mountains.
 A great wind drove them.
 Presently the moon and the earth disappeared.
 Men died of a terrible heat.
 They also perished in the waves.
 Men bewailed what happened.
 Uprooted trees floated about in the waves.
 Men having fastened boats together trembled with cold.
 Alas, men were enclosed under the tent without doubt."**

The above translation is attributed to the native tribe called the Esquimaux of Canada. Just one of hundreds of flood traditions that many scholars have collected.

Also from further south in the Carolinas we have the following very interesting tradition:

**"a star fell to the earth, and rain soon followed.
 Days and days of rain quenched the fire.
 Great holes burned in the earth by the fire were filled,
 forming a great inland sea."**

The above traditions would seem to be describing a super super hurricane combined with a burning effect due to the impact of the star.

One survey of 40 traditions of global water destruction, which included traditions that circled the globe and included most major centers of population and many island tribes, showed that they verified the major principles of the Genesis record as follows.

Principal Features of the Biblical Record	Assyria/Babyl 1	Assyria/Babyl 2	Peria 1	Peria 2	Syria	Asia Minor	Greece	Egypt	Italy	Vithusia	Wales	Scandinavia 1	Scandinavia 2	Lacland	Russia	China	India 1	India 2	Alaska	Esquimaux/Canada 1	Esquimaux/Canada 2	Ches/Carabas	Carabas (USA)	Merica (USA)	Lakos (USA)	Paranos (Mexico)	Pimas (Mexico)	Toltecs (Mexico)	Asteas (Mexico)	Witchoacan (Mexico)	Nicaragua	Peru	Brazil	Carward Islands	Fiji Islands 1	Fiji Islands 2	Andaman Island	Hawaii	Sumatra			
Man in Transgression	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Divine Destruction	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Favored Family	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Ark Provided	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Destruction by Water	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Human Seed Saved	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Animal Seed Saved	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Universal Destruction	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Landing on Mountain	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Birds Sent Out	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Survivors Worship	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Divine Favor on Saved	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

(from Byron C. Nelson, *The Deluge Story in Stone* (Augsburg, Minneapolis, 1931), Appendix II, Flood Traditions, Figure 38)

- Human seed saved-92%
- Boat provided-87%
- Universal Destruction-60%
- Favored Family-38%
- Man in transgression-35%
- Divine Destruction-28%
- Birds sent out-22%
- Animal seed saved-20%
- Survivors worship-18%
- Divine favor on saved-12%

In looking for a possible natural catastrophic cause of the great flood many theories have been proposed. Looking back at the Esquimaux tradition we note the following characteristics. High water, strong wind, high heat, large waves, uprooted and floating vegetation, and trembling cold. One possible scenario which might account for a majority of these factors is large amounts of volcanic type activity along portions of the subsurface ocean ridges for a short time. Fig 1 below shows examples of the type of activity that can happen along the earth's surface plate lines and Fig 2 shows the present configuration of the subsurface ridge areas. Note the massive size of the mid-Atlantic ridge! (Information on plate tectonics may be seen at <http://www.platetectonics.com>)

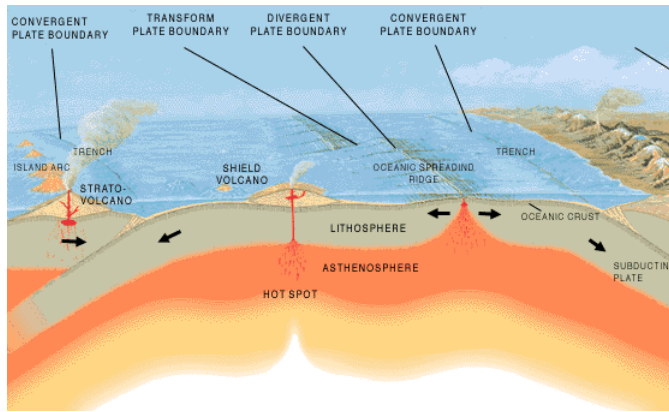


Fig1

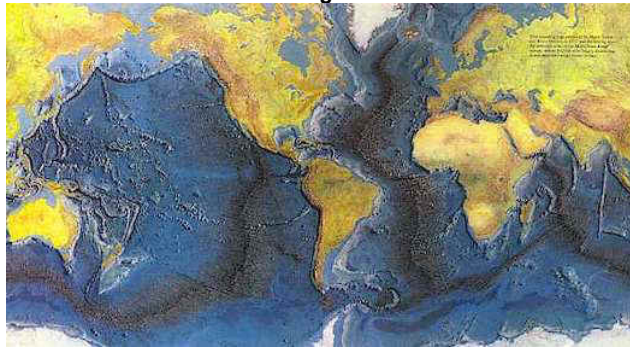
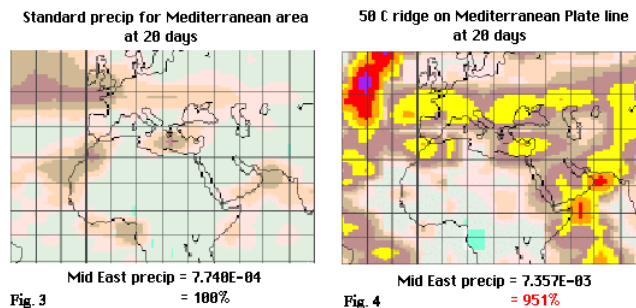


Fig2

Should greatly increased activity along the plate lines cause heating of the oceans along these lines there would be many large and terrible "super" storms which would greatly disturb the climate of the entire globe. NOAA is currently doing research on the subsurface plate lines and they have discovered many indicators of recent and current subsurface activity. And nearly all scientists agree that the materials along the subsurface spreading ridge lines are of recent origin. It is also possible that the flow could be of such a magnitude as to cause changes in the sea level. For example, the surface flow area of the Columbia lava plateau covers over 200,000 square miles and in places is up to a mile thick. Also possibly the polar ice caps would be temporarily melted. After the volcanic activity stopped there would be a transition period as climatic activity decreased and lesser affected areas of the extreme north and south continents would return to frigid climates, but with greatly increased moisture in the atmosphere it is theorized that an ice age would result.

We all know how catastrophic can be the effects of only a 3 degrees Centigrade increase of ocean surface temperature due to the past El Nino. When El Nino is active, a giant high pressure system centered near Easter Island drops slightly in pressure and touches off a change in Pacific currents, bringing warmer water in certain areas and colder water to others. An area 600 miles northwest of Easter Island was found to have 1133 seamounts and volcanoes, far more than any other area known on dry land or under the ocean. In 1995, scientists reported that a spate of undersea quakes and lava eruptions had preceded the onset of the El Nino cycle then in effect. Dr. Daniel A. Walker, a geophysicist at the University of Hawaii, said that the seismic activity was the most unusual it had been in 30 years and tentatively linked it to El Nino. Greater increases on a global scale would obviously cause destruction of a greater magnitude.

Using available computer simulation models it is possible to a limited extent to simulate the possible rainfall effects of the theorized condition. Of course, there have been many proposed theories as to the configuration of the global surface at the time of the flood, but for now it is convenient to assume that this configuration was as it is today. Fig 3 below shows one possible rainfall configuration for the Mediterranean area as we know it today which is shown as a visual reference. And Fig 4 below shows one very limited computer simulation in which global rainfall amounts are shown to be increased up to 10 times.



A second proposed possibility which would be consistent with the Algonquin Indian legend is the impact of an ice comet. Information indicates that they may consist of a large percentage of water with estimates at from 25 to 60 percent. The planet Pluto, (there's been much discussion lately as to whether it is indeed a true planet), has been estimated by one source to be up to 80% water. Many believe that Pluto and its rather large moon Charon are Kuiper Belt objects and that there are many other items nearing their size located in the belt.

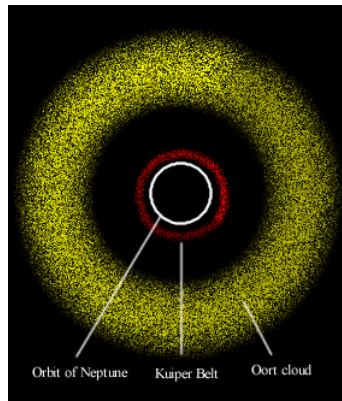


Fig 5

To greatly increase the amount of water on the earth would require a rather large size object since the earth presently has approximately 340×10^6 cubic miles of water. A Pluto-type ice sphere of 320 miles in diameter would increase the water on the earth by about 5 percent. Pluto itself is 1450 miles in diameter. One comet that recently visited our skies was about 25 miles wide. It would be hard to imagine the catastrophic destruction that the impact of a 320-mile wide ice comet would cause to planet Earth.

More reasonable would seem to be a swarm of small ice comets over a few days time period. Quite possibly the Earth in its orbit could enter a band of small ice comets which shower the Earth with a considerable amount of water in a few days time period. Or also there is the possibility of the Earth orbit encountering the remains of a large comet that was broken up by impacts or encounters with the outer planets or their gravitational forces, or as will be shown below, a comet broken up by the heating effects of our Sun. Theoretically the larger outer planets such as Jupiter and Saturn work like sweepers to clean up a lot of the space trash before it comes into the neighborhood of our lesser planet Earth. For example the comet Shoemaker-Levy 9 impacted Jupiter over a period of 7 days (July 16 - July 22, 1994) with 20+ observable fragments.

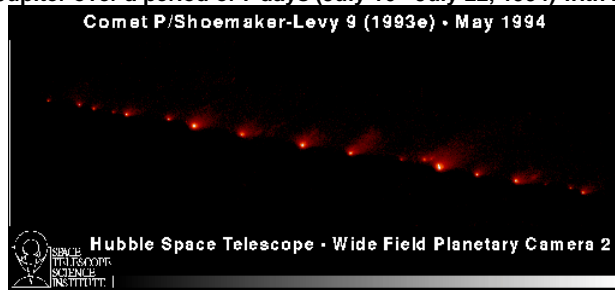


Fig 7

"Just before the first comet fragment hit Jupiter, Zdenek Sekanina wrote that based on Hubble Space Telescope observations in early July 1994 the fragments had effective diameters generally between 1 and 2 kilometers: Although the evidence points to an apparently continuing disintegration of the large fragments in numerous discrete events, objects a few km across still seem to have been present in early July, and the temporal variations in the effective diameters are likely to be primarily a rotational effect of strongly irregular shape." It can be estimated that prior to breakup and loss of much of the water content, the comet was possibly between 10 to 12 miles in diameter.



Fig 8, Comet 57P/du Toit-Neujmin-Delporte after splintering into at least 19 fragments from <http://news.bbc.co.uk/2/hi/science/nature/2153650.stm>

"Rabbi Moses Ben Nachman, a Jew living in Spain, wrote of God taking two stars from Khima and throwing them at the earth in order to begin the great flood. (from "Comets in Ancient Cultures" By Noah Goldman U. Maryland, College Park Scholars) An indicator that the flood comet appeared in the sky as a twin comet.

After being broken up and dispersed by the heating effects of the sun while still in space the fragmented comet must enter our atmosphere which is very hard on intruding high speed space objects! A very large percentage of them are broken up or "exploded" by the experience. Even iron meteorites such as the Gibeon meteorite, 90% iron, which was apparently a large object that burst high in the atmosphere and produced a debris field 70 miles (120 km) wide by 230 miles (390k km) long. The breakup was so complete that no major craters have ever been identified even though many masses between 100 and 500 kg have been found, and in the past few years an increasing number of small Gibeon meteorites have been located as modern metal detection equipment has allowed meteorite hunters to find the smaller specimens. The majority of comet material would be considerably more fragile than that of most meteorites or asteroids.

It should also be noted that any natural cause for the flood must be relatively short-lived. In order for the larger animals and humans to survive, the area where they landed should return to near normal in just a few seasons. The Biblical chronology requires the heavy rains to stop after 40 days and for land to become dry enough for the occupants of the ark to emerge after 1 year and 17 days. After 11 months and 18 days plant growth has to have reappeared when the dove returned with a plucked leaf. And within a short time Noah was able to plant and harvest a vineyard. If the ocean waters were heated considerably due to subsurface volcanic activity along the mid-ocean ridges as proposed, it would take a relatively long time for ocean cooling back to near normal, possibly as long as 500 years or more.

How long it would take to return to near normal growing seasons due to an ice comet shower would seem to depend upon the size and number of comet fragments and the percentage of solid material versus water contained within the comets. The larger the number of fragments, the smaller the fragments and the higher the percentage of water, the faster the Earth

atmosphere and surface could return to normal. The heavy rainfall from that portion of the comet's water that vaporized in the atmosphere would clean the air and minimize the effect of dust clouding from land impacts. Assuming a nearly optimal comet shower condition, probably portions of the Earth could return to normal growing seasons in a relatively short time, say within a decade or less. Since the major portion of the Earth surface is water, the probabilities are that most of the comet material that did not turn to vapor in the atmosphere and reached the surface would impact on water covered areas. This would not be inconsistent with the wording of the Scriptures since the Hebrew words translated as "fountains of the great deep broken up", can also be translated as "cleaved". In fact "to cleave" is the basic meaning of this Hebrew word "baqa" (Strong's # 1234), which is the opening up of an object due to a striking. The ice comet shower would also seem to better fit the Biblical record in that the heavy rains and great disturbances to the seas would start in a very short time after the impact of the first fragment with the atmosphere and the seas, and the heavy rains and the disturbances to the waters would start to decrease not long after the last major fragment had impacted. Therefore, if a high water content comet much larger than Shoemaker-Levy 9 was fragmented into say 100+ major fragments and many, many smaller fragments and impacted the Earth over approximately 40 days the result would seem to closely fit the Biblical record.

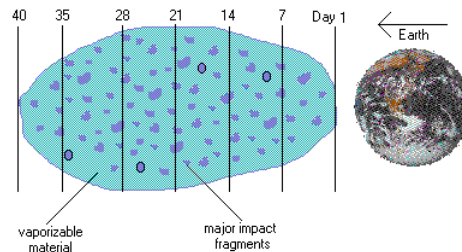


Fig 9



Fig 10

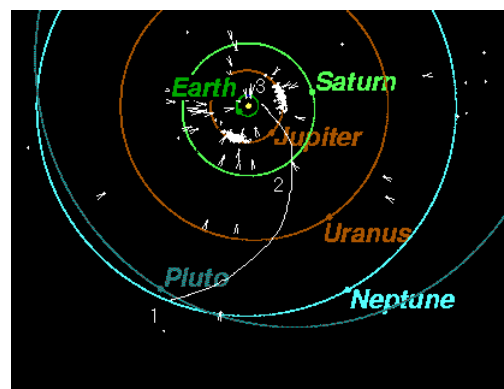
Conclusion; We have briefly summarized some of the many tribal traditions that seem to verify the Biblical account of the flood and presented only two of many possible theorizations concerning how a natural phenomenon could possibly cause such a great destructive event. See Note A and Note B for further expansion of the multi-fragment ice comet shower concept which our research to date seems to indicate as the most probable theory.

In attempting to visualize the true nature of the flood it might help to use the following amplified translation of 2 Peter 3:6.

Whereby the world that then was,
being dashed down (washed down, deluged, overflowed) with water,
perished (was fully destroyed):

Therefore, one must consider the possibility that a large portion of the damage of the flood was due to a "washing down" and "washing over" effect, as with flash flooding and tidal waves, instead of the standard interpretation of a deep standing flood of water that covered the entire globe.

Note A: COMET NOAH, a theoretical scenario



1 Kuiper Belt item Noah (KBNoah) leaves the belt possibly due to an encounter with another Kuiper Belt item or an encounter with planet Pluto

2 Breakup begins as Comet Noah (CTNoah) nears the orbit of the inner planets due to planet gravitational pull and heating effects of the Sun. There is also the possibility of asteroid impacts. Its comet-type orbit is deflected by the effects of the gravitational pull of the inner planets.

3 CTNoah comes under the attraction of Earth's gravity and as it enters the exosphere break up accelerates due to higher gravitational effects and as heating starts due to friction of the Earth's atmosphere. A major portion of the ice evaporates as friction heat increases and becomes the heavy rains. That portion that does not evaporate, both of the ice and the solid material, impacts with the Earth's surface. A majority portion cleaves the surface of the seas and causes massive disturbances to the seas and tidal waves that run onto the land. That portion that impacts with the land causes surface disturbances, but the effect of fragments and dust being kicked up into the atmosphere is mitigated by the heavy rain, as compared to the what would happen with a dry asteroid impact. Impact craters are then heavily eroded by the rain and run off. After 40 days the effects of CTNoah are ended.

Aftereffects: The sea levels have raised considerably submersing a large portion of the seashores including much of the then-populated lands. The heavy rains and runoff have heavily eroded the highest mountains and highlands, forming new canyons and rivers. There is considerable floating debris on the surface of the waters in and on which the small animal and insect life survive. With time, runoff and erosion continues; and the seas slowly settle down. The pressures of the additional water cause Earthquakes and movements of the surface and sea bottoms resulting in both sinking and rising of land surfaces. The atmosphere starts to clear and the aftereffect rains lessen and the sea surface temperatures start to return to normal. Growth starts again from roots and seeds that remain on or near the land surface. After 1 year and 17 days it is safe for Noah, family and animal friends to exit the ark.

**Note B: Evidences from Paleoindian Sites,
Astronomical Observations, Postglacial Sea Levels,
Ice Cores, and Archeological Discoveries**

"Radiocarbon dating indicates that switching from Bølling to Allerød to Younger Dryas climatic regimes during the Pleistocene-Holocene transition caused regional hydrological conditions to change suddenly from desiccation and declining water tables to rising water tables at essentially the same time across North America. During Younger Dryas reduced evaporation due to colder temperatures caused what precipitation there was to be more effective in recharging water tables (making black mats and aquolls) and raising water levels in ponds and lakes (diatomites, marls and gyttjas). How did this cause 32 genera of Pleistocene fauna to become extinct immediately prior to the Younger Dryas event? Some have argued that extinction was gradual with species dropping out at different times in the late Pleistocene or that a domino effect occurred as the extinction of one group led to the extinction of another resulting in a crash of the ecological system. These scenarios would have taken more time than the geochronology allows. The sudden extinction occurred at exactly the onset of the Younger Dryas deep freeze. Therefore, climate change is very likely a significant factor. But it also occurred during a time of depleted watering places and at the same time as predation by Clovis folk. Therefore, what may have done them in was the sudden and dramatic climate change combined with the hunting pressure on weakened animals concentrated at the few existing watering places which may have been frozen over. On the other hand, the extinction is so quick and complete that I wonder if something we really don't yet understand happened 10,800 14C years ago at the real Pleistocene-Holocene boundary." (From "Stratigraphic Manifestations of Bolling, Allerod, and Younger Dryas Climate at Paleoindian Sites in North America and the Causes of Extinction" by C. V. Haynes, Jr.; available at <http://geology.er.usgs.gov/eespteam/workshop/abs.html>.)

"Dr. Clube ascribes other events including the Old Testament story of Noah and his Ark to a Dark Age linked with colliding heavenly bodies. He also believes that climatic changes, including fears of present global warming, may have a cosmic component. There is sufficient evidence, he says, to indicate that collisions happen within centuries and millenniums rather than millions and billions of years, with multiple encounters more likely than sceptics claim. " ("A cosmic trail with destruction in its wake", by Nick Nuttall Times Newspapers Limited The Times, May 24, 1990, Thursday)

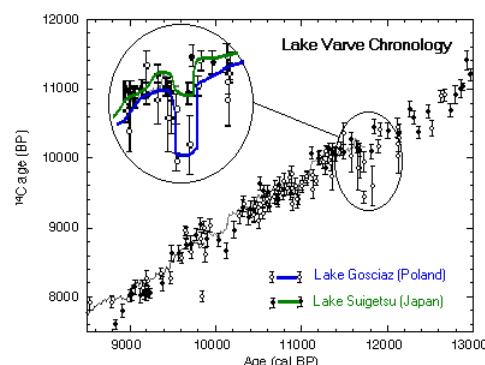
"Abstract: The structure of the Taurid meteoroid complex is investigated using orbital element measurements from the IAU Meteor Data Center. The complex is found to have been formed during the last about 10 kyr, this time-scale corresponding to a probable late stage in the evolution of the parent object, a giant comet which was apparently captured into a small-perihelion, short-period orbit about 20 kyr ago and which, in an initial highly active phase, gave rise to the material that now broadly constitutes the zodiacal cloud. Models of the evolution of the complex under gravitational perturbations suggest that meteoroids must have originally left the parent object near perihelion, but also allow the possibility that fragmentations have occurred when large disintegration products collided with objects in the asteroid belt." ("The structure and evolution of the Taurid complex", STEEL, D. I.; ASHER, D. J.; CLUBE, S. V. M. ,Royal Astronomical Society, Monthly Notices (ISSN 0035-8711), vol. 251, Aug. 15, 1991, p. 632-648)

Also Alexander Tollmann, "a professor in the institute of geology at the University of Vienna, compared the numerous myths of a great flood, recorded in almost every prehistoric civilisation, with the geological evidence for a comet impact at about the same time. He used the two sources of information to date the flood very precisely, to around the year 9,600BC.

Two discoveries are central to his claim. One is the distribution of the splinters of molten rock thrown up by the impacts, known as tektites. There was, he said, a huge concentration of them in sediments laid down about 10,000BC. Variations in the amounts in different parts of the world suggested Earth was hit by seven large fragments and many smaller ones.

The other is the apparent sudden increase in radioactive carbon-14 found in fossilised trees dating back to the same era. This, said Tollmann, was due to the destruction of the ozone layer by the comet, an event that exposed the atmosphere to higher levels of radiation and increased carbon-14 production."

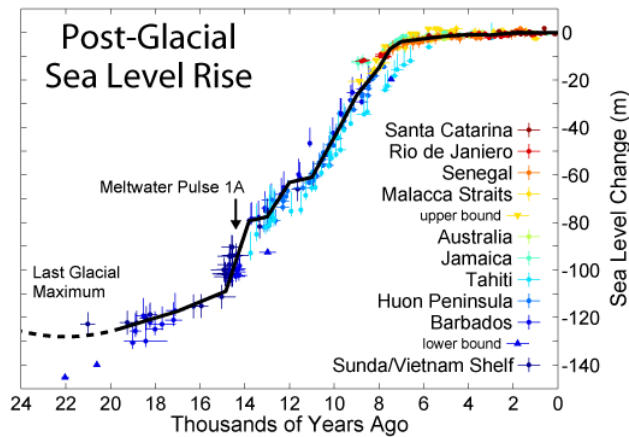
(From http://www.nando.net/newsroom/ntn/health/042296/health11_25615.html)



Modified Fig. PE-4 from <http://www.cio.phys.rug.nl/HTML-docs/Verslag/97/PE-04.htm>

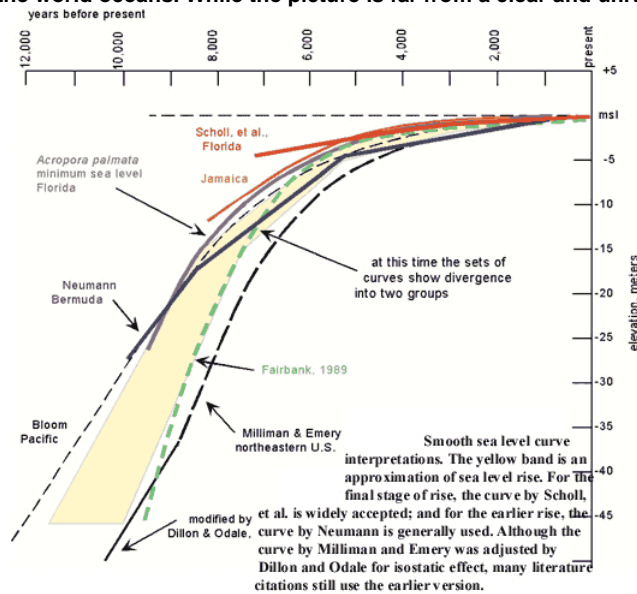
We also find a similar time estimate from postglacial sea level data and from the sea level data we get a very rough estimate of the size for the ice comet.

"As the last great ice sheets thinned, retreated, and disappeared, their water was returned to the oceans. Radiocarbon dating of drowned reefs, swamps, coastal features, and river channels allows the reconstruction of both the rapid decay of ice sheets and the gradual climb to present sea level. Rapid sea level rise about 12,000 years ago may represent the major decay of the Scandinavian Ice Sheet, and about 9000 years ago, the Laurentide."

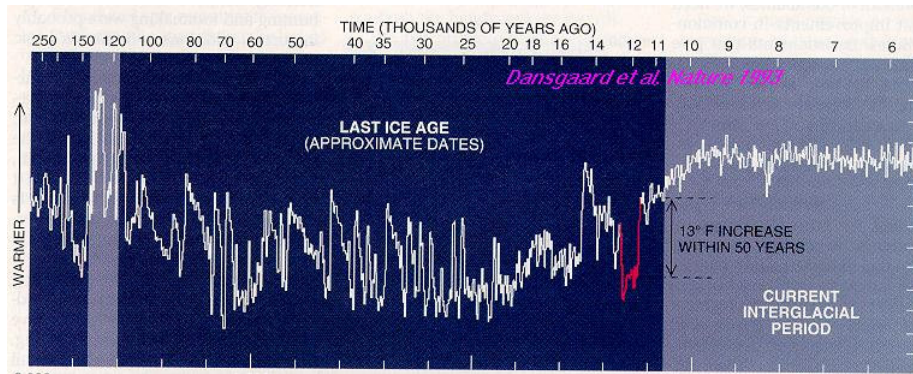


"The Laurentide Ice Sheet had nearly disappeared by about 5000 years ago, thus the last 10 m of sea level rise cannot be explained by ice sheet decay. Thermal expansion of ocean waters and isostatic uplift of the shallow North Sea and Hudson Bay (spilling their water into the larger oceans), are the most likely explanations." (From "A Primer on glacio-eustatic sea levels" at <http://www.homepage.montana.edu/~geol445/hyperglac/eustasy1>)

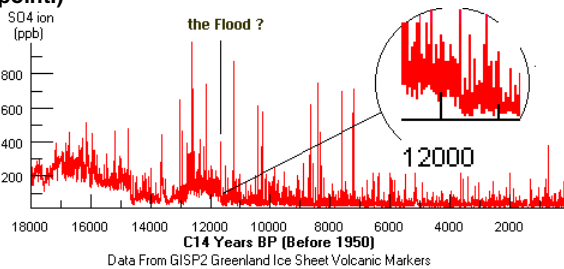
They are saying that they cannot really explain the estimated last 10 meters of sea level rise for the last 5000 or so years (The Scholl study in Florida indicates only a 2 meter rise in the last 5000 years.). Not often discussed is the fact that all data has an error band, and in the case of data derived from C14 dating methods there is considerable error, see Note C below, and also due to interpretations of the physical evidences made by each individual researcher. The plot below from <http://cima.iprm.edu/~morelock/sealvl.htm> illustrates the disagreements from different research studies and the uncertainty spread at 10,000 BC becomes quite large. "One alternative supports a smooth sea level rise, while the other points to pulses in the addition of meltwater to the world oceans. While the picture is far from a clear and universally accepted,"



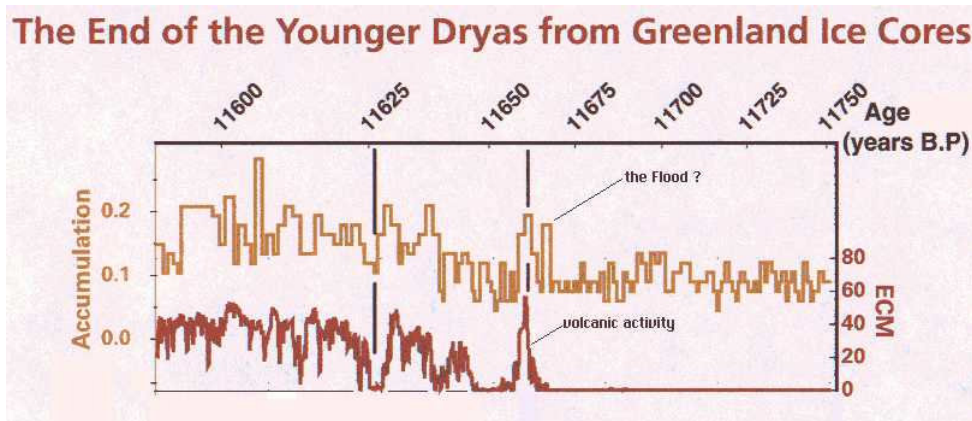
Therefore, there are many possible curve shapes that can fit within the wide error band that their data has. Including a sudden rise of sea level due to a comet induced flood followed by a relatively rapid melting of the ice sheets due to a sudden warming of the climate. The below indicated 13 degree temperature rise in less than 50 years at the close of the Younger-Dryas would be quite catastrophic.



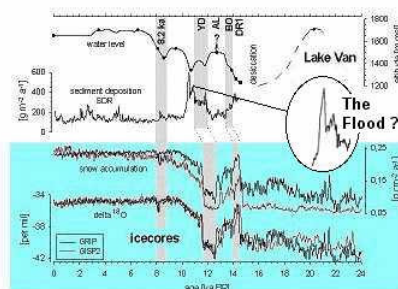
We also see a shift in the recorded icecore acid (SO₄) levels in the data plot shown below. (Most probably there is a discontinuity in the icecore at this point.)



Zooming in a little closer and looking at particle Accumulation and ECM (electrical conductive measurement, considered as a measurement of acidity), we see in both curves a spike due to volcanic activity and in the Accumulation plot it is preceded by a data pulse that appears to not be associated with the volcanic activity. Obviously we would like to firmly state that this is particle accumulation due to the proposed comet encounter, but actually the data is just not that reliable with unexplained pulses in other areas, and then there is also the strong probability of a short discontinuity in the data at this point.



Taking a look at the sudden sea level changes of Lake Van (near Mt. Ararat) as shown in the figure below, we see an increase in the levels at approximately the time period of interest. The problem here is the dating errors and accuracy for each of the respective studies. The Ice Core Working Group in their publication of May 1998 proposed that their dating was within 2 percent for the periods in question, which would give possible errors of around 300 years. The Lake Van working group says "The age correlation between the Lake Van sediment and the Greenland ice core chronologies is very good for the Holocene, but a time difference of 570 (GRIP) or 730 (GISP2) years between the Late Pleistocene chronozones (Fig. 3; e.g. Grootes et al. 1993; Cuffey et al., 1995; Dansgaard et al., 1993) exists, which need further investigation." And we would further propose that they possibly got it a few years wrong in their correction, and instead the end of Younger-Dryas could possibly correspond to the sharp spike in sediment deposition for Lake Van. The data from seven studies including tree rings, varves, coral dating, and Greenland ice cores indicates the termination of the Younger Dryas to be within a range from 10,447 to 11,700 yr. B.P. (avg. 11,074 +/- 627) (from Paleo 122(1996)p.114,Table 2). The indicated time of the sediment deposition spike at approx. 10,500 yr. B.P. is just within the the lower end of this range.



(modified fig. 3 from <http://www.tu-darmstadt.de/fb/geo/gpi/landmann/abstract/gusdvs.htm>)

They describe the condition of the core sample at the time of the sharp spike in sediment deposition as follows: "At around 10,500 yr B. P. a conspicuous layer, consisting of 7-10 dark brown, thick varves ..., was deposited in Lake Van. Biomarker analyses of this organic carbon rich layer ... showed, that the lipid fraction consist mainly of longchain alkenones ... The author concludes that Prymnesiophyceae were the primary producers and suggests that a mixing event, following a long time of stagnation, led to the enrichment of nutrients in the lake water." (from Palaeo 122(1996)p.115) We obviously would propose that "the flood" was the suggested "mixing event".

To obtain our very rough estimate of the minimum comet size, we are at the minimum assuming that it was the proposed multi-fragment ice comet shower that contributed the approximately 10 meter of sea level rise at 10,000 BC, instead of the other proposed theories. Then the estimated minimum ice comet size would be 120 miles in diameter, assuming 80% water content.

Well then , why can't we see physical evidence of the comet impact all over the globe? And the answer is that we can! J. Ronald Eyton and Judith I. Parkhurst in their paper "Re-Evaluation of the Extraterrestrial origin of the Carolina Bays" (<http://abob.libs.uga.edu/bobk/cbayint.html>) carefully analyzed the possibility of meteors, asteroids or comets forming the Carolina Bays and concluded that it was most likely due to a comet. And J. C. Stager and L.B. Cahoon reported on sediment cores collected in Lake Waccamaw Bay Lake in southeastern North Carolina (<http://abob.libs.uga.edu/bobk/wacbay.html>), the largest of the Carolina Bays, and concluded that it was between 10,000 to 15,000 years old. Formations similar to the Carolina Bays are located in many various locations around the globe. (We should note that many other researchers have proposed various other origins of the bays, including the now extinct giant beaver (extinct 9,000 to 10,000 years ago), but others report there is no evidence that the giant beavers built dams.) The 10,000 to 15,000 year old estimate is not exactly pin point dating, however, fortunately for us, significant comet encounters occur very infrequently, possibly only once every 100,000 years. Therefore we would expect there to be only one significant comet impact event within a 5,000 year time span.

"Allow me to pass along the following accounts of legends passed down among Native Americans concerning the origin of the Bay lakes on whose shores they long lived:

Of Lake Mattamuskeet:

".....kneeling at a sacrificial alter, she prayed to the Great Spirit to save the brave and her perishing people. After her invocation, a star fell to the Earth, and rain soon followed. Days and days of rain quenched the fire. Great holes burned in the Earth by the fire were filled, forming a great inland sea." (Algonquin Indian legend, Touring the Backroads of North Carolina's Upper Coast, p.268)

Of Lake Waccamaw

"The local Indians are known as the "People of the Falling Star," and they believed the lake was created by a falling star, perhaps a great meteorite." (Waccamaw-Siouan Indian legend, Wild Shores, Exploring the Wilderness Areas of Eastern North Carolina. p.150)"



Carolina Bays Northwest of Myrtle Beach, South Carolina
(<http://www.georgehoward.net/cbays.htm>)

We also get a rough confirmation of the proposed date of the flood from archaeological data concerning the place and time of the beginning of Neolithic agriculture, consistent with Genesis 9:20 "Noah, a man of the soil, began the planting ..." (NEB)

"The cradle of agriculture generally has been placed in the Jordan Valley of the southern Levant (today's Israel and Jordan). But work by Simcha Lev-Yadun of Israel's Agricultural Research Organization and colleagues suggest the first farms may have been farther north, between the Tigris and Euphrates rivers in what is today northeastern Turkey and northern Syria. Wild progenitors of the main Neolithic founder crops (einkorn wheat, emmer wheat, barley, lentil, pea, chickpea, bitter vetch, and flax) are found together only in this small core area of the Fertile Crescent. Lev-Yadun reports that wild chickpea especially is extremely rare, yet it was a staple crop of Neolithic life 10,000 years ago. Agriculture, therefore, probably began in an area where chickpea is native. Archaeological evidence shows that the earliest known farming settlements of the Fertile Crescent were in this core area.

Also, the limited genetic variability of these crops implies that they were domesticated only once — rather than by several different cultures at roughly the same time. Evidence of domesticated crops in the core area dates to about 10,000 years ago, while the earliest signs of farming elsewhere are about 9,300 years ago. Neolithic sites discovered in the core area indicate that a society with plenty of food thrived there. In sites such as Cayonu, Novali Cori, and Gobekli Tepe, impressive architecture, images, and artifacts have been found. Settlement sites are also larger in this area than many others of the same time in other parts of the Fertile Crescent. ..." (From "The Cradle of

Recent genetic studies indicate that at one or more times in human history only a very few individuals were the genetic source, consistent with the historical flood accounts. If one uses the standard 25 years per generation, the flood at some time between 10,500 and 11,500 yr. B.P. would be very roughly between 420 and 460 generations ago. (The possibility of increased longevity not being considered.)

"indicate that the action of natural selection against deleterious mutations has been relatively weak over the six-million-year period. This suggests either that the human population has been through one or more severe reductions, or 'bottlenecks', or that only a small proportion of people in any given generation passes its genes on to the next generation – or both. Either way, the effect will be to enhance random sampling effects at the expense of natural selection. The effect of this may have been that, over the millennia, a large number of slightly deleterious mutations have become fixed in the human population." (from "Six million years of degradation", Macmillan Magazines Ltd 1999 - NATURE NEWS SERVICE, <http://www.nature.com/nsu/990204/990204-2.html>)

Note C: a CAUTION concerning C-14 dating

"Plant materials (wood, charcoal, textiles, grain etc.) are generally considered the best sample types for C-14. Apart from contamination, other factors can cause an apparent age. Some species of hardwoods live several centuries, and the C-14 result should represent the date of the rings present in the wood or charcoal sample. Furthermore, dates on plant materials grown in regions of volcanic activity may be older than the true age because of a natural dilution of the local atmospheric C-14 by volcanic gases. Saup, et al (1980) investigated the C-14 result of 5730 BP on wood from a mine shaft believed to be Roman or Etruscan. Plants growing in this region of volcanic emissions (Monte Amiata, Tuscany, central Italy) gave fictitious dates of 1805, 2540 and 4350 years BP. Discrepancies of up to 20% between C-14 results and historical data in the Aegean and in Egypt are thought to derive from minor atmospheric variations (Hood 1978).

Divergence of the C-14 age from the historically dateable context is clearly the best, perhaps the only, method of evaluating the effects of contamination. While it is indisputable that C-14 does give results generally harmonious with the expected historical age, the exceptions are manifold, even with optimum sample material and site conditions. In a series from historical sites in Yugoslavia (Srdoc et al 1981), wood samples of the 13th century gave dates of 240 and 580 BP, a 14th-15th century sample gave 940 BP, 1st-2nd century B.C. samples gave 2170, 6030 and 5600 BP, and a Neolithic sample gave 1940 BP. The site of Akrotiri in Greece, destroyed by the Thera eruption of ca. 1550 B.C. and sealed with an ash layer 3m. deep, was thought to be "an ideal source for radiocarbon samples." A recent series of eight samples yielded only four results deemed reliable: two dates "are exceptionally early and do not fit into the archaeological picture," two other dates "are very late and were probably contaminated" (Weinstein and Michael 1978). All of the samples were grain or charcoal of short-lived wood, and all were found in jars in one room. Regarding the early dates, the authors remarked:

"Why are they so early? Are there special factors or phenomena surrounding the Akrotiri samples of which the radiocarbon specialists are unaware? At present, the series II dates are certainly of little or no value for Minoan chronology."

Betancourt et al (1978:202) also discuss several dates that are too early or too late in the expected historical chronology, and conclude:

"One or two dates should never be used by themselves to establish a site's chronology. So many dates have proven to be useless because of contamination and other causes that one can only establish a radiocarbon chronology with some degree of confidence if several dates from the same site fall into a consistent pattern that agrees with the stratigraphic sequence."

Possible contaminating agents are many and varied, as described above. Unless there are specific conditions which warrant specialized pretreatment, most laboratories process samples with acid and alkali washes. While this standard pretreatment is usually effective in removing modern contaminants, it may not do so for intrusive materials deposited much earlier. The well-known controversy over the earliest date (pre-10,000 B.C.) from Meadowcroft rockshelter in Pennsylvania hinges on an alleged gradual contamination of the charcoal samples through the injection of dead carbon in the form of coal particles or of organic solubles (Haynes 1980; Dincauze 1981), in spite of the fact that the cave is dry and its earliest cultural layer is well sealed. One of the proponents of contamination, C. Vance Haynes, was a pioneer of chemical pretreatment methods to remove plant debris from C-14 samples. He points out that the dated samples from Meadowcroft are not pure charcoal but "mixtures of finely divided carbon and carbonaceous matter with... a significant percentage of soluble organic matter" (1980:583). Humate extractions were dated some 10,000 years earlier than the residual material in one sample. Cook (1964) investigated apparent charcoal samples from archaeological sites using chemical procedures similar to but stronger than those of C-14 pretreatment, and concluded that many were decayed wood with "considerable amounts of organic matter produced by micro-organisms through past centuries." Others were partially burned (carmelized) wood with considerable infiltration of organic matter.

Another famous early man site in North America, the Old Crow site in the Yukon territory of Canada, also yielded very misleading C-14 results according to a recent study by Nelson (1986). Bone tools from the site had given a date of around 27,000 years B.P. These tools were made of caribou ribs, and Nelson found that the outer portions of the bone had exchanged carbon with the air and ground water. A sample taken from the innermost portion of the bone yielded an age of 1,350 years. As in the Meadowcroft samples, the dating of progressive fractions revealed discrepancies not apparent when the samples were subjected to traditional pretreatment and dated.

My own investigation of a "charcoal" sample dated 8500 BP from a geological context in Hong Kong led to uncertainties inherent in the dates on wood samples from certain depositional environments. The wood was taken from a marine clay 18m. Below sea level; it was jet black as if charred. Laboratory examination (Grisack 1985) revealed however that the cellulose structure did not exhibit the morphological changes associated with charring. Scanning electron microscope study revealed that the pore spaces of the cellulose were almost completely filled. The analytical spectrometer showed the main inorganic substances present were sulfur and iron, with lesser amounts of silicon, aluminium, calcium and sodium. Treatment with 50% hydrochloric acid was effective in removing inorganic materials, but under the SEM the pore spaces remained as occluded with debris as before. The sample also showed very little birefringence under polarized light, whereas wood fibers should be brightly birefringent. "The explanation that suggests itself is that some organic type material has

slowly, over a long period of time, been filtering into the lumens of the wood and possibly the cell walls as well, displacing the cellulose or carbon" (Grisack 1985:3). In the opinion of F.H. Kendall, Director of the: Radioisotope Unit at the University of Hong Kong, standard C-14 pretreatment of wood and charcoal samples would not succeed in removing organic material translocated into the lumens and cell walls of the cellulose (personal communication 1985).

It is clear that "more research on dating technology needs to be conducted so that the reliability of dates can be assessed" (Stanford 1982:205). MacDonald(1983:100, 108) believes that the absorption of humates from ground water may have seriously contaminated many dates from the northeastern US with its particularly acidic soils:

"The critical question that demands immediate attention is that of humic acid contamination of C-14 dates, since there is growing evidence that current lab pretreatments are inadequate and that we are confounded by dates that may in some cases be too old and in other cases too young ..."

In sum, it should be obvious to the non-specialist, as it is to most archaeologists and radiocarbon scientists, that possible contamination always represents an element of uncertainty which no amount of laboratory pretreatment or measurement can totally efface. Clusters of congruent dates on different materials, replicated at different sites, eventually allow for a reliable radio-carbon chronology to be established, but there is, quite simply, no possibility of an absolute date on a single sample or artifact." (from <http://www.shroud.com/meacham.htm> by William Meacham)

"The radiocarbon age scale that would be calculated from first principles (based on the decay rate of the 14C isotope, assuming that 14C was at the same level of abundance as it is at present) is not always reliable, because there have been fluctuations in the rate of production in 14C at the top of the atmosphere. The problems are particularly great at about 10,000 14C y.a., when a large influx of 14C-depleted carbon from the oceans, combined with a decrease in the rate of 14C production at the top of the atmosphere, gives an 'age plateau' such that the same 14C age covers a wide span of real time, about 1,000 years." 14C years ago=>Calibrated ('real') years ago

1,000 => 1,000
2,000 => 2,000
2,500 - 2,800 => 2,600
(sudden shift in atmospheric 14C content)
3,000 => 3,200
4,000 => 4,500
5,000 => 5,900
6,000 => 6,950
7,000 => 7,900
8,000 => 8,900
9,000 => 10,000
10,000 => 11,200 - 12,200
(radiocarbon plateau)
11,000 => 12,900
12,000 => 14,000
13,000 => 14,500
15,000 => 17,000
16,000 => 19,500
17,000 => 21,000
18,000 => 22,500
20,000 => 24,500
25,000 => 28,000
30,000 => 35,000
40,000 => 45,000"

(from: <http://www.esd.ornl.gov/projects/qen/nerc14C.htm>)

Chapter 13; ALL is How Big ? When considering the Biblical Flood ?

For a first example look at Genesis 3:20 where per the King James Version Adam pronounces Eve as

"the mother of all living"

How big is this all ?

Is it totally inclusive of all living matter, plants, bacteria, aquatic life, bugs, fowl, and all the mammals and all primates?
Was she "mother nature" ?

Or on a slightly smaller scale lets rule out plants and just assign her as mother of all non-plant life, does this seem more reasonable ?
But we know that per chapter 1 all plant life and all the animals were created before Eve!

So how about only the primates ?

Or how about only the humanoids ?

Or how about only Adam's offspring ?

Just by a straight translation of the Hebrew of this verse only, we are not really exactly sure what is the true meaning and therefore James Moffatt decided to translate it as

"all living persons"

A small subset of "all living matter" and the word "persons" is not in the Hebrew!

And our preferred translation considering the context and the total creation record is only all of Adam's offspring.

In the flood chronicle of Genesis 6:9 through 8:22 the Hebrew word "kol" or "kowl" (Strong's #3605) is used 46 times and it is

translated as all, every, any, or whole depending upon the context. The question is, is this a universal all, meaning that totally everything is effected without any exception, or is it a figurative all effecting only those things within a limited scope of a reference area? Many have interpreted that it means that all living breathing animals on the surface of the earth were destroyed, except for those creatures on the ark. And on the other hand many contend that the destruction of the flood was limited to a smaller subset of the living breathing land animals and that the flood covered only that land surface within the scope of the Biblical narratives.

Let us take a look at the story of the dove as a second example. In verse 8:5, before the release of the dove, we find that "in the tenth month, on the first day of the month, were the tops of the mountains seen". Then the dove is released in verse 8:9, 40 days later, and "the dove found no rest for the sole of her foot" ... "for the waters were on the face of the *whole* earth:" But we know that the tops of the mountains were now visible! Why didn't the dove fly to the tops of the mountains and there find rest for the sole of her foot? It would seem that the tops of the mountains, though visible, were either too far off for the dove to fly to them in one day, or they were not suitable for a resting area for the dove. We could thereby conclude that the phrase "for the waters were on the surface of the *whole* earth:" is referring only to that area which the dove covered in its search and does not refer to the land surface area of the entire globe. Also see the Note for more examples.

Then how about the totality of the destruction of the land animals? In verse 7:21 of the King James Translation we see the phrases "of fowl", "of cattle", "of beast", and "of every creeping thing". To translate it as "among" would also be proper. This translation is from the prefixing of the Hebrew letter Beyth before the noun. And in verse 22 we also see "of *all* that was in the dry land, died". In order for these "of/among" phrases to be satisfied you do not have to destroy every living one of these living categories, you only have to destroy at least one or some of every kind of these categories and you will have legally satisfied the requirement in that you have destroyed "of/among" every kind but not having destroyed every living one of that particular category. And thus the flood story is interpreted to indicate that portions of each of the land animal categories were destroyed, and not total breathing land animal population over the entire globe. And the standing flood waters did not totally cover all the global land surface mountains to the tip of Mount Everest, when simple calculations indicate that there is presently not enough water on the earth to do so.

Conclusion: We have hopefully illustrated why it is preferable to interpret the Hebrew Scriptures such that the Genesis flood record is describing a deluge that impacted all land animal types and rained on all the land surface of the globe, but was somewhat less than a global catastrophe that involved complete reconfiguration of the total surface of the earth and killed totally all breathing animals on the global land surfaces as some have interpreted.

Notes

• Brown-Driver-Briggs' Hebrew Definitions:

erets (Strong's H776)

1. land, earth
 - a. earth
 1. whole earth (as opposed to a part)
 2. earth (as opposed to heaven)
 3. earth (inhabitants)
 - b. land
 1. country, territory
 2. district, region
 3. tribal territory
 4. piece of ground
 5. land of Canaan, Israel
 6. inhabitants of land
 7. Sheol, land without return, (under) world
 8. city (-state)
 - c. ground, surface of the earth
 1. ground
 2. soil
 - d. (in phrases)
 1. people of the land
 2. space or distance of country (in measurements of distance)
 3. level or plain country
 4. land of the living
 5. end(s) of the earth
 - e. (almost wholly late in usage)
 1. lands, countries
 - a. often in contrast to Canaan

Part of Speech: noun feminine

A Related Word by BDB/Strong's Number: from an unused root probably meaning to be firm

Same Word by TWOT Number: 167

In the majority of instances *kol erets* does not refer to the entire planet earth. In fact, of the 205 instance of *kol erets* in the Old Testament, it might refer to the entire planet just 40 times, and even some of those are questionable. About half of those instance occur in the books of Psalms and Isaiah. Here are some more examples.

- "Is not the whole [*kol*] land [*erets*] before you? Please separate from me: if to the left, then I will go to the right; or if to the right, then I will go to the left." (Genesis 13:9) (*The "whole land" was only the land of Canaan*)
- "And the people of all [*kol*] the earth [*erets*] came to Egypt to buy grain from Joseph, because the famine was severe in all the earth." (Genesis 41:57) (*The people from the Americas did not go to Egypt*)
- Then God said, "Behold, I am going to make a covenant. Before all your people I will perform miracles which have not been produced in all [*kol*] the earth [*erets*], nor among any of the nations; and all the people among whom you live will see the working of the LORD, for it is a fearful thing that I am going to perform with you." (Exodus 34:10) (*There would be no need to add "nor among any of the nations" if "all the earth" referred to the entire planet.*)

- "You shall then sound a ram's horn abroad on the tenth day of the seventh month; on the day of atonement you shall sound a horn all [kol] through your land [erets]." (Leviticus 25:9) (The Hebrews were not required to sound a horn throughout the entire earth)
- "Thus for every [kol] piece [erets] of your property, you are to provide for the redemption of the land." (Leviticus 25:24) (The law does not apply only to those who own the entire earth)
- "behold, I will put a fleece of wool on the threshing floor. If there is dew on the fleece only, and it is dry on all [kol] the ground [erets], then I will know that Thou wilt deliver Israel through me, as Thou hast spoken." (Judges 6:37, see also 6:39-40) (kol erets could not refer to the entire earth, since it would not be possible for Gideon to check the entire earth)
- "And Jonathan smote the garrison of the Philistines that was in Geba, and the Philistines heard of it. Then Saul blew the trumpet throughout [kol] the land [erets], saying, "Let the Hebrews hear." (1 Samuel 13:3) (Obviously, Saul could not have blown a trumpet loud enough to be heard throughout the entire earth)
- "For the battle there was spread over the whole [kol] countryside [erets], and the forest devoured more people that day than the sword devoured." (2 Samuel 18:8) (No, the battle did not take place over the entire earth.)
- "So when they had gone about through the whole [kol] land [erets], they came to Jerusalem at the end of nine months and twenty days." (2 Samuel 24:8) (No they didn't go through the entire earth, just the lands of Palestine.)
- "And all [kol] the earth [erets] was seeking the presence of Solomon, to hear his wisdom which God had put in his heart." (1 Kings 10:24) (It is unlikely that the Native Americans went to see Solomon.)
- Then the fame of David went out into all [kol] the lands [erets]; and the LORD brought the fear of him on all the nations. (1 Chronicles 14:17) (It is unlikely that the Native Americans knew about David.)
- "And David said, "My son Solomon is young and inexperienced, and the house that is to be built for the LORD shall be exceedingly magnificent, famous and glorious throughout all [kol] lands [erets]." (1 Chronicles 22:5) (The temple was famous to all the lands in the Middle East, but was destroyed before the advent of globalism.)
- "And they were bringing horses for Solomon from Egypt and from all [kol] countries [erets]." (2 Chronicles 9:28) (It is unlikely that the Chinese brought horses to Solomon)

Chapter 14; Noah's Ark, how to build one!

Noah's Ark, how could an early man build such a thing? Noah, Ark, Biblical, Bible

6:14 Make for yourself a coffer (box, chest) of pitch trees (cypress); nests shall you make in the coffer, and you will cover it inside and outside with a covering (pitch, bitumen).

6:15 And thus you shall make it; three hundred cubits (~450 ft.) the length, fifty cubits (~75 ft.) its breadth, and thirty cubits (~45 ft.) its height.

6:16 A light you will make to the coffer, and to a cubit you shall finish it above; and the opening to the coffer you will place in its side; with lower, second, and third floors you will do it.



Yes, our view of the ark is rather fuzzy and many artists have provided various concepts of how the ark could have been constructed. But, from what little we know, how could an early man having very little technology have constructed such a large floating structure?

We need something that will float in very extreme circumstances so why not start out with a basic concept of a large log raft or barge. "Build a barge of cypress wood" from "A New Translation of the Bible" by James Moffatt.



A large log raft used in the past to float logs down from the northwest to San Diego.

The common cypress, native to the Mediterranean region, is a symmetrical evergreen that resembles some poplars and often reaches a height of more than 90 ft. It has a close-grained yellow or reddish wood so resinous that it resists rotting even after prolonged submersion in water so it is an ideal wood to make sure our ark stays afloat and without having a sealed hull. Using a two layer approach, one longitudinal and one cross ways would provide good stability and strength in both directions. Since we don't want Noah to have to make large chains for tying them together as shown in the above photo we will have to assume that he and his family have mastered the technology of rope making from vines or made from dried prairie grass. Obviously having an axe to prepare the logs would be great, but as one thinks of it, not really necessary,

sharpened hand stones could be used in log preparation. A two layer log raft base would take about 450 two foot diameter logs 75 feet long. And if he, Noah, didn't want to cut his own logs he could steal them from beavers (see note 1) for although they usually select trees 2 to 8 inches in diameter, they can fell trees with diameters as large as 30 inches. He could even study the beaver to learn techniques since colonies of beavers often dig canals from the pond to a grove of trees. Such canals are up to 3 ft wide and deep and often a few hundred yards long. The timber is then readily floated down the canal. If he disturbed a beaver's dam they would cut new logs to repair it and continue this cycle until he gets enough logs. (Where there is a will there is a way.)

Now, for the upper part of the ark, consider a pole and beam structure of cypress poles with thatch covering the sides and the top. Thatch roofs have been known to withstand winds of up to 100 miles an hour and to last 40-60 years.



Thatching a roof.

The pitch covering on the outside and inside of the walls would serve as a protective coating and maybe even to keep the passengers from eating the walls. Obviously, thatching is also a natural for nest construction.



A weaverbird nest and a commune of weaverbird nests. The Hebrew word translated as rooms/nests can also imply the material of the nest, the reeds or grass



A newly constructed reed boat designed to replicate ancient boats. Remains of pitch covered reed boats used in the Euphrates river have been discovered in eastern Turkey that have been dated to about 3800 BC (see Note A) and from Kuwait an even older, about 5000 BC, ocean-going reed boat used in the Persian Gulf.

The big job for the thatching would be to gather all the required grass, dry it, weave the rope, tie it onto the framework, and pitch it inside and out.

The actual construction details for the light is difficult to understand from the description given. Many have envisioned it as a sort of cupola along the top center line. Also one can interpret the Scriptures to indicate that the side covering was to go up to within one cubit, about 18 inches, of the top, thus allowing this opening all around for light and ventilation. "Put an 18-inch opening in the ark all around ..." from "The Modern Language Bible: The New Berkeley Version in Modern English".

And many have envisioned the opening in the side to be a combined door and entrance ramp for loading all the animals and their food.

Now that we have solved all the construction details. How about provisions for the passengers.

6:19 And from every living thing of all flesh, two of all to come into the coffer, to keep alive with you; male and female they will be,

6:20 from the flying creature after their kind, and from the cattle after their kind, from every creeping thing of the earth after its kind, two from all will come to you to keep alive.

6:21 And you take for yourself of all eatable that is eaten, and you will gather to yourself; and let it be for you and for them for eating.

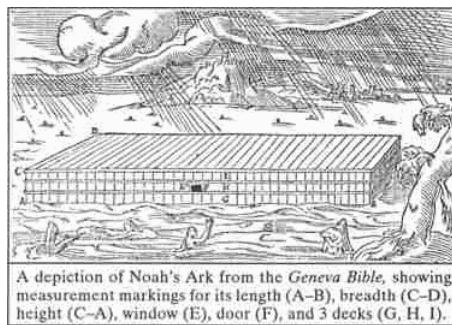
7:2 From every creature clean will you take to yourself seven by seven, a man and his woman; and the creature that not clean it by two, a man and his woman;

7:3 of the flying creature of the skies seven by seven, a male and his female, to keep alive seed upon the face of all the earth.

The list of "clean" and "not clean" animals is not a very long list and includes only those animals that man might consider eating that lived in the localized area. But, many have long said that it is Noah's job "to keep seed alive upon the face of all the earth" (King James Version). However, most often when the Scriptures uses the Hebrew word for all or every it is a localized all, not a global all! Obviously, the logical way is to put all the larger heavier animals on the bottom floor and the smaller animals and birds in the two upper stories of nests. Many of the passengers would naturally construct their own nests if materials were readily available. The humans would seem to have to stay most of the time on the lower floor to take care of the feeding and clean up chores.

Not often discussed is that the ark is also a food warehouse! So it must also include nests for food storage, enough food for a little over a year and probably enough for a short time after the flood until vegetation for food can grow back in the area. Per verse 8:11 we know that olive leaves were growing before they left the ark. The olive tree normally grows below 5000 feet altitude.

Conclusion: We have discussed a possible low-technology version of the ark for those who have expressed the opinion that an early man was not capable of building such a structure. Remember, the Hebrew text never says that it was a ship, instead says it was a box, a large box, but never the less a box, and as such would not require a high level of technology for its construction. As mentioned with what can be learned from the beaver, most of the techniques could have been learned from observing the animals and the birds in their nest construction.



A depiction of Noah's Ark from the *Geneva Bible*, showing measurement markings for its length (A-B), breadth (C-D), height (C-A), window (E), door (F), and 3 decks (G, H, I).

Here is a floating model, about 1:150 scale.



Note 1: Beaver, semiaquatic mammal noted for the building of dams. One species of beaver occurs in North America, the other in Eurasia. The two species differ chiefly in the shape of the nasal bones and are so much alike that some authorities consider them to be varieties of the same species. They are large rodents; the average adult beaver weighs about 35 lbs., but specimens as heavy as 90 lbs. have been found, and some extinct beavers were almost bearlike in size.

Note A: Bitumen Artifacts at Hacinebi Tepe, Anatolia, Turkey



Bitumen is a naturally occurring petroleum-based tar-like material. Mixed with tempering materials it was widely used and traded in the ancient Near East as a material for waterproofing, as a building material, and as an adhesive. More than 400 bitumen artifacts have been recovered from all the fourth millennium phases (A-B1-B2) at Hacinebi. Chemical compositional analyses permit the identification of bitumen sources, and by extension, the reconstruction of fourth millennium exchange systems. The inhabitants of Hacinebi imported bitumen from a variety of sources in Anatolia, North Syria, south Mesopotamia, and southwestern Iran.



Bitumen "ingot" with reed impressions, HN6106 Op. 11 locus 40 (Schwartz and Hollander 2000:fig. 5).



Bitumen with basketry impression. HN3516 Op. 7 locus 39 (Schwartz and Hollander 2000: fig. 3).



Uruk bevel rim bowl with bitumen-coated interior, possibly used for processing melted bitumen.. HN6212 Op. 10 locus 65 (Schwartz and Hollander 2000:fig.4).



Juglet with bitumen waterproofing. HN201 Op. 1 locus 12 (Stein and Misir 1994b:fig. 7).



Chipperd stone sickle blade with bitumen hafting. HN12057 Op. 12 locus 145.



Bitumen hafting from tool handle showing string impressions. HN2259 Op. 7 locus 25.

(source: <http://faculty-web.at.northwestern.edu/anthropology/stein/HNfindsBitumen.html>)

copied from: http://www.northwestern.edu/univ-relations/media_relations/releases/11_2002/riverboats.html

Northwestern News

Last updated 11/20/2002

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November 18, 2002

Earliest River Boats May Have Carried Petroleum

EVANSTON, Ill. -- Recently discovered boat fragments found at the site of Hacinebi in southeast Turkey offer evidence of the world's earliest riverboats and the earliest transport of trade goods -- including petroleum products -- by river, according to Mark Schwartz, a graduate student in anthropology at Northwestern University, whose findings were published in the fall edition of the British archaeological journal, *Antiquity*.

The only direct evidence linked to the world's first boats to travel by river, rather than by sea, Schwartz's finds bolster scholars' understanding of the early development of maritime technology and its tie to transportation and trade during the very early stages of the development of civilization.

While finds in the Persian Gulf demonstrate early transport on oceans, it was river trade that played a greater part in the development of the earliest civilizations both in terms of the sheer volume of goods moved and the strength of the trade routes.

Dating to 3800 B.C., the fragments are remnants of the bitumen (natural petroleum tar) coating placed on early reed boats to waterproof them. Evidence suggests that the bitumen-coated boats also were likely to have carried petroleum products as cargo. Coupled with chemical sourcing data from Hacinebi, Schwartz's discovery points to the earliest form of the petroleum trade in the Near East.

"With all the current, heated discussions about the petroleum industry in the Near East, it is ironic that the world's earliest river boats in this area -- and indeed the world -- were also transporting petroleum," said Schwartz.

The presence of the waterproofed boats provides a more complete picture of the ancient exchange economy of southeast Anatolia. The fragments directly document the boat's connection to a trading center and the first time boats were used to transport trade goods on a river system."

Much of the research on trade and transport in the Near East has focused on Mesopotamia, where the world's first cities appeared during the fourth millennium. But this boat find and the site of Hacinebi lie outside of the "heartland of cities." While evidence does point to trade with southern Mesopotamia (present day Iraq) during the later phases of Hacinebi's history, excavations, led by Gil Stein, the director of the Oriental Institute of the University of Chicago, suggest that the site played an important role in local Anatolian trade even before the arrival of merchants from Mesopotamia.

"The presence of local trade goods such as copper, shell and chlorite at the site along with our recent discovery of the early reed boat fragments demonstrate that the people of Hacinebi were developing impressive long-distance exchange relationships on their own before the arrival of Mesopotamians," said Schwartz.

The people of Hacinebi were involved in early metallurgy and likely were using bitumen-covered boats to transport copper ore, among other items, down the Euphrates from the Ergani source 200km north in the river. The Hacinebi area was historically an important place for trade and transport.

Stable carbon and hydrogen isotope analyses performed by Schwartz, with David Hollander of the University of South Florida, suggest that bitumen was transported to the site from at least three different Anatolian sources and document a non-Mesopotamian, Anatolian source of bitumen for the reed boat coating. The fragments show distinct impressions of reed bundles and rope and clearly document ancient boat building and the widespread use of this ancient technology.

Modern reconstruction of ancient reed boats try to depict these types of vessels, but bitumen is rarely used on them, making them prone to water logging and/or rotting.

"The fact that the ancient people of Hacinebi took the time to waterproof their reed boats demonstrates a high degree of investment," said Schwartz. "These boats were meant to last, and the very thick coating signifies a boat that was much larger than a simple canoe."

These findings relate directly to recent discoveries from Kuwait which point to even older (5000 B.C.) ocean-going reed boats in the Persian Gulf.

"Taken together, these finds point to interesting parallels between different regions and cultures and reinforce each other's validity," said Schwartz. "You may be able to refute that one find of reed-impressed bitumen is not part of a reed boat, but it is much more difficult to argue against many finds from different areas and time-periods of the Near East."

Ethnographic records point to the existence of reed boats in many cultures throughout the world including the Sudan, coastal Peru, lake Titicaca, New Zealand and the marshes of southern Iraq. The boats in the Near East were constructed in similar ways -- reed bundles waterproofed with bitumen -- illustrating ingenuity in the construction of impressive watercraft with simple materials that ancient people found nearby.

The discoveries were all found at sites where trade is believed to have played an important role in ancient economies. Many ancient societies such as Egypt, Mesopotamia, and Harrappa used riverine trade routes extensively in the formative stages of their development. It was only after they had been states for a few hundred years that they relied on long-distance trade on the world's oceans.

Shipping timber, stone, copper and bitumen down the Euphrates River would have been relatively cheap, quick and efficient means of supplying a developing society with materials it needed to grow and flourish.

While many ancient civilizations were started on rivers for agricultural reasons, trade on these rivers was an important outgrowth and a key ingredient for their development.

"With all of the recent advances in technology, water transport is still the most efficient way to move cargo and goods long distances," said Schwartz. "Even though the Euphrates has always been a dangerous river to navigate, these ancient merchants had a lot of incentive to engage in this early version of the petroleum industry."

Note B: Genetic and Linguistic Studies Point toward the Location and the Time.

All people are related, but "In the article in the November 2001 issue of *The American Journal of Human Genetics*, Ariella Oppenheim of the Hebrew University of Israel wrote that this new study revealed that Jews have a closer genetic relationship to populations in the northern Mediterranean (Kurds, Anatolian Turks, and Armenians) than to populations in the southern Mediterranean (Arabs and Bedouins)." (from http://www.barzan.com/kevin_brook.htm)

Also:

"A family tree of Indo-European languages suggests they began to spread and split about 9,000 years ago. The finding hints that farmers in what is now Turkey drove the language boom - and not later Siberian horsemen, as some linguists reckon. ... Around this time, farming techniques began to spread out of Anatolia - now Turkey - across Europe and Asia, archaeological evidence shows." (From "Language tree rooted in Turkey" by John Whitfield, http://www.nature.com/nsu/nsu_pf/031124/031124-6.html)

Both of these studies would place the location in the Ararat area since we have recorded (Genesis 11:2-9) that soon after the flood they migrated out of the mountainous regions from the east. Then soon after that the multiple languages were developed as their speech was confused and then from there they were scattered. Also the linguistic study places the scattering to about 9,000 years ago for those of the Indo-European languages, therefore, the flood would be sometime prior to 9,000 years ago.

Chapter 15; BIBLICAL OLD TESTAMENT CHRONOLOGY

The Bible genealogy of the old testament book of Genesis, can they be used to set dates in Biblical history?

Nearly all who know about the Biblical Scriptures have at one time wondered when Adam was created and when was the flood! Seems like a simple enough question, just add up the numbers in Genesis 5 and Genesis 11 and you have the dates: right? Unfortunately it is not that simple! When one adds up the numbers it is usually assumed that the genealogies given are a continuous listing of fathers and the year and name of the first direct son, and that there is only one son of that name. We are told that each had many offspring, for example a tradition is that Adam and Eve had 33 sons and 23 daughters. The ancient Hebrew wording has no designation for grandfather, great grandfather, grandson, great grandson, etc.. The son mentioned could possibly be a son who some how distinguished himself or was the most favored son and not the first son. We all know of the custom in some families to have the same name for many generations and use designations like senior and junior or designations like I, II, III, etc.. (In 12th Dynasty Egypt there were 4 kings named Amenem-het, 18th Dynasty had 4 Thutmoses and 4 Amenhoteps, and there were 11 Ramesses in the 19th and 20th Dynasties. Assyria had 4 kings named Shal-maneser. And in the Scriptures there were 2 Abimelech, 2 Jabin and 2 Enoch.) And to further complicate the matter we have number differences between the Masoretic text and the Septuagint translation due to possible transcription or translation differences. And also the Masoretic text omits Cainan (or Kainan) which the Septuagint includes in 11:12-13. However, Luke also includes Cainan in his genealogy which seems to support the Septuagint translation.

Therefore, depending upon the preferred translation and interpretations of key passages by those doing the calculations we have greatly different end results. For the creation of Adam for instance different scholars have given us dates of 4,004 BC, 5,490 BC, 10,842 BC, and 12,028 BC as a few examples. And for the date of the flood 2,348 BC, 3,228 BC, 4,819 BC, and 5,799 BC are a few examples. (see Note A) The numbers from the Septuagint provide later dates than those of the Masoretic text. For millenniums the standard way was to assume that there was a direct father-son relationship for each name given and that the year given was the birth year of the direct son. From these calculations we get the lower values for the creation of Adam and the flood. But many students were not fully satisfied with these values since the archaeological evidences being uncovered did not seem to confirm these early dates. Then along came Harold Camping who proposed that unless it was obvious from the text that there was a direct father-son relationship, there was instead an ancestral relationship with the named descendant being born during the year of the death of the patriarch. This method gives the much later dates and seems to correlate more closely to the information being presented by archaeologists. But again these calculations did not seem to satisfy many since it deviated greatly from the standard interpretations of the Hebrew text.

Well then how does one choose between the various dates given? Not an easy proposition to resolve! However, there is another possibility not so often considered. In the Hebrew text there are overlooked occurrences of a single Hebrew letter separator interjected within the text of chapters 5 and 11 (see Note B). That is the Hebrew letter "Samech", the fifteenth Hebrew letter which as a numeric stands for sixty and is equivalent to the English letter S. It occurs between sets of verses pertaining to many, but not all, of the patriarchs and would seem to indicate that the information concerning most of the patriarchs stand alone and should be more properly considered as very short separate paragraphs. This we are proposing is a designation of a separation between most of the patriarchs dominion. An indicator that the text is not intended to be treated as one continuous chronological record. The samech break reportedly indicates a break to a lesser degree, however, in the Masoretic text Genesis record paragraph breaks are seldom indicated. And in the case of the samech breaks the majority of them are in chapters 5 and 11. Therefore, we propose that these breaks are very significant and should not be ignored. (To view a translation of chapters 5 and 11 with the Hebrew letter separators indicated, and alternate Septuagint year values, take a look at chapter 5 and/or chapter 11 in section 2

It is proposed that each patriarch is indeed the ancestor of the next listed patriarch, but for many of them it is an ancestral relationship through a number of not listed generations. As many others have suggested, the listing of 10 patriarchs in each of the genealogy sequences of chapters 5 and 11 in the Masoretic text are listings of only the most renown men of these periods. That when the Septuagint translation included Cainan there was no error involved, it is just an indication that there were other direct descendants that have been omitted and for some reason one scribe preferred to include Cainan. Could it be that the scribe was a descendant of Cainan? Textual interpretation and placement of the separators would seem to indicate that possibly only in the cases of Adam-Seth, Methuselah-Lamech, Lamech-Noah, Noah-Shem/ Ham/ Japheth, Shem-Arphaxad, and Terah-Abram/ Nahor/ Haran are there direct father-son relationships. (See note: C for examples of the use of the Hebrew word "yalad" , translated as begat, to cover multi-generations in additional passages of Genesis.)

Are the listed patriarchs the only ones that lived to such old ages? Of course we can't know the answer to this question. Possibly brevity was of a necessity because early sections of the Genesis record had been passed down orally through many generations before writing came into existence. The narrative can however be used as an indicator that as Josephus puts it "...they attain to so long a duration of life, for those ancients were beloved of God and made by himself; and because their food was then fitter for the prolongation of life,..."

Conclusion: We have briefly reviewed the confusing state of the interpretations of the Genesis record that allows some to propose many varied dates for the creation of Adam and for the flood. And have instead proposed that to use these portions of the Scriptures to determine dates is an incorrect interpretation. Instead for the times in question we will have to depend upon the best estimates that scientific technology can provide for us. And at present it would appear that the best estimates would be 8,000 BC to 10,000 BC for the time of the flood and 12,000 BC to 14,000 BC for the time of Adam. Hopefully in the near future the scientists will be able to provide us with better estimates for these dates as technology continues to improve.

Now, Lets say it in Different Words

Why it is NOT proper to "add up" the genealogies of Genesis chapter 5 and chapter 11 !

1) "Every word of God is pure; He is a shield unto them that put their trust in him.
Add thou not unto His words, lest He reprove thee, and thou be found a liar." Proverbs 30:5-6

a) **NO** where does the Bible "add up" the genealogies !

b) Or say to "add up" the genealogies !

c) Nor hint at how they should be "added up"!

d) Those that do so must assume that they know how the ancients did genealogies ! But, in fact they often used different rules than just a strict biological father to son lineage. (See note A below.)

2) The difficulties with **assuming** one knows how to "add up" the genealogies

a) **Luke adds a name:** In Luke 3:35-36 he includes a Cainan between Salah and Arphaxad. Genesis 11:12-13 includes No name between Arphaxad and Salah. Cainan is the son of Arphaxad and Shelah is the son of Cainan according to Luke; while in the Chronicle this name is not found. However, in Hebrew traditional lineage this name can be found, it is found in the Greek Septuagint Version. Why was this name not in our Bible and found in Septuagint and tradition? By some Hebrew traditions if a person died when they are very young before they have a chance to establish a name for himself, the child born to them will be known as the child of the living grandfather. This practice is shown in the book of Ruth where Ruth's son Obed is referred to as the son of Naomi. Ruth 14:7. If the son died before he established himself and legally took possession of the properties and rights as a son he would not be listed. Or if they were of bad reputation they might not be listed. Was the latter the case with Cainan?

In *The Patriarchal Age: or, the History and Religion of Mankind* (1854), George Smith writes[1]: "*It is remarkable that, notwithstanding the omission of the name of Cainan from the Hebrew text, and the consequent general rejection of him by historians, there are more traditions preserved of him than of his son Salah. The Alexandrine Chronicle derives the Samaritans from Cainan; Eustachius Antiochenus, the Saggodians; George Syncellus, the Gaspheni; Epiphanius the Cajani. Besides the particulars already mentioned, it is said Cainan was the first after the flood who invented astronomy (astrology), and that his sons made a god of him, and worshipped his image after his death. The founding of the city of Harran in Mesopotamia is also attributed to him; which, it is pretended, is so called from a son he had of that name.*" - *Anc. Univ. Hist., vol. i, p. 96, note.*"

Such a deletion would not be acceptable to the gentile world where actual parenthood is always counted.

Many scholars have long proposed that due to the poetic similarity of Genesis chapter 5 and chapter 11 verses 10 thru 26 that only the most notable men were listed.

b) **Is Luke favoring the Septuagint translation?** If Luke is favoring the Septuagint translation that also includes Cainan then we have a problem since the Septuagint has many different numbers in the genealogies, (see the figure below.) "The Bible Knowledge Commentary" by John Walvoord and Roy Zuck reports that though Luke had relatively few direct quotations from the Old Testament, 15 times his "references and quotations .. are based on the Septuagint." (The quote of 7:27 appears to be from an unknown text.)

c) **Yalad is multi-generational:** The Hebrew word "yalad" (Strong's #3205) can indicate multi-generations, thus some scholars have proposed that Genesis is using the "Patriarchal-Age" method which unless it was obvious from the text that there was a direct father-son relationship, there was instead an ancestral relationship with the named descendant being born during the year of the death of the patriarch. (see note A below)

Following we have the usage of "begat" ("yalad") including not only the patriarch, but entire families/tribes.

"And Canaan begat ("yalad") Sidon his firstborn, and Heth, And the Jebusite, and the Amorite and the Girgasite, And the Hivite, and the Arkite, and the Sinite, And the Arvadite, and the Zemarite, and the Hamathite: and afterward were the families of the Cannanites spread abroad." (Genesis 10:15-18)

Following we have the usage of "bare/begat" ("yalad") including 16 offspring in two generations.

"And sons of Gad; Ziphion, and Haggi, Shuni, and Ezbon, Eri, and Arodi, and Areli. And the sons of Asher; Jimnah, and Ishuah, and Isui, and Beriah, and Serah their sister: and the sons of Beriah; Heber, and Malchiel. These are the sons of Zilpah, whom Laban gave to Leah his daughter, and these she bare ("yalad") unto Jacob, even sixteen souls." (Genesis 46:16-18)

e) **The use of the term son is completely flexible:** Christ was the son of David, and in 1 Chron. 26:24, we read: "Shebuel the son of Gershon, the son of Moses, was ruler of the treasures." This was in David's time, several hundred years after Moses. Yet Gershon was the son of Moses, while Shebuel was twelve or fifteen generations from the person whose son he is said to be;

d) **Matthew skips names:** One would possibly think that Matthew in his genealogy for Christ would have copied directly from the Chronicles, but in fact in verse 1:8 there is skipped three names between Jehoram and Uzziah (Azariah) that 1 Chronicles 3:10-11 includes, that of Akaziah, Joash, and Amaziah. Affirming as "The Bible Knowledge Commentary" by Walvoord and Zuck says "Jewish reckoning did not require every name in order to satisfy a genealogy."

Therefore, the Biblical genealogies are often formulated under rules that differ from the strict biological father to son lineage.

Note A: Sample Chronological Calculations

	Sample Chronological Calculations of Birth Date - BC			
	"Ussher" Method Masoretic	Method Septuagint	"Patriarchal-Age" Method Masoretic	Method Septuagint
Adam	4004	5490	10842	12028
Seth	3874	5260	10712	11798
Enos	3769	5055	10607	11593
Cainan	3679	4865	9702	10688
Mahalaleel	3609	4695	8792	9778
Jared	3544	4530	7897	8883
Enoch	3382	4388	6935	7921
Methuselah	3317	4203	6570	7556
Lamech	3130	4016	5601	6597
Noah	2984	3828	5419	6399
Flood	2348	3228	4819	5799
Shem	2446	3326	4917	5897
Aphaxad	2346	3226	4317	5297
Cainan		3019		4762
Salah	2311	2961	3879	4302
Eber	2281	2831	3446	3842
Peleg	2247	2697	2982	3438
Reu	2217	2567	2743	3099
Senug	2185	2435	2504	2760
Nahor	2155	2305	2274	2430
Terah	2126	2126	2126	2126
Abram	1996	1996	1996	1996

"Archbishop Ussher, an illustrious prelate of the Irish Church His chronological labors were directed toward affording an idea of the time that elapsed between certain events in recorded history. For this purpose he took the year 1 A.D.--the beginning of the Christian era--as his starting point, and calculated backwards as far as reliable recorded history afforded good working ground. He reckoned as far back as 4004 B.C., and then finding no more available material in the form of history, either written or inscribed, he had to stop. He did not mean to imply that he had reached the point of creation at all. On the contrary, he had simply gone as far as recorded history enabled him to go." (from Hebrew Greek Key Study Bible, Compiled and Edited by Spiros Zodhiates, Th.D. 1984)

"Bishop James Ussher (1581-1656) attempted to calculate the date of Creation by adding the generations of the patriarchs before Abraham. He arrived at a date of 4004 BC for the Creation. We now know his calculations were in error. There was simply not enough time between Noah and Abraham based on his figures. Noah is said to have lived for 350 years after the flood. But, adding the generations for the patriarchs between Noah and Abraham yields only 292 years. Thus Abraham would have been 58 years old when Noah died. This does not square with other statements of Scripture which indicate that Abraham's family and certainly his peers, were idolaters when God called him out of his ancestral land (Jos 24:2). If Noah were still alive, or recently deceased, idolatry would not be flourishing and the Flood still fresh in men's memories.

There are gaps, names missing, in the genealogical records in Genesis 11 and Genesis 5. We know this by comparing them with those in Luke 3. The term "begat" can and often did refer not to a son, but to a grandson or great-grand-son. In at least one case, it was an ancestor removed by 400 years! (Compare Ex 6:20 with Nm 3:17-19 and 27-28--see also Matthew 1:8 where three generations are omitted and I Chronicles 26:24 where there are 400 years between Shebuel and Gershom.)

The Bible implies great antiquity for the events of Genesis 11, the Tower of Babel and the separation of nations. By the time Abraham left Ur of the Chaldees and Haran to enter the land of Canaan there were already Kenites, Kennizzites, Kadmonites, Hittites, Perizzites, Rephaites, Amorites, Canaanites, Girgashites and Jebusites there (Gn 15:19). In Egypt, the Pharaonic dynasties were already powerful (Gn 12:15). Philistines had arrived in Canaan from Capthor (the island of Crete) and were in Canaan before Abraham arrived (Jer 47:4; Gn 20:2). It is not unreasonable to allow 2,000 years or perhaps as much as 4,000 years between the Flood and Abraham." (from "How Old Are Those Hills?" by Austin Robbins, B&S Vol. 11, No. 3, Summer 1998)

Note B: Interlinear Hebrew Text for Genesis 11 showing letter "Samech" separators

Following is an extract from "The Interlinear Bible" (1986) by J. P. Green, Sr., page 9, showing the Hebrew Masoretic text with added bold arrows to indicated the "Samech" separators.

The image shows an interlinear Hebrew text for Genesis 11:10-17. The Hebrew text is in the top line of each verse, with English transliteration below it. Bold arrows point to specific 'Samech' (ס) characters in the Hebrew text, which serve as separators between words. The text includes the following verses:

- 10 אלה תולדת שם שם כדמאת שנה וילד את ארפכשד
- 11 שנתם ארבע מאות ושלשים ויהי שם אחר היקרו את ארפכשד
- 12 המש מאת שנה וילד בנים ובנות: ס
- 13 ויהי ארפכשד ויהי ארפכשד ויהי ארפכשד ויהי ארפכשד
- 14 וילד בנים ובנות: ס
- 15 את עבר: ויהי שם אחר וילדה את עבר שלש שנים
- 16 וארבע מאת שנה וילד בנים ובנות: ס
- 17 עבר ארבע ושלשים שנה וילד את פלג: ויהי עבר

...in the Masoretic texts and is present in our Hebrew Bibles today. A samech (the Hebrew "s") between sentences indicates a paragraph break of smaller degree, while a pe (the Hebrew "p") between the ending of a sentence on one line and the beginning of a new sentence on another indicates a larger break." (from http://www.fuller.edu/ministry/berean/chs_vss.htm)

The samech break appears 8 times in chapter 5, 8 times in chapter 11, and a total of only 15 more times in the other 48 chapters of Genesis.

(To view a translation of chapters 5 and 11 with the Hebrew letter separators indicated take a look at [-\[5\]-](#) and/or [-\[11\]-](#). Use the browser "back" function to return to this page.)

Note C: Examples of Hebrew word "yalad" (Strong's #3205) indicating multi-generations

Following we have the usage of "begat" ("yalad") including not only the patriarch, but entire families/tribes.

And Canaan begat ("yalad") Sidon his firstborn, and Heth,
And the Jebusite, and the Amorite and the Girgasite,
And the Hivite, and the Arkite, and the Sinite,
And the Arvadite, and the Zemarite, and the Hamathite:
and afterward were the families of the Cannanites spread abroad.
(Genesis 10:15-18)

Following we have the usage of "bare/begat" ("yalad") including 16 offspring in two generations.

And sons of Gad; Ziphion, and Haggi, Shuni, and Ezbon, Eri, and Arodi, and Areli.
And the sons of Asher; Jimnah, and Ishuah, and Isui, and Beriah,
and Serah their sister: and the sons of Beriah; Heber, and Malchiel.
These are the sons of Zilpah, whom Laban gave to Leah his daughter,
and these she bare ("yalad") unto Jacob, even sixteen souls.
(Genesis 46:16-18)

Note D: Chronology of Ancient Egypt

The concept of an exact chronology for any civilization is fraught with danger and that of Egypt is certainly no exception. We are after all, dealing with a society with very little in the way of written history or literature to assist us. The Romans recorded events in relation to the traditional founding of Rome in 753 BC and the accessions of the various consuls and emperors; the Greeks from the date of the first Olympic Games in 776 BC. Egyptian chronology however, is a mixture of legend, fiction, astronomical data, documentary 'evidence' and an awful lot of guesswork!

In theory, history is arranged into 31 'Dynasties', each one being a collection of rulers from the same power base. This system was first employed by Manetho, High Priest and scribe at Heliopolis; who was ordered by Ptolemy II Philadelphus to write a history of the previous rulers. Manetho's list stretches from Menes (traditionally the first king of a unified Egypt) down to his own time. As well as the names of each king, he gives the length and some of the events of each reign. He was able to use the records held at the temple of Heliopolis, such as 'King Lists'. These original source documents have unfortunately, not survived, in many cases having been written on papyrus.

The Ancient Egyptians had no single, continuous era for counting years, such as our modern use of BC and AD. Instead, they dated documents and events by the year of the current pharaoh's reign. It is difficult to establish the exact order and length of each reign, as some kings ruled simultaneously in different parts of the country. There are ancient 'King-Lists', but these are not complete (sometimes for political or ideological reasons) and there are many gaps to fill.

Egyptian records of astronomical observations were sometimes dated by the king's regnal year. Using these rare occurrences we can attempt to calculate when this took place, giving a possible date BC in our own calendar. These are the cause of many arguments in egyptological circles however, so must be treated with the utmost caution.

Whilst modern research has thrown up many inaccuracies (in particular the individual reign lengths) the order of the various rulers together with the breaks in Dynasty are still very largely as Manetho wrote it in the 4th Century BC. Egyptologists today divide Manetho's Dynastic system into historical eras; reflecting stages of political stability, divided by times of relative internal strife or transition called 'Intermediate Periods'.

The main historical divisions now in general use are:

Dynasty	Approx. Dates	Historical Period	Capital
	5000-3150 BC	PREDYNASTIC PERIOD	
	5000-4000 BC	Badarian	
	4000-3500 BC	Amratian (Naqada I)	
	3500-3150 BC	Gerzean (Naqada II)	
0	3150-3050 BC	ARCHAIC PERIOD	
1	3050-2890 BC		Memphis
2	2890-2686 BC		
3	2686-2613 BC	THE OLD KINGDOM	Memphis
4	2613-2498 BC		
5	2498-2345 BC		
6	2345-2181 BC		
7 & 8	2181-2161 BC	1ST INTERMEDIATE PERIOD	Memphis
9 & 10	2160-2040 BC		Herakleopolis
11	2134-1991 BC	THE MIDDLE KINGDOM	Thebes
12	1991-1782 BC		
13 & 14	1782-1650 BC	2ND INTERMEDIATE PERIOD	Delta
15 & 16	1663-1555 BC		Avaris

17	1663-1570 BC		Thebes
18	1570-1293 BC	THE NEW KINGDOM	Thebes
19	1293-1185 BC		
20	1185-1070 BC		
21	1069-945 BC	3RD INTERMEDIATE PERIOD	Tanis
22	945-715 BC		Bubastis
23	818-715 BC		
24	727-715 BC		Sais
25	747-656 BC		Kush
26	664-525 BC	THE LATE PERIOD	Sais
27	525-404 BC		Persian I
28	404-399 BC		Sais
29	399-380 BC		Mendes
30	380-343 BC		
31	343-332 BC		Persian II
	332BC-323AD	GRAECO-ROMAN ERAS	
	332-305 BC	Macedonian Empire	
	305-30 BC	Ptolemaic Empire	
	30 BC-323 AD	Roman Empire	

(copied from <http://www.smashman.iofm.net/new4chronology.html>)

The above table starts at around 7000 B.P., however, very interestingly "11,600 years ago marked the beginning of the Rule of Mortal Humans on Earth according to Manetho (Egyptian historian ca. 343 BC)" prior to that was "Rule by Demigods and Spirits of the Dead (followers of Horus)". (from <http://www.innerx.net/personal/tsmith/iceciv.html>) A very close correspondence to the indicated termination of the Younger Dryas (11,550 +-70 B.P. per the GRIP ice core data) and the time we would choose as the most likely time of the flood, and soon afterward the tribes would start multiplying and migrating from the "Ararat" area into lower lands of the most northern part of the fertile crescent where the archaeologists have uncovered the first evidences of large scale farming and community building, around 10,000 to 11,000 B.P..

You ask, why include a quote from an ancient Egyptian Historian who writes of "demigods and spirits of the dead"? "It is ironic that although great reliance is placed upon Manetho and his "Egyptian History", no full text of his work actually survives. Manetho's history is known to us because several writers whose works have survived quoted extensively from it. These writers included Josephus, writing in the late 1st century AD, Sextus Julius Africanus, writing around the year 220 AD, and Bishop Eusebius of Caesarea, writing in the early 4th century AD. Around five hundred years later, the works of Sextus Julius and Bishop Eusebius were used as a basis for a history of the world, written by George the Monk who was the secretary to the Byzantine Patriarch Tarasius (784-806 AD). All of these writers took only the extracts that they wanted from Manetho's work, so his account exists only in fragments within these later works." (from <http://www.egyptologyonline.com/manetho.htm>)

Concerning "the beginning of the Rule of Mortal Humans on Earth" according to Manetho, even though Adam and his offspring were to multiply and have "dominion", it is not until after the flood that we read:

Be fruitful, and multiply, and replenish the earth.
And the fear of you and the dread of you
shall be upon every beast of the earth.
(Genesis 9:1-2)

Therefore we can conclude that probably before the flood mankind never fully had "dominion", that this was to happen only after the flood, "the beginning of the Rule of Mortal Humans on Earth".

(Note: We won't try to explain "demigods and spirits of the dead", but one could possibly contemplate the meaning of Genesis 6:4 which is also very controversial.)

Chapter 16; Babel, from whence came All Languages?

"And the whole earth was of one language,
and of one speech" Genesis 11:1 (KJV)

Very few in this modern world now take the above Scripture passage seriously! Let us take a look at the evidence that support it.

"over 75 percent of English words come direct from Hebrew words"

The above quote was published in 1985 and was based mainly on the work of a Professor Edward Odium in his work "God's Covenant Man" (1916).

Wait a minute, I have heard people speak in Hebrew, and it sure don't sound like English!! You have got to be kidding!!

But let us take a closer look at the facts remembering that dialects within the same language can make it difficult for communication between even those who supposedly speak the same language. Just a few of the English dialects of today include New Yorker English, Southern drawl, Texan, Midwestern, and let us not forget the English from the "parent" country, Great Britain. No matter which dialect you speak you may have to ask someone with a different dialect to repeat a sentence or phrase before you can understand it! Then how difficult would it be for the same language a few hundred years ago, or a few thousand years ago? I imagine most of us have seen old writings such as those of the founders of our country and noticed that some of the letters look "funny" and some of the words were spelled different. And most of us are familiar with the truism that most of the languages of modern Europe come from one "parent" language. Cannot we then carry this back even further to the possibly most all languages came from one "parent" language?

Over time languages under go a transformation and spellings change, and meanings change, but still many of the basics stay mostly the same. There are certain transformations that take place that most of us are familiar with. For instance when changing a word to the plural or adding ng to the end of a word we often have to make a letter change or add a letter. This is the type of changes that have happened over time as the various languages evolved. Mostly the vowels are to a large part interchangeable when comparing words from different languages and are to be mostly ignored. The original Biblical Hebrew in effect had no vowels, only the constants were of importance.

Also all letters that are pronounced with the same part of the mouth can be considered as interchangeable. M and N are interchangeable nasal sounds and D, T, and TH can be considered as the "same" letter. This is known as Grimm's law, given to us by the same Jakob Grimm who gave us the fairy tales.

It is also common to reverse letters and even in some cases to reverse the entire word.

Also letters can be dropped or added.

Let us look at the English word "direct". Ignoring the vowels, we have basically a three letter word d-r-ct. By the rules of constant sounds made by the same part of the mouth the following are considered as the same, D-T-DT-TH, R-L-WR, and H-K-Q-KH-G & hard C. Now examine the following figure and notice how various languages have a word that has to do with direct, direction, road, path, pathway, way, track, journey, all related meanings. In nearly all cases the center sound has stayed the same and mostly the first sound has been retained, but dropped by some, and in some cases the last sound has been dropped.

Hebrew דרך	(way, manner, journey, road)	De	Re	KH
Arabic	{highway, way}	Ta	Ri	Q
Australian	{paths}	Tu	Ri(n)	Gas
Aborigine	{straight, direct}	Thoo	R	Gool
Bouton: Malay	{road}	Da	Ra	
Chinese	{way}	Dau	Lu	
Czech	{track, way}	T	Ra	Ha
Finnish	{course, way}	To	La	
Gaelic	{journey}	Tu	Rus	
Indonesian	{direction}		aRa	H
Indonesian	{manner, way}	Tja	Ra	
Japanese	{journey}		Ryo	Ko
Japanese	{road}	Do	Ro	
Japanese	{street}	To	Ri	
Korean	{manner, way}		Ro	KHe
Korean	{reversal of <i>kil</i> , road, street}		Li	K
Latin	{to direct: source of DIRGE DIRIGIBLE}	Di	Ri	Gere
Polish	{course, track}	To	R	
Polish	{way}	D	Ro	Ga
Russian	{road, way}	Do	Ro	Ga
Spanish	{straight}	De	Re	Cho
Thai	{direct, straight}	Dt	Ro	Hng

from "The Word" by Isaac E. Mozeson, Shapolsky Publishers, Inc. (1989)

Fig1

Let us also look at a very small sampling of words that have the same sound and meaning in both English and Hebrew in the figure to follow.

ENGLISH	HEBREW	VARIED MEANINGS
Abash, Bashful	Baash	Abashed, uncomfortable, abhorred
Ahah	Ahah	Ahah, an exclamation of surprise
Bag	Bag	Booty, or haul
Bad	Bad	To lie, to be a liar, bad
Batter or bat	Batsah	To destroy or batter
Band	Banat	To band, or make a band
Bear	Baar	Brutish, stupid, coarse, as bearish
Barley	Bar	Corn, as in barley
Bedeck	Bedeck	To repair, to ornament, bedeck
Booth	Bothe	To pass the night in a tent or booth
Bolt	Bala	To swallow, as to bolt his dinner in
Bore	Boar, baar	To bore, or dig
Broth	Baroth	Food, broth, or soup
Carmine	Karmile	Red, crimson
Career	Karar	To go around, dance, roll, turn, career
Carpet	Karpas	Cotton-stuff
Crash	Garash	To crush or to crash
Come	Kum	To advance, join, as come here
Colton	Kuttoneth	Colton, flax, linen
Damask	Dameek	A kind of silk
Dagger	Dakar	To stab, a thing that stabs
Delicate	Daleketh	Weak, sick, feverish
Deacon	Dekon	A registrar, or one who registers
Din	Din	Strife, noise, din
Earth	Eretz	Land, earth
Gargle	Gargareth	Throat, gullet, to gargle the throat
Gala	Gal	Exultation, a gala-day, a day to rejoice
Gnaw	Knaw	To bite, sting, gnaw
Grip	Garaph	To grip, seize, snatch
Gush	Gush or goosh	To pour out, as to gush
Grab	Karab	To grab, grip, grasp
Harass	Haras	Destroy, worry, harass
Halleluiah	Halal	To rejoice, to praise, to shout
Holiday	Hulledeth	A holiday, or birthday
Horrid	Orits or arats	Terrify, make terrible, or horrid
Hurrah	Ruah	To shout, to call out, sign of triumph
Keel	Keil	A vessel, a ship
Knee	Kanah	To bend, to kneel
Lad	Galad	To bear, to beget, as to bear a lad or child
Mellow	Melo	Mellow, ripe, fullness, maturity
Mar	Mar	Bitter, spoiled, marred
Ore	Or	Horizon, light, shining metal as zinc, ore, orange
Pass	Pasa	To step, go, go apart, pass
Perish	Parash	Scattered, routed, lost, perished
Pen	Pen	An enclosure, as a sheep pen
Push	Poosh	Scatter, push, rout
Put	Putz	To scatter, to put to flight, push
Puke	Pook	To puke, put out
Rash	Raash	To be angry, to rage
Room	Rum	Make tall, a space, enlargement
Ruts, or rut	Rutz	Rut, runner, run
Raven	Ravah	To siliate, to raven or ravage
Reckon	Arak	To array, set in order, count, reckon
Sake	Sakan	Profit, for the sake of
Sack	Saq	A bag, or sack
Satin	Sadin	Cloth, garments, linen cloth
Shame	Shamen	Amazed, astonished, shamed
Shiver	Sheber	Shiver, break, shiver my timbers
Sore	Tsur	Distress, soreness
Sorrow	Tsarar	Sorrow, inflict with trouble
Suck	Suk	To draw out, as to suck
Soothe	Suth	To persuade, soothe
Terrible	Teruah	A battle shout, awful, terrible
Thrash	Darash	To beat, or thrash
Urge	Ur	To push, press, stir up
Use	Useeah	To employ, use
Vacate	Vuckuck	To empty
Vat	Haveet	a large tank, tub or cask
Veto	Veetale	To forbid
Via	Vah	a way
Vivid	Aveev	Animated, lifelike
Weak	Wrakh	To bend, soft, tender
Wrath	Evrah	raging anger
Yes	Esh, or yesh	Yes, to say yes
Yell	Yelail	To yell, or cry out

Fig2

A student of the Anglo-Saxon language provided some very interesting old Saxon words for a further illustration. These words are believed to be old enough that they would not be corrupted by more modern influences. The table below may seem rather confusing, but remember ancient Hebrew had only 22 letters, all of which were consider as consonants (see note A), therefore we would have a match when we have matched the meaning and the consonants only of the old Saxon word, and considering the interchangeability of the consonants as provided in parenthesis where appropriate. Do we get 100 percent matches? No obviously not , but remember we are examining words whose origins go back many thousands of years, and thus have had considerable opportunity for changes and corruptions.

OLD SAXON WORDS					
Saxon word	meaning	Strong's number	Hebrew	consonants	meaning
lagu	sea water	#3892	לה	L-KH(G,Q)	to be moist (a form of liquid)
saerima	coast	#2188	זצח	Z(S)-Vowel-H	sweat, salty
brimlad	ocean path	#7481	דצס	R-Vowel-M	agitated (like the sea waves)
		#7481	דצס	R-Vowel-M	agitated (same as above) (source of b, and lad unknown)
fleotend	seabird	#6403	פלט	P(F)-L-T	to flee/fly (over the)
		#5067	נד	N-D	waves
nicor	sea monster	#5170	נהד	N-CH-R	snorting, nostrils
gudbill	sword	#1407	נד	G-D	cutting
		#1101	בלל	B-L-L	to anoint
gebindan	bind	#1366	לבנ	G-B-L	a cord
		#5084	נדן	N-D-N	a sheath like for a sword
bregdan	weave	#707 or #708	ארנ	Vowel-R-G	reg part is weaving (source of b and ending dan unknown)
banloca	joint	#996	בין	B-Vowel-N	between, distinction
		#3920	לכד	L-K(C)-D	cohere, stick together

Fig3

(ref: "A Concise Dictionary of the words in The Hebrew Bible ...", by James Strong)

In his book "The Word" Isaac Mozeson, published by Shapolsky Publishers, Inc. (1989), has documented the connection between English and Hebrew for many thousands of words.

Conclusion: we have documented in a small way the interconnection between English and other languages to the proposed

"patriarch" of languages, Hebrew. The references do a much better and thorough job.

It obviously would be much more difficult to show that the Hebrew language was the true language of the time before Babel, but hopefully in the near future there will be found some way to show this relationship as the archeologists make more discoveries. (see note A)

References:

1) "God's Covenant" by Professor Edward Odlum (1916) as referenced in "Missing Links Discovered in Assyrian Tablets" by E. Raymond Capt, Artisan Sales (1985)

2) "The Word" by Isaac E. Mozeson, Shapolsky Publishers, Inc. (1989) (You may want to visit his web site at <http://www.homestead.com/edenics>)

Note A: Keys to Hebrew
(ref: "The Word" by Isaac E. Mozeson, Shapolsky Publishers, Inc. (1989))

Key to pronunciation of the Hebrew	
Hebrew	English
א	Vowel
ב	B [BH, F, V]
ג	G [K, KH, J]
ד	D [DT, T]
ה	H
ו	Vowel, BH, V, W, [R]
ז	Z [S]
ח	KH [H, Q]
ט	T [D, DT]
י	Y [J, vowel]
כ	K, KH, hard C
ל	L [R]
מ	M [N]
נ	N [M]
ס	S
פ	Vowel, G, KH, K
צ	P [F, PH, V]
ק	TS [S, ST, T]
ר	K [Q, H]
ש	R [L, WR]
ת	S, SH [CH]
ך	T [S, TH]

* How the letter appears at the end of a word.

The Alphabet and Derivatives

	th,t	sh	r	q	tz	p	u	s	n	m	l	k	y	t	h	z	v	h	d	g	b	a
1	+	w	7	q	3	1	o	4	y	y	L	4	2	⊗	⊗	Z	Y	3	A	7	9	X
2	1	v	7	p	Y	7	u	3	1	4	L	4	λ	6	H	1	7	7	4	7	Y	v
3	7	Y	7	P	Y	3	Y	7	Y	3	Y	λ	6	H	1	1	7	4	λ	5	N	
4	7	w	7	p	3	9	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
5	7	7	7	p	3	9	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
ENGLISH	A	T	S	R	Q	Z	P	Q	S	N	M	L	C, K, Y, I	T, O	H	Z	F	(E)	D, T	J, K	b	A
GREEK		ψ	ρ	Σ	φ	α	υ	ε	ο	ν	μ	λ	κ	ι	η	θ	ζ	(E)	Δ	Γ	Β	Α
OLD JAPANESE	ハ	シ	7	7	Z	9	U	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

KEY

1. Hebrew-Phoenecian: about 8th century B.C.
2. Hebrew-Aramaic: 6th-4th century B.C.
3. Dead-Sea scrolls: about 1st century B.C.
4. Modern Print Letters
5. Modern cursive letters

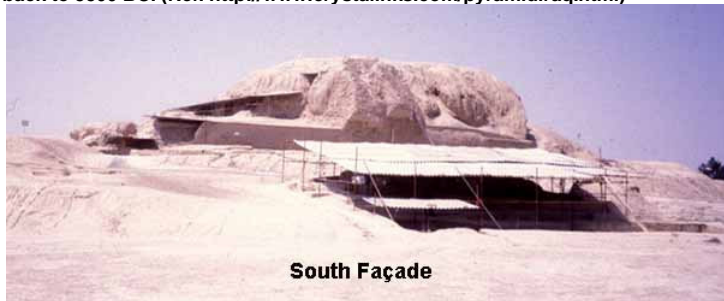
Note B: Evidences from Mesopotamia

"In those days, the lands of Subur (and) Hamazi,
Harmony-tongued (?) Sumer, the great land of the decrees of princship,
Uri, the land having all that is appropriate(?),
The land Martu, resting in security,
The whole universe, the people in unison (?)
To Enlil in one tongue [spoke]. ...
(Then) Enki, the lord of abundance, (whose) commands are trustworthy,
The lord of wisdom, who understands the land,
The leader of the gods, Endowed with wisdom, the lord of Eridu
Changed the speech in their mouths, [brought (?)] contention into it,
Into the speech of man that (until then) had been one.

(translation from "The Babel of Tongues: A Sumerian Version" by Kramer, S.N.,
Journal of the American Oriental Society 88:108-11,1968)

In Babylonia the archaeologists have discovered remains of many towers, called Ziggurats (Akkadian word ziqqurat from zaqaru, to be high). They are of varying sizes from 20 meters on a side to over 90 meters on a side. More than 30 have been discovered and they had names like "Temple of the Foundation of Heaven and Earth", "Temple that Links Heaven and Earth", "Temple of the Exalted Mountain", "Temple of Exalted Splendor", and "Temple of the Stairway to Pure Heaven". It is believed that the earliest was located at Eridu, which according to Sumerian tradition was the first city. Some are multi-layered, up to 16 layers, with each being built over the remains of earlier structures. The building materials were sun dried bricks in the centers and burnt bricks and bitumen mortar for the outer layers. (Ref. "The Mesopotamian Background of the Tower of Babel Account and its Implications, by John H. Walton, Bible and Spade Vol. 9, No. 3, Summer 1996)

And while the above described structures are the most famous and many have proposed that one of them is the Tower of Babel, in fact none of them are the oldest that have been found to date. Reportedly the oldest found to date is Tepe Sialk which is located south of Tehran, Iran. The main ziggurat has been dated to 2900 BC. And a near by second mound has been dated by a joint study between Iran's Cultural Heritage Organization, The Louvre, and Institute Francais de Recherche en Iran to indicate that the oldest settlements in Sialk date back to 5500 BC. (Ref. <http://www.crystalinks.com/pyramidiraq.html>)



South Façade
The Ziggurat at Sialk

Were any of these the true Tower of Babel ? Answer: NO !

There have long been traditions that the true "Ur of the Chaldees" was located in the north at Urfa, twenty miles northwest of Haran. And supported by many distinguished scholars such as Cyrus H. Gordon in "The World of the Old Testament", New York: Doubleday and Co., 1948, p. 132. Also some of the latest archaeological and language studies support the dividing of the languages as occurring in Anatolia Turkey.

"A family tree of Indo-European languages suggests they began to spread and split about 9,000 years ago. The finding hints that farmers in what is now Turkey drove the language boom - and not later Siberian horsemen, as some linguists reckon. ... Around this time, farming techniques began to spread out of Anatolia - now Turkey - across Europe and Asia, archaeological evidence shows." (From "Language tree rooted in Turkey" by John Whitfield, http://www.nature.com/nsu/nsu_pf/031124/031124-6.html) Therefore, this evidence indicates that all of the early history of Genesis 1-11 was located in the Ararat area and the northern most portion of Mesopotamia and there would have been located the true tower of Babel.

The Scriptural Hebrew account is so brief that it is difficult to discern the full story. Many have implied that immediately the workers on the tower were unable to understand each other and quit work in confusion. When in fact, there is no mention of the time factor and the method of "confounding" the languages is also not discussed. The basic meaning of the Hebrew word "balal" (Strong's #1101) is to overflow and then by implication, to mix.

From Flavius Josephus, "The Antiquities of the Jews", we get a quote from "The Sibyl";

"When all men were of one language, some of them built a high tower,
as if they would thereby ascend up to heaven,
but the gods sent storms of wind and overthrew the tower,
and gave every one his peculiar language;
and for this reason it was that the city was called Babylon."

Possibly then the manner in which the Lord initiated the confusion, "let us go down", was via a natural catastrophe. If this was the major contributing factor or just a part of the whole of the "confounding" is difficult to understand. The above non-scriptural account would seem to indicate a two part event, with first a blowing over of the tower and then a giving of a "peculiar language" to each person.

Today many that supposedly speak the same language have radically different understandings of the same words. We could on a lighter side theorize that possibly some were enrolled in east side schools (liberal) and the others were educated in west side schools (conservative). We also know that men readily make changes in their languages and often in very short time spans as slangs crop up and then these slangs are more permanently incorporated into the language. Therefore, many like to propose the concept that languages are continuously "evolving" and then over time humans evolved their languages from much simpler languages, grunts and gestures. However some recent studies have indicated that there are no simple "evolving" languages on the present earth and some languages are actually with time being simplified.

"All contemporary modern humans use very complex languages. There are no "primitive" languages: the 5,000 or more spoken today are equally flexible and expressive, and their grammar and syntax are sometimes richer and more precise than that of the more widespread like English and Spanish, which have undergone some simplification over the centuries." (ref: Luigi Lura Cavalli-Sforza, "Genes, People and Languages", New York:North Pointe Press, 2000, page 59)

Therefore as has been proposed by some students, our present languages are not necessarily evolving, but actually doing the opposite and becoming more simplified and less exacting. We may actually have many more words to speak and write with, but we may in fact have languages today that are less capable. Indications such as these have caused some linguists to conclude that the nature of the language situation is almost "insoluble". The Dead Sea Scrolls, however, are evidence that for millenniums the believers were very exacting in maintaining the "sacred" records! We can probably assume that the non-believers were not necessarily so exacting. Could it be that the ones in Babel having strayed from the faith no longer felt it imperative to hold to the "sacredness" of the original language and teachings given of the Lord, and this was a part of the causation of the "confounding"? Or how about the possibility that the only scholars/scribes of the area and their records were destroyed when the tower collapsed?

Possibly we should better consider that the process was not short term, but a long term process occurring over centuries. With first a dividing of the people along ideological/religious lines. Then with each subgroup/clan developing their own rituals and jargon which with time developed into distinct dialects encouraged by the desire for each group to separate from the others. Possibly this process had already started as each subgroup strayed from the original beliefs and was then accelerated when the tower was destroyed. Providing an initiative for each to go off and build a new center of worship which more aligned with their rituals. And of course it is not unreasonable to assume that many fights and wars erupted as part of this process. This long term process could more readily align with the perspective that we have proposed on the chronologies chapter.

So in summary, we just don't fully understand the nature of the events that caused the "confounding" and the scattering, and over what time period it all took place, the Scriptural record is just too brief! It would seem most likely that it was a long term process

Chapter 17; Biblical Sodom and Gomorrah found !

The "Bible and Spade" Summer 1999 (Vol 12, No. 3) from the Associates for Biblical Research announces "The Discovery of the Sin Cities of Sodom and Gomorrah". The name of these two cities have long been by-words in our language for wickedness. And many scholars and archaeologists have long searched for the truth about these cities.

"And Lot lifted up his eyes, and beheld all the plain of Jordan, that it was well watered every where, before the Lord destroyed Sodom and Gomorrah, even as the garden of the Lord, like the land of Egypt, as thou comest unto Zoar." Genesis 13:10 (KJV)

"And Lot went up out of Zoar, and dwelt in the mountain, and his two daughters with him: for he feared to dwell in Zoar: and he dwelt in a cave, he and his two daughters." Genesis 19:30 (KJV)

"And there went out the king of Sodom, and the king of Gomorrah, and the king of Admah, and the king of Zeboiim, and the king of Bela (the same is Zoar;) and they joined battle with them in the vale of Siddim;" Genesis 14:10 (KJV)

The first most important source for locating the cities is the location of Zoar and Lot's cave and is from the mosaic map on the floor of a church in Madaba, Jordan, known as the Madaba map and as shown in Fig 1 below.

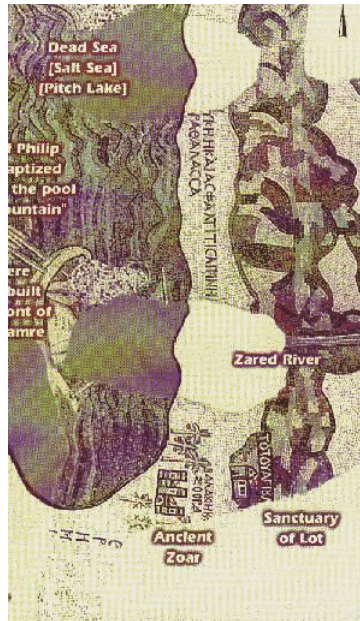


Fig1

Fig 2 below shows the excavation site of the known traditional location of the "Sanctuary of Lot" in the hills above the indicated site for Zoar.

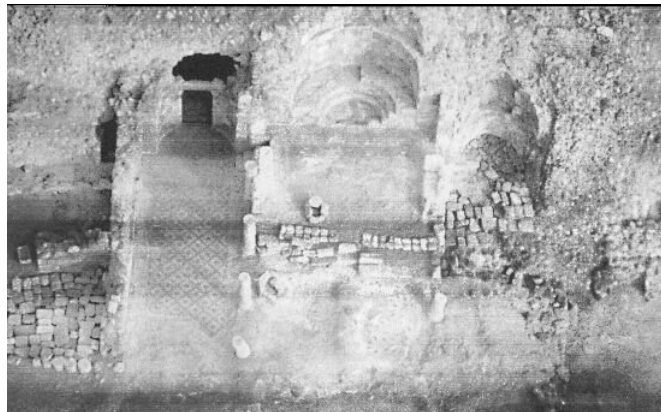


Fig2

One popular theory for a long time was that the cities were located in the plain south of the Dead Sea and later covered by the waters as the Dead sea water level has changed over time. The level of the waters has receded in recent years and search of the area has located no evidence to verify this location. Searches starting in 1973 began to discover evidences of occupied cities in the area southeast of the Dead Sea, most of them located so as to obtain the benefit of water flow from the many Wadi's of the area. The map of the proposed locations is shown in Fig 3 below.

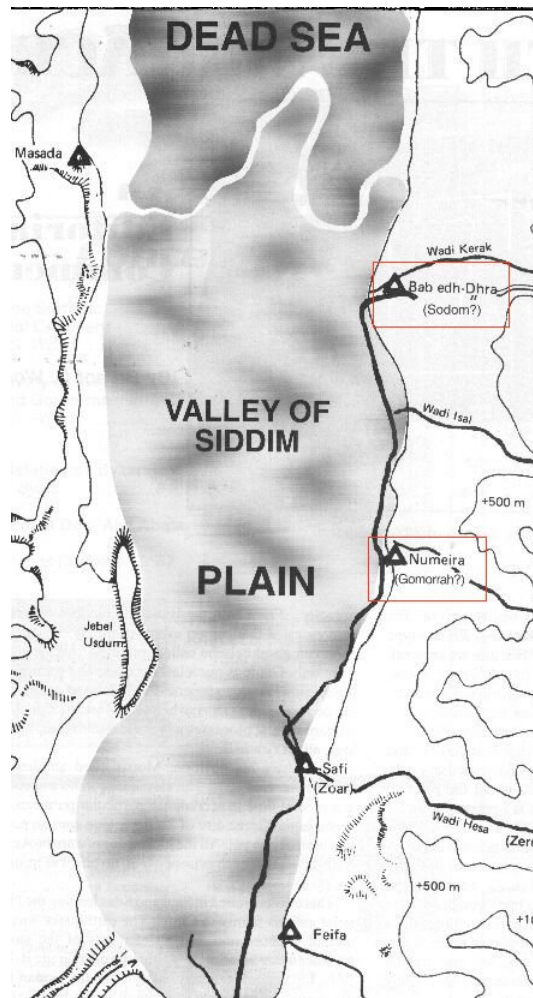


Fig3

To date there has been located only evidence for two of the five Cities of the Plain, but they are proposing that the evidence is strong that the two most important cities of Sodom and Gomorrah have been found. That being the evidences found of destruction by fire at each site due to the layers of ash found in the digs by archaeologists. Bab edh-Dhra (Sodom) is the largest of the two sites, the 7 meter wide (23 feet) city wall enclosed 9-10 acres with gates located at the west and the northeast. The northeast gate had two flanking towers with massive stone and timber foundations, possibly the gate in which Lot sat (Genesis 19:1). Estimated population at the time of the destruction was between 600-1200. There was a large cemetery at Bab edh-Dhra and pottery evidence indicates that some of the residents of Numeira (Gomorrah) buried their dead in this cemetery. It appears that Numeria was in existence for only a short time, possibly less than 100 years. Paleobotany investigations indicated that a rich diversity of crops were grown in the area including barley, wheat, grapes, figs, lintels, flax, chickpeas, peas, broad beans, dates, and olives.

Concerning the proposed cause of the destruction, they are proposing that it was the result of an earthquake that forced combustible material to the surface and into the atmosphere. Surveys have located bitumen, petroleum, natural gas and sulfur in the area. And to the east of the Dead Sea is a major fault line and these cities are located exactly on this fault line. See Fig 4 below.

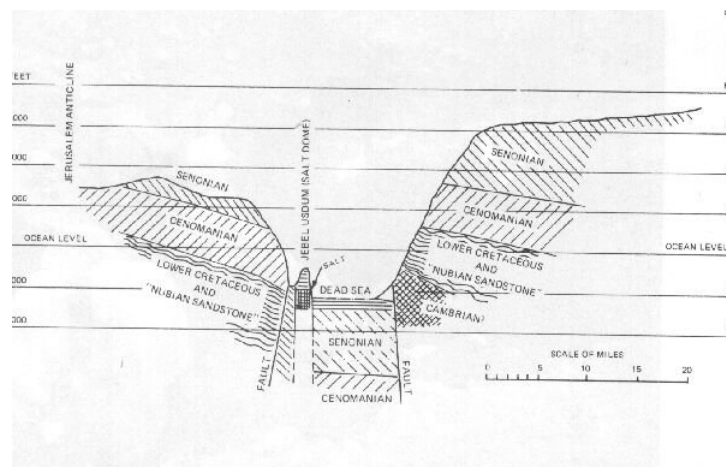


Fig4

The Scriptures say that Abraham looked and saw "the smoke of the country went up as the smoke of a furnace" and does not seem to mention a quaking, but does use the Hebrew term for "overturning" in Deuteronomy 29:23. Possibly this is an indication that the earthquake proposal is valid. Changes of elevation of up to 164 feet have been noted which caused a change in direction of the Wadi Numeria at the site, which is believed to be the event that caused the destruction. Also found were evidences that the residents hastily fled the site and buried skeletons of those who were caught in the destruction.



Bryant G. Wood

"Then the Lord rained down burning sulfur on Sodom and Gomorrah—from the Lord out of the heavens. Thus He overthrew those cities" (Gn 19:24–25). All across the site of Bab edh-Dhra archaeologists found evidence of a fiery destruction, such as this layer of ash in the western temple. Tumbled walls attested to an earthquake as well.



Michael Luddeni

Charnel house A22 in the cemetery at Bab edh-Dhra. In the final phase of occupation at Bab edh-Dhra, the dead were interred in mud brick buildings called charnel houses. Five examples were excavated, and in each case they were destroyed by fire at the same time the city was destroyed. Careful stratigraphic excavation of charnel house A22 shown here, the largest of those excavated, revealed that the fire started in the roof and spread to the interior when the roof collapsed. This provides powerful evidence that "the Lord rained down burning sulfur on Sodom and Gomorrah—from the Lord out of the heavens" (Gn 19:24).



Bryant G. Wood

The author points to the burn layer at Numeira, testifying to the fiery destruction that overcame the city at the end of the EB III period. As at Bab edh-Dhra, there was evidence of a violent earthquake that occurred with the fire. The sites of Bab edh-Dhra and Numeira are located on the eastern fault line of the Jordan rift valley. Geologists theorize that an earthquake caused pressure on subterranean petroleum deposits which were forced out of the ground, ignited, and fell back down on the Cities of the Plain.

(The above three figures are from B&S Vol 20 No. 3 Summer 2007, p78-84)

Conclusion: The author proposes that "... it is clear that the infamous cities of Sodom and Gomorrah have now been found." You may visit their web site at <http://www.ChristianAnswers.net/abr/abrhome.html>

Note; LOCATION OF ZOAR

"Deuteronomy 34

1 And Moses went up from the plains of Moab to Mount Nebo, the top of Pisgah, which is opposite Jericho. And Jehovah caused him to see all the land; Gilead to Dan;
 2 and all Naphtali, and the land of Ephraim, and Manasseh, and all the land of Judah to the sea beyond;
 3 and the Negeb, and the plain of the valley of Jericho, the city of palm trees, to Zoar.
 4 And Jehovah said to him, This is the land which I have sworn to Abraham, to Isaac, and to Jacob, saying, I will give it to your seed. I have caused you to see with your eyes, but you shall not cross over there." (Literal Translation by J.P. Green, Sr.)

"Gilead to Dan", if one reads this last phrase of verse one and stops they could assume that Dan was to the north of the territory of Gilead, but instead the city of Dan is almost directly north of Jericho and north of the territory of Naphtali, see the map below. North of Gilead is the non-Israelite kingdom of Bashan. So it seems better for understanding if one partitions it as "Gilead to Dan and all of Naphtali;"

Then if we look at verse three with the north as our pattern we will see that the location of Zoar should be to the south of the territory of the Negeb where settled by the tribe of Simeon and not directly to the south of "the plain of the valley of Jericho". And it should be directly to the south of Jericho and Dan.

During the early Israelite settlement period the upper portion of the Negeb was settled by the tribe of Simeon which is not mentioned in the verses. Likewise the territory of the tribe of Dan is not mentioned in the north.

Therefore, the traditional location of Zoar as shown on the Madaba Map, and this location is disputed by many, is exactly where one would expect it to be according to this understanding of Deuteronomy 34:1-3.

Note: All three cities mentioned, Dan (Laish), Jericho, and Zoar (Bela) are ancient sites that predate Abraham.



Chapter 18; Bible Dragons!

Dragons! You have got to be kidding! No one believes in Dragons!

How can we have a serious discussion about Dragons?

But, to the citizens of Great Britain at the time that the King James Version of the Bible was being translated dragons were a serious topic! One author in doing his research located nearly 200 places in the area at which "dragon" sightings had been reported. The literature of the day contained many references to dragons and similar creatures.

In the King James Version of the Bible the Hebrew words that are translated most often as dragon/dragons was "tanniyim/tanniyn". "Tanniyim" occurs 12 times and "tanniyn" and the plural tanninim occur 14 times. Fig 1 below details the places in the Scriptures where it occurs and how it is translated by the King James Version, the New King James Version and other varying translations given by various Bible versions.

Verse	King James	New King James	Other Translations
Gen 1:21	whales	sea creatures	sea-monsters/sea-serpents/ sea-beasts
Ex 7:9/10/12	serpent/s	serpent/s	sea-serpent/snake/reptile dragon/monster
Deu 32:33	dragons	serpents	
Neh 2:13	dragon	serpent	jackal
Job 7:12	whale	sea serpent	ravening monster/monster dragon/crocodile
Job 30:29	dragons	jackals	wolf/brutes that howl
Psm 44:19	dragons	jackals	wild dogs/sea-serpent
Psm 74:13	dragons	sea serpents	sea-monsters/monsters/crocodiles
Psm 91:13	dragon	serpent	crocodile/dragons
Psm 148:7	dragons	sea creatures	
Isa 13:22	dragons	jackals	wolves/wild dogs/porcupines birds of ill omen
Isa 27:1	dragon	reptile	Nile Dragon (same as Leviathan?)
Isa 34:13	dragons	jackals	wolves/wild dogs
Isa 43:20	dragons	jackals	wolves
Isa 51:9	dragon	serpent	monster
Jer 9:11	dragons	jackals	serpents/wolves
Jer 10:22	dragons	jackals	wolves/night dogs
Jer 14:6	dragons	jackals	wolves
Jer 49:33	dragons	jackals	serpents/wild dogs/wild animals
Jer 51:34	dragon	monster	
Jer 51:37	dragons	jackals	wolves/wild dogs
Eze 29:3	dragon	monster	crocodile
Mic 1:8	dragons	jackals	wolves/wild dogs
Mal 1:3	dragons	jackals	serpents

Fig1

As you can see the more modern version of the Bible, the New King James Version, has most utilized jackals when the context indicates that a wild desert animal is indicated and this obviously makes sense considering the wild and desert environment of the Biblical area at the time. However, there are a number of other passages when obviously a sea animal is indicated and where the characteristics are such that a much larger and terrible animal are indicated. In those cases they used monster, sea creature or serpent. From reading Isaiah 27:1 it seems obvious that "tanniyim/tanniyn" also includes the leviathan of Job 41, which is also mentioned in Psalms 74:14 and 104:26. We obviously conclude that it can also include the behemoth of Job 40:15.

Leviathan, a mighty sea creature with scales and terrible teeth. Arrows, swords, stones and javelins cannot harm him and he regards iron as straw. A flame goes out of his mouth and smoke out of his nostrils. He makes the sea boil and leaves a shimmering wake. His heart is hard as stone and when he rises up the mighty become afraid. Sounds like the classic dragon from the dark ages, does it not?

Behemoth, he eats grass, his bones are like beams, his ribs like bars of iron, he has power and strength in his hips and stomach muscles. His tail like a cedar is one characteristic that has bothered many since some have proposed the hippopotamus which has a small elephant type tail. Some have proposed the crocodile which has a strong tail, but they are not known for eating grass. Therefore, some have proposed that the behemoth is unlike any animal now living. It must have been one of the animals now extinct?

But back to dragons, are they remaining ancestors of dinosaurs? Some has proposed so! And was the King James Version right in translating "tanniyim/tanniyn" in some cases as dragon as many have proposed? We obviously are not going to resolve this argument here! But the following is just one example of a discovered "dragon" which received considerable publicity, but has naturally been dismissed by many scientists. Caught by Japanese fisherman off the coast of New Zealand at a depth of about 1000 feet. It was photographed and measured by the ship biologist. Weighing two tons and it was 30 feet in length. The trawler's captain ordered it thrown back into the sea for fear that it would contaminate his catch of fish. The Japanese government issued a stamp in commemoration of the event. For your consideration below are the photographs and sketch by the biologist.

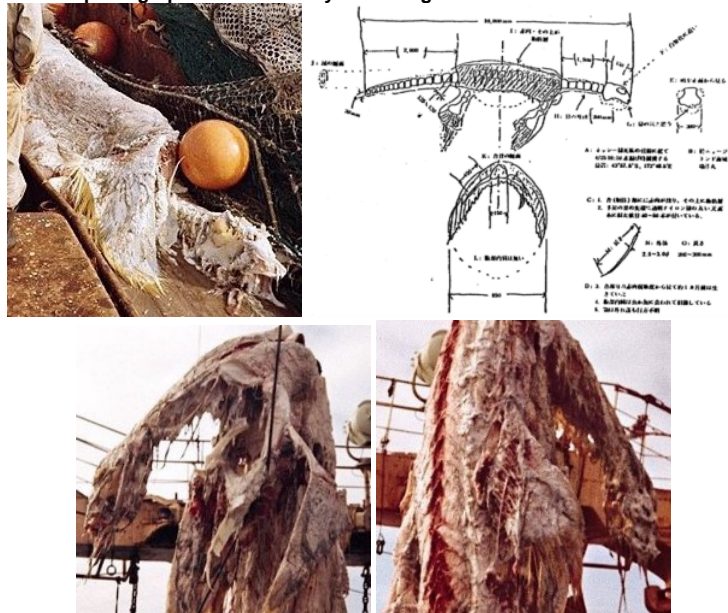


Fig 2-6

Is it a plesiosaur, a rotting carcass of a basking shark, a unidentified species resembling a non-shelled sea turtle, or what? If you were a citizen of England around year 1600 AD and you came upon such a rotting carcass on the beach, as it looks lying on the deck in the photo above, and considering all the publicity that dragons were getting at the time, would you not believe that you had found a dead dragon? Pretty sure that we would!

And if you want a strange sea "serpent" consider the oarfish, species up to 56 feet long have been reported.



Conclusion: The Hebrew word "tanniyim/tanniyn" is broad enough in scope to cover all types of wild beasts, including those that are extinct, including the plesiosaur, basking shark, giant shelled sea turtle, or oarfish, all can be classified as "tanniyim/tanniyn". The author proposes that future translations would be better served by translating it as "wild beast" and not cloud the interpretation by using the name of an animal that is currently living. That the words of the Genesis passages can be interpreted to include all types of animals, known living species and extinct species! Many species have gone extinct in very recent history, many, many more than can be counted, only very rough estimates of the sea and land creatures that have gone extinct are available.

Chapter 19; Biblical Archaeology Evidences for the Accuracy of the Scriptures

THE MOABITE STONE



Discovered in Dhiban, Jordan, in 1868 by a Anglican medical missionary by the name of F. A. Klein. The language is Moabite. The translation is by A. Lemaire in 1994. The following is a list of some of the people, places and things that the tablet has in common with the Scriptures.

"I am Mesha ... the Dibonite" (line 1)
 Mesha- Genesis 10:30 2Kings 3:4 ; a Moabite king ~853 BC
 Dibon- Numbers 21:30 ; a city

"Omri had taken possession of the land of Medeba" (line 7)
 Omri- 1Kings 16:16 ; king of Israel (the Northern Kingdom) 885-873 BC
 Medeba- Numbers 21:30 ; a city

"And I built Baal Meon And I built Kiriathaim" (lines 9-10)
 Beth Ball Meon- Joshua 13:7 Ezekiel 25:9 ; a city and Baal was a Canaanite fertility god
 Kiriathaim- Joshua 13:19 Ezekiel 25:9 ; a city

"the men of Gad had dwelt in the land of Ataroth from of old, and the king of Israel built Ataroth for himself," (line 10)
 Gad- Genesis 30:11 ; a person/tribe/territory
 Israel- Genesis 32:28 ; a person/nation/territory (mentioned 4 times)
 Ataroth- Numbers 32:3 ; & 32:4 ; a city

"the town belonged to Chemosh and to Moab ... Keriioth my town" (line 12)
 Chemosh- Numbers 21:9 ; a Moabite god (mentioned 11 times)
 Moab- Genesis 19:37 ; a person/tribe/territory
 Keriioth- Joshua 15:25 ; a city

"men of Sharon ... take Nebo against Israel" (line 14)
 Sharon- 1 Chronicles 5:16 ; a plain
 Nebo- Numbers 32:3 ; a city

"the king of Israel had built Jahaz" (line 18-19)
 Jahaz- Numbers 21:23 ; a city

"I built Aroer, and made the highway through the Arnon" (line 26)
 Aroer- Numbers 32:24 ; a city
 Arnon- Numbers 21:13 ; a river

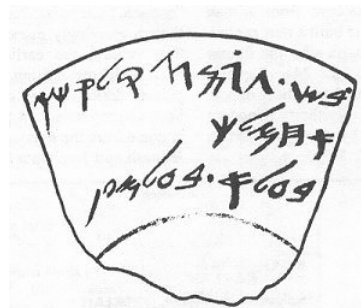
"I built Bezer, for it was in ruins" (line 27)
 Bezer- Deuteronomy 4:43 ; a city, location uncertain.

"And the house [of Dav]id dwelt in Horanaim" (line 31)
 The translation of the above line is uncertain due to the condition of the tablet and is in dispute.



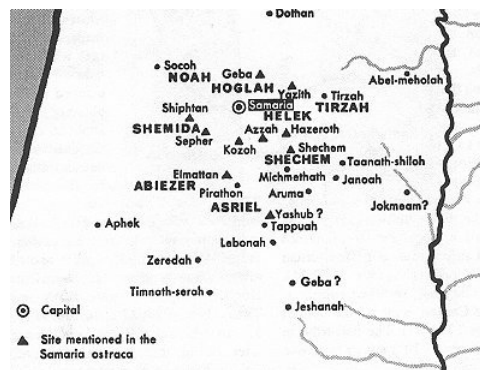
Biblical Archaeology evidences for the accuracy of the Scriptures.

Samaria Ostraca identifying Clans of Manasseh



Samaria Ostraca 27: "In the 15th year from [the clan/district of] Helek to Asa Ahimelek. Baala [the] Baalmeonite."

Evidence for the locations of the clans of Manasseh, son of Joseph, were discovered in 1910 under the direction of G. A. Reisner in Samaria (the capital city established 880 BC by king Omri). Discovered were 63 potsherds with inscriptions written in ink, called ostraca (plural) or ostracon (singular). Though seemingly a minor find, they remain among the earliest of the archaeological discoveries of ancient Hebrew writings. Commercial records that document the transaction of oil and wine from various regions of Samaria to various officials. Thirty of them identify the clan/district name of 7 of the 10 offspring of Manasseh identified in Joshua 17:2-3 when they were being assigned their territory in chapter 17. Each of the five sons of verse 2 are identified, Abiezer (1 ostraca), Asriel (2 ostraca), Helek (6 ostraca), Shechem (1 ostraca), and Shemida (17 ostraca). Only two of the daughters of Zelophehad (verse 17:3) are identified, Hoglah (2 ostraca) and Noah (1 ostraca). The potsherds are estimated to date approximately 784-783 BC. The allocation of the territories took place in the 15th century BC and one might suspect that clan designations could have possibly passed out of use by that time. However, the locations and the spellings are unchanged. An indication of the strength of the clan loyalty of the nomadic Israelite tribes and a testimony to the accuracy of the Biblical records.
(ref. B&S Vol 10, No. 1, Winter 1997)



Biblical Archaeology evidences for the accuracy of the Scriptures.

Customs and laws of Nuzi



A library of tablets dating from 1600 to 1350 BC was located at Nuzi, an ancient trade center in Assyria. The site possibly had been settled since 3000 BC and was first called Gasur. Among the more interesting discoveries in the tablets were some of the social and religious practices of the periods as recorded in the deeds, wills, marriage agreements, and adoptions. They possibly shed light on many of the customs that are documented in the Scriptures that may appear to us as being unusual (wierd?).

In the case of a childless couple, the wife could locate another wife for the husband.

"If Gilimninu (the wife) will not bear children,

Gilimninu shall take a woman of Lulluland as a wife for Shennma (the husband)."

Sarah provided Hagar for Abraham (Genesis 16:3) for the purposes of bearing children. Should the first wife later bear a son, he would rank over a son born to the second wife. Such was the case when Isaac was born (Genesis 21:1-10)

Adoptions were used, a man could adopt a woman as a sister and he agreed to provide a husband for the woman, and a childless couple could adopt a slave or a man lacking property. Possibly applying to the relationship of Abraham to Sarah (Genesis 20:2) and also that of Eliezer (Genesis 15:2) in Abraham's household. The adopted person was obligated to care for the needs, weep over and bury them when they died.

Fathers were not required to select the first born son as the heir, they could select any of the sons as they so pleased. Example Jacob's selection of Joseph and then passing this right of inheritance onto the sons of Joseph, Ephraim and Manasseh as though they were his sons. (Genesis 48:5)

A father was required to find a wife for the sons (Genesis 24:4) and arrange marriage contracts for the daughters. If the parents died, the heir was required to arrange the marriage of his sisters. But in this case the heir had less authority and the sister had the right of refusal.

Wills referred to the family gods as symbols of ownership and authority and were highly valued. Possibly explaining why Laban was so concerned that Rachel had taken the images when Jacob was fleeing Laban (Genesis 31). Tablets were also highly valued and passed down from generation to generation.

Also there were tablets documenting that a heir could legally sell their birthright to a brother. Example, Esau exchanging his birthright for soup in a time of need (Genesis 25:29-34).

Also found were tablets recording blessings pronounced by aging men just before an expected death. As did Jacob in Genesis 48-49, Moses in Deuteronomy 33 and Joshua in Joshua 23-24.

Therefore, many of the recorded customs in Genesis are demonstrated to be consistent with the customs of the ancient mideast societies.
(ref. B&S vol. 7, No. 1, Winter 1994)

C14 dating affirms Scripture/Scripture affirms C14 dating!

San Francisco Chronicle

A judgment about Solomon
Evidence supports Hebrew kingdoms in biblical times

David Perلمان, Chronicle Science Editor



Deep in the ruins of a Hebrew town sacked nearly 3,000 years ago by an Egyptian Pharaoh, scientists say they have discovered new evidence for the real-life existence of the Bible's legendary kingdoms of David and Solomon.

The evidence refutes recent claims by other researchers who insist that the biblical monarchs were merely mythic characters, created by scholars and scribes of antiquity who made up the tales long after the events to buttress their own morality lessons.

The debate, however, is not likely to subside, for archaeology is a field notable for its lengthy quarrels among partisans, however scientific they may be.

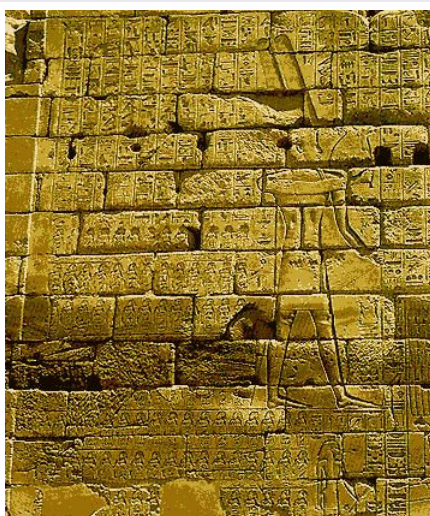
The latest evidence comes from Israeli and Dutch archaeologists and physicists after seven years of digging at a historic site called Tel Rehov. The site is in the Jordan valley of Israel, where successive settlements rose and fell over the centuries.

Using highly sophisticated techniques for establishing dates through the decay rate of radioactive carbon, the scientists have pinned down the time of a disputed moment in history, recorded in the Bible, when a

Pharaoh now known as Shoshenq I invaded Jerusalem.

As the book of Chronicles relates in the Old Testament, Shoshenq (the Bible called him Shishak) came "with twelve hundred chariots and threescore thousand horsemen" and plundered Israel's capital, as well as such towns and fortresses as Rehov, Megiddo and Hazor.

The Pharaoh later listed those conquests on a monument in the temple of Amun at Karnak, where the Egyptian city of Luxor now stands.



(List and second photo from <http://www.specialtyinterests.net/sheshonk.html>)

- | |
|--|
| 11=Gaza, Genesis 10:19,
Joshua 10:41 |
| 12=Makkedah, Joshua 10:10 |
| 13=Rubuti, |
| 14=Aijalon, Joshua 21:24 |
| 15=Kiriathaim?, |
| 16=Beth- horon, Joshua
10:10 |
| 17=Gibeon, Joshua 9:3 |
| 18=Mahanaim, Genesis 32:2,
Joshua 13:26 |
| 19=Shaud[y], |
| 20=?, |
| 21=Adoraim, 2 Chronicles
11:9 |
| 22=Hapharaim, Joshua 19:9 |
| 23=Rehob, Numbers 13:21,
Joshua 19:28 |
| 24=Betshan, |
| 25= Shunem, Joshua 19:18 |
| 26=Taanach, Joshua 12:21 |
| 27=Megiddo, Joshua 12:21 |
| 28=Adar, Joshua 15:3 |
| 29=Yadhamelek, |

The new timetable places Shoshenq's rampage and looting at Rehov in the 10th century rather than the 9th, a highly significant difference. It sets the date at about 925 B.C., some five years after Solomon was said to have died, and some 80 years earlier than other archaeologists maintain.

Those scholars, known in the world of archaeology as "minimalists," insist that both David and Solomon were little more than tribal chieftains, and certainly not the mighty monarchs of the Bible.

A report on the new evidence appears today in the journal *Science* by Hendrik Bruins, a desert researcher at Ben-Gurion University of the Negev in Israel, Johannes van der Plicht of the Center for Isotope Research at the University of Groningen in the Netherlands, and Amihai Mazar of the Hebrew University of Jerusalem, the principal archaeologist at Tel Rehov.

In a telephone interview, Mazar said that one specific "layer of destruction" at the site yielded a harvest of charred grain seeds and olive pits that enabled his colleagues to date them with an unusually high level of precision. The dates of both earlier and later layers showed clearly how the successive layers of occupation could be determined from the 12th through the 9th centuries B.C., he said.

"They provide a precise archaeological anchor for the united monarchies of the time of David and Solomon," Mazar said. "The pottery we found there also tells us that the conquest dates from the same period as Megiddo, when its mighty gates and walls and temples were also destroyed by Shoshenq's armies."

More than 40 years ago the late Yigael Yadin, who won fame as an army officer during Israel's war for independence, turned to archaeology and after excavating the imposing ruins at Megiddo maintained that they were in fact destroyed during the so-called Solomonic period.

Recently, however, a group of archaeologists led by Israel Finkelstein of Tel Aviv University working at Megiddo has insisted that the so-called Solomon's gate there dates from a much later time -- perhaps 100 or even 200 years after Solomon.

Finkelstein read a copy of the Mazar report that was sent him by e-mail. After replying that Mazar "is a fine scholar," he insisted that "there are many problems with his archaeological data" and that the samples of material used for the radiocarbon dating are at best questionable.

In the past, Finkelstein has accused Mazar of harboring a "sentimental, somewhat romantic approach to the archaeology of the Iron Age," according to an earlier account in *Science*.

On Thursday, however, one of the leaders in the archaeology of Israel, Professor Lawrence E. Stager, who is director of Harvard University's Semitic Museum, dismissed the claims of Finkelstein and the other archaeologists who share his views.

"Mazar and his colleagues have now put another nail in the coffin of Finkelstein's theories," Stager said.
"There's no question that Rehov and the other cities that Shoshenq conquered were indeed there at the time of Solomon.

"We don't need to rely any more only on the Bible or on Shoshenq's inscriptions at Karnak to establish that Solomon and his kingdom really existed, because we now have the superb evidence of the radiocarbon dates."

copied from <http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2003/04/11/MN24970.DTL>

Radio-dating backs up biblical text

An ancient waterway, described in the Bible, has been located and radiocarbon-dated to around 700 BC¹.

11 September 2003
HELEN R. PILCHER



The 500 meter-long tunnel still carries water to the city of David
© BiblePlaces.com

The half-kilometre Siloam Tunnel still carries water from the Gihon Spring into Jerusalem's ancient city of David. According to verses in Kings 2 and Chronicles 2², it was built during the reign of the King Hezekiah - between 727 BC and 698 BC - to protect the city's water supply against an imminent Assyrian siege. Critics argue that a stone inscription close to the exit dates the tunnel at around 2 BC.

To solve the conundrum, geologist Amos Frumkin, of the Hebrew University of Jerusalem, and colleagues looked at the decay of radioactive elements - such as carbon in plants and thorium in stalactites - in tunnel samples.

The plaster lining the tunnel was laid down around 700 BC, says Frumkin's team. A plant trapped inside the waterproof layer clocked in at 700-800 BC, whereas a stalactite formed around 400 BC. "The plant must have been growing before the tunnel was excavated; the stalactite grew after it was excavated," explains Frumkin.

The study "makes the tunnel's age certain", says archaeologist Henrik Bruins of Ben-Gurion University of the Negev, Israel. The Siloam Tunnel is now the best-dated Iron Age biblical structure so far identified.

The remains of buildings and structures described in the Bible are notoriously difficult to find. Specimens are rare, poorly preserved, hard to identify and often troublesome to access. Says James Jones, Bishop of Liverpool, UK: "This scientific verification of historical details in the Bible challenges those who do not wish to take it seriously."

Tunnel vision

The samples also help to explain how the tunnel was built. The passage is sealed with layers of plaster, the deepest and oldest of which is directly above the bedrock, with no sediment between. This shows that the plaster was applied immediately after the tunnel was built, Frumkin says.

"It's also quite unique to find well-preserved plant remains in plaster," says Bruins. Workers may have made up huge quantities outside the tunnel, where the plants could have become mixed in, and then taken it inside.

Large enough to walk inside, the Siloam Tunnel zigzags through an ancient hill. Its carved inscription describes how two teams of men, starting on opposite sides of the mountain, managed to meet in the middle. They may have followed a natural fissure in the limestone rock, Bruin suggests.

Unusually, the inscription does not name King Hezekiah - other monarchs commonly boasted of their architectural achievements in stone. The carving is six metres inside the tunnel, so it must have been made by lamplight.

It's quite unique to find well-preserved plant remains in plaster
Henrik Bruins
Ben-Gurion University

"It wasn't meant to be seen by the public," says Biblical historian Andrew Millard of Liverpool University, UK. "I think it was the workmen recording what an extraordinary feat they had accomplished."

References

1. Frumkin, A., Shimron, A. & Rosenbaum, J. Radiometric dating of the Siloam Tunnel, Jerusalem. *Nature*, 425, 169 - 171, (2003)
2. 2 Kings 20:20; 2 Chronicles 32:3,4.

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The Pools at Siloam

From <http://www.latimes.com/news/science/la-sci-siloam 9aug09,1,3097577.story?coll=la-news-science> (edited)

By Thomas H. Maugh II, Times Staff Writer, August 9, 2005

"Workers repairing a sewage pipe in the Old City of Jerusalem have discovered the biblical Pool of Siloam, a freshwater reservoir that was a major gathering place for ancient Jews making religious pilgrimages to the city.

The pool was fed by the now famous Hezekiah's Tunnel and is "a much grander affair" than archeologists previously believed, with three tiers of stone stairs allowing easy access to the water, said Hershel Shanks, editor of the Biblical Archaeology Review, which reported the find Monday.

The newly discovered pool is less than 200 yards from another Pool of Siloam, this one a reconstruction built between AD 400 and 460 by the Empress Eudocia of Byzantium, who oversaw the rebuilding of several biblical sites.

The site of the first Pool of Siloam constructed in the 8th century BC by Judean King Hezekiah, who foresaw the likelihood that the Assyrians would lay siege to Jerusalem and knew a safe water supply would be required to survive the attack, is still unknown. It was presumably destroyed in 586 BC when Babylonian King Nebuchadnezzar razed the city.

The pool was discovered by a repair team excavating a damaged sewer line last fall under the supervision of Eli Shukron of the Israel Antiquities Authority. As soon as Shukron saw two steps uncovered, he stopped the work and called in Reich, who was excavating at the Gihon Spring.

When they saw the steps, Shukron said, "we were 100% sure it was the Siloam Pool."

With winter approaching, the two men had to hurry their excavation so the sewer could be repaired before the rainy season.

As they began digging they uncovered three groups of five stairs each separated by narrow landings. The pool was about 225 feet long, and they unearthed steps on three sides.

They do not yet know how wide and how deep the pool was because they have not finished the excavation. The fourth side lies under a lush garden — filled with figs, pomegranates, cabbages and other fruits — behind a Greek Orthodox Church, and the team has not yet received permission to cut a trench through the garden.

"We need to know how big it is," Charlesworth said. "This may be the most significant and largest *miqveh* [ritual bath] ever found."

The excavators have been able to date the pool fairly precisely because of two fortunate occurrences that implanted unique artifacts in the pool area.

When ancient workmen were plastering the steps before facing them with stones, they either accidentally or deliberately buried four coins in the plaster. All four are coins of Alexander Jannaeus, a Jewish king who ruled Jerusalem from 103 to 76 BC. That provides the earliest date at which the pool could have been constructed.

Similarly, in the soil in one corner of the pool, they found about a dozen coins dating from the period of the First Jewish Revolt against Rome, which lasted from AD 66 to 70. That indicates the pool had begun to be filled in by that time.

Because the pool sits at one of the lowest spots in Jerusalem, rains flowing down the valley deposited mud into it each winter. It was no longer being cleaned out, so the pool quickly filled with dirt and disappeared, Shanks said."



Chapter 20; Easter, the most Happy, Blessed Event; derived from Eastre, Eostre, Eostur, or Ostara?

Is Easter a pagan festival?
And Leah said, **Happy** am I,
for the daughters will call me **blessed**:
and she called his name **Asher**.
[Genesis 30:13]

The Hebrew text uses three almost identical words in the above passage.

Strong's #837 'osher - "Happy"
Strong's #833 'ashar - "blessed"
Strong's #836 'Ashar - "Asher"

Per Strong's "Hebrew and Chaldee Dictionary", from #833 came #836, #837 and the more often used form #835. #835 ('esher), which Leah did not use, is used 43 places in the Old Testament Scriptures and is either translated blessed or happy.

While we are quite sure that it was a very blessed and happy event for Leah, the subject of this small write up will be a more earth shattering and blessed event, the resurrection of our Lord Jesus Christ. You ask how do we get from Leah to the resurrection! The answer is in the meanings and soundings of the Hebrew words. For we as Christians can think of no more **blessed** and **happy** event than the resurrection. Many scholars have written that the Christian celebration of Easter was a convenient borrowing from the ancient pagan ceremony of Eastre, Eostre, Eostur, or Ostara. (see note).

Let us take a closer look at other possibilities for the name of the Easter celebration! Isaac E. Mozeson in his book "The Word" (Shapolsky Publishers, 1989) on page 23 under the topic "ASIA / AYSH" has the following.

"ROOTS: ASIA is pronounced much like the Hebrew term ASH (fire-Deuteronomy 4:24). Dr. Shipley's "Dictionary of Word Origins" (p. 144) cites an ancient Assyrian marker inscribed Asu, "land of the rising sun". We call this land mass Asia, and the direction of the fiery sunrise we name EAST.

BRANCHES: Christians celebrate the rising Son at Easter"

The Hebrew word that Mr. Mozeson is proposing as the ancient Hebrew patriarch word for our EAST and EASTER consists of two Hebrew letters, 'Aleph and Shiyn, it is Strong's #784. 'Aleph represents a vowel and the differences between the a, e, or o sounds are represented by combinations of marks below the 'Aleph. Per Mr. Mozeson, "Vowels are certainly interchangeable and ought to be largely ignored when comparing words from different languages. In effect, Biblical Hebrew has no vowels; the vowel letters in English (A, E, I, O, and U) are chaotic contrivances that help to make English a nightmare to spell." And we might add the way they are used in Hebrew texts seem even more chaotic and confusing for the original handwritten parchment form of the Bible has no vowel marks, and only verbal tradition allowed the scribes to add the form of vowel markings presently used. As with most all languages, variants in pronunciation are noted among Hebrews from various locations and traditions

Adding the Hebrew letter Reysh (adding the r sound) after the 'Aleph and Shiyn we get our family of words #833, #835, #836 and #837, with #833 and #837 being the "Happy" and "blessed" in Leah's statement. We are most interested in #835 which is pronounced eh'-sher and is translated as either blessed or happy. #837 is pronounced o'-sher. They are sound alike words for Eastre, Eostre, Eostur, or Ostara, the names of the "ancient pagan festivals" which the early Christians supposedly adopted as a means to celebrate unnoticed in ancient pagan times. See the extract from Strong's below.

833. אָשָׁר 'āshar, aw-shar'; or אֲשֶׁר 'āshēr, aw-share'; a prim. root; to be straight (used in the widest sense, espec. to be level, right, happy); fig. to go forward, be honest, prosper:—(call, be) bless (-ed, happy), go, guide, lead, relieve.

834. אֲשֶׁר 'āsher, ash-er'; a prim. rel. pron. (of every gen. and numb.); who, which, what, that; also (as adv. and conjunc.) when, where, how, because, in order that, etc.:— × after, × alike, as (soon as), because, × every, for, + forasmuch, + from whence, + how (-soever), × if, (so) that ([thing] which, wherein), × though, + until, + whatsoever, when, where (+ -as, -in, -of, -on, -soever, -with), which, whilst, + whither (-soever), who (-m, -soever, -se). As it is indeclinable, it is often accompanied by the personal pron. expletively, used to show the connection.

835. אֲשֶׁר 'āsher, eh'-sher; from 833; happiness; only in masc. plur. constr. as interjec., how happy!:—blessed, happy.

836. אֲשֶׁר 'āshēr, aw-share'; from 833; happy; Asher, a son of Jacob, and the tribe descended from him, with its territory; also a place in Pal.:—Asher.

837. אֲשֶׁר 'āsher, o'-sher; from 833; happiness:—happy.

838. אֲשֶׁר 'āshūr, aw-shoor'; or אֲשֶׁר 'āshshūr, ash-shoor'; from 833 in the sense of going; a step:—going, step.

839. אֲשֶׁר 'āshūr, ash-oor'; contr. for 8391; the cedar tree or some other light elastic wood:—Ashurite.

אֲשֶׁר 'Ashshūr. See 804, 838.

Conclusion: It is proposed that early Christians who had a good knowledge of Biblical Hebrew when the concept of celebrating the resurrection was being formed would be very comfortable with the name of Eostur or Eoshur or Eostre or Eoshre for the celebration of the Lord's resurrection, whichever form was used in the early days before it became the more modern Easter. It is truly a most blessed and happy celebration! Of course the Christian would know the true meanings even if it did sound similar to and was being celebrated at the same season as the pagan celebrations! Note also that the parent word, #833 - 'asher', also has a meaning of being right or leading in the right way.

Per Mr. Mozeson, "More English words can be clearly linked to Biblical Hebrew than to Latin, Greek, or French."

Notes

Eastre, Eostre, Eostur, or Ostara

[a] From "Heathen Holidays" by Denise Snodgrass, CHAPTER III, EASTER: THE GODDESS OF SPRING

The name of this festival, itself, shows its heathen origin. "Easter" is derived from Eastre, or Eostre, the Anglo-Saxon Goddess of spring and dawn. There also is some historical connection existing between the words "Easter" and "East," where the sun rises. The festival of Eostre was celebrated on the day of the Vernal Equinox (spring). Traditions associated with the festival of the Teutonic fertility Goddess survive in the Easter rabbit and colored eggs.

Spring is the season of new life and revival, when, from ancient times, the pagan peoples of Europe and Asia held their spring festivals, re-enacting ancient regeneration myths and performing magical and religious ceremonies to make the crops grow and prosper.

[b] From "The American Book of Days," by George William Douglas we read:

As the festival of Eostre was a celebration of the renewal of life in the spring it was easy to make it a celebration of the resurrection from the dead of Jesus. There is no doubt that the Church (of Rome) in its early days adopted the old pagan customs and gave a "Christian" meaning to them.

It would have been suicide for the very early Christian converts to celebrate their holy days with observances that did not coincide with celebrations that already existed. To save lives, the missionaries cleverly decided to spread their religious message slowly throughout the populations by allowing them to continue to celebrate pagan feasts, but to do so in a Christian manner.

As it happened, the pagan festival of Eastre occurred at the same time of year as the Christian observance of the Resurrection of Christ. It made sense, therefore, to alter the festival itself, to make it a Christian celebration as converts were slowly won over. The early name, Eastre, was eventually changed to its modern spelling, Easter.

[c] The Pagan origins of the holiday according to a Venerable Bede, English historian of the early 8th century, the name Easter, like the name of the days of the week, is a survival from the old Teutonic mythology. According to Bede it is derived from the Norse *Ostara* or *Eostre*, the Anglo-Saxon goddess of spring, to whom the month of April, and called *Eostur-monath*, was dedicated. The Greek myth, Demeter and Persephone, with its Latin counterpart, Ceres and Persephone, conveys the idea of a goddess returning seasonally from the nether regions to the light of day. This is in conjunction with the festival of spring, or vernal equinox, March 21, when nature is in resurrection after winter.

Chapter 21; The Long Day of Joshua 10?

For millenniums there has been discussion and controversy over the Scriptural record of Joshua 10:11-14. Flavius Josephus in his "Antiquities of the Jews" writes:

"Joshua made haste with his whole army to assist them,
and marching day and night, in the morning fell
upon the enemies as they were going up to the siege;
and when he had discomfited them, he followed them,
and pursued them down the descent of the hills.
The place is called Beth-Horon; where he also understood
that God assisted him, which he declared by thunder and
thunderbolts, as also by the falling of hail larger than usual.
Moreover, it happened that the day was lengthened that the night
not come on too soon, and be an obstruction to the zeal of the
Hebrews in pursuing their enemies; insomuch that Joshua took
the kings, who were hidden in a certain cave at Makkedah, and
put them to death. Now, that the day was lengthened at this
time, and was longer than ordinary, is expressed in the books
laid up in the temple." (from the William Whiston translation)

He adds the part about the "thunder and thunderbolts", says the hail was larger than usual, but fails to mention that many of the enemy were killed by the hail, and is rather low key about the length of the day. One would not get the impression that the earth actually stopped rotating! So what is going on? How does one get a lengthened day??

The Hebrew of the text is rather interesting and a close to literal translation might be as follows.

"and he said; Before the eyes of Israel,
Sun, on Gibeon be dumb (or silent),
and moon, in the valley of Aijalon.
And was dumb (or silent) the sun,
and the moon stood,
until the nation was avenged on its foes.
Is it not written in the Book of the Upright?
And stood the sun in the midst of the heavens,
and did not press to go as on a full day.
And never has been a day that before it or after it;
For Jehovah listened to the voice of a man.
For Jehovah fought for Israel."

Two different Hebrew words are used in the passage which are often translated in these verses as "stand still" or "stood still". The first is transliterated as "damam" (Strong's #1826) and it has a basic literal meaning of "to be dumb" and by implication, to be astonished, to stop, or also to perish. And it is many times translated as to be silent. (see note A for the interlinear Hebrew text and Strong's dictionary extractions) The second word used is transliterated as "amad" (Strong's #5975) and it has a basic literal meaning of "to stand". However, per Strong, it is used in various relations both literal and figurative, and as transitive or intransitive, a wide range of uses. Considering the many varying possibilities such as, to raise up, set forth, dwell, abide, endure, tarry, continue and even cease; we are left scratching our head about the true implications of the Hebrew text.

Is the translation using the word "still" warranted when earlier in the Scriptures, Exodus 9:16, it is translated as "raised"?

And also as indicated in the note the last phrase of verse 13 could be properly translated "as a day full"

A paraphrase from the Bible in Basic English is;

"10:12 It was on the day when the Lord gave up the Amorites
into the hands of the children of Israel
that Joshua said to the Lord, before the eyes of Israel,
Sun, be at rest over Gibeon;
and you, O moon, in the valley of Aijalon.
10:13 And the sun was at rest and the moon kept its place
till the nation had given punishment to their attackers.
(Is it not recorded in the book of Jashar?)
So the sun kept its place in the middle of the heavens,
and was waiting, and did not go down, for the space of a day.
10:14 And there was no day like that, before it or after it,
when the Lord gave ear to the voice of a man;
for the Lord was fighting for Israel."

Under what conditions could one imagine that there could be the longest and brightest possible lighting condition to provide a figurative resting of the sun and moon upon the area for a figurative space of a day? Short of having the rotation of the earth stop when it seems apparent that to do so would be so catastrophic that no life on the earth would survive. Let us take a look at the possible condition that could accompany a severe hailstorm. We might be tempted to say a "Texas" size hailstorm, but one of the most severe recorded

hailstorms of recent history occurred in Kansas.

Hail falls along paths scientists call hail swaths. These vary from a few square acres to large belts 16 kilometers (10 miles) wide and 160 kilometers (100 miles) long. (The hail storm of Joshua 10 went between Beth-horon to Azekah, approximately 15 miles.) Swaths can leave hail piled so deep it has to be removed with a snow plow. In Orient, Iowa, in August 1980, hail drifts were reported to be 2 meters (6 feet) deep. On 11 July 1990, softball-sized hail in Denver, Colorado, caused \$625 million in property damage, mostly to automobiles and roofs. Forty-seven people at an amusement park were seriously injured when a power failure trapped them on a Ferris wheel and they were battered by softball-sized hail. A quick search of the internet reveals that there were recorded deaths due to hail stones in the USA on May 8, 1784 at Winnsborough, SC, eight persons were killed. Various other North American reports of deaths from hail came from Broome, Quebec, in 1879; Uvalde, Texas, in 1909; Windsor, North Carolina, in 1931; and near Toronto, Ontario, in 1976. Only two deaths have been authenticated by the National Weather Service (formerly the U.S. Weather Bureau). The first occurred on May 13, 1939, near Lubbock, Texas. A 39-year-old farmer died of injuries received when he was caught in an open field during a severe hailstorm. More recently, an infant lying in its mother's arms was killed by hail at Fort Collins, Colorado, on July 30, 1979.

One of the larger hailstones ever documented weighed 0.75 kilograms (1.67 pounds), and spans 14.4 centimeters (5.67 inches), this famous 3rd September 1970 Coffeyville hailstone as shown below is compared to an egg.



(from <http://www.ucar.edu/communications/factsheets/Hail.html>)

And stones weighing between 4 and 5 pounds have been reported. One of the deadliest modern history hailstorms ever recorded was in northern India in 1888, when hailstones the 'size of a cricket ball' reportedly killed 246 people and also 1,600 sheep and goats. Some of the victims were hit directly, others perished in drifts several metres deep, and some died from exposure. In 1932 in the western Hunan Province, China, 200 people were killed and thousands injured. (The record of Joshua 10 does not actually tell us how many were killed by the hail.) It is not unusual for a severe hailstorm to rapidly pass over an area in the afternoon and to be followed by beautiful clear skies long before sundown. And often the storm will have washed the atmosphere of most of the particulate matter resulting in one of those nights when the sky is so clear that it appears one can reach up and touch the stars. In the event that sunset would be accompanied by the rise of the moon at or near its brightest possible condition (the full moon at perigee) the result would seem to be the most optimum light conditions for the longest hours of a day possible. A long day?

The Israelite army traveled all night from Gilgal to arrive outside of Gibeon for an early morning surprise for its foes, an ascent of around 4,000 feet and a distance of more than 20 miles, so they were accustomed to travel at night. (Archaeologists have not located the exact site of the Gilgal camp between Jerico and the Jordan river.) After routing the opposing army with a great slaughter outside of Gibeon, they then continued in hot pursuit toward Beth-horon, where the hailstorm started its destruction. They pursued the Canaanite coalition down through the descent of Beth-horon, and then southward across the Valley of Aijalon and finished the job at Azekah/Makkedah, two neighboring villages approx 20 miles from Gibeon.



This direction of the flow of the battle explains why Joshua was requesting "Sun, be at rest over Gibeon; and you, O moon, in the Valley of Aijalon." The Aijalon Valley was an important military and caravan route through the approximately 1500 feet high rocky plateau called the Shephelah, a major connection route between the Bethel/Gibeon/Jerusalem area and the coastal plain. It was quite an endurance feat for Joshua and his army, hike a three quarters marathon distance overnight, win a decisive battle in the morning, begin the pursuit and witness the partial destruction of the surviving foes by a world class hailstorm and then continue the pursuit for another three quarters marathon distance to complete the destruction of the foes.

Conclusion; Therefore it is proposed that the wording of the Hebrew text does not require the sun to stop in the sky, which would seem to be a breaking of the promise of Genesis 8:22, "While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease". The statement "And there was no day like that, before it or after it" would be fully satisfied by a severe greater than "Texas" sized hailstorm followed by a bright clear full moon lit night, allowing the Israelites to pass through the Aijalon Valley and complete the defeat of the foes under a bright clear moonlight sky as Joshua requested of the Lord. Instead of breaking "My covenant with the day and My covenant with the night, so that day and night will not come at their appointed time" (Jeremiah 33:20 RSV), a more practical solution was provided.

Full moon at Perigee and Apogee



Notes: Interlinear Hebrew Text for Joshua 10:11-14

Following is an extract from "The Interlinear Bible" (1986) by J. P. Green, Sr., page 196, with added red underlines to highlight the Hebrew words often translated as "stand still" or "stood still". Note that twice the word "still" is put in parentheses to properly indicate that it is an added word. Another time "stood" is in parentheses and not "still", and the remaining time neither is so designated, rather confusing interpretations.

Also added are two blue underlines showing that in the first line the Hebrew translated as "as they fled" uses the same prefix as that at the ending of verse 13. Therefore, the end of verse thirteen could just as properly be translated as "as a day full" instead of "for a day full".

Also included are extracts from Strong's Hebrew and Chaldee Dictionary for "damam" (#1826), "amad" (#5975) and "tamiym" (#8549).

Makkedah. ¹¹And it happened, as they fled from the face of Israel, they were in the descent of Beth-horon, even Jehovah cast great stones on them out of the heavens, to Azekah; and they died. *The many who died by the hailstones were more than the sons of Israel had killed by the sword.*
¹²Then Joshua spoke to Jehovah in the day when Jehovah gave the Amorites up before the sons of Israel; and he said, Sun, stand still before the eyes of Israel in Gibeon! And, Moon stand still in the valley of Aijalon! ¹³And the sun stood still, and the moon stood still, until the nation was avenged on its foes. Is it not written in the Book of the Upright? Yea, the sun stood still in the middle of the heavens, and did not hasten to go down for a full day. ¹⁴And there has not been a day such as that, before it or after it; for Jehovah listened to the voice of a man. For Jehovah fought for Israel.
¹⁵And Joshua returned, and all Israel with him, to the camp at Gilgal.
¹⁶And these five kings

3068 to 1032= 4174 them struck 3478 or ascent of 6440 them sued 5127 19:61
 11 יהוה בנסם | מפני ישראל | הם בגור | בתהורן | יהוה
 Jehovah, horon Beth- the in they, Israel before they as it And
 of descent (being) 1413 68 fled was 7393
 4191 5625 8064 1413 68
 השליך עליהם אבנים גדולות מן השמים עד עזקה וימתו
 and, Azekah to the out great stones upon cast
 died they heavens of 1259 68 4191 them 834 7227
 רבים אשר מתו באבני הברד מאשר הרגו בני ישראל
 Israel the had (were) hail the by died who (The) many
 of sons killed than more 3091 1696 of stones
 3068 5414 3117 3068 3091 1696
 12 בורכ: | אז ידבר יהושע | יהוה ביום | תת יהוה את
 Jehovah when the in to Joshua spoke Then the by
 gave day Jehovah 3478 567
 האמרו לפני בני ישראל | ואמר | ליהוה ישראל | שמש
 ,Sun, Israel the before he and ;Israel the before the
 of eyes said 6010 1826 1391 Amorites
 5975 3394 8121 1826 357 6010 3394 1826 1391
 13 בנבעון | דום ורה | בגמק אילן | ויהם | השמש ורה עמד
 stood the and the And !Ajalon the in and stand on
 (still) moon, sun still (stood) of valley, moon, still Gibeon
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 38,08 8549 3117 935 213 38,08 80,64 2677 8121
 14 ויהם | קחצי | השמים | ולא | אץ | לבוא | ביום | המים: | ולא
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 יהוה | ביום | הווא | לפני | ואחריו | לשמע | יהוה | בקול | איש
 :man a the Jehovah for after or before that day as has
 of voice to listened :it it
 3478 3605 3091 7725 3478 3898 30,68
 15 כי | יהוה | נלחם | לישראל: | וישב | יהושע | וכל | ישראל
 Israel and Joshua And for fought Jehovah for

1826. דָּמַם *dāmam*, daw-mam'; a prim. root [comp. 1724, 1820]; to be dumb; by impl. to be astonished, to stop; also to perish:—cease, be cut down (off), forbear, hold peace, quiet self, rest, be silent, keep (put to) silence, be (stand) still, tarry, wait.

5975. עָמַד *amad*, aw-mad'; a prim. root; to stand, in various relations (lit. and fig., intrans. and trans.):—abide (behind), appoint, arise, cease, confirm, continue, dwell, be employed, endure, establish, leave, make, ordain, be [over], place, (be) present (self), raise up, remain, repair, + serve, set (forth), over, (tle, up), (make to, make to be at a, with-) stand (by, fast, firm, still, up), (be at a) stay (up), tarry.

8549. תָּמִיִּם **tâmiym**, *taw-meem'*; from 8552; *entire* (lit., fig, or mor.); also (as noun) *integrity, truth*:—without blemish, complete, full, perfect, sincerely (-ity), sound, without spot, undefiled, upright (-ly), whole.

"lit." and "fig." are abbreviations for "literal" and "figurative" respectively.

Section Two: New Perspective Translations

GENESIS 1, In the beginning God

1 In the beginning created God the heavens and the earth.	1 In the beginning God created the heavens and the earth.	1 In the beginning God created the universe.
2 And the earth was waste and void; and darkness over <i>the</i> face of <i>the</i> deep.	2 And the earth was waste and void; and darkness was upon the surface of the deep.	2 There was no life on the earth; and the surface waters were in darkness.
And the Spirit of God brooded over the face of the waters.	And the Spirit of God brooded over the surface of the waters.	The Spirit of God was brooding over the surface of the waters.
3 And said God, Let be light; and was light.	3 And God said, Let there be light; and there was light.	3 And God said, Let there be light, and light appeared on the surface.
4 And saw God the light, that <i>it</i> was good; and divided God between the light and the darkness.	4 And God saw the light, that <i>it</i> was good; and God divided the light from the darkness.	4 God saw that the light was good and He separated light from darkness.
5 And called God the light Day, and the darkness He called Night. And was mixing and was breaking forth time one.	5 And God called the light Day, and the darkness he called Night. And the mixing and the breaking forth were time one.	5 He called the light Day, and the darkness Night; from darkness to light, the first creation phase.
#P#	#P#	#P#
6 And said God, Let be an expanse in the midst of the waters, and let it dividing between the waters from the waters.	6 And God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters.	6 And God said; Let there be an expanding in the middle of the waters, and let it separate the waters.
7 And brought forth God the expanse, and He separated between the waters that <i>were</i> under the expanse and the waters that <i>were</i> above the expanse; and it was so.	7 And God brought forth the expanse, and separated between the waters that were under the expanse and the waters that were above the expanse; and it was so.	7 God brought forth the atmosphere which separated the lower waters from the upper waters.
8 And called God the expanse Heavens. And was mixing and was breaking forth time second.	8 And God called the expanse Heavens. And the mixing and the breaking forth were time second.	8 God called the atmosphere the Sky (Heavens); from darkness to light, the second creation phase.
#P#	#P#	#P#
9 And said God, Let be collected the waters under the heavens to place one, and let appear the dry <i>land</i> ; and it was so.	9 And God said, Let the waters under the heavens be gathered together unto one place, and let the dry land appear; and it was so.	9 Then God said; Let the surface waters be gathered together and let the dry land rise from the waters.
10 And called God the dry <i>land</i> Earth; and the collection of the waters He called Seas; and saw God <i>it</i> was good.	10 And God called the dry land Earth; and the gathering together of the waters He called Seas; and God saw that it was good.	10 God called the dry land Earth, and the waters he called Seas, and He saw it was good.
11 And said God, Let sprout the earth tender sprouts, plant seeding seed, tree of fruit yielding fruit after its kind, its seed within it, on the earth; and it was so.	11 And God said, Let the earth sprout vegetation, the plant yielding seed, and the fruit tree yielding fruit after its kind, with its seed in itself, upon the earth; and it was so.	11 And God said; Let the earth sprout vegetation, and plants bearing seeds, and trees bearing fruit with the seed in the fruit, and it happened on the earth.
12 And bore the earth tender sprouts, plant yielding seed after its kind, and tree yielding fruit, its seed within it, after its kind; and saw God that <i>it</i> was good.	12 And the earth sprouted vegetation, and plants yielding seed after its kind, and the tree yielding fruit, whose seed was in itself, after its kind; and God saw that it was good.	12 The earth sprouted vegetation, and plants bearing seeds, and trees bearing fruit with the seed inside, and He saw it was good.
13 And was mixing and was breaking forth time third.	13 And the mixing and the breaking forth were time third.	13 From darkness to light, the third creation phase.
#P#	#P#	#P#
14 And said God, Let be lights in the expanse of the heavens to divide between the day from the night: and let them be for signs, and for seasons, and for days, and years;	14 And God said, Let there be lights in the expanse of the heavens to divide the day from the night: and let them be for signs, and for seasons, and for days, and years;	14 Then God said; Let the lights appear in the sky to divide day from night; and let them be for signs of seasons, days, and years.
15 And let them be for lights in the expanse of the heavens to give light on the earth; and it was so.	15 let them be for lights in the expanse of the heavens to give light upon the earth; and it was so.	15 Let the lights shine brightly upon the earth, and it happened.
16 And brought forth God two the lights great; the light great	16 And God brought forth two	16 God brought forth two great lights, the bright light in the day, and the dim light at night, and

for rule of the day; and the light small for the rule of the night, and the stars.	great lights; the greater light to rule the day; and the lesser light to rule the night, and the stars.	the stars also.
17 And appointed them God in the expanse of the heavens to give light on the earth,	17 And God appointed them in the heavens to give light upon the earth,	17 And God gave them in the sky to light the earth,
18 and to rule over the day and over the night, and to divide between the light and darkness; and God saw that <i>it was good</i> .	18 and to rule over the day and over the night, and to divide the light from the darkness; and God saw that it was good.	18 to light the day and also the night and to separate light from darkness, and He saw it was good.
19 And was mixing and was breaking forth time fourth.	19 And the mixing and the breaking forth were time fourth.	19 From darkness to light, the fourth creation phase.
#P#	#P#	#P#
20 And said God, Let swarm the waters swarms breathing creatures living, and flying creatures flying upon the face of the expanse of the heavens.	20 And God said, Let the waters bring forth abundantly the moving creatures having life, and flying creatures above the earth in the expanse of the heavens.	20 Then God said; Let the waters abound with moving creatures, and the sky with winged creatures.
21 And created God the great living creatures, and every living creature that moves, which swarmed the waters after its kind, and every winged creature after its kind; and saw God that <i>it was good</i> .	21 And God created the great living creatures, and every living creature that moves, which swarmed the waters after its kind, and every winged creature after its kind; and God saw that it was good.	21 God created the great living creatures, and every living creature that moves and lives abundantly in the waters, and every winged living creature of the air, and He saw it was good.
22 And blessed them God, saying, Be fruitful and be many and fill the waters in the seas, and the winged creatures let be many on the earth.	22 And God blessed them, saying, Be fruitful and multiply and fill the waters in the seas, and let the winged creatures multiply on the earth.	22 God blessed them and told them to be fruitful and multiply to fill the waters, and for the winged creatures to multiply on the earth.
23 And was mixing and was breaking forth time fifth.	23 And the mixing and the breaking forth were time fifth.	23 From darkness to light, the fifth creation phase.
#P#	#P#	#P#
24 And said God, Let bring forth the earth the breathing creatures living after its kind, cattle, and the creeping things, and creatures of the earth after its kind; and it was so.	24 And God said, Let the earth bring forth the breathing creatures after its kind, cattle, and the creeping things, and creatures of the earth after its kind; and it was so.	24 Then God said; Let the earth bring forth all the kinds of living creatures, the cattle, the crawling, and the wild creatures, and it happened.
25 And brought forth God the living creatures of the earth after its kind, and the cattle after its kind, and every creeping thing on the earth after its kind; and saw God it was good.	25 And God brought forth the living creatures of the earth after its kind, the cattle after its kind, and every creeping thing on the earth after its kind; and God saw it was good.	25 God brought forth all the kinds of living creatures on the earth, the cattle, the crawling, and the wild creatures; and He saw it was good.
26 And said God, Let Us bring forth man (ruddy-man) in Our image, after Our likeness: and let them prevail over the fish of the sea, and over the winged creature of the heavens, and over cattle, and over all the earth, and over all creeping things moving on the earth.	26 And God said, Let Us bring forth man in Our image (a shadowing), after Our likeness: and let them prevail over the fish of the sea, and over the winged creature of the heavens, and over cattle, and over all the earth, and over all creeping things that move on the earth.	26 Then God said; Let Us bring forth humans in Our image (a shadowing); and let them prevail over the fish, the birds, the cattle and over all the earth, and everything that crawls over the earth.
27 So created God the man in His image, in the image of God created He him; male and female He created them.	27 So God created man in His own image, in the image of God created He him; He created them male and female.	27 God created humans in his own likeness, in His own likeness He created male and female.
28 And blessed them God , and said to them God, Be fruitful and be many, and fill the earth, and subdue it; and rule over the fish of the sea, and over the winged creatures of the heavens, and over all living things that move on the earth.	28 And God blessed them, and God said to them, Be fruitful and multiply, and fill the earth, and subdue it; and rule over the fish of the sea, and over the winged creatures of the heavens, and over all living things that move on the earth.	28 And He blessed them and told them to be fruitful, multiply and fill the earth, and subdue it; having control over the fish, birds and all living creatures on the earth.
29 And said God, Behold, I have given you every plant seeding seed which <i>is</i> on the surface of all the earth, and every tree in which is the fruit of a tree seeding seed; to you it will be for food.	29 And God said, Behold, I have given you every plant bearing seed which is on the surface of all the earth, and every tree in which is the fruit of a tree bearing seed; to you it will be for food.	29 And God said; Behold, I have provided every seed bearing plant on the earth, and every tree with fruit and seed for your nourishment.
30 And to every living thing of the earth, and to every winged creature of the heavens, and to everything moving on the earth in which is living breath, every green plant for food. And it was so.	30 And to every living thing of the earth, and to every winged creature of the heavens, and to everything moving on the earth in which is living breath, for its food every green plant. And it was so.	30 Also to every living creature of the earth, to the birds, and to everything living that crawls on the earth, I have given all the green plants for their nourishment; and it was so.
31 And saw God everything that He had brought forth; and behold, <i>it was good</i> exceedingly. And was mixing and was breaking forth time sixth.	31 And God saw everything that He had brought forth; and behold, it was very good. And the mixing and the breaking forth were the time sixth.	31 And He saw everything that He had created, and it was indeed very good. From darkness to light, the sixth creation phase.

Note:(1) The #P# represents the letter "Phe" separator in the Hebrew text.

GENESIS Chapter 2, Adam and Eve

<p>1 And were finished the heavens and the earth and all their host.</p> <p style="text-align: center;">~</p> <p>2 And finished God on time the seventh His work that He had brought forth, and He rested on time the seventh from all His work that He had brought forth.</p> <p>3 And blessed God time the seventh, and sanctified it, because on it He rested from all His work that had created God to bring forth.</p> <p>4 These are the origins of the heavens and the earth in their being created, in the time of the bringing forth Jehovah God's earth and heavens.</p> <p>5 And every shrub of the field not yet it was on the earth, and every herb of the field not yet it had sprung up; for not had rain sent Jehovah God on the earth, and a man was not to work the soil.</p> <p style="text-align: center;">~</p> <p>6 And a vapor went up from the earth, and watered all the face of the soil.</p> <p style="text-align: center;">~</p> <p>7 And formed Jehovah God the man dust from the soil, and blew into his nostrils breath of life, and became the man a living being.</p> <p style="text-align: center;">~</p> <p>8 And planted Jehovah God a garden in Eden (pleasure), to the east; and put there the man whom He had formed.</p> <p>9 And caused to sprout Jehovah God from the soil every tree pleasant to the sight and good for food; and the tree of life in the midst of the garden, and the tree of knowledge of good and evil.</p> <p style="text-align: center;">~</p> <p>10 And a river went out from Eden to water the garden; and from there spread out and existed four heads.</p> <p>11 The name of the one Pishon (dispersive); it winds around all the land of Havilah (circular), where there is gold;</p> <p>12 And the gold of that land is good; there is bdellium and stone of the onyx.</p> <p>13 And the name of the river second is Gihon (stream); it winds around all the land of Cush .</p> <p>14 And the name of the river third is Hiddekel; it is the one walking east of Assyria (successful). And the river fourth it is Euphrates (fruitfulness).</p> <p>15 And took Jehovah God the man and put him in the garden of Eden to work it and to keep it.</p> <p>16 And charged Jehovah God to the man, saying, of every tree in the garden eating you may freely eat;</p> <p>17 but of the tree of knowledge of good and evil not you may eat from it, for in the time of your eating of it dying you will surely die.</p> <p>18 And said Jehovah God, not it is good being of the man by himself, I will bring forth a helper corresponding to him.</p> <p>19 And had formed Jehovah</p>	<p>1 Thus the heavens and the earth were finished, and all that they contained.</p> <p>2 And on the seventh time God finished His work that He brought forth; and He rested on the seventh time from all the work that He had brought forth.</p> <p>3 And God blessed the seventh time, and sanctified it; because on it He rested from all the work that He had created and brought forth.</p> <p style="text-align: center;">~</p> <p>4 These are the origins of the heavens and the earth when they were created, in the times that the Lord God brought forth the earth and the heavens.</p> <p>5 And before every plant of the field was in the earth, and before every vegetation of the field had sprouted; for the Lord God had not caused it to rain on the earth, and there was no man to cultivate the soil.</p> <p>6 And there went up a mist (vapor,fog) from the earth, and watered the whole surface of the earth.</p> <p>7 And the Lord God fashioned man from the clay of the soil, and breathed into his nostrils the breath of life, and man became a living being.</p> <p>8 And the Lord God planted a garden in Eden, to the east; and there He put the man who He had fashioned.</p> <p>9 And out of the ground the Lord God caused to sprout every tree that is pleasant to the sight and good for nourishment; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil.</p> <p>10 And a river went out of Eden to water the garden; and from there spread out and existed four headwaters.</p> <p>11 The name of the first was Pishon; that which bordered all the land of Havilah, where there is gold;</p> <p>12 And the gold of that land is good; there is bdellium and the onyx stone.</p> <p>13 And the name of the second river is Gihon; it is the one winds around all the land of Cush.</p> <p>14 And the name of the third is Hiddekel; it is the one going east of Assyria. And the fourth river is Euphrates.</p> <p style="text-align: center;">~</p> <p>15 And the Lord God took the man and put him into the garden of Eden to work it and to keep it.</p> <p>16 And the Lord God commanded the man, saying, you may freely eat of every tree in the garden;</p> <p style="text-align: center;">~</p> <p>17 but of the tree of knowledge of good and evil you may not eat, for from the time that you eat of it you will be doomed to die.</p> <p style="text-align: center;">~</p> <p>18 And the Lord God said, It is not good that the man should be alone; I will provide a helper suited to him.</p> <p>19 And from the soil the Lord God had fashioned every</p>	<p>1 The universe was finished.</p> <p style="text-align: center;">~</p> <p>2 And on the seventh time the Lord God completed his work and He rested.</p> <p style="text-align: center;">~</p> <p>3 He blessed and sanctified the seventh time because on it he rested from His work.</p> <p style="text-align: center;">~</p> <p>4 These were the beginnings of the universe and the phases in which God created it.</p> <p style="text-align: center;">~</p> <p>5 And before plants existed, before they had sprouted; for God had not caused it to rain and there were no farmers.</p> <p style="text-align: center;">~</p> <p>6 Then there went up a vapor from the soil and watered the whole earth.</p> <p style="text-align: center;">~</p> <p>7 And God fashioned man out of the clay, breathed into him the breath of life, and he became a living being.</p> <p style="text-align: center;">~</p> <p>8 Then God planted a garden in Eden to the east and there He put the man.</p> <p style="text-align: center;">~</p> <p>9 And out of the soil He caused to sprout every beautiful and nourishing tree; also in the midst of the garden the tree of life and the tree of knowledge of good and wickedness.</p> <p style="text-align: center;">~</p> <p>10 A river went out of Eden to water the garden, and from there was the source of four headwaters.</p> <p>11 The first was Pishon which winds through all of Havilah, gold was there.</p> <p style="text-align: center;">~</p> <p>12 Its gold was good and there were other precious things.</p> <p style="text-align: center;">~</p> <p>13 The second river was Gihon which winds through all of Cush.</p> <p style="text-align: center;">~</p> <p>14 The third was the Tigris which went east of Assyria, and the fourth was the Euphrates.</p> <p style="text-align: center;">~</p> <p>15 And God took the man and put him in the garden to take care of it.</p> <p>16 And God told the man, you may freely eat of each tree in the garden,</p> <p style="text-align: center;">~</p> <p>17 except for the tree of knowledge of good and wickedness, for from the time of you eating from it you will be doomed to die.</p> <p>18 Then God said; It is not good for man to be alone, I will provide a mate for him.</p> <p style="text-align: center;">~</p> <p>19 And God brought to the man every creature of land and air that He had fashioned to see what he would call them, and whatever he called them, that</p>
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God from the soil every living creature of the field and every winged creature of the heavens; and He caused to come to the man to see what he would call to them, and all which might call to it the man each living creature, that was its name.

20 And called the man names to all the cattle, and to flying creatures of the heavens, and to every living creature of the field, but for Adam not was found a helper corresponding to him.

21 And caused to fall Jehovah God a sleep deep on the man, and he slept, and He took one from his sides, and shut flesh under it.

22 And fashioned Jehovah God the side which He had taken from the man into a woman, and caused her to come to the man.

23 And said the man, this now is bone from my bones, flesh from my flesh. For this will be called woman, because out of man has been taken this.

24 Therefore, will leave a man his father and his mother and adhere with his woman, and they will become into flesh one.

25 And they were both nude, the man and his woman, and not they were ashamed.

creature of the field and every winged creature of the heavens; and He brought them to the man to see what he would call them, and what ever the man might call each living creature, that was its name.

20 And the man gave names to all four footed creatures, all winged creatures of the heavens, and every creature of the field, but for man there was not a helper suited to him.

21 And the Lord God caused a deep sleep to fall on the man, and he slept, and He took one from his sides, and closed up the flesh underneath.

22 And the Lord God fashioned the side taken from the man into a woman, and brought her to the man.

23 And the man said, this at last is bone from my bones, flesh from my flesh. For this will be called woman, because this has been taken out of man.

24 Therefore, a husband will leave his father and mother and will join to his wife, and they will become as one flesh.

25 And they were both unclothed, the man and his wife, and they were not ashamed.

was their name.

20 And the man gave them all names, but none of them were suited to be a mate for him.

21 And God caused a deep sleep to come over the man and took from his side, and then He healed it.

22 From the side God fashioned a woman and took her to the man.

23 The man said, she is of my bones and my flesh, therefore she will be called woman, for she was taken out of man.

24 Husbands will leave their parents and join with their mate, they will be like one.

25 They were both unclothed, but not embarrassed.

GENESIS Chapter 3, the Sin of Adam and Eve

1 And the Nachash (hissing) was cunning above every creature of the field that had brought forth Jehovah God. And said he to the woman; Yea, has said God, not you may eat from any tree of the garden?

2 And said the woman to the Nachash; Of the fruit of the trees of the garden we may eat,

3 but of the fruit of the tree that is in the middle of the garden, had said God, Not will you eat of it, nor will you touch it, lest you die.

4 And said the Nachash to the woman, Not dying suddenly you will die;

5 For knows God that in the time you eat of it, then will be opened your eyes, and you will be as God knowing good and bad.

6 And saw the woman that was good the tree for food, and that was pleasant it to the eyes, and that desirable the tree was to have understanding, and she took of its fruit and ate, and also gave of it to her husband with her, and he ate.

7 And were opened the eyes of both of them and they knew that nude they were; and they sewed leaves of the fig tree and fashioned for themselves aprons.

8 And they heard the sound of Jehovah God walking up and down in the garden at the breeze of the day, and they hid themselves the man and his woman, from the face of the Jehovah God in the midst of the trees of the garden.

9 And called Jehovah God to the man and said to him, Where are you?

10 And he said, Your sound I have heard in the garden and I was afraid for nude I am, and I hid myself.

1 The serpent was cunning above every creature of the field that the Lord God had brought forth. And he said to the woman; Is it so that God has said, You will not eat from any tree of the garden?

2 And the woman said to the serpent; We may eat of the fruit of the trees of the garden, 3 but of the fruit of the tree which is in the middle of the garden, God has said, You will not eat of it, nor will you touch it, lest you die.

4 And the serpent said to the woman, You will not very suddenly die;

5 For God knows that in the moment you eat of it, your eyes will be opened, and you will be as God in knowing good and bad.

6 And the woman saw that the tree was good for food, and that it was pleasant to the eye, and the tree was to be coveted to provide understanding, she took of its fruit, and ate, and also gave of it to her husband with her, and he did eat.

7 And the eyes of both of them were opened and they knew that they were unclothed; so they sewed leaves of the fig tree and made aprons for themselves.

8 And they heard the sound of the Lord God walking up and down in the garden at the breeze of the day, and they hid themselves, the man and his wife, from the face of the Lord God in the midst of the trees of the garden.

9 And the Lord God called to the man and said to him, Where are you?

10 And he said, I had heard your sound in the garden and I was

1 The serpent was the most cunning of the all the creatures God made. And he said to the woman, Did God say you should not eat of any tree in the garden?

2 And the woman answered, We may eat of the fruit of any tree in the garden,

3 except for the fruit of the tree in the middle of the garden, He said, you will not eat it, or touch it, or you will die.

4 And the serpent answered, You will not very suddenly die,

5 for God knows that when you eat of it you will be like Him in knowing about good and bad.

6 And the woman saw the fruit was beautiful and delicious and she wanted it to increase her understanding, so she picked it and ate it and gave it also to her husband, and he ate also.

7 Their eyes were opened and they realized they were unclothed, so they made aprons of fig leaves for themselves.

8 Then they heard the Lord walking around in the garden at dusk and they hid from Him in the bushes.

9 And God called, Where are you?

10 And the man said, I heard You and was afraid since I was unclothed, and hid myself.

11 And He said, Who told you that nude you were? Of the tree which I have charged you not to eat from, have you eaten?

12 And said the man, The woman You gave to be with me, she has given to me of the tree, and I ate.

13 And said Jehovah God to the woman, What is this you have done? And said the woman, the Nachash lead astray me, and I ate.

14 And said Jehovah God to the Nachash, Because you have done this, cursed you are above all creatures, and more than all the living creature of the field. On your belly your will go, and dust you will eat all the days of your life.

15 And hostility I will set between you and between the woman, between your seed and between her seed, he will bruise to your head, and you will bruise him on the heel.

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16 To the woman He said, Exceedingly I will increase your sorrow and your conception in sorrow you will bring forth sons, and to your husband your longing shall be, and he will rule over you.

#S#

17 And to the man He said, Because you have listened to the voice of your woman, you have eaten which I charged you, saying, Not you will eat of it, cursed will be the soil because of you; in sorrow you shall eat of it all the time of your life.

18 And thorns and thistles it will bring forth to you, and you will eat the plant of the field.

19 By the sweat of your face you will eat bread until you return to the soil; for out of it you have been taken: for dust you are, and to dust will you return.

20 And called the man name his woman Eve (living), because she became the mother of all living.

21 And fashioned Jehovah God for the man and his woman garments of skin, and clothed them.

22 And said Jehovah God, Behold, the man has become as one of Us, to know good and bad, and now lest he put forth his hand and take also from the tree of life and eat, and live for an age;

23 Therefore, sent him Jehovah God out of the garden of Eden to work the soil which he was taken from.

24 And He drove out the man, and He placed at the east of the garden of Eden the cherubim, and flaming the sword whirling around to guard the way of the tree of life.

afraid because I was unclothed, and I hid myself.

11 And He said, Who told you that you were unclothed? Have you eaten of the tree that I commanded you not to eat?

12 And the man said, The woman who You gave to be with me, she has given to me of the tree, and I ate.

13 And the Lord God said to the woman, What is this that you have done? And the woman said, the serpent lead me astray, and I did eat.

14 And the Lord God said to the serpent, Because you have done this, you are cursed above all creatures, more than all the creatures of the field. You will go on your belly, and dust will you eat all the days of your life.

15 And I will set hostility between you and the woman, between your seed and her seed, they will attack your head, and you will attack their heel.

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16 He said to the woman, I will greatly increase your anguish in childbearing, and you will bring forth sons in sorrow, and your longing will be to your husband, and he will rule over you.

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17 And He said to the man, Because you have listened to the voice of your wife, and have eaten which I commanded you, saying, You will not eat of it, the soil will be cursed because of you; you will eat of it in sorrow all the days of your life.

18 It will bring forth thorns and thistles to you, and you will eat the plants of the field.

19 By the sweat of your face will you eat food till you return to the soil; for you have been taken out of it, for of the earth you are, and to the earth you will return.

20 And the man called the name of his wife Eve; because she was to be the mother of all living.

21 And the Lord God made garments of skin for the man and his wife and clothed them.

22 And the Lord God said, Behold, the man has become like Us, knowing good and bad, and now lest he put forth his hand and take also from the tree of life and eat, and live for an age;

23 Therefore, the Lord God sent him out of the garden of Eden to till the soil from which he was taken.

24 So He drove out the man; and He placed at the east of the garden of Eden Cherubims, and a flaming sword whirling around to guard the way of the tree of life.

11 And God said, Who told you that you were unclothed? Have you eaten of the fruit that I commanded you not to eat?

12 And he said, The woman You gave to me as a mate, she gave it to me and I ate.

13 And God said, What have you done? And the woman said, the serpent charmed me and I ate it.

14 So the Lord said to the serpent, Because you have done this you will be cursed more than any creature, and you will crawl on your belly and eat dust the rest of your life.

15 And there will be war between you and the woman, between you offspring and her offspring, they will strike your head and you will strike at their heels.

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16 To the woman God said, You anguish in childbirth will increase, you will bear sons in sorrow, you longing will be to your mate, and he will be your boss.

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17 To the man God said, Because you have listened to your wife and disobeyed me, the soil will be cursed because of you and you will live from it in sorrow the rest of your life.

18 It will grow thorns and thistles, and you will eat plants from among them.

19 You will work for food from the soil until you return to it, for you were fashioned from it, from the dirt you are and to the dirt you will return.

20 And the man called his wife Eve, for she was to be the mother of all of Adam's offspring.

21 And the Lord made them garments of skin and clothed them.

22 And the Lord said, Behold, Like Us the man now knows about good and bad, I will keep him from eating of the tree of life and living for ages.

23 So the Lord put him out of the garden of Eden to farm the soil from which he was fashioned.

24 He drove the man out and placed Cherubims to the east of the garden of Eden and a whirling flaming sword to guard the way to the tree of life.

Note:(1) The #S# represents the letter "Samech" separator in the Hebrew text.

GENESIS Chapter 4, Cain and Abel

1 And the man knew Eve his woman; and she conceived, and gave birth to Cain (acquired), and said, I have received a man

1 And Adam knew Eve his wife; and she conceived, and gave birth to Cain, and said, I have received a man from the Lord.

1 And Adam had a sexual union with his wife Eve who gave birth to Cain, and she said, the Lord has given me a man.

by Jehovah.

2 And she again gave birth, to his brother Abel (emptiness). And became Abel a shepherd of flocks, and Cain became a worker of the soil.

3 And was it in the process of time that brought Cain from the fruit of the soil an offering to Jehovah

4 And Abel brought also he from the firstlings of his flocks even from their fat. And looked Jehovah to Abel and to his offering;

5 And of Cain and to his offering, not He did look. And blazed up Cain greatly, and fell his face.

6 And said Jehovah to Cain, Why have blazed up you, and why has fallen your face?

7 Is there not if you do well exaltation? And if not you do well, at the door sin is crouching. And toward you its desire, but you should rule over it.

8 And talked Cain with Abel his brother; and as they were in the field, rose up Cain against Abel his brother, and killed him.

9 And said Jehovah to Cain, Where *is* Abel your brother? And he said, not I do know; Protector my brother *am* I?

10 And He said, What you have done? The voice of blood your brother's cries to Me from the soil.

11 And now cursed *are* you, from the soil which opened its mouth to receive blood your brother from your hand;

12 When you work the soil not again will it give its strength; a wavering one and a wandering one you will be on the earth.

13 And said Cain to Jehovah, Is greater my punishment than I can bear.

14 Behold, you have driven me today from the face of the soil; and from Your face I will be hidden; and I will be a wavering one and a wandering one on the earth; And it will be anyone finding me will kill me.

15 And said Jehovah to him, If anyone kills Cain, double-sevens he will be avenged. And set Jehovah on Cain a sign, so that not should kill him anyone who finds him.

16 And went out Cain from the face of Jehovah and lived in the land of Nod (vagrancy) east of Eden.

17 And knew Cain his woman, and she conceived, and gave birth to Enoch (initiated); and he built a city, and he called the name of the city like the name of his son, Enoch.

18 And was born to Enoch Irad (fugitive); and Irad did bring forth Mehujael (smitten of God); and Mehujael did bring forth Methusael (man who is of God); and Methusael did bring forth Lamech .

19 And took to himself Lamech two wives; the name of the one Adah (ornament), and the name of the second Zillah (shadow).

20 And Adah gave birth to Jabal (stream); he was the father of those tenting and possessing.

21 And name his brother Jubal

2 And she again gave birth, to his brother Abel. And Abel was a shepherd of flocks, but Cain was a tiller of the soil.

3 And in the process of time Cain brought an offering unto the Lord of the fruit of the soil.

4 And Abel, he also brought of the firstlings of his flock and of the fat of them. And the Lord was pleased with Abel and his offering;

5 But of Cain and his offering, He was not pleased. And Cain was very angry, and his face fell.

6 And the Lord said to Cain, Why are you angry, and why is your face fallen?

7 If you do well, will you not be accepted? And if you don't do well, sin is lurking at the door. And to you will be its desiring, but you can rule over it.

8 And Cain talked with Abel his brother; and later when they were in the field, Cain rose up against Abel his brother, and killed him.

9 And the Lord said to Cain, Where is Abel your brother? And he said, I do not know; Am I my brother's keeper?

10 And He said, What have you done? The voice of your brother's blood is crying to me from the soil.

11 And now you are cursed more than the earth, which has opened its mouth to receive your brother's blood from your hand;

12 When you till the soil it will not again yield to you its abundance; a fugitive and a vagabond will you be on the earth.

13 And Cain said to the Lord, my punishment is greater than I can bear.

14 Behold, you have driven me out this day from the face of the soil; and from Your face will I be hidden; and I will be a vagabond and a fugitive on the earth; and it will happen that anyone that finds me will try to kill me.

15 And the Lord said to him, If anyone kills Cain, vengeance will be taken on him sevenfold. And the Lord set a mark on Cain, so that anyone finding him would not kill him.

16 And Cain went out from the presence of the Lord, and lived in the land of Nod, on the east of Eden.

17 And Cain knew his wife; and she conceived, and gave birth to Enoch; and he built a city, and called the name of the city after the name of his son, Enoch.

18 And to Enoch was born Irad; and Irad became the father of Mehujael; and Mehujael became the father of Methusael; and Methusael became the father of Lamech.

19 And Lamech married two wives; the name of one was Adah, and the name of the other Zillah.

20 And Adah gave birth to Jabal; he was the father of those who dwell in tents, and of those who have herds.

21 And his brother's name was Jubal; he was the father of all

2 She also gave birth to his brother Abel. Abel was a shepherd and Cain was a farmer.

3 Then one day Cain sacrificed an offering to the Lord of his farm crop.

4 And Abel also sacrificed of the first of his flock and their fat. And the Lord was pleased with Abel's offering.

5 But He was not pleased with Cain and his offering, so Cain became very angry and depressed.

6 And the Lord said to Cain, Why are you angry and depressed?

7 If you do good, won't you be accepted? And if not sin will try to possess you. But you can overcome its temptation!

8 And Cain met his brother in a field, argued with him and killed him.

9 And the Lord said to Cain, Where is your brother? And Cain answered, I don't know. Am I my brother's keeper?

10 The Lord said, What have you done? I hear the sound of your brother's blood crying from the soil!

11 Now you are cursed more than the soil that has swallowed your brother's blood.

12 When you try to farm it will no longer grow good crops for you, so you will become a wanderer and a fugitive.

13 And Cain said to the Lord, My punishment is too severe!

14 You have driven me from my farm and I will have to wander all over the earth and be hidden from Your presence! And anyone finding me will try to kill me!

15 And the Lord said, If anyone kills Cain they will be punished sevenfold. And Cain was marked so that anyone finding him would know not to kill him.

16 And Cain moved from near Eden, to the east, to the land of Nod.

17 And Cain had a sexual union with his wife who gave birth to a son, Enoch, and Cain was building a city so he called it Enoch also.

18 And to Enoch was born Irad; and to Irad a son Mehujael; and to Mehujael a son Methusael; and to Methusael a son Lamech.

19 And Lamech married two wives; the name of one was Adah, and the name of the other Zillah.

20 And Adah gave birth to Jabal; he was the father of tent dwellers and shepherds.

21 And his brother's name was

(jubilant); he was the father of all those handling harp and pipe.	those that handle the harp and pipe.	Jubal; he was the father of musicians.
~	~	~
22 And Zillah also she gave birth to Tubal-Cain (offspring of Cain), the hammerer of every cutting tool of brass and iron; and the sister of Tubal-Cain Naamah (pleasantness).	22 And Zillah, she also gave birth to Tubal-cain, the sharpener of every instrument of brass and iron; and the sister of Tubal-cain was Naamah.	22 And Zilah also gave birth to Tubal-Cain who forged cutting tools of copper and iron, and the sister of Tubal-Cain was Naamah.
~	~	~
23 And said Lamech to his women, Adah and Zillah, hear my voice women of Lamech, listen to my words; for a man I have slain for my wounding, and a young man for my bruising.	23 And Lamech said to his wives, Adah and Zillah, hear my voice; wives of Lamech, listen to my words; for I have slain a man for wounding me, and a young man for my bruising.	23 And Lamech said to Adah and Zillah, listen my wives, hear me well; for I have killed a man for wounding me, a young man who bruised me.
~	~	~
24 For double-sevens is Cain avenged, and Lamech seventy and seven.	24 If Cain will be avenged sevenfold, truly Lamech seventy and sevenfold.	24 If Cain will be avenged seven times, truly Lamech 77 times.
~	~	~
25 And knew Adam again his woman; and she gave birth to a son, and she called his name Seth (substituted); For has placed for me God seed another in place of Abel, because killed him Cain.	25 And Adam knew his wife again; and she gave birth to a son, and called his name Seth; For God has given me another seed instead of Abel, who Cain slew.	25 And Adam had a sexual union with his wife again; and she had a son, and called his name Seth; for God, said she, has given me another son instead of Abel, who Cain killed.
~	~	~
26 And to Seth, also he was born a son; and he called his name Enos (mortal); Then was a beginning (or to pierce/profane ?) to call upon the name of Jehovah.	26 And to Seth, to him also there was born a son; and he called his name Enos; then began men to call upon (or profane?) the name of the Lord.	26 And to Seth there was born a son; and he called his name Enos; and men began to call upon (or profane?) the Lord.
#S#	#S#	#S#

Note:(1) The #S# represents the letter "Samech" separator in the Hebrew text.

GENESIS Chapter 5, The Genealogy of the Sons of Adam

1 This is the book of the generations of Adam. In the time that created God Adam, in the likeness of God he brought forth him.	1 This is the book of the genealogy of Adam. In the time that God created Adam, in the likeness of God he was brought forth.	1 This is the book of Adam's family, from the time that the Lord created him in His likeness.
~	~	~
2 Male and female He created them, and He blessed them, and called their name Adam, in the time when they were created.	2 Male and Female He created them, and blessed them, and called their name Man (same as Adam), in the time that they were created.	2 He created male and female, blessed them, and called them mankind (same as Adam).
~	~	~
3 And lived Adam thirty and a hundred years (or 230?) and did bring forth a son in his own likeness, according to his image; and called his name Seth;	3 And Adam lived a hundred and thirty years (or 230?) and became the father of a son in his own likeness, resembling himself; and called his name Seth;	3 And Adam lived 130 (or 230?) years and had a son like him, and he called him Seth.
~	~	~
4 And were the days of Adam after he did bring forth Seth eight hundred years (or 700?); and he did bring forth sons and daughters;	4 And the days of Adam after he had become the father of Seth were eight hundred years (or 700?); and he had sons and daughters;	4 And after Seth, Adam lived 800 (or 700?) years having sons and daughters.
~	~	~
5 And were all the days that Adam lived nine hundred years and thirty years; and he died.	5 And all the days that Adam lived were nine hundred and thirty years; and he died.	5 He lived to age 930 and then died.
#S#	#S#	#S#
~	~	~
6 And lived Seth five years and a hundred years (or 205?), and did bring forth Enosh;	6 And Seth lived a hundred and five years (or 205?), and became the forefather of Enos;	6 Seth lived 105 (or 205?) years and then became the forefather of Enos.
~	~	~
7 And Seth lived after he did bring forth Enosh seven years and eight hundred years (or 707?), and did bring forth sons and daughters;	7 And Seth lived after he became the forefather of Enos eight hundred and seven years (or 707?), and had sons and daughters;	7 Then Seth lived 807 (or 707?) years having sons and daughters.
~	~	~
8 And were all the days of Seth twelve years and nine hundred years; and he died.	8 And all the days of Seth were nine hundred and twelve years; and he died.	8 He lived to age 912 and then died.
#S#	#S#	#S#
~	~	~
9 And lived Enosh ninety years (or 190?), and did bring forth Cainan (fixed);	9 And Enos lived ninety years (or 190?), and became the forefather of Cainan;	9 Enos lived 90 (or 190?) years and then became the forefather of Cainan.
~	~	~
10 And lived Enosh after he did bring forth Cainan fifteen years and eight hundred years (or 715?), and did bring forth sons and daughters;	10 And Enos lived after he became the forefather of Cainan eight hundred and fifteen years (or 715?), and had sons and daughters;	10 Then Enos lived 815 (or 715?) years having sons and daughters.
~	~	~
11 And were all the days of Enosh five years and nine hundred years, and he died.	11 And all the days of Enos were nine hundred and five years, and he died.	11 He lived to age 905 and then died.
#S#	#S#	#S#
~	~	~
12 And Cainan lived seventy	12 And Cainan lived seventy	~

12 And lived Cainan seventy years (or 170?), and did bring forth Mahalaleel (praise of God);	years (or 170?), and became the forefather of Mahalaleel;	12 Cainan lived seventy (or 170?) years and then became the forefather of Mahalaleel.
13 And lived Cainan after he did bring forth Mahalaleel forty years and eight hundred years (or 740?), and did bring forth sons and daughters;	13 And Cainan lived after he became the forefather of Mahalaleel eight hundred and forty years (or 740?), and had sons and daughters;	13 Then Cainan lived 840 (or 740?) years having sons and daughters.
14 And were all the days of Cainan ten years and nine hundred years, and he died.	14 And all the days of Cainan were nine hundred and ten years, and he died.	14 He lived to age 910 and then he died.
#S#	#S#	#S#
15 And lived Mahalaleel sixty five years (or 165?), and did bring forth Jared (a descent);	15 And Mahalaleel lived sixty five years (or 165?), and became the forefather of Jared;	15 Mahalaleel lived 65 (or 165?) years and then became the forefather of Jared.
16 And lived Mahalaleel after he did bring forth Jared thirty years and eight hundred years (or 730?), and did bring forth sons and daughters;	16 And Mahalaleel lived after he became the forefather of Jared eight hundred and thirty years (or 730?), and had sons and daughters;	16 Then Mahalaleel lived 830 (or 730?) years having sons and daughters.
17 And were all the days of Mahalaleel five and ninety years and eight hundred years, and he died.	17 And all the days of Mahalaleel were eight hundred ninety and five years, and he died.	17 He lived to age 895 and then died.
#S#	#S#	#S#
18 And lived Jared two and sixty years and a hundred years, and did bring forth Enoch (initiated);	18 And Jared lived a hundred sixty and two years, and became the forefather of Enoch;	18 Jared lived 162 years and then became the forefather of Enoch.
19 And lived Jared after he did bring forth Enoch eight hundred years, and did bring forth sons and daughters;	19 And Jared lived after he became the forefather of Enoch eight hundred years, and had sons and daughters;	19 Then Jared lived 800 years having sons and daughters.
20 And all the days of Jared were two and sixty years and nine hundred years, and he died.	20 And all the days of Jared were nine hundred sixty and two years, and he died.	20 He lived to age 962 and then died.
#S#	#S#	#S#
21 And lived Enoch five and sixty years (or 165?), and did bring forth Methuselah (man of a dart);	21 And Enoch lived sixty and five years (or 165?), and became the forefather of Methuselah;	21 Enoch lived 65 (or 165?) years and then became the forefather of Methuselah.
22 And walked about Enoch with God after he did bring forth Methuselah three hundred years (or 200?), and did bring forth sons and daughters;	22 And Enoch walked (or pleased, or followed, or conversed) with God after he became the forefather of Methuselah three hundred years (or 200?), and had sons and daughters;	22 Then Enoch lived following God for 300 (or 200?) years having sons and daughters.
23 And were all the days of Enoch five and sixty years and three hundred years;	23 And all the days of Enoch were three hundred sixty and five years;	23 He lived to age 365.
24 And walked about Enoch with God; and then he was not; for God took him.	24 And Enoch walked (or pleased, or followed, or conversed) with God; and he was not; for God took him.	24 Enoch followed God; and then the Lord took him.
#S#	#S#	#S#
25 And lived Methuselah seven and eighty years and a hundred years, and did bring forth Lamech;	25 And Methuselah lived a hundred eighty and seven years, and became the father of Lamech;	25 Methuselah lived 187 years and then became the father of Lamech.
26 And lived Methuselah after he did bring forth Lamech two and eighty years and seven hundred years, and did bring forth sons and daughters;	26 And Methuselah lived after he became the father of Lamech seven hundred and eighty and two years, and had sons and daughters;	26 Then Methuselah lived 782 years having sons and daughters.
27 And all the days of Methuselah were nine and sixty years and nine hundred years, and he died.	27 And all the days of Methuselah were nine hundred sixty and nine years, and he died.	27 He lived to age 969 and then he died.
28 And lived Lamech two and eighty years and a hundred years (or 188?), and did bring forth a son;	28 And Lamech lived a hundred eighty and two years (or 188?), and had a son;	28 Lamech live 182 (or 188?) years and then had a son.
29 And he called his name Noah (rest), saying, This one will comfort us from our work and toil of our hands from the soil which has cursed the Lord.	29 And he called his name Noah, saying, This one will comfort us from our work and toil of our hands because of the soil which the Lord has cursed.	29 He named him Noah, saying, My son will comfort us in our work and toil due to the cursing of the soil by God.
30 And lived Lamech after he did bring forth Noah five and ninety years and five hundred years (or 565?), and did bring forth sons and daughters;	30 And Lamech lived after he became the father of Noah five hundred ninety and five years (or 565?), and had sons and daughters;	30 After Lamech had Noah he lived 595 (or 565?) years having sons and daughters.
31 And all the days of Lamech were seven and seventy years and seven hundred years (or 753?), and he died.	31 And all the days of Lamech were seven hundred seventy and seven years (or 753?), and he died.	31 He lived to age 777 (or 753?) and then he died.
#S#	#S#	#S#
32 And was Noah a son of five hundred years and did bring	32 And Noah was five hundred years old when he became the	32 Noah was 500 years old when he had sons Shem, Ham, and

forth Shem, Ham, and Japheth. father of Shem, Ham, and Japheth. Japheth.

Notes:(1) The #S# represents the letter "Samech" separator in the Hebrew text. (2)The alternate year values in parenthesis are from the Septuagint, a translation to Greek prepared about 270 BC.

GENESIS Chapter 6, Noah and the Ark

1 And it came about men began to be many on the face of the earth, and daughters were conceived by them.

2 And the sons of the God saw that the daughters of men were good; and they took to themselves all that they chose.

3 And said Jehovah, not will strive My Spirit with man always in their going astray he is flesh; and his days are a hundred and twenty years.

4 The Nephilim (mighty ones?) were on the earth in days those; and even afterwards, when came in the sons of God to the daughters of men, and they conceived to them, they were the mighty men who from ancient time the men of name.

5 And saw Jehovah that great the evil of man on the earth, and every conception in the thoughts of their hearts was only of bad all the day.

6 And sighed Jehovah that he had brought forth man on the earth, and was displeased to his heart.

7 And said Jehovah, I will blot out man who I have created from the face of the earth; from man to creature, and the creeping creatures, and the flying creature of the skies; for I sigh that I have fashioned them.

8 But Noah found favor in the eyes of Jehovah.

9 These are the generations of Noah; Noah a man just and complete in his generations, with God Noah walked about.

10 And did bring forth Noah three sons, Shem (name), Ham (hot), and Japheth (expansion).

11 And was corrupt the earth before God, and was filled with the earth violence.

12 And saw God the earth, and behold it was corrupted; for had corrupted all flesh its way upon the earth.

#S#

13 And said God to Noah, The end of all flesh has come before My face; for is filled the earth with violence before their face; and behold, I will destroy them with the earth.

14 Make for yourself a coffer of pitch trees; nests shall you make in the coffer, and you will cover it inside and outside with a covering.

15 And thus you shall make it; three hundred cubits the length, fifty cubits its breadth, and thirty cubits its height.

16 A light you will make to the coffer, and to a cubit you shall finish it above; and the opening to the coffer you will place in its side; with lower, second, and third floors you will do it.

1 And it came about when mankind began to multiply on the face of the earth, and daughters were conceived by them.

2 And the sons of God saw that the daughters of men were good; and they married all of them who they chose.

3 And the Lord said, My Spirit will not always contend with man for his going astray in his flesh; let the time allowed them be for a hundred and twenty years.

4 There were mighty ones on the earth in those days; and even afterwards, as the sons of God went in to the daughters of men, and they conceived children by them, the same became powerful men which were of old times, men of authority.

5 And God saw that the wickedness of man was great on the earth, and that every imagination in the thoughts of their hearts was continually of evil.

6 And the Lord sighed that he had brought forth man on the earth, they displeased him in his heart.

7 And the Lord said, I will blot out man who I have created from the face of the earth; from man to creature, and the creeping creatures, and the fowls of the air; for I sigh that I have fashioned them.

8 But Noah found grace in the eyes of the Lord.

9 These are the generations of Noah; Noah was a just man and undefiled in his generations, and Noah was conversant with God.

10 And Noah became the father of three sons, Shem, Ham, and Japheth.

11 The earth was corrupted before God, and the earth was filled with violence.

12 And God looked upon the earth, and behold it was corrupt; for all people had corrupted their way upon the earth.

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13 And God said to Noah, The end of all people has come before me; for the earth is filled with violence through them; and behold, I will destroy them with the earth.

14 Make an ark of gopher wood; rooms will you make in the ark, and cover it inside and out with pitch.

15 And this is the plan with which you will make it; The length of the ark will be three hundred cubits, the width of it fifty cubits, and the height of it thirty cubits.

16 A window will you make to the ark, and to within a cubit above will you enclose it; and a door to the ark will you place in

1 As men began to multiply on the earth and have many daughters,

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2 The followers of God saw that there were good daughters among men, and they chose those that they liked.

3 And the Lord said, My Spirit will not always plead with men concerning their wickedness, their time will be 120 years.

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4 There were mighty men then, and even afterwards, and they had sexual unions with men's daughters and conceived children, these became mighty men of history, men of authority.

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5 And God saw their wickedness and that they were continually thinking evil thoughts.

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6 And the Lord sighed with displeasure, it broke His heart.

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7 And the Lord said, I will destroy all living creatures on the earth, mankind, birds, cattle, creeping things, for I am extremely displeased with mankind.

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8 But Noah found grace in the eyes of the Lord.

9 This is the family of Noah; Noah was a just man and from a uncorrupted family, and Noah communicated with the Lord.

10 Noah had three sons, Shem, Ham, and Japheth.

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11 The earth was very corrupt and filled with violence.

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12 And God looked and saw all the corruption, for all people were corrupt.

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13 And God said to Noah, It is time to end the lives of all people on earth for there is too much violence, Behold, I will destroy them with the earth.

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14 Make an ark of cypress trees with rooms in it, and cover it inside and out with a covering.

~

15 This is the plan, length 300 cubits, width 50 cubits, and height 30 cubits.

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16 Make a skylight in it and enclose it overhead to within one cubit, place a door in its side, and inside have three floors.

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17 And even I, behold, I am bringing the flood of the waters upon the earth to ruin all flesh wherein is the breath of life under the skies; and as many as that are on the earth will expire.
 18 And I will establish My covenant with you; and you will come into the coffer, you and your sons, and your woman, and the woman of your sons with you.
 19 And from every living thing of all flesh, two of all to come into the coffer, to keep alive with you; male and female they will be,
 20 from the flying creature after their kind, and from the cattle after their kind, from every creeping thing of the earth after its kind, two from all will come to you to keep alive.
 21 And you take for yourself of all eatable that is eaten, and you will gather to yourself; and let it be for you and for them for eating.
 22 And did Noah all that charged him God, this he did.

the side; with lower, second, and third floors will you make it.
 17 And behold, I, even I, will bring flood waters upon the earth to ruin all flesh wherein is the breath of life under the sky; and as many as are on the earth may perish.
 18 But with you I will establish My covenant; and you will come into the ark, you and your sons, and your wife, and your sons' wives with you.
 19 And of every living thing of all flesh, two of every kind will you bring into the ark, to keep them alive with you; they will be male and female,
 20 of fowls after their kind, and cattle after their kind, of every creeping thing of the earth after its kind, two of every sort will come unto you to keep them alive.
 21 And take for yourself of all food that is eaten, and you will gather it to you; and it will be for food for you, and for them.
 22 Thus Noah did according to all that God commanded him, this he did.

17 Then Behold, I will bring a flood over the earth to cause ruin to all breathing flesh under the sky, and all may die.
 18 But with you I will establish my covenant, go into the ark with your wife, your sons, and their wives.
 19 And of all living creatures, two of each kind, male and female, will you keep alive.
 20 Of birds, cattle, creeping things, after their kind, two of all types will come to you to keep them alive.
 21 Gather up of all food that is nourishing, gather it together for the creatures, you and your family.
 22 And Noah did all that the Lord told him.

GENESIS Chapter 7, the Flood

1 And said Jehovah to Noah, Come you and all your house into the coffer, for you I have seen a just one before My face in generation this.
 2 From every creature clean will you take to yourself seven by seven, a man and his woman; and the creature that not clean it by two, a man and his woman;
 3 of the flying creature of the skies seven by seven, a male and his female, to keep alive seed upon the face of all the earth.
 4 For to the days after seven more I will cause to rain on the earth forty days and forty nights, and will blot out among all standing that I have brought forth from off the face of the earth.
 5 And did Noah all that charged him Jehovah.
 6 Noah was a son of six hundred years, and the flood was waters on the earth.
 7 And went in Noah and his sons, and his woman, and women his son's, with him into the coffer from the face of the waters of the flood.
 8 Of the creatures clean and creatures that were not clean, of flying creatures, and of everything that creeps on the earth,
 9 two by two they came to Noah and into the coffer, male and female, as had charged Jehovah Noah.
 10 And it was, after the seven days, that the waters of the flood came into being upon the earth.
 11 In year of six hundred years of life Noah's, in the new moon second, in the seventeenth day of the new moon, in day this all the wells of the great deep were cleaved, and the holes of the skies were opened.
 12 And was the rain on the earth forty days and forty nights.
 13 In same day this entered

1 Then the Lord said to Noah, Come into the ark, you and all your household, because I have seen that you are righteous before Me among this generation.
 2 You shall take with you seven pair each of every clean animal, a male and his female; two each of animals that are unclean, a male and his female;
 3 also seven pair each of flying creatures of the air, a male and his female, to keep the species alive on the face of the earth.
 4 For after seven more days I will cause it to rain on the earth forty days and forty nights, and I will blot out among every living creature on the face of the earth that I have brought forth.
 5 And Noah did as the Lord had commanded him.
 6 Noah was six hundred years of age when the flood waters were on the earth.
 7 So Noah, with his sons, his wife, and his son's wives, went into the ark before the waters of the flood.
 8 Of clean creatures, of unclean creatures, of flying creatures, and of everything that creeps on the earth,
 9 in pairs they went to Noah and into the ark, male and female, as God had commanded Noah.
 10 And the time came, after the seven days, that the waters of the flood came on the earth.
 11 In the six hundredth year of Noah's life, in the second month, the seventeenth day of the month, on that day all the wells of the great deep were cleaved, and the gates of heaven were opened wide.
 12 And rain was on the earth forty days and forty nights.
 13 In this same day Noah and Noah's sons, Shem, Ham, and Japheth, and Noah's wife and

1 And the Lord said to Noah, Come you and all your household into the ark, for I have seen you to be righteous.
 2 Of every pure (clean) animal take seven pairs, the male and his female, and a pair of the unclean (unclean) animals, the male and his female.
 3 and the birds of the air by seven mated pairs to keep them alive on the earth.
 4 In seven days I will cause it to rain on the earth for forty days and nights; and among every living creature I have brought forth some will be wiped off the face of the earth.
 5 And Noah did as he was commanded.
 6 When Noah was 600 years old the waters came on the earth.
 7 Noah went into the ark with his wife, sons, and the son's wives before the floods came.
 8 The pure and unclean animals, also birds and creeping animals,
 9 they went in pairs unto Noah in the ark, male and female, as the Lord had commanded.
 10 Then after seven days the floods started.
 11 In the 600th year of Noah's life, the seventeenth day of the second month, the wells of the seas were broken up by impact, and the windows of the sky opened up.
 12 The rain fell for forty days and nights.
 13 That day at the start had Noah, Shem, Ham, and Japheth and their wives entered into the ark.

Noah and Shem, Ham, and Japheth, the sons of Noah, and Noah's woman and the three women of his sons with them into the coffer;
 14 They and every creature after its kind, and every cattle after its kind, and every creeping creature that moves on the earth after its kind, and every flying creature after its kind, every birds of every wing.
 15 And went they to Noah into the coffer, two by two of all flesh which in it is the breath of life.
 16 So those going in male and female of all flesh, went in as had charged him God; and shut Jehovah after him.
 17 And was the flood forty days on the earth, and increased the waters and lifted the coffer, it was raised above the earth.
 18 And prevailed the waters and were increased greatly on the earth, and the coffer walked upon the face of the waters.
 19 And the waters were strong, exceedingly, exceedingly on the earth, and all the high hills were hidden under all the skies.
 20 Fifteen cubits upward were strong the waters, and hid were the hills.
 21 And perished all flesh that moved on the earth, and among the winged creature, and among the cattle, and among wild creatures and among creeping things that swarm on the earth, and every man;
 22 All which breathed the breath of life, in whose nostrils of all that was on dry land perished.
 23 And was wiped away among every standing that was on the face of the earth, of man, to cattle, to creeping things and to flying creatures. They were wiped off from the earth, and was left only Noah and those with him in the coffer.
 24 And were strong the waters on the earth fifty and a hundred days.

the three wives of his sons with them went into the ark;
 14 They and every creature after its kind, and cattle after its kind, and every creeping thing that moves on the earth, and every winged creature after its kind, small birds of every wing.
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 15 And they went into the ark to Noah, in pairs, of all flesh in which is the breath of life.
 16 So those that entered, male and female of all flesh, went in as God had commanded him; and the Lord shut them in.
 17 And the flood was on the earth forty days. The waters increased and raised the ark, it was lifted above the earth.
 18 And the waters prevailed and greatly increased on the earth, and the ark floated about on the surface of the waters.
 19 And the waters were exceedingly violent on the earth, and all the high hills under the heavens were covered.
 20 The waters increased strongly fifteen cubits upward, and the hills were covered.
 21 And perished all flesh that moved on the earth, of the winged creature, of the cattle, and of wild creatures and of creeping things that swarm on the earth, and all mankind;
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 22 All in whose nostril was the breath of life, and of all on dry land perished.
 23 And was wiped away among every living thing that was on the face of the earth, of mankind to four footed creatures, to creeping things and to winged creatures. They were wiped off from the earth, only Noah and those with him in the ark remained.
 24 The waters prevailed on the earth one hundred and fifty days.

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 14 They and all the animals of every kind.
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 15 The animals went to Noah in pairs, all that breathed.
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 16 They went in pairs of all kind as the Lord commanded, and the Lord shut them in.
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 17 And the flood was for forty days on the earth with the waters lifting up the ark.
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 18 The waters prevailed and got very deep and the ark was carried about.
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 19 The waters were violent on the earth, and all the high hills under the sky were covered.
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 20 Fifteen cubits up the waters prevailed, and the hills were covered.
 21 And died of all flesh that moved on the land, of birds, of cattle, of wild creatures and of creeping animals, of all those on dry land, and all mankind;
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 22 All those with breath in their nostrils, of all on the land perished.
 23 They perished among every living creature on the land, they were wiped off the earth; Noah only and those with him in the ark remained alive.
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 24 The waters prevailed 150 days on the earth.

GENESIS Chapter 8, the Flood Ends

1 Then remembered God Noah, and every living thing, and all the cattle that were with him on the coffer. And caused to pass God a wind over the earth, and the waters subsided.
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 2 And shut up the wells of the deep and the holes of the skies were shut up, and the rain from the skies was restricted.
 3 And turned back the waters from the earth going and retreating; and diminished the waters at the end of fifty and a hundred days.
 4 Then rested the coffer in the seventh on the seventeenth day of the new moon, on the hills of Ararat.
 5 And the waters were going and falling until the new moon tenth; in the tenth on the first of the new moon, were seen the head of the hills.
 6 So it was at the end of forty days and opened Noah the window of the coffer which he had brought forth;
 7 And sent he out the raven, and it went out, going out and returning until were dried up the

1 Then God remembered Noah, and every living thing, and all the four footed creatures that were with him on the ark. And God made a wind to pass over the earth, and the waters began to decrease.
 2 Also the wells of the great deep and the gates of heaven were shut up, and the rain from the heavens was held back.
 3 And the waters decreased from off the earth steadily; and the waters diminished after the end of a hundred and fifty days.
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 4 Then the ark rested in the seventh month, on the seventeenth day of the month, upon the hills of Ararat.
 5 And the waters decreased steadily until the tenth month; in the tenth month on the first of the month, were the tops of the hills seen.
 6 So it came to pass at the end of forty days that Noah opened the window of the ark he had made;
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 7 He sent forth a raven, which went to and fro until the waters

1 And the Lord remembered Noah and every living thing, of all the animals that were with him on the ark; and He made a wind to pass over the earth and the waters decreased.
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 2 The wells of the seas and the floodgates of the heavens stopped, and the rains from the heavens were held back.
 3 The waters steadily decreased and after 150 days the waters were down.
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 4 And the ark rested on the 17th day of the 7th month on the hills of Ararat.
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 5 The waters went steadily down until the first of the tenth month and the tops of the hills appeared.
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 6 And then at the end of 40 days Noah opened the skylight of the ark.
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 7 He set loose a raven which flew around until the waters

waters from off the earth.	had dried up from off the earth.	dried up.
8 And he sent out a dove from him, to see if had lightened the waters from off the face of the earth;	8 Then he sent out a dove from him, to see if the waters were decreased from off the surface of the earth;	8 Also he set free a dove to see if the waters were gone,
9 and not found the dove rest for the sole of its foot, and it returned to him into the coffer, for the waters on the face of all the earth; And he put out his hand, and took it, and brought it to him into the coffer.	9 but the dove found no rest for the sole of its foot, and it returned to the ark to him, for the waters were still on the surface of the earth; then he put forth his hand, and took it, and pulled it to him into the ark.	9 but the dove didn't land and returned to the ark since the waters were still there; so Noah took it and put it back in the ark.
10 And he writhed yet seven days next, and again sent the dove out of the coffer.	10 He waited yet another seven days, and again sent the dove out of the ark.	10 He waited another seven days and set the dove loose again.
11 And came to him the dove at the time of dusk, and behold, an olive leaf torn off in its mouth; so knew Noah that were lightened the waters from off the earth.	11 And the dove returned to him in the evening, and behold, in its mouth was a freshly picked olive leaf; so Noah knew that the waters were decreased from off the earth.	11 The dove returned to him in the evening with a freshly picked olive leaf; so Noah knew that the waters were down.
12 So he waited yet seven days next and sent out the dove and not did it continually return to him again.	12 So he waited yet another seven days and sent out the dove which did not return again to him.	12 He waited another seven days and again set the dove loose and it did not return to him.
13 And it was in the one and six hundred year, in the beginning, on the one of the new moon, were dried up the waters from off the earth; and removed Noah the covering of the coffer, and he saw, and behold, was dried the face of the earth.	13 And it came to pass that in the six hundredth and first year, in the first month, the first day of the month, that the waters were dried up on the earth; and Noah removed the covering of the ark and looked, and indeed the surface of the ground was dry.	13 And then in year 601, the first of the first month, the waters were down and Noah removed the cover on the ark, and looked, and behold, the ground was dry.
14 And in the new moon second, on the seventh-twenty day of the new moon, was dry the earth.	14 And in the second month, on the twenty-seventh day of the month, the earth was dry.	14 On the 27th day of the second month the earth was dried.
15 And spoke God to Noah, saying,	15 Then God spoke to Noah saying,	15 And God spoke to Noah, saying
16 Go out of the coffer, you and your woman, and your sons, and the women of your sons with you.	16 Go out of the ark, you and your wife, and your sons, and your sons' wives with you.	16 Go out of the ark, you and your wife and your sons and their wives.
17 Every living thing that with you of all flesh, of flying creatures and cattle and of every creeping thing that creeps on the earth, bring out with you, and let them swarm on the earth, and be fruitful and be many on the earth.	17 Bring out with you every living thing of all flesh that is with you, birds and cattle and every creeping thing that creeps on the earth, so that they may be abundant on the earth, and be fruitful and multiply on the earth.	17 Take all the living creatures, birds, cattle and creeping things; so that they may be many on the earth, to be fruitful and multiply.
18 And went out Noah, and his sons and his woman, and women his sons with him.	18 So Noah went out, and his sons and his wife, and his sons' wives with him.	18 And Noah went out with his wife, his sons, and their wives.
19 Every living creature, every creeping thing, every flying creature, all which creeps upon the earth according to their families, went out of the coffer.	19 Every living creature, every creeping thing, every winged creature, and whatever creeps on the earth according to their kinds, went out of the ark.	19 Every wild creature, creeping things and birds went out of the ark.
20 Then built Noah an altar to Jehovah, and took of every animal clean and of every flying creature clean, to ascend as burnt offerings on the altar.	20 Then Noah built an altar to the Lord, and took of every clean animal and of every clean bird, and offered a burnt offering on the altar.	20 And Noah built an altar to the Lord, and took of the clean animals and birds and prepared a burnt offering.
21 And smelled Jehovah the fragrance soothing. And Jehovah said in His heart, Not I will continue to treat lightly again the soil because of the man, for the form of the heart of man is evil from his youth; and not will I again strike of every living creature as I have done,	21 And the Lord smelled a soothing fragrance. Then the Lord said in His heart, I will never again curse the ground because of the man, although the thoughts of man's heart is evil from his youth; nor will I again punish of every living creature as I have done,	21 And the Lord smelled the pleasant fragrance, and said in His heart, I will not continue to curse the ground because of mankind; even though from his youth he has bad thoughts in his mind; and I will not again punish of every living thing as I have done.
22 While all the days of the earth, seed and harvest, and cold and heat, and summer and winter, and day and night will not cease.	22 While the earth remains, seedtime and harvest, and cold and heat, and summer and winter, and day and night will not cease.	22 While the earth remains, seedtime and harvest, cold and heat, summer and winter, day and night, will not fail.

GENESIS Chapter 9, God's Covenant

1 And blessed God Noah and his sons and said He to them; Be fruitful and be many, and fill the earth.	1 So God blessed Noah and his sons and said to them; Be fruitful and multiply, and fill the earth.	1 God blessed Noah and his sons and said, be fruitful, multiply and fill the earth.
2 And the fear of you and the terror of you will be on every living creature of the earth, on	2 And the fear of you and the dread of you shall be on every wild creature of the earth, on	2 All animals of the earth will fear you, birds, fish and all that moves. You are given control of them.

every flying creature of the skies, on all that moves on the earth, and on all the fish of the seas. Into your hand they are given.

3 Every moving thing that is alive for you will be for eating. Even as plant the green, I have given you all.

4 Only flesh with its life breath, its blood, not you will eat.

5 Surely the blood of your life breath I will seek it, from the hand of every living creature I will seek it, and at the hand of the man; at the hand of man's brother will I seek out the life breath of the man.

6 Whoever spills out the blood of the man, by man his blood will be spilled; For in the image of God He brought forth man.

7 And you, be fruitful and be many; and swarm over the earth and be many on it.

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8 And spoke God to Noah and to his sons with him, saying;

9 And I, Behold, I, am raising up My covenant with you and with your seed after you,

10 and with every life breather that is with you; among the flying creatures, among the cattle, and among every living creature of the earth with you, from all going out of the coffer, to every living creature of the earth.

11 I raise up My covenant with you; and not will be cut off all life breathers again by the waters of the flood; not will there be ever again a flood to ruin the earth.

12 And said God; This is the sign of the covenant which I am about to give between Me and between you, and every life breather living that is with you, for generations everlasting.

13 My bow I have set in the cloud and it will be a sign of a covenant between Me and the earth.

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14 And it will be when I cause a covering of clouds over the earth then will be seen the bow in the clouds;

15 and I will remember My covenant which is between Me and you and every life breather living among all flesh; and not will become again the waters for flooding to ruin all flesh.

16 And will be the bow in the clouds and I will see to remember the covenant everlasting between God and every life breather living among all flesh that is on the earth.

17 And said God to Noah, This is the sign of the covenant which I have raised up between Me and all flesh that is on the earth.

18 And were the sons of Noah that went out of the coffer Shem, Ham, and Japheth. And Ham he the father of Cannan (humiliated).

19 Three these are the sons of Noah and from these was scattered the whole earth.

20 And began to be Noah a man of the soil, and he planted a vineyard.

21 And drank he of the wine and was drunk and was uncovered in the midst of his tent.

22 And saw Ham, the father of

every winged creature of the heavens, on all that moves on the earth, and all the fish of the seas. They are given into your hand.

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3 Every moving thing that lives will be food for you. I have given you all things, even as the green plants.

4 But you shall not eat flesh with its life, that is, its blood.

5 Surely for your lifeblood I will avenge, by the power of every wild creature I will avenge it, and by the power of mankind; by the power of every man's brother will I avenge the life of a man.

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6 Whoever sheds man's blood, by man his blood will be shed; For in the likeness of God He brought forth man.

7 And as for you, be fruitful and multiply; spread over the earth and multiply on it.

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8 Then God spoke to Noah and to his sons with him, saying;

9 Behold I, even I, am establishing My covenant with you and your offspring after you,

10 and with every living creature that is with you; the winged creatures, the four footed creatures, and every wild creature of the earth with you, all that go out of the ark, every creature of the earth.

11 I establish My covenant with you; never again shall all flesh be blotted out by the waters of a flood; never again shall there be a flood to ravage the earth.

12 And God said; This is the sign of the covenant which I make between Me and you, and every living creature that is with you, for all generations to come.

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13 I appoint My rainbow in the cloud and it will be a sign of the covenant between Me and the earth.

14 And it will be that when I gather the clouds over the earth the rainbow will appear in the clouds;

15 and I will bring to remembrance My covenant which is between Me and you and every living creature of all flesh; the waters will never again become a flood to destroy all flesh.

16 The rainbow will be in the clouds and I will look at it to bring to remembrance the everlasting covenant between God and every living creature of all flesh that is on the earth.

17 And God said to Noah, This is the sign of the covenant which I have established between Me and all flesh that is on the earth.

18 The sons of Noah that went out of the ark were Shem, Ham, and Japheth. And Ham was the father of Cannan.

19 These three are the sons of Noah and from these the whole earth was populated.

20 And Noah, a man of the soil, planted a vineyard.

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21 And he drank of the wine and became drunk and was uncovered in his tent.

22 And Ham, the father of Cannan, saw his father

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3 Every moving thing can be food for you, as I gave you the green plants, I give them to you.

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4 But do not eat flesh with the blood of life in it.

5 Surely for your lifeblood I will avenge, by the creature, or by man, or by man's brother, I will avenge the life of a man.

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6 Whoever sheds man's blood, By man his blood will be shed; For I have brought forth man in My likeness.

7 To you I say, be fruitful and multiply; spread over the earth and multiply on it.

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8 Then God spoke to Noah and to his sons with him, saying;

9 Behold I am establishing My covenant with you and your offspring to follow, 10 and with every animal that is with you; birds, cattle, and every wild creature of the land with you, all that go out of the ark, every creature of the earth.

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11 I establish My covenant with you; Never again shall all flesh be destroyed by the waters of a flood; never again will a flood make waste all the earth.

12 And God said; This is the sign of the covenant which I make between Me and you, and every living creature that is with you, for all generations to come.

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13 I appoint My rainbow in the clouds and it will be a sign of the covenant between Me and the earth.

14 When I gather the clouds over the earth and the rainbow will appear in the clouds;

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15 I will recall My covenant which is between Me and you and every living creature; the waters will never again become a flood to destroy all flesh.

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16 The rainbow will be in the clouds and I will look at it to recall the everlasting covenant between God and all living things that are on the earth.

17 And God said to Noah, This is the sign of the covenant which I have established between Me and all beings that are on the earth.

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18 The sons of Noah that went out of the ark were Shem, Ham, and Japheth. And Ham was the father of Cannan.

19 These three are the sons of Noah and from them the whole earth was populated.

20 And Noah, a farmer, planted a vineyard.

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21 He drank of the wine and became drunk and was uncovered in his tent.

22 And Ham, the father of Cannan, saw his father uncovered and he denounced him to his two brothers outside.

Cannan, the nakedness of his father and he denounced him to his two brothers outside.	uncovered and he denounced him to his two brothers outside.	23 And Shen and Japheth took a robe and put it on both their shoulders and went backwards and covered the shame of their father. Their faces were turned away so that they did not see their father uncovered.
23 And took Shen and Japheth a garment and put it on shoulders both their and they went backwards and covered the nakedness of their father. Their faces backward nakedness their father not they did see.	23 And Shen and Japheth took a garment and put it on both their shoulders and went backwards and covered the shame of their father. Their faces were turned away so that they did not see their father uncovered.	24 When Noah sobered he knew what his younger son had done.
24 Then awoke Noah from his wine, and knew what had done to him his son younger.	24 Then Noah awoke from his wine, and knew what his younger son had done.	25 Then he said; Cursed be Cannan; He will be a slave of slaves to his brothers.
25 and said he; Cursed Cannan; a servant of servants will he be to his brothers.	25 Then he said; Cursed be Cannan; He will be a slave of slaves to his brothers.	26 And he said; Blessed be the Lord, the God of Shem, and may Cannan be his slave.
26 And said he; Blessed be Jehovah, the God of Shem, and will be Cannan a servant to him.	26 And he said; Blessed be the Lord, the God of Shem, and may Cannan be his slave.	27 God will enlarge Japheth, and may he dwell in the tents of Shem; and Cannan will be their slave.
27 God will enlarge Japheth, and he will lodge in the tents of Shem; and will be Cannan a servant to them.	27 God will enlarge Japheth, and may he dwell in the tents of Shem; and Cannan will be their slave.	28 And Noah lived after the flood 350 years.
28 And lived Noah after the flood three hundred years and fifty years.	28 And Noah lived after the flood three hundred and fifty years.	29 When Noah was 950 years old he died.
29 And were all the days of Noah nine hundred years and fifty years; and he died.	29 And the life of Noah was nine hundred and fifty years; and he died.	

Note:(1) The #S# represents the letter "Samech" separator in the Hebrew text.

GENESIS Chapter 10, the Genealogy of the sons of Noah

1 And these are the generations of the sons of Noah; Shem, Ham, and Japheth, and were brought forth to them sons after the flood.	1 Now this is the genealogy of the sons of Noah; Shem, Ham, and Japheth, the sons born to them after the flood.	1 Now this is the genealogy of the sons of Noah; Shem, Ham, and Japheth, the sons born to them after the flood.
2 The sons of Japheth; Gomer (completion), and Magog, and Madai, and Javan (effervescing), and Tubal, and Meshech (sowing), and Tiras.	2 The sons of Japheth; Gomer, Magog, Madai, Javan, Tubal, Meshech, and Tiras.	2 The sons of Japheth; Gomer, Magog, Madai, Javan, Tubal, Meshech, and Tiras.
3 And the sons of Gomer; Ashkenaz, and Riphath, and Togarmah.	3 The sons of Gomer; Ashkenaz, Riphath, and Togarmah.	3 The sons of Gomer; Ashkenaz, Riphath, and Togarmah.
4 And the sons of Javan; Elishah, and Tarshish, Kittim, and Dodanim.	4 The sons of Javan; Elishah, Tarshish, Kittim, and Dodanim.	4 The sons of Javan; Elishah, Tarshish, Kittim, and Dodanim.
5 By these were separated the coasts of the nations in their lands, a man according to their tongue, according to their families and in their nations.	5 By these the coasts of the nations were separated into their lands, each according to their tongue, according to their families and into their nations.	5 By these the coasts of the nations were separated into their lands, everyone according to their language, according to their families and into their nations.
6 And the sons of Ham; Cush, and Mizraim, and Put, and Cannan.	6 The sons of Ham; Cush, Mizraim, Put, and Cannan.	6 The sons of Ham; Cush, Mizraim, Put, and Cannan.
7 And the sons of Cush; Seba, and Havilah, and Sabtah, and Raamah, and Sabtechah. And the sons of Raamah; Sheba and Dedan.	7 The sons of Cush; Seba, Havilah, Sabtah, Raamah, and Sabtechah. And the sons of Raamah; Sheba and Dedan.	7 The sons of Cush; Seba, Havilah, Sabtah, Raamah, and Sabtechah. And the sons of Raamah; Sheba and Dedan.
8 And Cush did bring forth Nimrod; who began to be a mighty one on the land.	8 Cush became the father of Nimrod; who became a mighty warrior in the land.	8 Cush fathered Nimrod; who became a mighty warrior in the land.
9 He was a might one of hunting before the face of Jehovah; so it is said, Like Nimrod the mighty hunter before the face of Jehovah.	9 He was a might hunter before the Lord; therefore it is said, Like Nimrod the mighty hunter before the Lord.	9 He was a might hunter before the Lord; therefore it is said, Like Nimrod the mighty hunter before the Lord.
10 And the beginning of his kingdom was Babel (confusion), and Erech (length), and Accad (fortress), and Calneh, in the land of Shinar.	10 And the beginning of his kingdom was Babel, Erech, Accad, and Calneh, in the land of Shinar.	10 And the start of his kingdom was Babel, Erech, Accad, and Calneh, in the land of Shinar.
11 Out of land that he went forth to Assyria (successful) and built Nineveh, and Rehoboth-Ir (streets city), and Calah (complete),	11 From that land he went to Assyria and built Nineveh. Rehoboth-Ir, Calah,	11 From that land he went to Assyria and built Nineveh. Rehoboth-Ir, Calah,
12 and Resen (to curb) between Ninevah and Calah, which is a city great.	12 and Resen between Ninevah and Calah, which is a great city.	12 and Resen between Ninevah and Calah, a great city.
13 And Mizraim did bring forth Ludim, and Anamim, and Lehabim (flames), and Naphtuhim,	13 And Mizraim became the father of Ludim, Anamim, Lehabim, Naphtuhim,	13 And Mizraim became the father of Ludim, Anamim, Lehabim, Naphtuhim,
14 and Pathrusim, and and	14 Pathrusim, and Casiuhim, from whom came the Philistines and Caphtorim.	14 Pathrusim, and Casiuhim, from whom came the Philistines and Caphtorim.
	#S#	#S#
	15 Cannan became the father of	

Casiuhim, from whom came the Philistines (rolling) and Caphtorim (encircle). #S#	his firstborn Sidon, and Heth, ~ 16 the Jebusite, the Amorite, and the Girgashite. ~	15 Cannan fathered his firstborn Sidon, and Heth, ~ 16 the Jebusite, the Amorite, and the Girgashite. ~
15 And Cannan did bring forth Sidon (catching fish) his firstborn, and Heth (terror), 16 and the Jebusite (trodden), and the Amorite (prominence), and the Girgashite. 17 and the Hivite (villager), and the Arkite (a tush), and the Sinite, 18 and the Arvadite (refuge for the roving), and the Zemarite, and the Hamathite (walled). And afterward were scattered the families of the Cananites. 19 And the border of the Cananites was from Sidon, coming toward Gerar (rolling), as far as Gaza (strong); coming toward Sodom (scorch), Gomorrah (ruined), and Admah (earthy), and Zeboim (gazelles), as far as Lasha (hot springs). 20 These the sons of Ham, according to their families, according to their tongues, in their lands, in their nations.	17 the Hivite, the Arkite, and the Sinite, 18 the Arvadite, the Zemarite, and the Hamathite. Afterward the families of the Cananites were dispersed. ~ 19 And the border of the Cananites was from Sidon as you go toward Gerar, as far as Gaza; then as you go toward Sodom, and Gomorrah, and Admah, and Zeboim, as far as Lasha. ~ 20 They were the sons of Ham, according to their families, according to their tongues, in their lands, in their nations. ~ 21 And to Shem was brought forth, also he the father of all the sons of Eber, the brother of Japheth the greater. 22 The sons of Shem; Elam, and Asshur, and Arphaxad, and Lud, and Aram. ~ 23 The sons of Aram; Uz, Hul, Gether, and Mash. ~ 24 Arphaxad became the father of Shelach, and Shelach became the father of Eber. 25 To Eber were born two sons; the name of one was Peleg, for in his days the country was divided; and his brother's name was Joktan. ~ 26 Joktan became the father of Almodad, Sheleph, Hazarmaveth, Jerah, ~ 27 Hadoram, Uzal, Diklah, ~ 28 Obal, Abimael, Sheba, ~ 29 Ophir, Havilah, and Jobab. All these, the sons of Joktan. ~ 30 And their dwelling places were from Mesha as you go toward Sephar, an eastern mountain. 31 The sons of Shem according to their families, according to their tongues, in their lands, according to their nations. 32 The families of the sons of Noah, according to their generations, in their nations; and from these the nations were divided on the earth after the flood.	17 the Hivite, the Arkite, and the Sinite, 18 the Arvadite, the Zemarite, and the Hamathite. Then the families of the Cananites were spread out. ~ 19 And the border of the Cananites was from Sidon as you go toward Gerar, as far as Gaza; then as you go toward Sodom, Gomorrah, Admah, and Zeboim, as far as Lasha. ~ 20 The sons of Ham, according to their families, according to their languages, in their countries, in their nations. ~ 21 And born also to Shem, the father of all the children of Eber, the brother of Japheth the elder. ~ 22 The sons of Shem; Elam, Asshur, Arphaxad, Lud, and Aram. ~ 23 The sons of Aram; Uz, Hul, Gether, and Mash. ~ 24 Arphaxad fathered Shelach, and Shelach fathered Eber. ~ 25 To Eber were born two sons; the name of one was Peleg, for in his days the country was divided; and his brother's name was Joktan. ~ 26 Joktan fathered Almodad, Sheleph, Hazarmaveth, Jerah, ~ 27 Hadoram, Uzal, Diklah, ~ 28 Obal, Abimael, Sheba, ~ 29 Ophir, Havilah, and Jobab. These were the sons of Joktan. ~ 30 And their dwelling places were from Mesha as you go toward Sephar, an eastern mountain. 31 These were the sons of Shem by their families, by their languages, in their lands, and by their nations. 32 These were the families of the sons of Noah, according to their generations, in their nations; and by them were the nations spread over the earth after the flood.
21 And born also to Shem, the father of all the children of Eber (region across), the brother of Japheth the elder. 22 The sons of Shem; Elam (hidden), and Asshur (successful), and Arpachshad, and Lud, and and Aram (highland). 23 And the sons of Aram; Uz (consultation), and Hul (circle), and Gether, and Mash. 24 And Arpachshad did bring forth Shelach, and Shelach did bring forth Eber. 25 And to Eber were born two sons; the name of one Peleg (division), for in his days the land was divided; and name of his brother Joktan (he will be made little). 26 And Joktan did bring forth Almodad, and Sheleph (extract), and Hazarmaveth (village of death), and Jerah (a lunation/month), 27 and Hadoram, and Uzal, and Diklah, 28 and Obal, and Abimael (father of Mael), and Sheba, 29 and Ophir, and Havilah, and Jobab (howler). All these, the sons of Joktan. 30 And their dwelling places were from Mesha as you go toward Sephar (census), a hill to the east. 31 These the sons of Shem according to their families, according to their tongues, in their lands, according to their nations. 32 These the families of the sons of Noah, according to their generations, in their nations; and from these were separated the nations on the earth after the flood.		

Note:(1) The #S# represents the letter "Samech" separator in the Hebrew text.

GENESIS Chapter 11, the Genealogy of the Sons of Shem

1 And was all the earth of lip one and of speech one.	1 Now the whole earth had one language and one speech.	1 Now the whole earth had one language and one vocabulary.
2 And it was, in their pulling up from the east, they found a	2 And it came to pass, as they journeyed from the east, that	2 And it happened, as they journeyed from the east, that

valley-plain in the land of Shinar, and they sat there.	they found a plain in the land of Shinar, and they dwelt there.	they found a plain in the land of Shinar, and they settled there.
3 And said each one to his fellow, Give help. Let us make raw bricks and fire <i>them</i> to a burning. And was to them the brick for stone, and the pitch it was to them for mortar.	3 Then they said one to another, Come let us make bricks and bake them thoroughly. They had brick for stone, and they had pitch for mortar.	3 Then they said to each other, Let's make bricks and bake them well. They had brick for stone, and asphalt for mortar.
4 And they said, Give help. Let us build for ourselves a city, and a tower with its head the skies; and make for ourselves a name, lest we be scattered upon the face of all the earth.	4 And they said, Come, let us build ourselves a city, and a tower whose top is in the heavens; let us make a name for ourselves, lest we be scattered abroad over the face of the whole earth.	4 And they said, Let's build our city, and a tower with a top into the sky; let's make a name for ourselves, instead of scattering over the surface of earth.
5 And came down Jehovah to see the city and the tower which had built the sons of men.	5 But the Lord came down to see the city and the tower which the sons of men had built.	5 But the Lord came down to see the city with the tower which the sons of men built.
6 And said Jehovah, Look! the people <i>are</i> one and the lip <i>is</i> one to all them, and this they begin to do, and now not will be restrained from them all which they have imagined to do.	6 And the Lord said, Indeed the people are one and they all have one language, and this is what they begin to do, now nothing that they propose to do will be withheld from them.	6 And the Lord said, Indeed they are unified and have one language, and this is how they behave, nothing that they plan to do will be impossible for them.
7 Give help. Let Us go down and let up mix up there their lip, so that not a man will hear lip their fellow.	7 Come, let Us go down and there confuse their language, that they may not understand one another's speech.	7 Come, let Us go down and confuse their language, so that they will not understand each other's speech.
8 And scattered Jehovah them from there over the face of all the earth, and they ceased from building the city.	8 So the Lord scattered them abroad from there over the face of all the earth, and they ceased building the city.	8 So the Lord scattered them over the surface of the earth, and they quit building the city.
9 Therefore was called its name Babel, because there mingled Jehovah the lip of all the earth; and from there scattered Jehovah them over the face of the earth.	9 Therefore its name is called Babel, because there the Lord confused the language of all the earth; and from there the Lord scattered them abroad over the face of the earth.	9 Therefore its name is called Babel, because the Lord confused their language; and the Lord scattered them over the surface of the earth.
#P#	#P#	#P#
~	~	~
10 These the generations of Shem; Shem a son of a hundred years, and did bring forth Arpachshad two years after the flood.	10 This is the genealogy of Shem; Shem was one hundred years old, and became the father of Arpachad two years after the flood.	10 This is the genealogy of Shem; Shem was 100 years old, and became the father of Arpachad 2 years after the flood.
11 And lived Shem after he did bring forth Arpachshad five hundred years, and did bring forth sons and daughters.	11 After he became the father of Arpachad, Shem lived five hundred years and had sons and daughters.	11 After he became the father of Arpachad, Shem lived 500 years and had sons and daughters.
#S#	#S#	#S#
~	~	~
12 And Arpachshad lived five and thirty years (or 135?) and did bring forth Shelach.	12 Arpachad lived thirty five years (or 135?) and became the forefather of Salah.	12 Arpachad lived 35 years (or 135?) and became the forefather of Salah.
13 And lived Arpachshad after he did bring forth Shelach, three years and four hundred years, and did bring forth sons and daughters.	13 After he became the forefather of Salah, Arpachad lived four hundred and three years and had sons and daughters.	13 After he became the forefather of Salah, Arpachad lived 403 years and had sons and daughters.
#S#	#S#	#S#
~	~	~
14 And Shelach lived thirty years (or 130?) and did bring forth Eber.	14 Sala lived thirty years (or 130?) and became the forefather of Eber.	14 Sala lived 30 years (or 130?) and became the forefather of Eber.
15 And lived Shelach after he did bring forth Eber three years and four hundred years (or 330?), and did bring forth sons and daughters.	15 After he became the forefather of Eber, Salah lived four hundred and three years (or 330?) and had sons and daughters.	15 After he became the forefather of Eber, Salah lived 403 years (or 330?) and had sons and daughters.
#S#	#S#	#S#
~	~	~
16 And lived Eber four and thirty years (or 134?) and did bring forth Peleg.	16 Eber lived thirty four years (or 134?) and became the forefather of Peleg.	16 Eber lived 34 years (or 134?) and became the forefather of Peleg.
17 And lived Eber after he did bring forth peleg thirty years and four hundred years (or 270?), and did bring forth sons and daughters.	17 After he became the forefather of Peleg, Eber lived four hundred and thirty years (or 270?) and had sons and daughters.	17 After he became the forefather of Peleg, Eber lived 430 years (or 270?) and had sons and daughters.
#S#	#S#	#S#
~	~	~
18 And lived Peleg thirty years (or 130?) and did bring forth Reu.	18 Peleg lived thirty years (or 130?) and became the forefather of Reu.	18 Peleg lived thirty years (or 130?) and became the forefather of Reu.
19 And lived Peleg after he did bring forth Reu nine years and two hundred years, and did bring forth sons and daughters.	19 After he became the forefather of Reu, Peleg lived two hundred and nine years and had sons and daughters.	19 After he became the forefather of Reu, Peleg lived 209 years and had sons and daughters.
#S#	#S#	#S#
~	~	~
20 And lived Reu two and thirty		

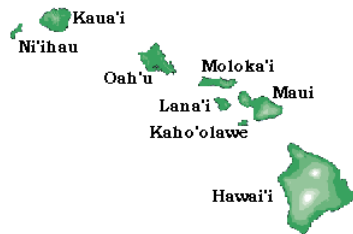
years (or 132?) and did bring forth Serug.	20 Reu lived thirty two years (or 132?) and became the forefather of Serug.	~	20 Reu lived thirty two years (or 132?) and became the forefather of Serug.
21 And lived Reu after he did bring forth Serug seven years and two hundred years, and did bring forth sons and daughters.	21 After he became the forefather of Serug, Reu lived two hundred and seven years and had sons and daughters.	#S#	21 After he became the forefather of Serug, Reu lived 207 years and had sons and daughters.
22 And lived Serug thirty years (or 130?) and became the forefather of Nahor.	22 Serug lived thirty years (or 130?) and became the forefather of Nahor.	#S#	22 Serug lived 30 years (or 130?) and became the forefather of Nahor.
23 And lived Serug after he did bring forth Nahor two hundred years, and did bring forth sons and daughters.	23 After he became the forefather of Nahor, Serug lived two hundred years and had sons and daughters.	#S#	23 After he became the forefather of Nahor, Serug lived 200 years and had sons and daughters.
24 And lived Nahor nine and twenty years (or 179?) and did bring forth Terah.	24 Nahor lived twenty nine years (or 179?) and became the forefather of Terah.	#S#	24 Nahor lived 29 years (or 179?) and became the forefather of Terah.
25 And lived Nahor after he did bring forth Terah nineteen years and one hundred years (or 125?) and did bring forth sons and daughters.	25 After he became the forefather of Terah, Nahor lived one hundred and nineteen years (or 125?) and had sons and daughters.	#S#	25 After he became the forefather of Terah, Nahor lived 119 years (or 125?) and had sons and daughters.
26 And lived Terah seventy years and did bring forth Abram, Nahor, and Haran.	26 Now Terah lived seventy years and became the father of Abram, Nahor, and Haran.	#S#	26 Now Terah lived 70 years and fathered Abram, Nahor, and Haran.
27 This are the generations of Abram, Nahor, and Haran. And Haran did bring forth Lot.	27 This is the genealogy of Abram, Nahor, and Haran. Haran became the father of Lot.	#S#	27 This is the genealogy of Abram, Nahor, and Haran. Haran fathered Lot.
28 And died Haran before the face of Terah his father in the land of his birth, in the Ur of the Chaldeans.	28 And Haran died before his father Terah in his native land, in the Ur of the Chaldeans.	#S#	28 And Haran died before his father Terah in his home land, in the Ur of the Chaldeans.
29 And took Abram and Nahor for themselves women; the name of the woman of Abram, Sarai, and the name of the woman of Nahor, Milcah, the daughter of Haran, the father of Milcah, and the father of Iscah.	29 The Abram and Nahor took wives; the name of Abram's wife Sarai, and the name of Nahor's wife Milcah, the daughter of Haran, the father of Milcah, and the father of Iscah.	#S#	29 Then Abram and Nahor married; Abram's wife was Sarai, and Nahor's wife was Milcah, the daughter of Haran, the father of Milcah, and the father of Iscah.
30 And was Sarai barren; not was to her a child.	30 But Sarai was barren; she had no child.	#S#	30 But Sarai was without children; she had no offspring.
31 And took Terah Abram his son and Lot, the son of Haran, son of his son, and Sarai his daughter-in-law, the woman of Abram, his son, and they went out with them from Ur of the Chaldeans to walk toward the land of Cannan; and they came unto Haran and they sat there.	31 And Terah took his son Abram and his grandson Lot, the son of Haran, and his daughter-in-law Sarai, his son Abram's wife, and they went out with them from Ur of the Chaldeans to go to the land of Cannan; and they came to Haran and dwelt there.	#S#	31 And Terah with his son Abram and his grandson Lot, the son of Haran, and his daughter-in-law Sarai, his son Abram's wife, decided to moved from the Ur of the Chaldeans to the land of Cannan; but when they came to Haran they stayed there.
32 And were the days of Terah five years and two hundred years, and died Terah in Haran.	32 So the days of Terah were two hundred and five years, and Terah died in Haran.	#S#	32 When the age of Terah were 205 years, Terah died in Haran.

Notes:(1)The #P# represents the letter "Phe" separator in the Hebrew text and the #S# represents the letter "Samech" separator in the Hebrew text. (2) The alternate year values in parenthesis are from the Septuagint, a translation to Greek prepared about 270 BC. Also in verses 12 and 13 the Septuagint includes, "And Aphaxad lived after he begot Kainan four hundred years and begot sons and daughters, and died. And Kainan lived a hundred and thirty years and begot Sala; and Kainan lived after he begot Sala three hundred and thirty years and begot sons and daughters, and died."

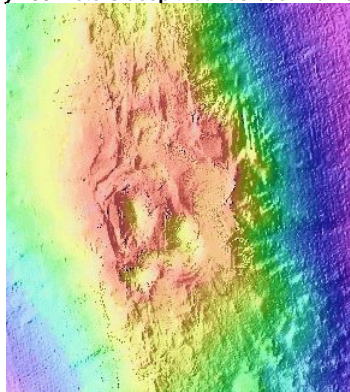
Section Three: Old Earth vs. Young Earth

Chapter 1; Volcanoes

Volcanoes did not play an important role in the Scriptures. However, some scholars have theorized that some of the events documented in the Scriptures were due to the actions of volcanoes, usually catastrophic events, possibly the plagues in Egypt. They played a factor in forming the terrain since the Biblical territory of Bashan, the now famous Golan Heights, was formed by extinct volcanoes. But for our purposes we are interested in volcanoes for what they can possibly tell us about the age of the earth.

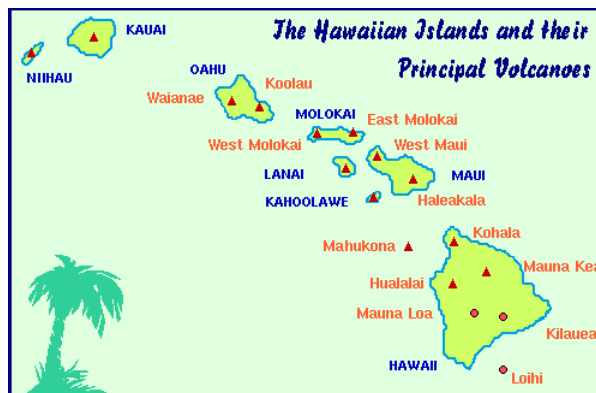


Hawaii, beautiful vacation land, land of peace and harmony, yet each island was born of tremendous heat and violence. The long chain actually starts with Loihi seamount which is presently not visible since it is still approximately three thousand feet below sea level. It sprang to life again in 1996 and during the summer of 1996 the largest swarm of earthquakes ever recorded on ANY Hawaiian volcano shook Loihi seamount. The swarm began on 17 July 1996; to date, a total of over 5000 earthquakes have been recorded by the Hawaii Volcano Observatory (HVO) network. Does this mean that soon we will be seeing video clips on the TV news of a new island being born? Probably not, since many volcanologists propose that it will be thousands of years before Loihi becomes an island. Seabeam bathymetry images taken in 1997 show that where there had once been a 300 meter tall cone called Pele's Vents there was a new pit approximately 200 meters deep that has been named Pele's Pit.



(from <http://www.soest.hawaii.edu/GG/HCV/loihi.html>)

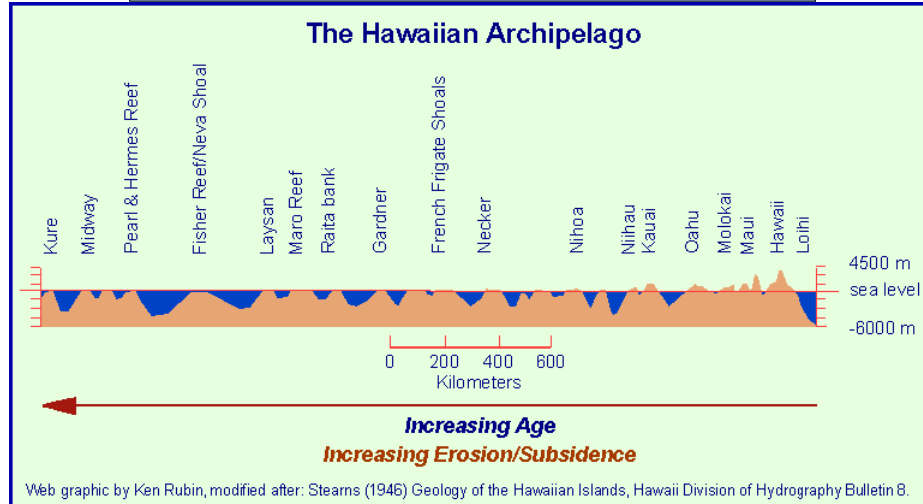
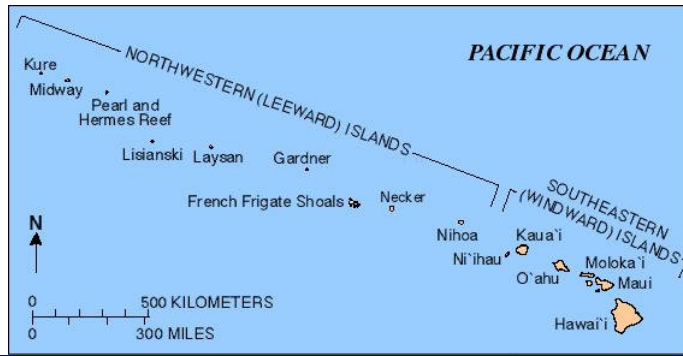
Next in the chain is Kilauea volcano, on the south side of the Island of Hawaii. It is one of the most active on Earth. Its current eruption (known as the Pu`u `O`o Eruption) started in January 1983 and as of January 2000 had produced 1.9 km³ of lava (0.112 km³/yr), had covered 102 km², and had added 205 hectares to Kilauea's southern shore. In the process, lava flows unfortunately destroyed 181 houses and resurfaced 13 km of highway with as much as 25 m of lava. It has also destroyed a National Park visitor center and a 700 year-old Hawaiian temple ("Waha'ula heiau" before and after). There are no signs that the current eruption is slowing or will come to an end anytime soon.



Kilauea shares the Hawaiian hot spot with its larger active sibling Mauna Loa and with Loihi seamount. Mauna Loa, or "Long Mountain" in Hawaiian, it rises 13,680 ft. (4,170 m) above sea level. USGS estimates are that due to the 33 recorded eruptions from January 10, 1843 to March 26, 1984 on Mauna Loa it has added 4.124 km³ to the Hawaii landscape, a rate of only 0.029 km³ per year. However, Mauna Loa is a REALLY tall and big mountain. At 60 miles long and 30 miles wide, it makes up half of the entire island. When one considers that the flanks of Mauna Loa sit on sea floor that is about 16,400 ft (5,000 m) deep, the "height" of this volcano relative to neighboring land (the sea floor) is more like 30,080 ft (9,170 m)! Mauna Loa is the largest active volcano in the world. In fact, using this last measure of it's height, it is one of the tallest mountain in the world (although many mountains, such as Mt. Everest in the Himalaya mountain range, sit higher relative to sea level). Mauna Loa is a "shield volcano", which means it is a gently sloping mountain produced from a large number of generally very fluid lava flows.

Mauna Kea is the tallest mountain in the Hawaiian Chain. Its summit rises to an elevation of 4205m above sea level. It is the second largest in subaerial surface area of the five shield volcanoes that comprise the island of Hawaii, but is considered to be extinct. Also on the big island is Hualalai. The summit of Hualalai rises to an elevation of 2523m (8271ft) above sea level. The most recent eruption of 1800-1801 occurred along a northwest rift zone.

Other than the locations on Hawaii, the last volcano to be active was just to the west of Maui, Haleakala. It was last active in 1790, but could become active again at any time as world wide volcano history testifies. (for more on the Hawaiian volcanoes visit <http://www.soest.hawaii.edu/GG/hcv.html>)

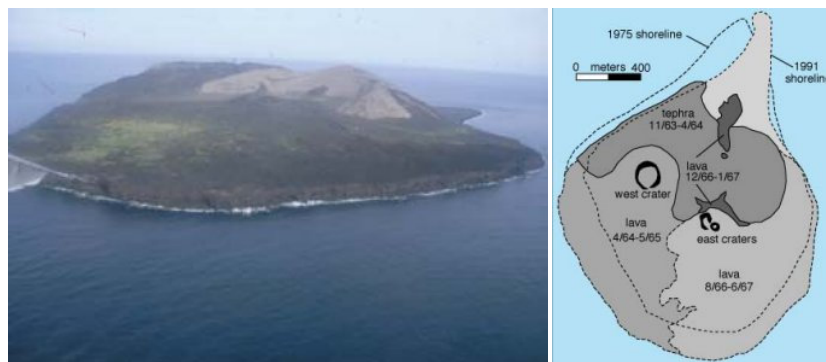


However, the occupied islands of Hawaii that so many are familiar with is only a small part of the story as shown in the above figures. There is a long string of islands, coral atolls, and seamounts in a long chain that complete the picture. Each formed by volcanic action and modified over a long time by the forces of our wonderful planet. As one moves along the chain erosion and subsidence has taken its toll and the amount of exposed land area decreases dramatically, a testimony to the age progression along the chain. The extent of the coral deposits are relatively small around the occupied islands and progress until at Midway, where core drillings have been taken, there is a minimum of 820 feet (250 m) thick deposits and with limestone showing up to depths of around 1066 feet (325 m). The following figures show Niihau island, Pearl & Hermes reef, and an animated depiction of the life of a volcanic Pacific island.



The question is how could such an extensive chain of volcanoes be formed in a relatively short time? The most recent island building work of Kilauea of 1.9 km³ in 17 years is very inadequate. Kilauea is at a minimum 25,000 km³ or 6,000 miles³ in volume per the USGS. At the present rate it would take approximately 220,000 years to build the present volcano. However, evidence on the volcano indicate that it has not always produced flows at the present slow and relatively steady rate. Large and thick deposits of ash and pumice are present from older eruptions, reported in 1790 and again in 1924. Along the cliffs of the Hilina fault system are exposed 9 ash layers indicative of such eruptions, estimated to be thousands of years old (ref. <http://geopubs.wr.usgs.gov/fact-sheet/fs132-98/>).

Surtsey, Iceland from Nov. 8, 1963 to June 5, 1967 put forth an estimated 1 km³ to form the present volcano from a sea floor at 130 meters depth (ref. http://volcano.und.nodak.edu/vwdocs/volc_images/europe_west_asia/surtsey.html). Shown below are a photo and a map of Surtsey, note that some green growth has appeared, but only to a limited extent, and the erosion effects on the map. Some have predicted that unless there are more island building eruptions, Surtsey will no longer be seen above sea level in 100 years.



Should Kilauea have grown continuously at the 1 km³ per 3.5 year rate it could have been built in 87,500 years.

Reportedly the greatest eruption of last century was in Katmai Alaska in 1912 (ref. <http://www.hvo.wr.usgs.gov/kilauea/>) when an estimated ten cubic kilometers of pumice and ash was expelled. In recorded history possibly the Katmai eruption was surpassed only by Karakatau in 1883, Tambora in 1815, and Greece's Santorini eruption in ~1600 BC. (see note A) The June 1912 eruption of Novarupta Volcano changed the Katmai dramatically. After the eruption 65 square kilometers (40 sq. miles) of lush green wilderness lay buried beneath hot pumice and ash, as much as 200 meters (700 ft.) deep in some areas. In near by Kodiak, for two days a person could not see a lantern held at arm's length. We don't know how much of the eruption was new material and how much was just relocation of material from the cone! (ref. <http://volcano.und.edu/vwdocs/Parks/katmai/katmai.html>).



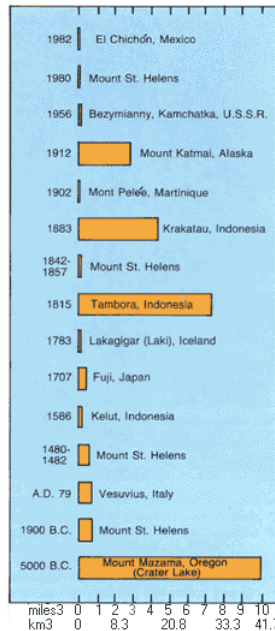
If Kilauea could perform in this manner, output 10 km³ per year, it could possibly be built in 2500 years. However, there is definitely no evidence that such an occurrence could have happened every year. See note D for indications in tree rings that the Hawaiian activity for the last 4000+ years has been relatively minor in nature.

And also don't forget, we need to build numerous volcanoes along the approximately 3045 mile long chain. The sister and elder volcano Mauna Loa, is much larger with a volume of 19,000 miles³ or 80,000 km³, more than three times the size of Kilauea. Many scientists believe that earlier in the Earth's history there were higher levels of volcanic activity, but the building of such an extensive chain of seamounts and islands in less than 10,000 years is difficult to visualize. Visualize, if you can, the crustal plate moving over the volcanic hot spot at a rate of 0.76 mile in a year, 8,025 times present max. rates, and volcanic material pouring forth at a rate greater than 188 cubic kilometers a year, 1,677 times present rate, assuming we need to build the equivalent of approximately 30 or more Kilauea's (> 750,000 km³), in less than 4,000 years! Or even on a much smaller scale, building only Mauna Loa in less than 4,000 years would require average flow rates of 178.9 times the 17 year output rate of Kilauea!

We also need the appropriate amount of erosion, subsidence, and coral deposit development in such a relatively short time. The latest studies seem to indicate that the maximum rate of coral reef development is 21 meters per thousand years at optimum conditions. However, these studies indicate that coral reef development is not a continuous process. That sea temperatures, sea levels, water clearness, storms, pests and diseases are among the many factors that cause coral reef development to be an on again, off again process with mean reef growth values being between 1.3 and 4.2 meters per thousand years. (ref. <http://cima.uprm.edu/~morelock/abstract/glynn30.htm>) For most coral to grow water must be relatively warm and shallow since energy from the sun is used in photosynthesis. Deep water blocks all sunlight and only very specialized corals can survive. Also should the coral start to develop while the volcano is still in the building stage, the newly developed coral formations may possibly be covered by new lava flows or ash and pumice. The 1993 "Hawaii Scientific Drilling Project" which drilled into Mauna Loa/Mauna Kea near the seashore hit a 85 feet (~26 m) thick deposit of "calcareous sediment" (coral reef deposit) after drilling through 100 feet of basalt. Possibly indicating 1,238 years of growth at the most optimum growth rate or around 20,000 years of growth at the slower 1.3 m/kyr growth rate. The above given reef growth rates also possibly indicate that if conditions were extremely optimum it would take at a minimum 11,905 years to build the coral reef deposit thickness at Midway. At the more reasonable 4.2 m/kyr development rate it would take 59,523 years to develop the 250 m thickness and this would start some time after the island building phase had slowed down and wave erosion had starting building the shallow shelves around the island necessary for extensive coral development.

Conclusion: The known physical characteristics of the volcanic Hawaiian Archipelago along with calculations based on known historic volcano performances presents a strong case against the formation of such an extensive chain in less than 10,000 years. Such a rapid formation would require crustal plate movement and volcanic material flows far exceeding known values for each parameter. Coral reef development speed would also seem to be a major problem. These indicators are proposed as strong evidence against a young earth, and strongly favoring an old age earth.

Note A: USGS ratings of some historic eruptions.

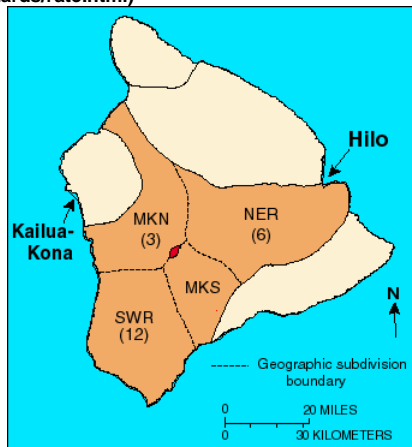


(from <http://pubs.usgs.gov/publications/msh/comparisons.htm>)

USGS publishes an alternate rating of Katmai in http://vulcan.wr.usgs.gov/LivingWith/VolcanicFacts/volcanic_impact.html, "Largest U.S. volcanic eruption of the 20th century, produced 21 cubic kilometers of volcanic material, which is equivalent to 230 years of eruption at Kilauea (Hawaii). (Or, about 30 times the volume erupted by Mount St. Helens in 1980.)" So be aware that as with most everything there are disagreements by different researchers as to the ratings of volcanic eruptions.

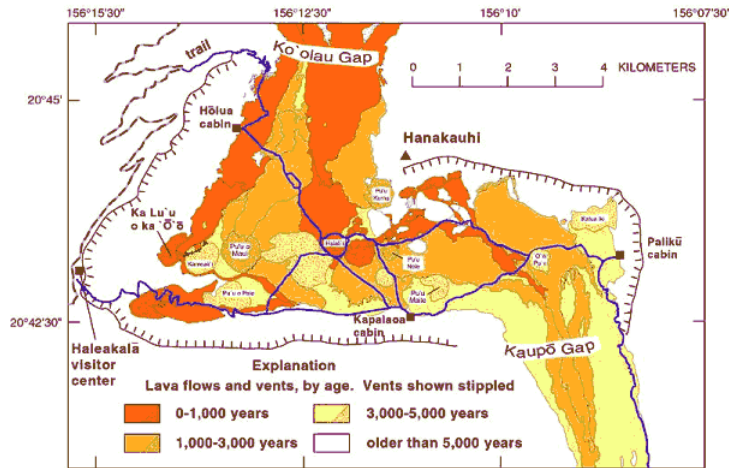
The ~1600 BC Santorini eruption has been estimated at 30-33 km³, after which the caldera collapsed into the sea. Submarine lava flows continued after the caldera collapse and were reported to emerge above sea level in 197 BC. Since then 11 recorded flow events have formed the Kameni Islands in the center of the caldera, with the last being in 1950. Though rising to 500 meters above the floor, only an estimated 2 km³ of the collapsed caldera has been refilled in about 3600 years. The Mount Mazama (now called Crater Lake, Oregon) eruption which the USGS has estimated at 42 km³ in ~5000 BC has also refilled to only a very limited extent. But even the larger of the above eruptions pales by comparison with the gigantic pyroclastic eruption evidences from volcanic systems such as Long Valley Caldera (California), Valles Caldera (New Mexico), and Yellowstone Caldera (Wyoming).

However, what would seem to be required to best build a long chain of volcanoes from the sea floor that extends for thousands of miles in length are not sudden violent eruptions. Especially if the sudden expulsion is followed by a collapse and it requires an extended time period for recovery as illustrated by Santorini and Mazama. The Hawaiian volcanoes, as are most volcanoes, are layered with ash interbedded within lava flows. The scientists of the 1993 "Hawaii Scientific Drilling Project" identified a minimum of 262 layers when drilling to 2460 feet (1056 m) into Mauna Loa/Mauna Kea. Around 80 percent of the layers were various forms of basalt, and the remaining layers interspersed within the basalt were characterized as coral(8), ash(15), soil(14), ash and soil mixed (10), and basaltic sand(5). (ref. http://expet.gps.caltech.edu/Hawaii_project.html) The below USGS "Simplified map of the Island of Hawai'i, showing the average rates of lava extrusion for historical eruptions on Mauna Loa (brown). The volcano is divided into four major sectors downslope from Moku'aweoweo caldera (shown in red): NER = northeast rift zone; MKS = Moku'aweoweo south; SWR = southwest rift zone; MKN = Moku'aweoweo north. In parenthesis, the rates of extrusion within each sector are in millions of cubic meters per day (6 = 6,000,000 m³/day). For comparison, the average rate of lava extrusion at Kilauea Volcano during the Pu'u 'O'o eruption is less than 0.5 million cubic meters per day." (from <http://www.hvo.wr.usgs.gov/maunaloa/hazards/rate.html>)



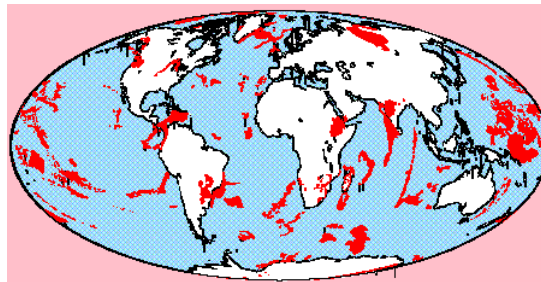
Thus presenting USGS rough estimates of historic intermittent flow rates for Mauna Loa of 6, 12 and 24 times the rate of the present Kilauea Pu'u 'O'o eruption, well short of our estimated requirement of 1,667 times.

The known history of Santorini, Vesuvius and most others, indicates there is most often extended time periods of inactivity between layer building activity. Such extended periods of inactivity would greatly decrease the average yearly building rate for each volcanic island/atoll/seamount. The continuously active volcano is rare, such as Stromboli, which has been almost continuously active for a minimum of 2000 years, and some say 5000 years. But at Stromboli the large volume eruption or lava flow is very rare and therefore it has done relatively little building in recorded history. The USGS studies of lava flows on Haleakala is an illustration of the intermittent nature of volcanic activity, especially in the postshield stage, as shown below.



(from http://hvo.wr.usgs.gov/volcanoes/haleakala/cratermap_large.jpg)

Volcanos like Kilauea or Mauna Loa grow faster and erupt more frequently during the preshield and shield-building stages, when they are closer to the center of the hot spot. Possibly the recent history lava flow champ was at Laki, Iceland in 1783-1784 when 14.7 km³ was produced in 8 months. And near the same area, the Eldgja flow in ~935 put out 19.6 km³ in 3 to 8 years (the time is uncertain due to poor records). These flows in Iceland make a very good showing in the Greenland icecores due to their closeness to the drilling location. Recent studies have possibly identified evidences of much greater flow rates at the Columbia lava plateau, possibly 1300 km³ in 5 to 15 years, but these estimates are difficult to verify. The Columbia lava plateau consists of approximately 175,000 km³ of material from over 300 major flows and countless smaller flows. And even if the evidences for very high lava flow rates in the Columbia area are verified, the evidences are that there were also extended periods of inactivity. Therefore, the entire 175,000 km³ lava flow area was not developed in a short time period, but instead over a very extended time period. Scattered over the world there are many large igneous flow areas which give solid evidence of extreme activity in the past, some estimated at 10 times the size of the Columbia area, such as the Deccan Traps area of India.

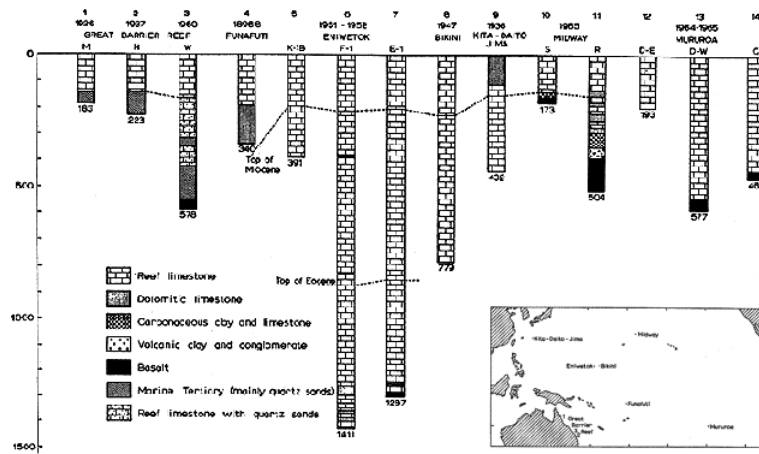


Note B: Hawaiian Legends of volcanic center movement

The possibility that the Hawaiian Islands become younger to the southeast was suspected by the ancient Hawaiians, long before any scientific studies were done. During their voyages, sea-faring Hawaiians noticed the differences in erosion, soil formation, and vegetation and recognized that the islands to the northwest (Niihau and Kauai) were older than those to the southeast (Maui and Hawaii). This idea was handed down from generation to generation in the legends of Pele, the fiery Goddess of Volcanoes. Pele originally lived on Kauai. When her older sister Namakaokahai, the Goddess of the Sea, attacked her, Pele fled to the Island of Oahu. When she was forced by Namakaokahai to flee again, Pele moved southeast to Maui and finally to Hawaii, where she now lives in the Halemaumau Crater at the summit of Kilauea Volcano. The mythical flight of Pele from Kauai to Hawaii, which alludes to the eternal struggle between the growth of volcanic islands from eruptions and their later erosion by ocean waves, is consistent with geologic evidence obtained centuries later that clearly shows the islands becoming younger from northwest to southeast. (from <http://pubs.usgs.gov/publications/text/hotspots.html>)

The Pele myths were associated with the genealogies of royal chiefs, with some genealogies extending back in time an astounding 95 generations. Some scholars believe that the occupants of the islands first arrived some time between 400 to 600 AD. And nearly all who study the history of the Hawaiians believe that they have occupied the islands for at least a minimum of 1000 years. Therefore the maximum possible time to be allowable for the forming of the west most occupied islands on which they would have first settled could be shortened by as much as 1600 years.

Note C: Pacific Atoll Drilling Results including Midway



Note D: TREE RINGS AND VOLCANOES

"Since the eruption of Mt. St. Helens and El Chichon in Mexico in 1982, there has been a renewed interest among scientists on a possible connection between large volcanic eruptions and significant effects on the climate. Some volcanoes inject sufficient material into the stratosphere that the amount of radiation received at the surface of the Earth from the Sun is materially altered. Large volcanic explosions deposit fine silicate ash and sulphur aerosols in the stratosphere, and these may remain there for some time.

Models of this type of event suggest that there would be an expansion of the region of circulating arctic air over western North America in January and a July weather pattern that would resemble those of a normal mid-May. One result of such weather would be to produce frosts in the height of the growing season in western North America.

Frost damage to mature trees is rare but can occur during the growing season with two successive nights at -5 C and days not above freezing. The freezing of water outside the immature growing cells crushes them and leaves a permanent record of frost in the tree ring for that year. In fact, the type of damage observed in the ring is different for the early part of the growing season and the late part. In a given tree ring, the date of the frost can sometimes be determined to within a week or two.

In several locations of the western United States lives the oldest known living thing on Earth: this is the Bristlecone pine (*Pinus longaeva*). In one location at Campito Mountain in the White Mountains of California, living trees and deadwood pieces provide an accurate year-by-year tree ring sequence back to 3435 BC, a continuous record for five and one-half thousand years! (Update: The bristlecone pine chronology in the White Mountains currently extends back almost 9,000 years continuously. That's to 7,000 BC! Several pieces of wood have been collected that will extend this date back even further. The hope is to push the date back to at least 8,000 BC. This will be important as the last Ice Age ended about 10,000 years ago, and to have a record of this transition period would offer scientists a wealth of information. (from <http://www.sonic.net/bristlecone/dendro.html>)

V. C. LaMarche and Katherine Hirsckboeck have recently reported, in the magazine *Nature*, on a study of the frost damage in the rings of the Bristlecone pine. In the recent tree-ring records, they find a remarkable correlation between frost damage rings and the known date of large eruptions. For example, in the past 100 years, there have been four climactically important events: Krakatoa (1883), Pelee, Soufriere (1902), Katami (1912), and Agung (1963). In each case, a ring of frost damage was found and always in the same year if the eruption was early in the year or, otherwise, the next year. The frost ring never preceded the volcanic event, which seems to prove that the frost rings are the result of the eruption.

When the tree ring record is examined back in time, there are some interesting results. Seventeen events are found in the rings between 2035 BC and 1884 AD. Some of these are known from other paleontological or historical evidence. For example, Mt. St. Helens erupted in 1500 AD and 2035 BC and Mt. Etna in 42 BC.

Of particular interest is the explosion of Santorini or Thera in the Aegean Sea. This great explosion has been suggested as the cause of the decline of the Cretan civilization about 1450 BC. However, radio carbon dating of material found on Thera has given 1688 BC within an uncertainty of 50 years. (Update: reported on Athens News Agency, 12/03/2008, new precision radiocarbon dating of two recovered olive branches puts the catastrophe at 1613 BC, with an error margin of plus or minus 10 years (1603 to 1623)) Now the tree ring frost tells us that Santorini exploded in 1626 BC or, at most, one or two years earlier; i.e., about 275 years before the sudden decline of Crete, which thus still remains a mystery." (from <http://www.physics.uoguelph.ca/summer/scor/articles/scor23.htm>)

The above indication that for 3919 years starting in 2035 BC there were only 17 significant world climate altering volcanic eruptions, many of which can be identified to a known historic eruption, is another way of saying that during this time any above sea level activity in the Hawaiian Archipelago was by comparison of a relatively minor magnitude. And the Greenland icecores also tend to verify this conclusion. In other words, it is proposed that if over the last 4000 years there had been considerable above sea level activity in Hawaii of much greater magnitude than Laki or Eldgja, possibly up to 10 times or more, then there should have been many such indications in the records of the tree rings and/or strong showings in the Greenland icecore data.

Note D; Super-Volcano Roots are Deep and Ancient !



Hawaiian Hot Spot Has Deep Roots

ScienceDaily (Dec. 3, 2009) — Washington, D.C.—Hawaii may be paradise for vacationers, but for geologists it has long been a puzzle. Plate tectonic theory readily explains the existence of volcanoes at boundaries where plates split apart or collide, but mid-plate volcanoes such as those that built the Hawaiian island chain have been harder to fit into the theory. A classic explanation, proposed nearly 40 years ago, has been that

magma is supplied to the volcanoes from upwellings of hot rock, called mantle "plumes," that originate deep in the Earth's mantle. Evidence for these deep structures has been sketchy, however. **Now, a sophisticated array of seismometers deployed on the sea floor around Hawaii has provided the first high-resolution seismic images of a mantle plume extending to depths of at least 1,500 kilometers (932 miles).**

This unprecedented glimpse of the roots of the Hawaiian "hot spot" is the product of an ambitious project known as PLUME, for Plume-Lithosphere Undersea Melt Experiment, which collected and analyzed two years of data from sea floor and land-based seismometers.

"One of the reasons it has taken so long to create these kinds of images is because many of the major hot spots are located in the middle of the oceans, where it has been difficult to put seismic instruments," says study co-author Sean Solomon, director of the Carnegie Institution's Department of Terrestrial Magnetism. "The Hawaiian region is also distant from most of the earthquake zones that are the sources of the seismic waves that are used to create the images. Hawaii has been the archetype of a volcanic hotspot, and yet the deep structure of Hawaii has remained poorly resolved. For this study we were able to take advantage of a new generation of long-lived broad band seismic instruments that could be set out on the seafloor for periods of a year at a time."

The PLUME seismic images show a seismic anomaly beneath the island of Hawaii, the chain's largest and most volcanically active island. Critics of the plume model have argued that the magma in hot spot volcanoes comes from relatively shallow depths in the upper mantle (less than 660 kilometers), not deep plumes, but the anomaly observed by the PLUME researchers extends to at least 1,500 kilometers. **Rock within the anomaly is also calculated to be significantly hotter than its surroundings,** as predicted by the plume model.

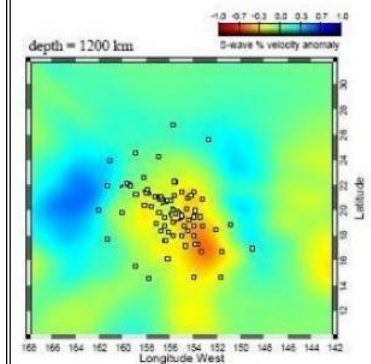
"This has really been an eye-opener," says Solomon. "It shows us that **the anomalies do extend well into the lower mantle of the Earth.**"

Erik Hauri, also of Carnegie's Department of Terrestrial Magnetism, led the geochemical component of the research. "We had suspected from geochemistry that the center of the plume would be beneath the main island, and that turns out to be about where the hot spot is centered," he says. "We also predicted that its width would be comparable to the size of island of Hawaii and that also turned out to be true. But those predictions were merely theoretical. Now, for the first time, we can really see the plume conduit."

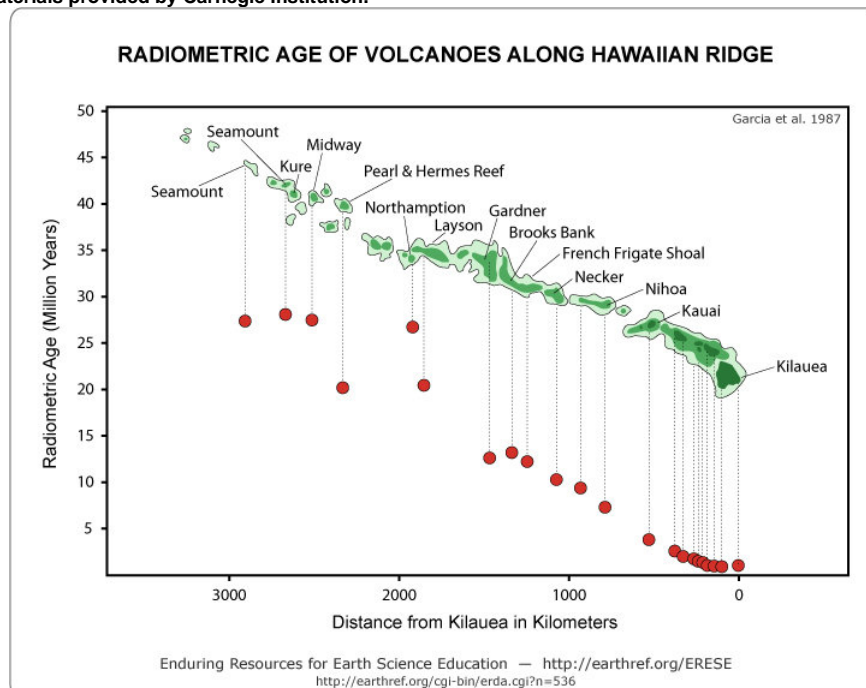
Has the question of hot spots and mantle plumes been settled at last? "We believe that we have very strong evidence that Hawaii is underlain by a plume that extends to at least 1,500 kilometers depth," says Solomon. **"It may well extend deeper, we can't say on the basis of our data,** but that is addressable with global datasets, now that our data have been analyzed. So it's a very strong vote in favor of the plume model."

The lead author of the study, published in the December 4, 2009 issue of *Science*, is Cecily Wolfe, a former Carnegie Fellow at the Carnegie Institution's Department of Terrestrial Magnetism now at the University of Hawaii at Manoa. Other authors are S.C. Solomon and E.H. Hauri, Carnegie Institution for Science; G. Laske and J.A. Orcutt, Scripps Institution of Oceanography; J. A. Collins and R.S. Detrick, Woods Hole Oceanographic Institution; and D. Bercovici, Yale University. The PLUME project is supported by the National Science Foundation.

The Carnegie Institution (www.CIW.edu) has been a pioneering force in basic scientific research since 1902. It is a private, nonprofit organization with six research departments throughout the U.S. Carnegie scientists are leaders in plant biology, developmental biology, astronomy, materials science, global ecology, and Earth and planetary science. Adapted from materials provided by Carnegie Institution.



Location of seismic velocity anomaly at a depth of 1,200 kilometers (746 miles) beneath Hawaiian Islands (outlines). Orange color indicates low S-wave velocities, implying higher rock temperatures. Open boxes show locations of sea-floor seismometers. (Credit: Image courtesy of Science)



The Pacific plate moves about one kilometer in 10,000 years, or about one mile in 16,000 years!!

Yellowstone's Plumbing Reveals Plume of Hot and Molten Rock

410 Miles Deep

ScienceDaily (Dec. 14, 2009) — The most detailed seismic images yet published of the plumbing that feeds the Yellowstone supervolcano shows a plume of hot and molten rock rising at an angle from the northwest at a depth of at least 410 miles, contradicting claims that there is no deep plume, only shallow hot rock moving like slowly boiling soup.

A related University of Utah study used gravity measurements to indicate the banana-shaped magma chamber of hot and molten rock a few miles beneath Yellowstone is 20 percent larger than previously believed, so a future cataclysmic eruption could be even larger than thought.

The study's of Yellowstone's plume also suggests the same "hotspot" that feeds Yellowstone volcanism also triggered the Columbia River "flood basalts" that buried parts of Oregon, Washington state and Idaho with lava starting 17 million years ago.

Those are key findings in four National Science Foundation-funded studies in the latest issue of the *Journal of Volcanology and Geothermal Research*. The studies were led by Robert B. Smith, research professor and professor emeritus of geophysics at the University of Utah and coordinating scientist for the Yellowstone Volcano Observatory.

"We have a clear image, using seismic waves from earthquakes, showing a mantle plume that extends from beneath Yellowstone," Smith says.

The plume angles downward 150 miles to the west-northwest of Yellowstone and reaches a depth of at least 410 miles, Smith says. The study estimates the plume is mostly hot rock, with 1 percent to 2 percent molten rock in sponge-like voids within the hot rock.

Some researchers have doubted the existence of a mantle plume feeding Yellowstone, arguing instead that the area's volcanic and hydrothermal features are fed by convection — the boiling-like rising of hot rock and sinking of cooler rock — from relatively shallow depths of only 185 miles to 250 miles.

The Hotspot: A Deep Plume, Blobs and Shallow Magma

Some 17 million years ago, the Yellowstone hotspot was located beneath the Oregon-Idaho-Nevada border region, feeding a plume of hot and molten rock that produced "caldera" eruptions — the biggest kind of volcanic eruption on Earth.

As North America slid southwest over the hotspot, the plume generated more than 140 huge eruptions that produced a chain of giant craters — calderas — extending from the Oregon-Idaho-Nevada border northeast to the current site of Yellowstone National Park, where huge caldera eruptions happened 2.05 million, 1.3 million and 642,000 years ago.

These eruptions were 2,500, 280 and 1,000 times bigger, respectively, than the 1980 eruption of Mount St. Helens. The eruptions covered as much as half the continental United States with inches to feet of volcanic ash. The Yellowstone caldera, 40 miles by 25 miles, is the remnant of that last giant eruption.

The new study reinforces the view that the hot and partly molten rock feeding volcanic and geothermal activity at Yellowstone isn't vertical, but has three components:

- The 45-mile-wide plume that rises through Earth's upper mantle from at least 410 miles beneath the surface. The plume angles upward to the east-southeast until it reaches the colder rock of the North American crustal plate, and flattens out like a 300-mile-wide pancake about 50 miles beneath Yellowstone. The plume includes several wider "blobs" at depths of 355 miles, 310 miles and 265 miles.

"This conduit is not one tube of constant thickness," says Smith. "It varies in width at various depths, and we call those things blobs."

- A little-understood zone, between 50 miles and 10 miles deep, in which blobs of hot and partly molten rock break off of the flattened top of the plume and slowly rise to feed the magma reservoir directly beneath Yellowstone National Park.
- A magma reservoir 3.7 miles to 10 miles beneath the Yellowstone caldera. The reservoir is mostly sponge-like hot rock with spaces filled with molten rock.

"It looks like it's up to 8 percent or 15 percent melt," says Smith. "That's a lot."

Researchers previously believed the magma chamber measured roughly 6 to 15 miles from southeast to northwest, and 20 or 25 miles from southwest to northeast, but new measurements indicate the reservoir extends at least another 13 miles outside the caldera's northeast boundary, Smith says.

He says the gravity and other data show the magma body "is an elongated structure that looks like a banana with the ends up. It is a lot larger than we thought — I would say about 20 percent [by volume]. This would argue there might be a larger magma source available for a future eruption."

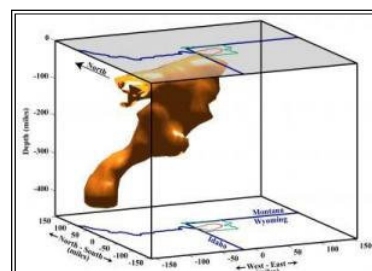
Images of the magma reservoir were made based on the strength of Earth's gravity at various points in Yellowstone. Hot and molten rock is less dense than cold rock, so the tug of gravity is measurably lower above magma reservoirs.

The Yellowstone caldera, like other calderas on Earth, huffs upward and puffs downward repeatedly over the ages, usually without erupting. Since 2004, the caldera floor has risen 3 inches per year, suggesting recharge of the magma body beneath it.

How to View a Plume

Seismic imaging uses earthquake waves that travel through the Earth and are recorded by seismometers. Waves travel more slowly through hotter rock and more quickly in cooler rock. Just as X-rays are combined to make CT-scan images of features in the human body, seismic wave data are melded to produce images of Earth's interior.

The study, the Yellowstone Geodynamics Project, was conducted during 1999-2005. It used an average of 160 temporary and permanent seismic stations — and as many as 200 — to detect waves from some 800 earthquakes, with the stations spaced 10 miles to 22 miles apart — closer than other networks and better able to "see" underground. Some 160 Global Positioning System



Seismic imaging was used by University of Utah scientists to construct this 3-D picture of the Yellowstone hotspot plume of hot and molten rock that feeds the shallower magma chamber (not shown) beneath Yellowstone National Park, outlined in green at the surface, or top of the illustration. The Yellowstone caldera, or giant volcanic crater, is outlined in red. State boundaries are shown in black. The park, caldera and state boundaries also are projected to the bottom of the picture to better illustrate the plume's tilt. Researchers believe "blobs" of hot rock float off the top of the plume, then rise to recharge the magma chamber located 3.7 miles to 10 miles beneath the surface at Yellowstone. The illustration also shows a region of warm rock extending southwest from near the top of the plume. It represents the eastern Snake River Plain, where the Yellowstone hotspot triggered numerous cataclysmic caldera eruptions before the plume started feeding Yellowstone 2.05 million years ago. (Credit: University of Utah)

stations measured crustal movements.

By integrating seismic and GPS data, "it's like a lens that made the upper 125 miles much clearer and allowed us to see deeper, down to 410 miles," Smith says.

The study also shows warm rock -- not as hot as the plume -- stretching from Yellowstone southwest under the Snake River Plain, at depths of 20 miles to 60 miles. The rock is still warm from eruptions before the hotspot reached Yellowstone.

A Plume Blowing in the 2-inch-per-year Mantle Wind

Seismic imaging shows a "slow" zone from the top of the plume, which is 50 miles deep, straight down to about 155 miles, but then as you travel down the plume, it tilts to the northwest as it dives to a depth of 410 miles, says Smith.

That is the base of the global transition zone -- from 250 miles to 410 miles deep -- that is the boundary between the upper and lower mantle -- the layers below Earth's crust.

At that depth, the plume is about 410 miles beneath the town of Wisdom, Mont., which is 150 miles west-northwest of Yellowstone, says Smith.

He says "it wouldn't surprise me" if the plume extends even deeper, perhaps originating from the core-mantle boundary some 1,800 miles deep.

Why doesn't the plume rise straight upward? "This plume material wants to come up vertically, it wants to buoyantly rise," says Smith. "But it gets caught in the 'wind' of the upper mantle flow, like smoke rising in a breeze." Except in this case, the "breeze" of slowly flowing upper mantle rock is moving horizontally 2 inches per year.

While the crustal plate moves southwest, the warm, underlying mantle slowly boils due to convection, with warm areas moving upward and cooler areas downward. Northwest of Yellowstone, this convection is such that the plume is "blown" east-southeast by mantle convection, so it angles upward toward Yellowstone.

Scientists have debated for years whether Yellowstone's volcanism is fed by a plume rising from deep in the Earth or by shallow churning in the upper mantle caused by movements of the overlying crust. Smith says the new study has produced the most detailed image of the Yellowstone plume yet published.

But a preliminary study by other researchers suggests Yellowstone's plume goes deeper than 410 miles, ballooning below that depth into a wider zone of hot rock that extends at least 620 miles deep.

The notion that a deep plume feeds Yellowstone got more support from a study published this month indicating that the Hawaiian hotspot -- which created the Hawaiian Islands -- is fed by a plume that extends downward at least 930 miles, tilting southeast.

A Common Source for Yellowstone and the Columbia River Basalts?

Based on how the Yellowstone plume slants now, Smith and colleagues projected on a map where the plume might have originated at depth when the hotspot was erupting at the Oregon-Idaho-Nevada border area from 17 million to almost 12 million years ago.

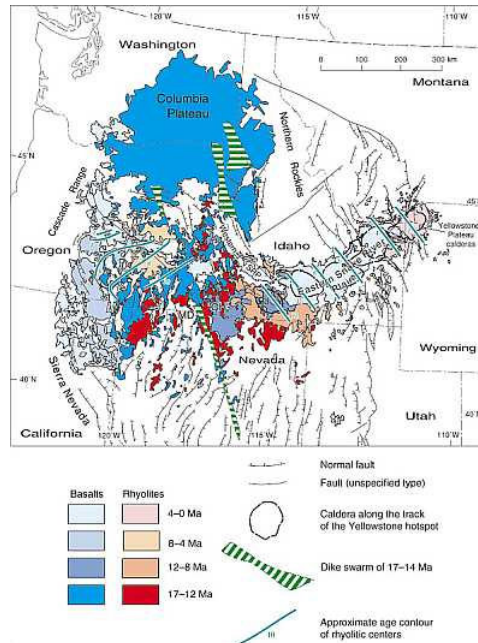
They saw overlap, between the zones within the Earth where eruptions originated near the Oregon-Idaho-Nevada border and where the famed Columbia River Basalt eruptions originated when they were most vigorous 17 million to 14 million years ago.

Their conclusion: the Yellowstone hotspot plume might have fed those gigantic lava eruptions, which covered much of eastern Oregon and eastern Washington state.

I argue it is the common source," Smith says. "It's neat stuff and it fits together."

Smith conducted the seismic study with six University of Utah present or former geophysicists -- former postdoctoral researchers Michael Jordan, of SINTEF Petroleum Research in Norway, and Stephan Husen, of the Swiss Federal Institute of Technology; postdoc Christine Puskas; Ph.D. student Jamie Farrell; and former Ph.D. students Gregory Waite, now at Michigan Technological University, and Wu-Lung Chang, of National Central University in Taiwan. Other co-authors were Bernhard Steinberger of the Geological Survey of Norway and Richard O'Connell of Harvard University.

Smith conducted the gravity study with former University of Utah graduate student Katrina DeNosaquo and Tony Lowry of Utah State University in Logan.



Chapter 2; Lake Varves

While the earth remaineth,
seedtime and harvest,
and cold and heat,
and summer and winter,
and day and night shall not cease.
(Genesis 8:22)

One of the products of the continuing cycles of the seasons can be found on the bottoms of some lakes. Each spring, tiny plants bloom in Lake Suigetsu, a small body of water in Japan. When these one-cell algae die, they drift down, shrouding the lake floor with a thin, white layer. The rest of the year, dark clay sediments settle on the bottom. At the bottom of Lake Suigetsu, thin layers of microscopic algae have been piling up for many years. The alternating layers of dark and light count the years like tree rings. The sedimentation or annual varve thickness is relatively uniform, typically 1.2 mm per yr for present conditions in Lake Suigetsu which is located near the coast of the Sea of Japan. Recently scientists took a 75-m long continuous core from the center of the lake for close analysis including AMS 14C measurements on more than 250 terrestrial macrofossil samples of the annual laminated sediments.

from <http://www.cio.phys.rug.nl/HTML-docs/Verslag/97/PE-04.htm>
by H. Kitagawa, J. van der Plicht

"In order to build up a calendar time scale (i.e., varve chronology) for the Suigetsu (SG) core, a total of 85 subsamples were taken in a section of SG extending from 10.43 to 30.34 m below the top sediment, each ca. 25 cm in length, including a 1.5 cm overlap with neighbouring subsamples. To allow detailed observation of the sediments, the well-cleaned surfaces of sediments were scanned with a digital camera. By means of computer image analysis of digital pictures, we found that the much less distinct varves observed in some intervals during the deglaciation and Glacial could be determined only with a relatively large error. In order to reconstruct a more precise and longer varve chronology for the laminated sediments from Lake Suigetsu, we have reassessed the varve chronology in the whole section during the deglaciation as well as the Glacial up to a depth of 30.45 m.

The uncertainty in the varve chronology comes from two sources: core sampling and varve counting. Detailed comparison with short piston cores shows that the sampling does not cause significant loss of varves - typically 0-2 cm to a maximum of 3 cm, corresponding to ca. 20-30 yr in the Holocene and ca. 50 yr in the Glacial. Since the varve ages from below 18 m (corresponding to ca. 20,000 cal BP) were estimated by varve counting of a single core, the ages quoted should be considered as minimum ages, the error increasing with depth. Based on the results of some duplicated countings of selected subsamples and independent counting of different subsamples collected from the same horizon, we estimate that the counting error is less than 1.5%, corresponding to 150 yr for 10,000 varve years.

From the laminated sediments we selected terrestrial-origin macrofossils such as leaves, branches and insects for AMS 14C measurements. (see note B) The samples are processed using a strong acid-alkali-acid (AAA) treatment for both samples and reference blank materials. The reference blank consists of more than 50 14C-free plant materials collected from the deep layer of the same core (corresponding to an age of ca. 90-100 ka). The Lake Suigetsu floating varve chronology consists of 29,100 varves. The sedimentation or annual varve thickness is relatively uniform (typically 1.2 mm yr⁻¹ during the Holocene and 0.62 mm yr⁻¹ during the Glacial). The age below 30.45 m depth is obtained by assuming a constant sedimentation in the Glacial (0.62 mm yr⁻¹).

In order to reconstruct the calendar time scale, we compared the Lake Suigetsu chronology with calibration curves obtained from recently revised absolute German oak and the floating German pine calibration curves (2). Figure PE-4 shows the best match between the tree-ring and the Lake Suigetsu chronologies, estimated by minimizing the weighted sum of squared differences between the 14C ages of macrofossils and the tree-ring calibration curve. The features in our data overlapping the tree-ring calibration agree very well, even for "wiggles" in the 14C calibration curves. Using this match, we defined the absolute time scale for the Lake Suigetsu varves chronology. The 29,100 yr Lake Suigetsu chronology then covers the absolute age range from 8830 to 37,930 cal BP.

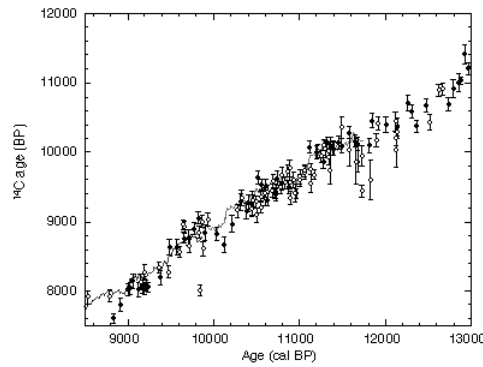


Figure PE-4. Matching of the 29,100-yr long floating varve chronology from Lake Suigetsu to the absolute chronology. \bullet = Lake Suigetsu (Japan); \circ = Lake Gosciadz (Poland). Continuous lines show the German oak and pine chronologies fixed by comparison with the varve chronology of Lake Suigetsu.

The combined ^{14}C and varve chronologies from Lake Suigetsu are used to calibrate the ^{14}C time scale beyond the range of the absolute tree-ring calibration. Figure 2 shows an atmospheric ^{14}C calibration for the complete ^{14}C dating range (less than 45 ka). The tree-ring calibration range, our calibration agrees well with the European sediments (3) and generally with marine calibrations obtained by combined U/Th and ^{14}C dating of corals (4,5). ...

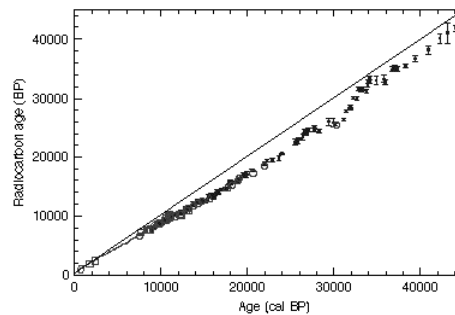


Figure PE-5. Atmospheric radiocarbon calibration for almost the complete ^{14}C dating range (less than 45 ka cal BP) reconstructed from annually laminated sediments from Lake Suigetsu (Japan). \bullet with 1-p bars = Lake Suigetsu, \circ , \sim and O correspond to U-series based ^{14}C calibration on corals."

The results from just one source could possibly be readily contested, but in this case the scientists have correlated the results from multiple sources including that of Lake Gosciadz (Poland), German oak and pine tree ring chronologies and also calibrations from coral data. Many in the scientific community are proposing the result of the above study as a "calibration" to radiometric C^{14} data, see note A. Also the data seems to indicate no more than a 16.7 percent error due to deviation of C^{14} in the atmosphere for the past 40,000 years.

Table 2
Recent dates for termination of Younger Dryas

Age (yr B.P.)	Location/Method	Reference	Comment
$> = 10,970$	Centr. European dendrochronology	1	stable isotopes on tree rings
$10,630 \pm 183$	Lake Holzmaar, varve counting	2	pollenzones, lithozones
$10,986 \pm 69$	Lake Soppen, varve counting	3, 4	pollenzones
11,100	U-Th dated corals	5	based on an age of 9700 ^{14}C yr B.P.
$11,200 + 500 - 200$	Lake Gosciadz, varve counting	6	isotopic and CaCO_3 data
$11,550 \pm 70$	GRIP ice core, layer counting	7	isotopic and other data, preliminary
$\sim 11,460$	GISP 2 ice core, layer counting	8	isotopic and other data

1: Kromer and Becker (1992). 2: Zolitschka et al. (1992). 3: Hajdas-Skowronek (1993). 4: Hajdas et al. (1993). 5: Bard et al. (1992). 6: Rozanski et al. (1992). 7: Johnsen et al. (1992). 8: Kapsner et al. (1995).

The above Table 2 from Palaeo 122(1996)p.114 summarizes published data concerning one proposed event, the termination of the Younger Dryas period, and illustrates the range of dating errors from various sources including tree rings, lake varves, coral dating and the Greenland ice cores. At the extremes there is a range from 10,447 to 11,700 year B.P.. The average being 11,074 yr B.P. plus or minus 627 years, a plus or minus 5.7 percent error range.

Conclusion: The apparent close correlation of the dating results from multiple sources appears to be strong evidence for an earth much older than 10,000 years!

And evidence that properly conducted C^{14} radiometric dating can approach reasonable accuracy, possibly within better than 10 percent.

Note A: The Radiocarbon age scale vs the 'real' (calibrated) years age scale.

from <http://www.esd.ornl.gov/projects/qen/nerc14C.html>

Most information on the past 30,000 years or so is from sites or specimens that have been dated using radiocarbon (^{14}C). However, the radiocarbon age scale that would be calculated from first principles (based on the decay rate of the ^{14}C isotope, assuming that ^{14}C was at the same level of abundance as it is at present) is not always reliable, because there have been fluctuations in the rate of production in ^{14}C at the top of the atmosphere. The problems are particularly great at about 10,000 ^{14}C y.a., when a large influx of ^{14}C -depleted carbon from the oceans, combined with a decrease in the rate of ^{14}C production at the top of the atmosphere, gives an 'age plateau' such that the same ^{14}C age covers a wide span of real time, about 1,000 years. Other dating methods (e.g. U/Th) can be used to attempt to check the 'true' age of specimens or sediment layers dated by ^{14}C , although these all have substantial error margins of their own. The most convincing way to check the ^{14}C age scale is through biological or sedimentological features which build up annual layers over long periods of time (e.g. tree rings, and annual layers of sediment building up on lake beds); counting back the annual layers will reveal the true number of years before the present, and comparing the ^{14}C age of each tree ring or sediment layer will give an age scale for how ^{14}C age can be converted into 'real' age. However,

even this method is not completely reliable; 'false' double rings can sometimes appear, and occasionally a year may not appear in the record. Because of these problems, individual ring or layer-counting studies often suggest 'real' ages differing from one another by several percent, though they all suggest that the 'real' age is older than the 14C age before about 3,000 years ago. The most recent working consensus (adopted by papers in leading Quaternary journals e.g. Dahl & Nesje 1996) 14C-to-real age conversion scale is given below, but because it is possible that opinions on the appropriate age conversion will change as more data come in, the time slices of the maps are presently described according to a 14C age scale. The reader can use this preliminary age scale as a guide to the likely true age of each of the time slices and vegetation distributions given on this page and on the QEN Pages. Useful sources on the current understanding of the radiocarbon timescale include Kilian et al. (1995), Goslar et al. (1995) and Stuiver et al. (1993). For times before 12,000 14 y.a., the table is mainly based upon the multi-source curve published by Kitagawa & van der Plicht (1998).

It is necessary to bear in mind that quite apart from all the problems of calibration, a significant proportion of radiocarbon dates are not reliable for any purposes, because they have been contaminated with older or younger carbon that changes the apparent age of the sample. Many radiocarbon-dating specialists still refer to their field as 'more an art than as science!' Published radiocarbon dates from sites and layers of fossils and sediments are quite often rescinded, when the materials are found to have been naturally contaminated. Most often the contamination is from older (less 14C-rich) calcium carbonate, coal or charcoal washed in from other layers, making a sample or layer seem older than it actually is. Although radiocarbon dating is a very useful tool for the Quaternary palaeoecologist, it must always be interpreted with caution.

14C years ago=>Calibrated ('real') years ago

1,000 =>	1,000
2,000 =>	2,000
2,500 - 2,800 =>	2,600
(sudden shift in atmospheric 14C content)	
3,000 =>	3,200
4,000 =>	4,500
5,000 =>	5,900
6,000 =>	6,950
7,000 =>	7,900
8,000 =>	8,900
9,000 =>	10,000
10,000 =>	11,200 - 12,200
('radiocarbon plateau')	
11,000 =>	12,900
12,000 =>	14,000
13,000 =>	14,500
15,000 =>	17,000
16,000 =>	19,500
17,000 =>	21,000
18,000 =>	22,500
20,000 =>	24,500
25,000 =>	28,000
30,000 =>	35,000
40,000 =>	45,000

Note B: CHILL-10,000 sampling protocol for AMS radiocarbon dating

by
Hilary H. Birks & André F. Lotter
from <http://www.cx.unibe.ch/sgi/Dating.htm>

In contrast to conventional radiocarbon decay-counting, AMS radiocarbon dating requires sample sizes that are substantially smaller. Generally, a sample size of between 1-2 mg organic carbon is needed for AMS radiocarbon dating. This varies between laboratories, so it is wise to check with your laboratory before proceeding. Besides the advantage of allowing a better stratigraphic resolution (i.e. slices of 0.5-1 cm instead of e.g. bulk sediment samples using 5-10 cm of the core) we have also to take into consideration that when dealing with such small samples a small amount of contamination will lead to a substantial deviation of the 'true' radiocarbon age. Therefore, Schumacher's (1973) approach should not be followed here.

The standard procedure of sample preparation adopted by the different CHILL-10,000 projects should follow the protocol listed below:

Separation of terrestrial plant macrofossils from the sediment

1. Cut the wet core into suitable slices. Avoid sampling slumps or turbidites as they may include older, reworked material.
2. Do not store these samples more than a few weeks in the refrigerator (see Wohlfarth et al., 1998). If you cannot proceed immediately, it is best to deep-freeze the samples.
3. Sieve the sample through a 250 mm mesh. NB, if macrofossil analysis is to be done on the sample(s), sieve through a 125 mm mesh to retain small seeds etc.
4. If the sediment will not break down immediately, soak it under water in a clean beaker with a lid. If necessary, sediment breakdown can be assisted by adding a small teaspoon of tetra-sodium diphosphate - 10-hydrate crystals Na₄P₂O₇·10H₂O, a.k.a. sodium pyrophosphate, or Calgon water softener. Shake to dissolve the powder and stand overnight or as long as necessary in the refrigerator. If the sediment is calcareous, treatment with 10% HCl may be desirable. If it is humified peat, treatment with 10% KOH may be desirable.
5. Sieve the sample. It may be useful to use a selection of mesh sizes. If macrofossil material is sparse, save the sediments >125 mm in addition to the larger fractions.
6. Store the sieved material under water in clean beakers with lids, both clearly labelled, in the refrigerator. If you cannot proceed immediately, deep-freeze the samples.

Selection of material for dating

1. Disperse a little of the material in water in a clean shallow (petri) dish. Under a stereo-microscope, magnification ca. 12x, pick out the plant fragments with soft (entomological) forceps. It may be useful to separate the different types, e.g. mosses, leaves, seeds, etc. for easier identification, or selection of one sort of material. The material for dating should be identified.
2. Remove any adhering sediment or other material with a small brush or forceps.
3. Under the microscope, pick out the remains once more, carefully avoiding sediment and any dust, hairs etc. and place them in water in a new clean container. This is a washing process.
4. Pick out the remains again and place them in a dry, dust-free box or glass. Let the sample dry, covered, at room temperature or at ca. 50°C in an oven overnight.
5. Weigh the sample to ensure you have enough material for dating, as required by your dating laboratory. Although some

laboratories can use as little as 2 mg dry material, to produce sufficient carbon it is usually best to submit at least 12 mg. For d13C measurements, 20 mg is required.

6. Control the dry sample once more for dust or clothing hairs. Wool hairs for example will make the sample 'younger'; synthetic oil-derived hairs will make the sample 'older'. With such small samples it is very important to do this.

7. Sterilize a glass vial at 600°C for 3 minutes. Place the clean sample in it. Label both the vial and the lid. Glass containers are preferable, as plastic suffers from static electricity which makes the fragments jump about.

8. The dry samples can be stored as necessary in a dark cold-room until being sent to the laboratory.

Steps 1-4 can be carried out in a laminated air flow chamber to reduce the chances of contamination by air-borne dust and clothing hairs. Important: As AMS samples are very small, already small amounts of fungal or bacterial biomass may easily contaminate the samples. Therefore, care should be taken to avoid this at all stages in the preparation; by proceeding rapidly, and by storing the samples in a dark refrigerator between stages. If delay is unavoidable, the material should be deep frozen. Samples should never be left in water at room temperature, as fungal growth can be extremely rapid. Samples that have been stored in this way, or in organic liquids (e.g. alcohol, glycerol etc.) should not be used for dating or d13C measurements. Working conditions should be as clean as possible, and care should be taken to remove all dust, hairs, etc from containers before use, and to control the samples for these contaminants as outlined above. With larger fragments, such as wood, do not handle them with your fingers.

Before sending off the samples for dating, note the following data in your lab journal:

- lake
- core ID, segment, date of coring
- core depth (relative and absolute) of sample
- date of macrofossil processing, chemical treatment
- what plant material is used for dating (e.g. 5 Abies needles, 20 Betula fruits, etc.)
- dry weight of submitted material
- expected age

When reporting the radiocarbon ages in publications, the following information should be given (see Stuiver & Polach, 1977):

- sample depth or code
- dating lab sample number
- material dated
- radiocarbon age $\pm 1\text{sd}$
- calibrated age (as cal years BP)
- d13C if measured

For calculating accumulation rates for biotic and abiotic variables within the framework of CHILL we suggest using a chronology that is based on a calendar age-scale. Calibration of radiocarbon ages can be done with various programs. The most commonly used is CALIB 3.0 (Stuiver & Reimer, 1993). This software can be downloaded from the WWW (<http://depts.washington.edu/qil/>). Caution should, however, be used when calibrating late-glacial radiocarbon ages (i.e. >10,000 14C BP), because this software uses the coral-derived U/Th dates that as yet are sparse, and not verified yet by independent chronologies. The next version, CALIB 4.0, will be available at the end of 1998. It uses the revised Hohenheim dendrochronology, and for ages >10,000 BP, it incorporates more coral U/Th measurements and the laminated Cariaco Basin data back to ca. 14,500 14C BP (Hughen et al., 1998). In addition, a new calibration data set from Lake Suigetsu, Japan, is now available back to ca. 40,000 14C BP (Kitagawa & van der Plicht, 1998). This chronology is based on AMS dates of terrestrial plant material from annually laminated lake sediments (see Radiocarbon 40, 1998, and the calibration issue of Radiocarbon to be published in late 1998).

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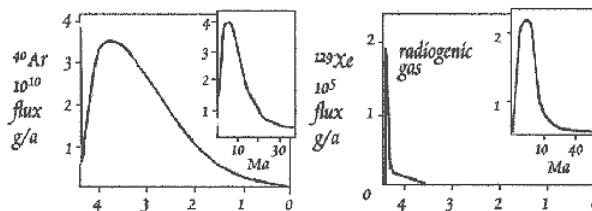
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28.October 1998

Chapter 3; Atmospheric Argon

The existing atmosphere surrounding the earth contains a little less than one percent of the inert gas Argon, an approximate total of 6.59×10^{19} grams. The isotope Argon-40 (^{40}Ar) is 99.6 percent of the total Argon. The only known source of ^{40}Ar is the radioactive decay of Potassium-40 (^{40}K), of which 11.2 percent decays into ^{40}Ar and the remainder into Calcium-40 (^{40}Ca). The lithosphere (outer layers) of the earth has been estimated to be 2.59 percent Potassium, of which about 0.01167 percent is ^{40}K . An approximately total of 5×10^{21} grams of ^{40}K in the earth of which 11.2 percent could eventually decay into ^{40}Ar . ^{40}K has a half life of 1.26 billion years (1.26×10^9). To generate the amount of ^{40}Ar in the atmosphere would require in round numbers 250 million years. However the model of an 4.5 billion year old earth would estimate that around 90 percent of the ^{40}K had decayed, so originally there could have been around 50×10^{21} grams which would decrease the generation time to about 25 million years.

But ^{40}Ar within the earth is only a small part of the story! Just because you have generated the required amount of ^{40}Ar due to decay within the earth does not mean that it will all appear in the atmosphere in a short time. Instead the majority will be trapped within the rocks of the earth until it can somehow be released to the atmosphere by some type of volcanic event. When the rocks containing the ^{40}Ar are heated to the molten state the gas will escape to the atmosphere except when it is at considerable depth and then the pressure will allow less of the gas to escape. Since there is at present relatively little volcanic action on the earth, in main that at the mid-ocean ridges and a few other isolated volcanic areas, ^{40}Ar gas is released to the atmosphere at a very slow rate of approximately 2.2×10^9 grams per year. The figure below represents a plot of the rate of Argon release to the atmosphere, called outgassing, that has been proposed by one scientific study.



from ref. http://www.geo.cornell.edu/geology/classes/Geo656/00notes/656_00Lecture25.pdf

These theories provide for a much faster outgassing rate and of course allows the present atmospheric Argon levels to be developed in 4.5 billion years since that is the age of the earth that many scientists propose. The plot of the ^{129}Xe is of interest to us only because the study used the known decay rate of ^{129}I to ^{129}Xe and the present atmospheric content of ^{129}Xe to derive the proposed degassing rate. This is possible because ^{129}I has a short half life of 17 million years and today for all practical purposes no longer exists in the earth. Then using this information along with the known decay rate of ^{40}Ar they were able to arrive at a proposed degassing rate with an initial "burp" of degassing with the early earth in a molten state. As the earth solidified the degassing rate then entered a second slower phase.

The question is are there any other possibilities that would allow for the atmospheric Argon to be developed in a very short time, less than 10,000 years?

a) Could the early earth have had a much higher level of ^{40}K ?

To generate the required amount of ^{40}Ar in less than 10,000 years would require levels of ^{40}K at over 10,000 times the present levels. And then the short time allowed for decay would result in better than 99.8 percent of these high levels remaining at present. Therefore this option can be ruled out!

b) Possibly during the early stages of creation the decay mode was different and most all, or a very high percentage, of the ^{40}K became ^{40}Ar .

This could possibly provide up to about an eight fold acceleration in generation of Argon, but well short of the required 10,000 fold increase.

c) Could the early earth being in a molten state allowed a very rapid outgassing rate, fast enough to allow the majority of the Argon to be generated on the first day?

As mentioned there is an indication of an early "burp", but the time required for a considerable amount of ^{40}Ar to be generated in the earth limits the magnitude of this initial outgassing phase. And also "And the Spirit of God moved upon the face of the waters." of Genesis 1:2 indicates a earth during day one that had a surface cool enough for liquid water to be present. So if the earth was initially in a molten state it could only be for part of day one. Thus requiring a very long day one or ruling out this proposal.

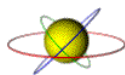
d) Some have proposed that the impacts of gaseous comets provided the main source for the early earth atmosphere. The interpretation of the early Genesis record to require creation within 6 literal days would not allow time for these proposed turbulent conditions on the earth to settle down to a reasonable steady state following such catastrophic collisions. For this to have been the source of much of the early atmosphere would again require a long day one.

e) Some have proposed a very rapid burst of radioactive decay at the beginning of creation, a condition that does not fit the laws of physics as we presently know them.

Such a burst could only be present during day one and day two of the creation or it would seem to subject all of the early life forms to a greater than "Chernobyl" radioactive condition which would seem to be incompatible with the development of life. "That variations in the ratio of ^{129}Xe to other Xe isotopes as observed suggests (1) the Earth formed shortly (within 170 Ma) after a nucleosynthetic event (probably a supernova), and (2) a substantial fractionation of I from Xe must have occurred early in Earth's history. So ^{129}Xe variations provide clues to the early degassing history of the Earth." These conclusions are contrary to this proposal and is the best science available today. Scientists have experimented and theorized about some means of increasing the isotope decay rate, for to do so might be advantageous say in energy generation, but to date no such method or possible theory has been discovered.

Conclusion: The total amount of ^{40}Ar in the atmosphere today and the results of studying the concentrations of the other noble gas levels in the atmosphere and in the earth is another strong indicator of a old age earth.

Chapter 4: Age of the Earth as indicated by Missing Isotopes



from http://www.don-lindsay-archive.org/creation/isotope_list.html

The 84 elements found on Earth occur as 339 isotopes. Only 269 of these are stable, and the other 70 are radioactive. An additional 1650 radioactive isotopes have been created in nuclear reactors and in particle accelerators.

The following is a table of all 29 known radioactive isotopes that have a half-life of one million years or more, and that are not being continually produced by natural nuclear reactions (see Note A). It has been sorted in order of half-life. For each isotope, the table shows whether it is one of the ones found on Earth.

Isotope	Half-Life (megayears)	Found on Earth?
Vanadium 50	6,000,000,000	yes
Neodymium 144	2,400,000,000	yes
Hafnium 174	2,000,000,000	yes
Platinum 192	1,000,000,000	yes

Indium 115	600,000,000	yes
Gadolinium 152	110,000,000	yes
Tellurium 123	12,000,000	yes
Platinum 190	690,000	yes
Lanthanum 138	112,000	yes
Samarium 147	106,000	yes
Rubidium 87	48,800	yes
Rhenium 187	43,000	yes
Lutetium 176	35,000	yes
Thorium 232	14,000	yes
Uranium 238	4,470	yes
Potassium 40	1,250	yes
Uranium 235	704	yes
Samarium 146	103	no
Plutonium 244	82	by extreme effort (see Note B)
Curium 247	16	no
Lead 205	15	no
Hafnium 182	9	no
Palladium 107	7	no
Cesium 135	3	no
Technetium 97	3	no
Gadolinium 150	2	no
Zirconium 93	2	no
Technetium 98	2	no
Dysprosium 154	1	no

The thing to notice is that this list falls naturally into two halves. Short-lived radioactives are suspiciously absent from the Earth. If we had carried this list all the way down to 1,000 year half-lives, the block of no's would be 37 long instead of 10 long.

The most obvious explanation for the above is that all these elements were present when the Earth was formed (see Note C), but by now the short-lived ones have decayed away. This explanation is compatible with the age scientists accept for the Earth (see Note D).

Of course, nothing about this list really proves that the Earth is old. But the list is exactly what we would expect if the Earth is old, and it is a very puzzling list if the Earth is young.

Footnotes:

- Note A; The list is of isotopes not being continually produced on Earth. I left out four isotopes because of this rule.
 - Manganese 53 and Beryllium 10 are produced by cosmic-ray radiation hitting dust in the upper atmosphere.
 - Uranium 236 is produced in uranium ores by neutrons from other radioactives.
 - Iodine 129 is produced from Tellurium 130 by cosmic-ray muons.

Radioactives with half-lives shorter than one million years are also produced: for example, Carbon 14 with a half life of 5730 years.

- Note B: The missing isotopes could have been present when the Earth was formed. It is reasonable to ask if they are missing because they were somehow never created in the first place. The answer is that they are not particularly difficult to produce "artificially", and current scientific theories about stars and supernovas say that these elements should have been produced in fairly large quantities. For example, Technetium 97 is in the no list above, but it has been detected in stars. One recent scientific theory about stars proposes how they manufacture Technetium 97 (see Note D) and also how Supernova 1987a manufactured Cobalt-56. (Supernova 1987a was special because it was not very far away. Theory predicts that such a supernova would create about 0.1 solar masses of nickel-56, which is radioactive. Nickel-56 decays with a half-life of 6.1 days into cobalt-56, which in turn decays with a half-life of 77.1 days. Both kinds of decay give off very distinctive gamma rays. Analysis of the gamma rays from SN1987a showed mostly cobalt-56, exactly as predicted. And, the amount of those gamma rays died away with exactly the half-life of cobalt-56.)

- Note C: The list is essentially compatible with the age many scientists propose for the earth. That age is 4.55 billion years. For most practical purposes, a radioactive material is no longer present after 10 or 20 of its half-lives. This is because 2^{10} is about a thousand, and 2^{20} is about a million. So, after 20 half-lives, only one millionth of the original amount remains.

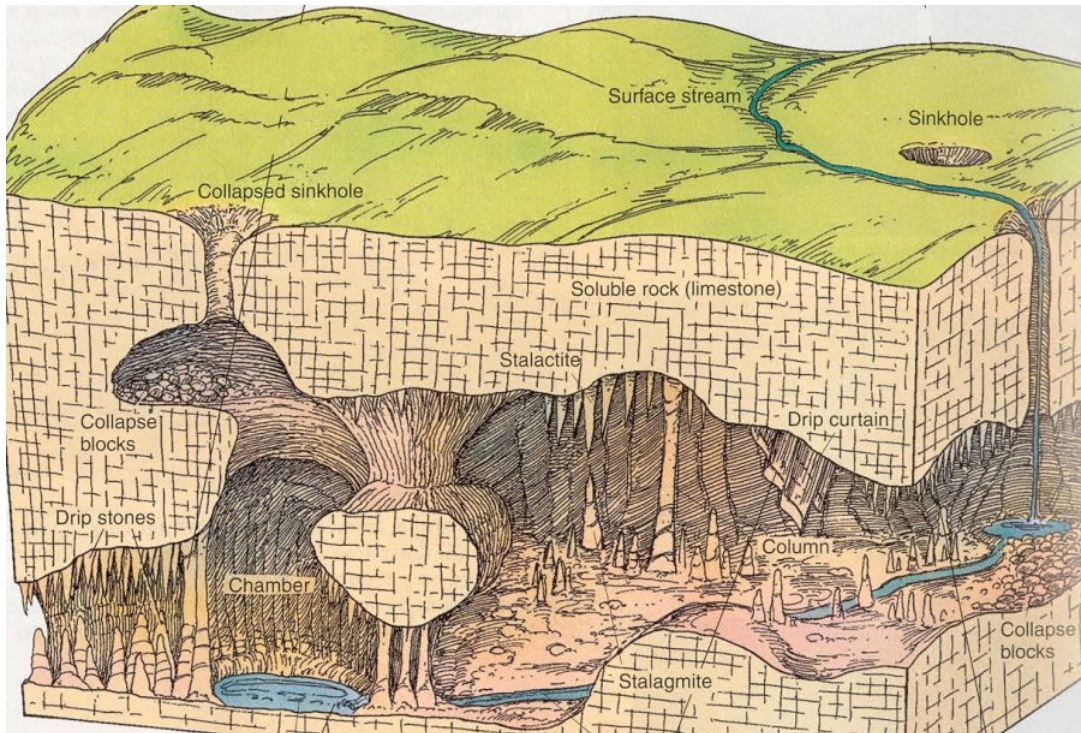
Uranium 235's half life is 704 million years, so 4.55 billion years is just a bit over six half-lives. It's reasonable for Uranium 235 to still be around in small quantities after that amount of time. And, in fact, it makes up about one percent of the Uranium now on Earth. The amounts of Uranium 235 and Uranium 238 would have been about equal, 4.55 billion years ago.

- Note D; Finding Plutonium 244. Its half life is 82 million years, so 4.55 billion years is 55 half lives. You might reasonably ask how come Plutonium 244 isn't listed as *no*. The answer is that someone made a very serious effort to find it: their article is referenced below. Eighty five kilograms of molybdenum ore were chemically concentrated, and then the lot was tediously run through a mass spectrometer. The amount of Plutonium 244 they found, 10^{-14} grams, was so small that it would have averaged one single radioactive decay every six years. Clearly, they could not have detected this Plutonium 244 with a geiger counter. However, 55 half lives ago, it would have been about one kilogram of plutonium metal. That's believable in 85 kilograms of metal ore.

Samarium 146's half life is 103 million years, so 4.55 billion years is 44 half lives. This means that Samarium 146 could be 200 billion times rarer than Uranium 235, but could be a thousand times commoner than Plutonium 244. I predict that if anyone tries very very hard to find Samarium 146, they will succeed. Curium 247, at almost 300 half lives, is completely out of the question."

Conclusion: In short, the cutoff point in the list of isotopes is consistent with a old earth.

Chapter 5; Caves and Caverns



- There are about 17,000 known caves in the United States. They occur in every State except Rhode Island and Louisiana. About 125 caves have been opened to the public for study and enjoyment. (China or Russia may have more but there statistics are not well developed.)
- The cave system with the greatest total length of surveyed passage is Mammoth Cave Kentucky, USA) at 591 kilometers (367 mi) in length. This record is unlikely to be surpassed in the near future, as the next most extensive known cave is Jewel Cave near Custer, South Dakota, at 225 kilometers (140 mi).
- The deepest known cave (measured from its highest entrance to its lowest point) is Voronya Cave (Abkhazia, Georgia), with a depth of 2,191 meters (7,190 ft). This was the first cave to be explored to a depth of more than 2 kilometers (1.2 mi). (The first cave to be descended below 1 kilometer (0.62 mi) was the famous Gouffre Berger in France.) The Ilyuzia-Mezhonnogo-Snezhnaya cave in Abkhazia, Georgia, (1,753 meters (5,750 ft)) and the Lamprechtssofen Vogelschacht Weg Schacht in Austria (1,632 meters (5,350 ft)) are the current second- and third-deepest caves. The deepest cave record has changed several times in recent years.
- The deepest vertical shaft in a cave is 603 meters (1,980 ft) in Vrtoglavica Cave in Slovenia. The second deepest is Patkov Gušt at 553 meters (1,810 ft) in the Velebit mountain, Croatia.
- The largest room ever discovered is the Son Doong Cave in Phong Nha-Ke Bang National Park in Quang Binh Province, Vietnam. Explored by British cave scientists of the British Cave Research Association, it is now regarded as the largest cave passage in the world. The biggest passage of Son Doong is over five kilometers in length, 200 meters high and 150 meters wide.
- The largest stalagmite "Goliath" Cathedral Caverns State park, Grant Alabama. It measures 45 feet tall and 243 feet in circumference.
- The tallest stalagmite of the world in a cave in Zhi Jin Cave, Hen Hitting Cave, Zhejiang province, about 70m tall (230 feet).

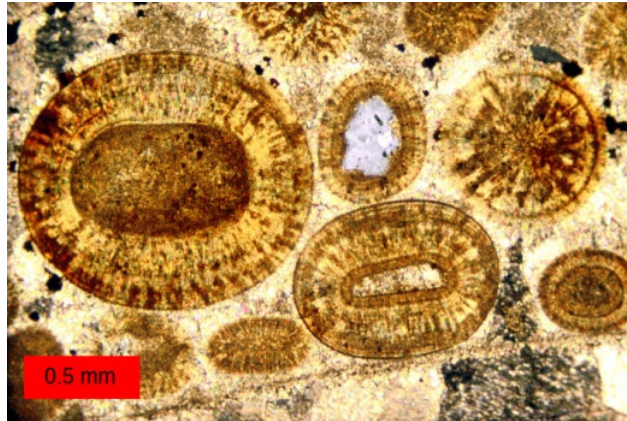
Cave Formation

First you need a suitable rock formation of soluble material. This is no small feat in itself since the primary source of the calcite in limestone is most commonly marine organisms. These organisms secrete shells that settle out of the water column and are deposited on ocean floors as pelagic ooze or alternatively are conglomerated in a coral reef. Bands of limestone emerge from the Earth's surface in often spectacular rocky outcrops and islands. Examples include the Burren in Co. Clare, Ireland; the Verdon Gorge in France; Malham Cove in North Yorkshire and the Isle of Wight, England; on Fårö near the Swedish island of Gotland, the Niagara Escarpment in Canada/United States, and Notch Peak in Utah. The world's largest limestone quarry is at Michigan Limestone and Chemical Company in Rogers City, Michigan.

Limestone is a very common sedimentary rock of biochemical origin which makes up about 10% of the total volume of all sedimentary rocks. It is composed mostly of the mineral calcite. Sometimes it is almost pure calcite, but most limestones are filled with lots of other minerals and sand and they are called dirty limestones. The calcite is derived mostly from the remains of organisms such as clams, brachiopods, bryozoa, crinoids and corals. These animals live on the bottom of the sea and when they die their shells accumulate into piles of shelly debris. This debris can then form beds of limestone. Some limestones may have been derived from non-biogenic calcite formation. Limestones form usually close to the source of shelly debris although some significant transport can occur. **Great sources for limestone are reefs. Reefs have been in existence for most of the history of life on Earth, but they have changed in the species that build them. Stromatolites, which are complex living structures of more than one organism (cyanobacteria and algae), formed the first reef like structures in the Cambrian Period. Early reefs in the Ordovician were composed of small crinoidal, bryozoan and brachiopod reef communities. In the Devonian, reefs became extremely large with tabulate and solitary corals starting to dominate, but brachiopods and crinoids still significant contributors. Some**

Cretaceous reefs really took on some huge proportions and were dominated by large, now extinct mollusks called rudist. Since those times, modern corals and bivalves (clams) have been the prime reef building organisms.

Permian limestone in which Carlsbad Caverns formed



Jurassic limestone in Utah



Corals and Stromatoporid in Devonian Limestone from Hopesnose,UK.

The Devonian Period is known as the "Age of Fishes" because almost all known groups of fish appear during the Devonian period. It was also the "age of ancient coral" because more types of coral (now extinct) appear in the Devonian than any other period.

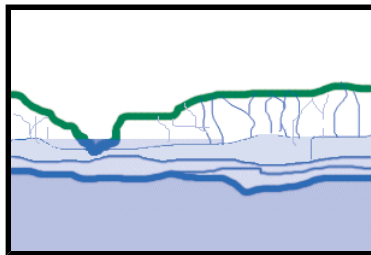
ERA	PERIOD	
Cenozoic	Quaternary	
	Tertiary	Neogene
		Paleogene
Mesozoic	Cretaceous	
	Jurassic	
	Triassic	
Paleozoic	Permian	
	Pennsylvanian	
	Mississippian	
	Devonian	
	Silurian	
	Ordovician	
	Cambrian	



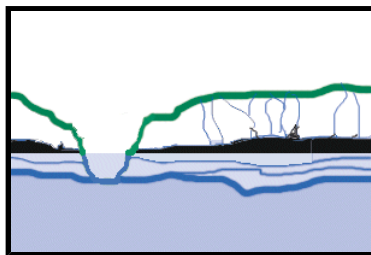
Stromatolites of Cambrian age in Hoyt Limestone at Lester Park, NY

Then the sea must retreat to expose the limestone deposit and slowly a cave is formed where there is bedrock of karst, or limestone. The water, carrying on its chemical reactions travel through cracks in the limestone, slowly dissolving the rock and enlarging the crevice. The runoff descends to the water table, the level of whatever river or lake is closest. As the acidic water moves to the river or lake, it dissolves more limestone, widening its underground channel and drawing in more ground water with it. In time, a main horizontal underground stream is formed, with pools, and tributaries. If the water table drops, either because the ground rises or the river cuts a deeper channel, the water once again trickles through crevices to make a lower level. The original streambed drains downward and as water drips through it to the lower level, it makes incredible formations in the open cave.

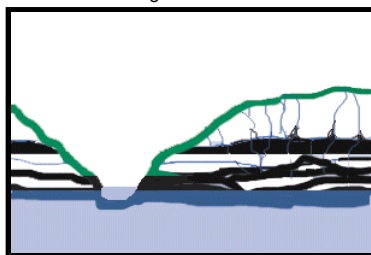
text and photos by Carla Sikorski



Acidified surface water finds it's way through crevices in the limestone. The water makes it's way to the water table and then flows toward the river.



As the river erodes it's bed, the water table drops and the acidified water falls through the larger channels that have been carved. It enlarges the vertical shafts, carving a larger channel.



More erosion drops the water level more. The cave drains through the floor. Cave formations begin in the drained cavern and a new cavern begins at the new level of the water.



Using precision dating and chemical sample techniques cave stalagmites can be used to study climate change

Cave Records Provide Clues To Climate Change

ScienceDaily (Oct. 1, 2007) — When Georgia Tech Assistant Professor Kim Cobb and graduate student Jud Partin wanted to understand the mechanisms that drove the abrupt climate change events that occurred thousands of years ago, they didn't drill for ice cores from the glaciers of Greenland or the icy plains of Antarctica, as is customary for paleoclimatologists. Instead, they went underground.

Growing inside the caves of the tropical Pacific island of Borneo are some of the keys to understanding how the Earth's climate suddenly changed - several times - over the last 25,000 years. By analyzing stalagmites, the pillar-like rock formations that stem from the ground in caves, they were able to produce a high-resolution and continuous record of the climate over this equatorial rainforest.



"These stalagmites are, in essence, tropical ice cores forming over thousands of years," said Partin. "Each layer of the rock contains important chemical traces that help us determine what was going on in the climate thousands of years ago, much like the ice cores drilled from Greenland or Antarctica."

One cross section of a stalagmite used to collect data.

The tropical Pacific currently plays a powerful role in shaping year-to-year climate variations around the globe (as evidenced by the number of weather patterns influenced by the Pacific's El Niño), but its role in past climate change is less understood. Partin and Cobb's results suggest that the tropical Pacific played a much more active role in some of the abrupt climate change events of Earth's past than was once thought and may even have played a leading role in some of these changes.

Polar ice cores reveal that the Northern Hemisphere and the Southern Hemisphere each have their own distinct patterns of abrupt climate change; the tropical Pacific may provide the mechanistic link between the two systems. Understanding how the climate changes occurred and what they looked like is important to helping scientists put into context the current trends in today's climate.

The research team collected stalagmites from the Gunung Buda cave system in Borneo in 2003, 2005 and 2006. Analyzing three stalagmites from two separate caves allowed the pair to create a near-continuous record of the climate from 25,000 years ago to the present. While this study is not the first to use stalagmites to examine climate over this time period, it is the first to do so in the tropical Pacific. Typically, in these types of studies, only one stalagmite is analyzed, but Partin and Cobb compared their three stalagmite records to isolate shared climate-related signals.

Stalagmites are formed as rain water, mixed with calcium carbonate and other elements, makes its way through the ground and onto the cave floor. As this solution drips over time, it hardens in layers, creating a column of rock.

Partin and Cobb cut open each stalagmite and took 1,300 measurements of their chemical content to determine the relative moisture of the climate at various periods in history starting from the oldest layers at the bottom to the present at the top. They dated the rocks by analyzing the radioactive decay of uranium and thorium, and determined the amount of precipitation at given times by measuring the ratio of oxygen isotopes.

"Our records contain signatures of both Northern and Southern Hemisphere climate influences as the Earth emerged from the last ice age, which makes sense given its equatorial location," said Cobb. "However, tropical Pacific climate was not a simple linear combination of high-latitude climate events. It reflects the complexity of mechanisms linking high and low latitude climate."

For example, Partin and Cobb's records suggest that the tropical Pacific began drying about 20,000 years ago and that this trend may have pre-conditioned the North Atlantic for an abrupt climate change event that occurred about 16,500 years ago, known as the Heinrich 1 event.

"In addition, the Borneo records indicate that the tropical Pacific began to get wetter before the North Atlantic recovered from the Heinrich 1 event 14,000 years ago. Perhaps the tropical Pacific is again driving that trend," said Partin.

"Currently our knowledge of how these dramatic climate changes occurred comes from just a few sites," said Cobb. "As more studies are done from caves around the world, hopefully we'll be able to piece together a more complete picture of these changes. Understanding how the dominoes fell is very important to our understanding of our current warming trend."

These findings are published in the Sept 27, 2007 issue of the journal Nature.

Dating earthquakes, Written in stone

Oct 2nd 2008
From *The Economist* print edition

A new way of detecting ancient earthquakes

ON DECEMBER 16th 1811, the residents of New Madrid, Missouri, were startled out of their beds by a huge earthquake, which was quickly followed by a second. Those who survived the catastrophe reported that cracks opened in the earth's surface, that the ground rolled visibly in waves and that large areas of land sank downwards. The crew of the *New Orleans*, the first steamboat to ply the Mississippi, told locals that they had moored on an island the evening before the earthquake only to discover that it was gone in the morning. People in places as far away as Boston declared that they heard church bells ringing at the time the earthquake happened.



Small white stalagmites. Insert: one stalagmite cut vertically in half, showing generations of growth with the white one on top.

That huge earthquakes occur in parts of North America outside their traditional habitat on the Pacific margin is well known from accounts like those from New Madrid. Such records, however, have been kept only since Europeans arrived, so it has been hard to work out how active the faults that cause them are. Now it is a little easier. A study carried out by Samuel Panno of the Illinois State Geological Survey and his colleagues has revealed that nearby caves store the dates of past earthquakes in stone.

Dr Panno and his team found their recording angel in the form of stalagmites, the conical projections that grow on the floors of limestone caves. (The structures that hang down above them are called stalactites.) They made their discovery when they were using a radioactive dating technique to check the ages of small stalagmites occupying a number of caves in the Midwest. Many of these stalagmites, they found, had come into existence at about the same moment, and that moment coincided with the New Madrid earthquake.

This makes sense. Stalagmites form when water trickles through crevices in a cave's ceiling and drips to the floor. Each drop carries with it a quantity of dissolved calcium carbonate (the defining ingredient of limestone) that it has picked up while flowing through the rock above. When a drop lands, some of this mineral is deposited at the landing site, where it accumulates, forming a stalagmite. A paper to be presented at a meeting of the Geological Society of America in Houston on October 5th by Dr Panno's colleague Keith Hackley suggests that when large earthquakes shake the ground, new cracks in cave ceilings open. The result is the formation of a new generation of stalagmites.

Like trees, stalagmites are often composed of concentric layers that represent annual growth periods. Counting the layers is one way of assessing how old a stalagmite is. But radioactive dating provides a second, and sometimes more accurate, assessment. In this case the geologists drilled into the stalagmites and estimated their age from the way that uranium decays into an isotope of thorium. Many, they found, dated back to 1811, while others began life in 1917, the date of another nearby earthquake.

Subsequent investigation has confirmed a further seven big earthquakes previously suspected to have happened over the course of the past 18,000 years. The dates of initiation for stalagmites collected occurred at 200 +/- 50, 1178 +/- 17, 3500 +/- 100, 3,900, 4600 +/- 110, 5500 +/- 240, 11,284 +/- 70, and 17,840 +/- 120 years BP. **Each of these dates, within limits of analytical error, correspond with known earthquakes associated with the NMSZ determined by others using sand blows and landslides.** While varying greatly, an average interval between quakes of 2,500 years is a hopeful sign for New Madrid's immediate future. But if the technique can be tried out in other places it might reveal areas now thought safe, precisely because there has not been a recent earthquake, that are actually under threat.

Timing of the 8.2-kyr event in a stalagmite from Northern Oman

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The 8.2-kyr event (Alley et al., 1997) is the most outstanding Holocene cooling episode in Greenland ice cores. This distinct event was triggered by a large outburst of meltwater from glacial Lake Agassiz through the Hudson strait into the North Atlantic at around 8.470 ± 0.300 kyr BP (Barber et al., 1999). The resultant freshening of the North Atlantic led to a weakening of the thermohaline circulation and widespread cooling in the North Atlantic regions (Alley and Ágústsdóttir, 2005). Furthermore, low levels of atmospheric methane indicate a drying of the tropics (Alley et al., 1997).

However, in many paleoclimate time series, unambiguous identification of the 8.2-kyr cold event is hindered by considerable age uncertainties and low temporal resolution. Furthermore, this event seems to be superimposed on a longer-term cold and dry period that lasted from around 8.6 to 8 kyr BP (Rohling et al., 2005). As a result, climatic anomalies occurring at approx. 8.2 kyr BP have often been wrongly ascribed to the 8.2-kyr event (Rohling et al., 2005).

Overall, the timing and geographical extent of this event are still a matter of debate, as precisely dated paleoclimate records are rare, particularly throughout the tropics (Alley and Ágústsdóttir, 2005). Whether anomalies around 8.2 kyr BP observed in paleoclimate archives are really representative of one synchronous event, different events or a one-time transgressive event remains largely unanswered. In order to resolve this puzzle surrounding the 8.2-kyr event, precise dating becomes critical. Stalagmites have the potential to contribute high-quality time series due to their precise and absolute chronologies. Here, we present a precisely-dated stalagmite from N. Oman to document the response of the Indian summer monsoon to the 8.2-kyr event in great detail.

Stalagmite H14

Stalagmite H14 (Fig. 1a) was collected from Hoti Cave in N. Oman (23°05'N, 57°21'E). Present-day climate in this area is arid and most of the total annual rainfall occurs during winter and spring, and limited rainfall occurs during summer by local thunderstorms (Fleitmann et al., 2007). During the early- to mid-Holocene, however, N. Oman was under the direct influence of the Indian summer monsoon and most of the annual precipitation occurred during summer (Burns et al., 1998; Fleitmann et al., 2003a). High monsoon precipitation is indicated by abundant early- to mid-Holocene stalagmites, whereas today, only a few and comparably small stalagmites are actively growing.

Stalagmite H14 shows well-developed annual bands over its entire length. Their thickness varies between 0.1 and 0.6 mm around a mean of 0.3 mm. The chronology of H14 is based on new ^{230}Th dating techniques, which allowed us to obtain 15 ^{230}Th dates with unprecedented small age errors of 15 to 45 years (2s) for the interval between 7.65 and 8.6 kyr BP (Fig. 1b). Precise ^{230}Th dating is also facilitated by high uranium contents of ~1.5 ppm and very low detrital contamination ($^{230}\text{Th}/^{232}\text{Th}$ atomic ratios are well above 1000). All ^{230}Th ages are in stratigraphic order, within the age uncertainties, and in very good agreement with annual band counts (Fig. 1b). This indicates that the observed sub-mm bands are indeed annual. The combination of accurate ^{230}Th dates and annual band counts allow us to construct a precise age model that is far more precise than linear interpolation between individual ^{230}Th dates.

A total of 388 oxygen isotope ($\delta^{18}\text{O}$) measurements were made at an average temporal resolution of 2 years. Previous studies have shown that variations in $\delta^{18}\text{O}$ in early- to mid-Holocene stalagmites from Oman are primarily driven by changes in the amount of monsoon precipitation (Fleitmann et al., 2003; 2004), with more negative $\delta^{18}\text{O}$ values being associated with higher precipitation and vice versa (so-called "amount effect"). This assumption is supported by the good agreement between $\delta^{18}\text{O}$ and annual band thickness (ABT). Thicker (thinner) annual bands, indicative of greater drip-water supply at times of enhanced precipitation, coincide with more negative (positive) $\delta^{18}\text{O}$ values (Fig. 2).

Timing of the 8.2-kyr event

The depth versus age plot (Fig. 1b) indicates an interruption in stalagmite deposition at 8.193 ± 0.015 kyr BP (age error was taken from the closest ^{230}Th date at 8.205 ± 0.015 kyr BP) as a result of a cessation in drip water supply, due to a significant drop in monsoon precipitation. The most likely cause for the reduction in monsoon precipitation is that strong winter cooling and enhanced Eurasian snow cover weak ended monsoon circulation by reducing the land-sea thermal contrast that drives the Indian summer monsoon (e.g., Fleitmann et al., 2003b, 2007). The timing of the decline in monsoon precipitation in N. Oman is in excellent agreement with the rapid temperature drop of approximately 5–8°C at 8.210 ± 0.047 kyr BP (based on the most recent GICC05 chronology, Rasmussen et al., 2006) in ice cores from Greenland. Additionally, the annually-precise German oak tree-ring record shows that a shift towards cooler and drier climatic conditions occurs at 8.204 kyr BP (Spurk et al., 2002). This date is in good agreement with the abrupt positive shift in $\delta^{18}\text{O}$ and decrease in ABT in stalagmite H14 from Oman at around 8.202 ± 0.016 kyr BP (Fig. 2c). Further support derives from other precisely dated stalagmites from Dongge Cave (China) and Padre Cave (Brasil), which place the onset of the 8.2 kyr event at 8.230 ± 0.025 and 8.203 ± 0.015 kyr BP, respectively (Cheng et al., in prep.). The independently ^{230}Th dated stalagmite H14 thus confirms the most recent ice core (GICC05 timescale) and oak tree-ring chronologies, and suggests that the 8.2-kyr event is indeed synchronous across the northern hemisphere. We note that the mean calibrated ^{14}C age of 8.470 ± 0.300 kyr BP for the catastrophic meltwater outburst from Lakes Agassiz and Ojibway (Barber et al., 1999) is somewhat older but this offset can be explained by sediment mixing and considerable uncertainties in local marine reservoir age estimates in the Hudson Strait (Teller and Leverington, 2004). Providing a precise estimate for the duration of the 8.2-kyr cold event is somewhat difficult as its termination seems to be rather gradual. Nevertheless, the hiatus in stalagmite H14 lasted from 8.193 ± 0.015 to 8.079 ± 0.015 kyr BP, similar to the duration recorded in ice cores from Greenland (Fig. 2b).

Conclusion

Our results suggest a commencing date for the 8.2-kyr event of around 8.202 ± 0.015 kyr BP in N. Oman, which is in good agreement with dates provided by Greenland ice cores and German oak tree-ring record. The 8.2-kyr event thus occurred synchronously within the dating errors, revealing the hemispheric extent and atmospheric transmission of the event from the North Atlantic to the tropics.

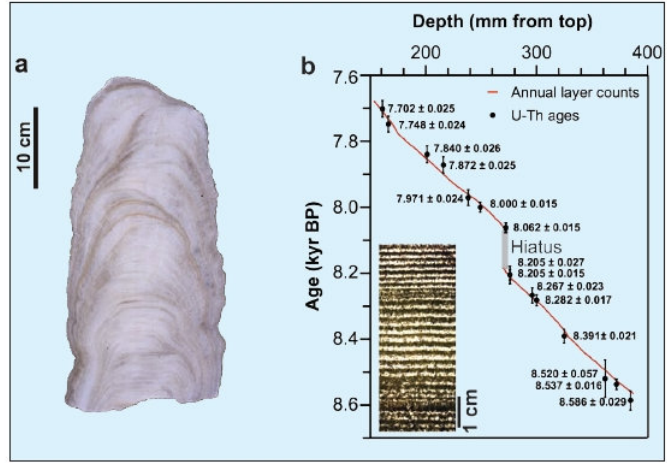


Figure 1: a) Image of stalagmite H14 from Northern Oman; b) Depth versus age plot for Stalagmite H14. Black dots with error bars denote ^{230}Th dates, red line shows annual band counts. Small inserted image shows well-developed annual bands, which are couplets of a dense (white) and more porous (black) calcite layers.

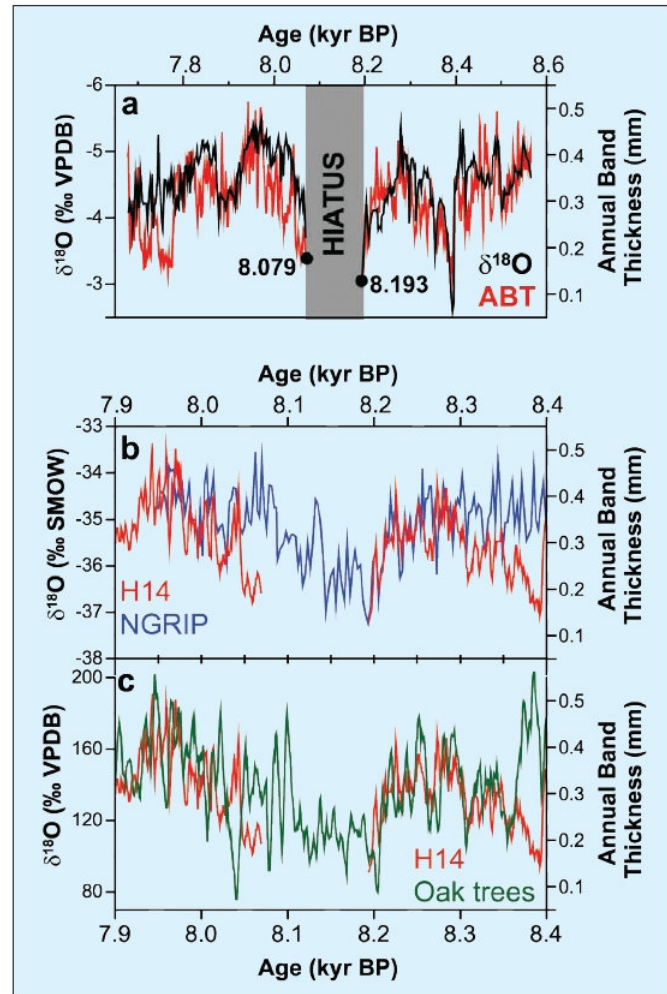


Figure 2: a) Comparison between $\delta^{18}\text{O}$ and annual band thickness (ABT) in stalagmite H14; b) Comparison between stalagmite H14 ABT profile and NGRIP $\delta^{18}\text{O}$ profile (Rasmussen et al., 2006); c) Comparison between stalagmite H14 ABT profile and German oak tree-ring chronology (Spurk et al., 2002).

This example from Oman demonstrates that an important strength of stalagmite-based paleoclimate reconstructions is their superior chronology, which enables identification of abrupt climatic events with very high precision.

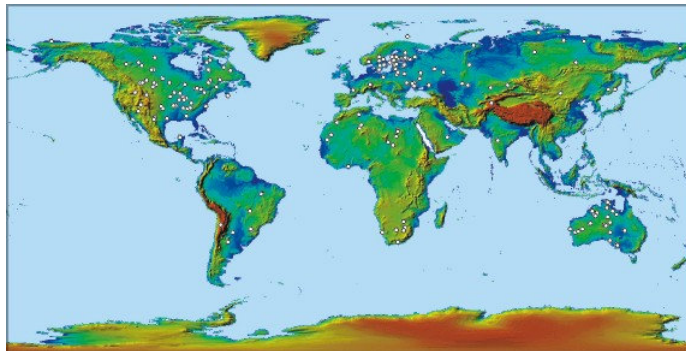
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Conclusions: The characteristics and magnitude of evidences provided by caves including various dating techniques now in use really leaves no doubt that the earth is very old !!

Chapter 6; Impact Craters

World Wide distribution of known Impact Craters



There are many factors that could determine the effect of an asteroid or comet impact on the earth and many theories concerning such impacts have been proposed and even recent "horror" movies. But, the fact is that there is ample evidence on the earth and especially on other objects in our solar system that many such impacts have occurred. The environment of our earth erodes and covers these impacts sites with time and only very recently in history have we began to search for and locate these many sites.

Here is a brief summary of the possible results.

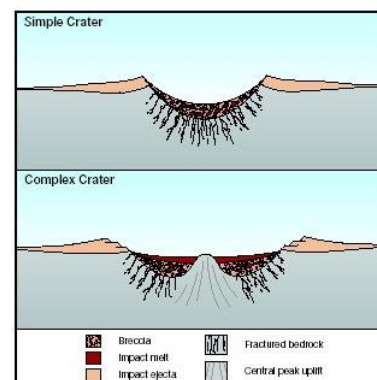
Size 1–10 km: Objects in this size range are likely to cause severe global effects and are theorized to be "species-busters". The crater alone from such an impact will be 10–15 times larger than the object itself and an ejecta blanket many times larger. They are portrayed as causing world-wide crop failures from dust injected into the atmosphere that could imperil civilization, and the largest-sized objects could make the human species become extinct. Some secular scientists have theorized that an impact 65 million years ago by an object of 5–10 km in diameter was partially or fully responsible for the extinction of half the living species of animals and plants at the time, including the dinosaurs.

Size 100 m–1 km: Objects in this size range are likely to cause severe damage over a regional area, possibly as large as a continent (hence the name "continent-busters"). If they strike land, they will almost certainly produce a crater, while an ocean impact will generate large tidal waves. A 150 m object might produce a crater 3 km in diameter, an ejecta blanket 10 km in diameter, and a zone of destruction extending much farther out. For a 1 km impactor the zone of destruction might reasonably extend to cover countries. The death toll could be in the tens to hundreds of millions. A 1 km impactor could begin to have minor global consequences, including global cooling caused by vast amounts of dust in the atmosphere.

Size 10–100 m: Objects in this size range can produce devastation similar to that of an atomic blast (leading to them occasionally being called "city-busters"). Effects include severe damage to or collapse of standing buildings and the ignition of flammable materials leading to widespread fires. The radius over which such effects occur would vary depending upon the size and composition of the object, but could easily exceed 10 km. The Tunguska event, in Siberia, of 1908 is thought to have been from an object about 60 m in size; it led to trees being flattened out to 20 km and trees 40 km away being damaged. At the small end of this size range, objects about 10 m strike the Earth about once a decade. Fortunately, only the densest objects, those containing iron, survive to the surface; most of the objects of this size explode sufficiently high in the atmosphere that there are no effects (other than maybe a loud noise) on the ground. At the larger end of this size range, it is estimated that the Earth is struck several times a millennium or about 1 impact every 100–



Laboratory impact simulation.



Crater Types

200 yr.

See Note A for a table of known impact locations.
See Note B for the Wikipedia article on impact craters.
See Note C for details of the Chesapeake Bay crater by USGS

Impact Craters Challenge Earth Age Theories

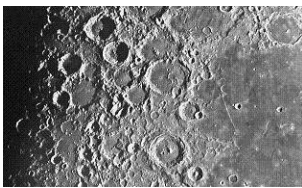


Barringer Crater in AZ, approx. 1.2 km (4000 ft) wide.

An early attempt to deal with the crater evidence was made by the "father of modern creationism," Henry M. Morris, who suggested that lunar and Martian craters might represent battle scars of a cosmic war between angels and Satan (Morris, 1972; Spears, 2006). In recent years most young earth theorists seem to have distanced themselves from Morris's fanciful proposal. Recognizing the scientific evidence that the craters represent millions of real meteorite impacts, some have attempted to accommodate them within the young earth timetable by proposing that virtually all such impacts occurred during one or two major bombardment episodes during the creation week, and/or the "Flood year."

In an article entitled "A biblically-based cratering theory" on the "Answers in Genesis" website Danny Faulkner writes:

If this latest impact catastrophe is equated with the biblical Flood, then it follows that the Flood on earth was accompanied by large impacts. The time frame of the Flood constrains the period over which the impacts could have occurred to no more than a few months less than a year. Depending upon the model adopted, the impacts may have happened over just a few days (Faulkner, 2006).

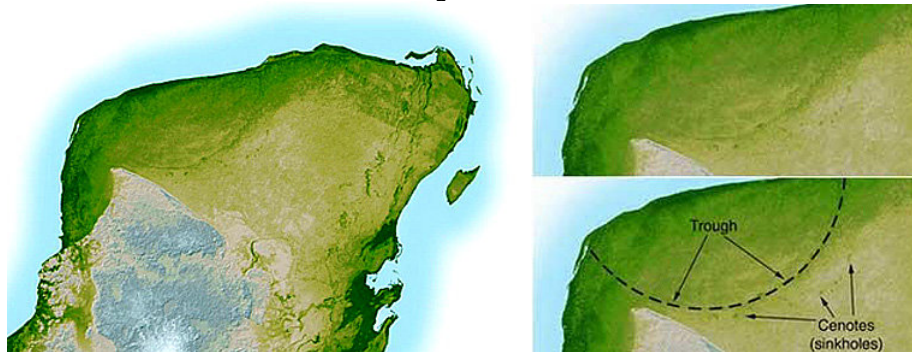


Lunar craters

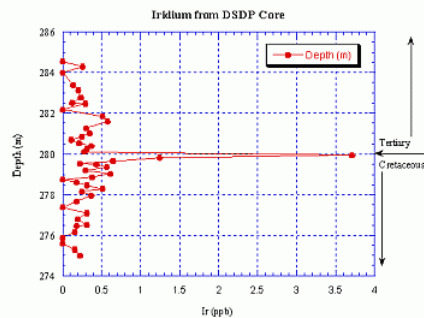
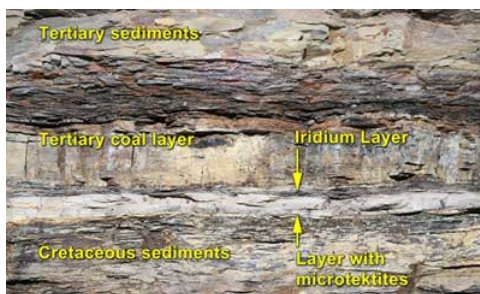
However, Faulkner and other young earth theorists do not seem to appreciate the implications of such massive bombardment within the young earth time frame. Over 200 major craters have been documented to date in the geologic record, and this is undoubtedly a small fraction of the actual number, since most would have been obliterated by tectonic actions and erosion, or totally hidden under sediments. We can get a good idea of the number of meteorite impacts on earth by examining the planets in our solar system which largely have less of such geologic activity, such as mercury, mars, and venus, as well as earth's moon.

Despite having a surface area only about 1/10 that of earth, our moon is covered by millions of craters. About a half a million have diameters greater than 1 km. The largest is about 360 kilometers (200 miles) wide; dozens are over 150 km in width. Note that the Chicxulub crater on earth, believed to have contributed to the K-T extinction when dinosaurs and many other life forms went extinct, is about 160 km wide, thought to have been made by a meteorite approximately 10 - 15 km wide. Many such impacts are thought to have occurred during an intense bombardment period about 3.9 billion years ago. On the moon, this resulted in the formation of 1700 lunar craters 100 kilometers wide or larger, defacing about 80% of the Moon's crust (Cohen, 2001). As Cohen notes: "The Earth would not have escaped a similar beating during this time." Indeed, since the earth's surface is over 13 times that of the moon, we can estimate that over 20,000 major sized meteors (each capable of making 100 km or larger crater) would have impacted the earth during this early bombardment episode alone. If compressed into a "Flood year," that amounts to over 50 major impacts a day. If further condensed into a "few days" as Faulkner suggests, the earth would have received several hundred major impacts each day. Yet, surprisingly Faulkner does not deal with the implications of this for human survival.

Yucatan showing outline of Chicxulub



The resulting debris from Chicxulub that ejected into high altitudes spread around the globe and settled as a thin layer of material that marks the precise K/T boundary between the last rocks of the Cretaceous Period and the first sediments formed in the younger (overlying) Tertiary Period. The deposits contain Iridium, a metallic element related to Platinum present in some meteorites, in amounts far greater than can be accounted for by volcanic sources or other terrestrial rocks.



It might be argued that impacts in deep water would be less destructive than those on land. However, even a few such impacts within a year or less would be devastating, as trillions of tons of debris (dust, gases and water vapor) would be thrown into the atmosphere when the object vaporized. This would likely result in a prolonged period of darkened skies, significantly lower global temperatures, acid rain, and what has been called global "nuclear winter" conditions. The impact would also result in earthquakes,

tremendously violent winds, and immense tidal waves, thoroughly engulfing and destroying any Ark. Even a single 10 km wide meteorite (roughly the size of the one which formed the Chicxulub crater), would create tsunamis several hundred meters high (Strobel, 2006). Imagine thousands of such impacts, plus even larger ones, all occurring within a year or less. No human life, in or out of an Ark, could have withstood such an onslaught.

It is very difficult to explain how millions of aquatic species—including many sensitive to specific ecological conditions, including narrow ranges of temperature, salinity, acidity, turbidity—survived a violent global Flood. Adding the implications of massive meteorite bombardment further undermines the plausibility of their model.

Perhaps realizing these difficulties, some young earth theorists have proposed that virtually all of the impacts occurred during the "creation week." However, this entails other major problems, including:

1. The Biblical description of the garden of Eden and God's declaration that the creation was "very good" hardly seem consistent with the idea that massive bolide bombardment was taking place during this time. And especially since some have the interpretation that the creation was "perfect" prior to the sin of Adam and Eve in the garden, even though NO where does the Bible directly so state.

2. One might propose that all the bombardment took place the same 24 hour day the moon was created on day 4 as per the interpretation by many young earth creationists, before life forms were created on days 5 and 6. However, not only does a lot of evidence contradict a one-day only bombardment, environmental conditions would hardly seem to have been favorable to life the very next day. Indeed, such a massive bombardment would make the earth a smoldering inferno.

3. Evidence of large craters occurs in different parts of the geologic record on earth, including Paleozoic and Cenozoic strata. Most creationists interpret these not as creation-week rocks, but as Flood or post-Flood deposits. Nearly three quarters of the impact sites known today were into sedimentary or a mixture of sedimentary strata overlying crystalline basement (see Note A) and thus would be interpreted to be into Flood or post-Flood deposits by young earth theorists.

4. Many craters on the moon and other bodies show evidence of impacts over a significant period of time; many are overlapped and subdued by volcanic activity (Herres and Hartmann, 2004). Radiometric dates on lunar samples support the great age of the impacts and their formation over millions of years—certainly not within a literal earth week. In fact, radiometric dating methods indicate that the known earth impact sites range through out the history of the earth from the modern period less than about 600 years ago until 2,400 million years ago. (See the second part of Note A for the listing of the impact sites by increasing date.)

Ironically, some creationists have tried to use meteorite evidence as an argument for a young earth, based on the supposed rarity of meteorites in the fossil record (Stevenson, 1975). However, the argument is entirely groundless, as it ignores all of the following:

1. The many physical factors and processes on earth which destroy or obscure meteorites in the geologic record (Thompson, 2005). There would be countless more if it weren't for Earth's constant remodeling. Volcanoes erupt and erosion washes over the planet's surface continually hiding the evidence of many craters. They are selectively found mostly in the stable interior regions of continents. Few underwater craters have been discovered because of the difficulty of surveying the sea floor, and the rapid rate of change of the ocean bottom with volcanics, plate tectonics subduction and mid-ocean ridge divergence.

2. The now known evidences from craters and meteoritic dust in the geologic record (Matson, 1994; Thompson, 2006). It was not until the 1960s that the existence of impact craters began to be widely accepted. And more than 50 had been tentatively identified by 1970. And obviously the list will grow with time.

3. The abundant evidence from the moon, Mars, and other bodies in our solar system indicating massive numbers of impacts. No plausible argument has been advanced as to why the earth would have escaped similar bombardment.

At one time many young earth theorists also argued that the amount of meteoritic dust on the moon was evidence for a young solar system. However, the argument was shown to be seriously flawed (Dalrymple, 1984), and as has since been acknowledged by many in the young earth community (Snelling and Rush, 1993). In fact, when evidence of dust influx rates is examined closely, it actually provides further support for conventional geologic ages (Stear, 2005).

Conclusion:

Abundant evidence indicates that the earth has been subjected to a massive number of impacts, including many large and catastrophic impacts. Such evidence is incompatible with the young earth timetable and human survival. Although many other lines of evidence also refute young earth theories, this readily understood impact evidence thoroughly and totally falsifies the young earth framework.

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(Above portions copied from <http://paleo.cc/ce/craters.htm> and edited to add information.)

Note A
Impact Structures listed by diameter (decreasing)

Current total number of confirmed impact structures: 176

copied from <http://www.unb.ca/passc/ImpactDatabase/CIDiameterSort3.htm>

Crater Name	Location	Latitude	Longitude	Diameter (km)	Age (Ma) *	Exposed	Drilled	Target Rock**	Bolide Type***
Vredefort	South Africa	S 27° 0'	E 27° 30'	300	2023 ± 4	Y	Y	M	Chondrite
Sudbury	Ontario, Canada	N 46° 36'	W 81° 11'	250	1850 ± 3	Y	Y	C	-
Chicxulub	Yucatan, Mexico	N 21° 20'	W 89° 30'	170	64.98 ± 0.05	N	Y	M	Chondrite
Popigai	Russia	N 71° 39'	E 111° 11'	100	35.7 ± 0.2	Y	Y	M	Chondrite
Manicouagan	Quebec, Canada	N 51° 23'	W 68° 42'	100	214 ± 1	Y	Y	M	-
Acraman	South Australia, Australia	S 32° 1'	E 135° 27'	90	~ 590	Y	N	C	Chondrite
Chesapeake Bay	Virginia, U.S.A.	N 37° 17'	W 76° 1'	90	35.3 ± 0.1	N	Y	M	-
Puchezh-Katunki	Russia	N 56° 58'	E 43° 43'	80	167 ± 3	N	Y	M	-
Morokweng	South Africa	S 26° 28'	E 23° 32'	70	145.0 ± 0.8	N	Y	C	Chondrite
Kara	Russia	N 69° 6'	E 64° 9'	65	70.3 ± 2.2	N	Y	M	Chondrite?
Beaverhead	Montana, U.S.A.	N 44° 36'	W 113° 0'	60	~ 600	Y	N	M	-
Tookoonooka	Queensland, Australia	S 27° 7'	E 142° 50'	55	128 ± 5	N	Y	M	-
Charlevoix	Quebec, Canada	N 47° 32'	W 70° 18'	54	342 ± 15*	Y	Y	M	-
Siljan	Sweden	N 61° 2'	E 14° 52'	52	376.8 ± 1.7	Y	Y	M	-
Kara-Kul	Tajikistan	N 39° 1'	E 73° 27'	52	< 5	Y	N	C	-
Montagnais	Nova Scotia, Canada	N 42° 53'	W 64° 13'	45	50.50 ± 0.76	N	Y	S	-
Araguainha	Brazil	S 16° 47'	W 52° 59'	40	244.40 ± 3.25	Y	N	M	-
Woodleigh	Australia	S 26° 3'	E 114° 39'	40	364 ± 8	N	Y	M	-
Mjølner	Norway	N 73° 48'	E 29° 40'	40	142.0 ± 2.6	N	Y	S	-
Saint Martin	Manitoba, Canada	N 51° 47'	W 98° 32'	40	220 ± 32	N	Y	M	-
Carswell	Saskatchewan, Canada	N 58° 27'	W 109° 30'	39	115 ± 10	Y	Y	M	-
Clearwater West	Quebec, Canada	N 56° 13'	W 74° 30'	36	290 ± 20	Y	Y	M	-
Manson	Iowa, U.S.A.	N 42° 35'	W 94° 33'	35	74.1 ± 0.1	N	Y	M	Chondrite
Yarrabubba	Western Australia	S 27° 10'	E 118° 50'	30	~ 2000	Y	N	C	-
Slate Islands	Ontario, Canada	N 48° 40'	W 87° 0'	30	~ 450	Y	N	C	-
Shoemaker (formerly Teague)	Western Australia, Australia	S 25° 52'	E 120° 53'	30	1630 ± 5	Y	N	M	-
Keuruselkä	Finland	N 62° 8'	E 24° 36'	~30	<1800	Y	N	C	-
Mistastin	Newfoundland/Labrador, Canada	N 55° 53'	W 63° 18'	28	36.4 ± 4*	Y	N	C	Iron?
Clearwater East	Quebec, Canada	N 56° 5'	W 74° 7'	26	290 ± 20	Y	Y	M	Chondrite
Steen River	Alberta, Canada	N 59° 30'	W 117° 38'	25	91 ± 7*	N	Y	M	-
Strangways	Northern Territory, Australia	S 15° 12'	E 133° 35'	25	646 ± 42	Y	N	M	Achondrite
Kamensk	Russia	N 48° 21'	E 40° 30'	25	49.0 ± 0.2	N	Y	S	-
Presqu'île	Quebec, Canada	N 49° 43'	W 74° 48'	24	< 500	Y	N	C	-
Boltysh	Ukraine	N 48° 45'	E 32° 10'	24	65.17 ± 0.64	N	Y	C	Chondrite?
Ries	Germany	N 48° 53'	E 10° 37'	24	15.1 ± 0.1	Y	Y	M	Achondrite?
Haughton	Nunavut, Canada	N 75° 22'	W 89° 41'	23	39	Y	N	S	-
Lappajärvi	Finland	N 63° 12'	E 23° 42'	23	73.3 ± 5.3	Y	Y	M	Chondrite
Rochelouart	France	N 45° 50'	E 0° 56'	23	214 ± 8	Y	N	C	Chondrite? Iron?
Gosses Bluff	Northern Territory, Australia	S 23° 49'	E 132° 19'	22	142.5 ± 0.8	Y	Y	S	-
Logancha	Russia	N 65° 31'	E 95° 56'	20	40 ± 20	N	N	M	-
Obolon'	Ukraine	N 49° 35'	E 32° 55'	20	169 ± 7	N	Y	M	-
Amelia Creek	Australia	S 20° 55'	E 134° 50'	~20	1640 - 600	Y	N	M	-

Dellen	Sweden	N 61°48'	E 16°48'	19	89.0 ± 2.7	Y	N	C	Stone?
Glikson	Australia	S 23°59'	E 121°34'	-19	< 508	Y	N	M	-
El'gygytgyn	Russia	N 67°30'	E 172°5'	18	3.5 ± 0.5	Y	N	C	Achondrite?
Lawn Hill	Queensland, Australia	S 18°40'	E 138°39'	18	> 515	Y	N	M	-
Oasis	Libya	N 24°35'	E 24°24'	18	< 120	Y	N	S	-
Suavjärvi	Russia	N 63°7'	E 33°23'	16	~ 2400			C-Ms	-
Ames	Oklahoma, U.S.A.	N 36°15'	W 98°12'	16	470 ± 30	N	Y	M	-
Kaluga	Russia	N 54°30'	E 36°12'	15	380 ± 5	N	Y	M	-
Logoisk	Belarus	N 54°12'	E 27°48'	15	42.3 ± 1.1	N	Y	M	-
Jänisjärvi	Russia	N 61°58'	E 30°55'	14	700 ± 5	Y	N	C-Ms	-
Zhamanshin	Kazakhstan	N 48°24'	E 60°58'	14	0.9 ± 0.1	Y	Y	M	Chondrite (Iron?)
Gweni-Fada	Chad, Africa	N 17°25'	E 21°45'	14	< 345	Y	N	S	-
Spider	Western Australia, Australia	S 16°44'	E 126°5'	13	> 570	Y	N	S	-
Sierra Madera	Texas, U.S.A.	N 30°36'	W 102°55'	13	< 100	Y	Y	S	-
Deep Bay	Saskatchewan, Canada	N 56°24'	W 102°59'	13	99 ± 4	N	Y	C	-
Kentland	Indiana, U.S.A.	N 40°45'	W 87°24'	13	< 97	Y	Y	S	-
Marquez	Texas, U.S.A.	N 31°17'	W 96°18'	12.7	58 ± 2	N	Y	S	-
Aorounga	Chad, Africa	N 19°6'	E 19°15'	12.6	< 345	Y	N	S	-
Nicholson	Northwest Territories, Canada	N 62°40'	W 102°41'	12.5	< 400	N	N	M	Achondrite
Vargeao Dome	Brazil	S 26°50'	W 52°7'	12	< 70	Y	N	M	-
Serra da Cangalha	Brazil	S 8°5'	W 46°52'	12	< 300	Y	Y	S	-
Avak	Alaska, U.S.A.	N 71°15'	W 156°38'	12	3 - 95	N	Y	S	-
Wells Creek	Tennessee, U.S.A.	N 36°23'	W 87°40'	12	200 ± 100	Y	Y	S	-
Ternovka	Ukraine	N 48°08'	E 33°31'	11	280 ± 10	N	Y	C	Chondrite?
Dhala	India	N 25°18'	E 78°8'	11	> 1700 < 2100	Y	N	M	-
Bosumtwi	Ghana	N 6°30'	W 1°25'	10.5	1.07	Y	N	C-Ms	Chondrite? Iron?
Kelly West	Northern Territory, Australia	S 19°56'	E 133°57'	10	> 550	N	N	C-Ms	-
Karla	Russia	N 54°55'	E 48°2'	10	5 ± 1	Y	Y	S	-
Eagle Butte	Alberta, Canada	N 49°42'	W 110°30'	10	< 65	N	Y	S	-
Upheaval Dome	Utah, U.S.A.	N 38°26'	W 109°54'	10	< 170	Y	Y	S	-
Paasselkä	Finland	N 62°2'	E 29°5'	10	< 1800	Y	Y		-
Flaxman	Australia	S 34°37'	E 139°4'	10	> 35	Y	N	C-Ms	-
Vista Alegre	Brazil	S 25°57'	W 52°41'	9.5	< 65	Y	N		-
Lumparn	Finland	N 60°9'	E 20°6'	9	~ 1000	N	Y	M	-
Ragozinka	Russia	N 58°44'	E 61°48'	9	46 ± 3	N	Y	M	-
Red Wing	North Dakota, U.S.A.	N 47°36'	W 103°33'	9	200 ± 25	N	Y	S	-
Mien	Sweden	N 56°25'	E 14°52'	9	121.0 ± 2.3	Y	Y	C	Stone?
Connolly Basin	Western Australia, Australia	S 23°32'	E 124°45'	9	< 60	Y	N	S	-
Ilyinets	Ukraine	N 49°7'	E 29°6'	8.5	378 ± 5*	N	Y	M	Iron?
Calvin	Michigan, USA	N 41°50'	W 85°57'	8.5	450 ± 10	N	Y	S	-
Crawford	Australia	S 34°43'	E 139°2'	8.5	> 35	Y	N	C-Ms	-
Glover Bluff	Wisconsin, U.S.A.	N 43°58'	W 89°32'	8	< 500	Y	Y	S	-
Bigach	Kazakhstan	N 48°34'	E 82°1'	8	5 ± 3	Y	Y	M	-
Elbow	Saskatchewan, Canada	N 50°59'	W 106°43'	8	395 ± 25	N	Y	S	-
La Moirerie	Quebec, Canada	N 57°26'	W 66°37'	8	400 ± 50	Y	N	C	-
Neugrund	Estonia	N 59°20'	E 23°40'	8	~ 470	N		S	-
Vepriai	Lithuania	N 55°5'	E 24°35'	8	> 160 ± 10	N	Y	S	-
Beyenchime-Salaatin	Russia	N 71°0'	E 121°40'	8	40 ± 20	Y	N	S	-
Des Plaines	Illinois, U.S.A.	N 42°3'	W 87°52'	8	< 280	N	Y	S	-
Serpent Mound	Ohio, U.S.A.	N 39°2'	W 83°24'	8	< 320	Y	Y	S	-
Couture	Quebec, Canada	N 60°8'	W 75°20'	8	430 ± 25	Y	N	C	-
Wanapitei	Ontario, Canada	N 46°45'	W 80°45'	7.5	37.2 ± 1.2	N	N	C	Chondrite
Lockne	Sweden	N 63°0'	E 14°49'	7.5	455	Y	Y	M	-
Piccaninny	Western Australia, Australia	S 17°32'	E 128°25'	7	< 360	Y	N	S	-
Crooked Creek	Missouri, U.S.A.	N 37°50'	W 91°23'	7	320 ± 80	Y	N	S	-
Cloud Creek	Wyoming, U.S.A.	N 43°7'	W 106°45'	7	190 ± 30 Ma	N	Y	S	-
Söderfjärden	Finland	N 63°2'	E 21°35'	6.6	~ 600	N	Y	C	-
Wetumpka	Alabama, U.S.A.	N 32°31'	W 86°10'	6.5	81.0 ± 1.5	Y	Y	M	-
Pilot	Northwest Territories, Canada	N 60°17'	W 111°1'	6	445 ± 2	Y	N	C	-
Rock Elm	Wisconsin, U.S.A.	N 44°43'	W 92°14'	6	< 505			S	-
Sääksjärvi	Finland	N 61°24'	E 22°24'	6	~ 560	Y	Y	M	Stony-iron?
Decaturville	Missouri, U.S.A.	N 37°54'	W 92°43'	6	< 300	Y	Y	M	-
Chukcha	Russia	N 75°42'	E 97°48'	6	< 70	Y	Y	M	-
Kursk	Russia	N 51°42'	E 36°0'	6	250 ± 80	N	Y	M	-
Maple Creek	Saskatchewan, Canada	N 49°48'	W 109°6'	6	< 75	N	Y	S	-
Middlesboro	Kentucky, U.S.A.	N 36°37'	W 83°44'	6	< 300	Y	Y	S	-
Tin Bider	Algeria	N 27°36'	E 5°7'	6	< 70	Y	N	S	-
Foelsche	Northern Territory, Australia	S 16°40'	E 136°47'	6	> 545	Y	N	M	-
Santa Fe	New Mexico, U.S.A.	N 35°45'	W 105°56'	6-13	<1200	N	N	M	-
Jebel Waqf as Suwwan	Jordan	N 31°03'	E 36°48'	5.5	56 - 37	Y	N	S	-
Chiylil	Kazakhstan	N 49°10'	E 57°51'	5.5	46 ± 7	Y	Y	S	-
Goat Paddock	Western Australia, Australia	S 18°20'	E 126°40'	5.1	< 50	Y	Y	S	-
Gardnos	Norway	N 60°39'	E 9°0'	5	500 ± 10	Y	N	C	Chondrite
Mizarai	Lithuania	N 54°1'	E 23°54'	5	500 ± 20	N	Y	C	-
Dobeles	Latvia	N 56°35'	E 23°15'	4.5	290 ± 35	N	Y	S	-
Rio Cuarto	Argentina	S 32°52'	W 64°14'	4.5	< 0.1	Y	N	M	Chondrite (H)
Riachao Ring	Brazil	S 7°43'	W 46°39'	4.5	< 200	Y	N	S	-

Kärda	Estonia	N 59°1'	E 22°46'	4	~ 455	N	Y	M	-
Ile Rouleau	Quebec, Canada	N 50°41'	W 73°53'	4	< 300	Y	N	S	-
Gov	Saskatchewan, Canada	N 56°27'	W 104°29'	4	< 250	Y	N	C	Iron?
Glasford	Illinois, U.S.A.	N 40°36'	W 89°47'	4	< 430	N	Y	S	-
Suvasvesi N	Finland	N 62°42'	E 28°10'	4	< 1000	N	Y	C	-
Mount Toondina	South Australia, Australia	S 27°57'	E 135°22'	4	< 110	Y	N	S	-
Brent	Ontario, Canada	N 46°5'	W 78°29'	3.8	396 ± 20*	N	Y	C	Chondrite
Steinheim	Germany	N 48°41'	E 10°4'	3.8	15 ± 1	Y	Y	S	-
Flynn Creek	Tennessee, U.S.A.	N 36°17'	W 85°40'	3.8	360 ± 20	Y	Y	S	-
Quarkiz	Algeria	N 29°0'	W 7°33'	3.5	< 70	Y	N	S	-
Kgagodi	Botswana	S 22°29'	E 27°35'	3.5	< 180	Y	Y	C	-
Zeleny Gai	Ukraine	N 48°4'	E 32°45'	3.5	80 ± 20	N	Y	C	-
New Quebec	Quebec, Canada	N 61°17'	W 73°40'	3.44	1.4 ± 0.1	Y	N	C	Chondrite (L?)
Newporte	North Dakota, U.S.A.	N 48°58'	W 101°58'	3.2	< 500	N	Y	M	-
Zapadnaya	Ukraine	N 49°44'	E 29°0'	3.2	165 ± 5	N	Y	C	-
Granby	Sweden	N 58°25'	E 14°56'	3	~ 470	N	Y	M	-
Gusev	Russia	N 48°26'	E 40°32'	3	49.0 ± 0.2	N	Y	S	-
Iso-Naakkima	Finland	N 62°11'	E 27°9'	3	> 1000	N	Y	S	-
Goyder	Northern Territory, Australia	S 13°9'	E 135°2'	3	< 1400	Y	N	S	-
Shunak	Kazakhstan	N 47°12'	E 72°42'	2.8	45 ± 10	Y	Y	C	-
Rotmistrovka	Ukraine	N 49°0'	E 32°0'	2.7	120 ± 10	N	Y	C	-
Viewfield	Saskatchewan, Canada	N 49°35'	W 103°4'	2.5	190 ± 20	N	Y	S	-
Mishina Gora	Russia	N 58°43'	E 28°3'	2.5	300 ± 50	Y	Y	M	-
Roter Kamm	Namibia	S 27°46'	E 16°18'	2.5	3.7 ± 0.3	Y	N	C	-
West Hawk	Manitoba, Canada	N 49°46'	W 95°11'	2.44	351 ± 20	N	Y	C	-
Holleford	Ontario, Canada	N 44°28'	W 76°38'	2.35	550 ± 100	N	Y	C	-
Tvären	Sweden	N 58°46'	E 17°25'	2	~ 455	N	Y	M	-
B.P. Structure	Libya	N 25°19'	E 24°20'	2	< 120	Y	N	S	-
Tenoumer	Mauritania	N 22°55'	W 10°24'	1.9	0.0214 ± 0.0097	Y	N	M	-
Lonar	India	N 19°58'	E 76°31'	1.83	0.052 ± 0.006	Y	Y	C	-
Talemzane	Algeria	N 33°19'	E 4°2'	1.75	< 3	N	Y	S	-
Liverpool	Northern Territory, Australia	S 12°24'	E 134°3'	1.6	150 ± 70	Y	N	S	-
Karikoselkä	Finland	N 62°13'	E 25°15'	1.5	~230	Y		C	-
Saarijärvi	Finland	N 65°17'	E 28°23'	1.5	> 600		Y	C	-
Tabun-Khara-Obo	Mongolia	N 44°07'	E 109°39'	1.3	150 ± 20	Y	N	C	-
Barringer	Arizona, U.S.A.	N 35°2'	W 111°1'	1.186	0.049 ± 0.003	Y	Y	S	IAB
Tswaing (formerly Pretoria Saltpan)	South Africa	S 25°24'	E 28°5'	1.13	0.220 ± 0.052	Y	Y	C	Chondrite
Wolfe Creek	Western Australia, Australia	S 19°10'	E 127°48'	0.875	< 0.3	Y	N	S	IIIAB
Kalkkop	South Africa	S 32°43'	E 24°34'	0.64	0.250 ± 0.050	Y	Y	S	-
Monturaqui	Chile	S 23°56'	W 68°17'	0.46	< 1	Y	N	C	IAB
Arnguid	Algeria	N 26°5'	E 4°23'	0.45	< 0.1	Y	N	S	-
Aouelloul	Mauritania	N 20°15'	W 12°41'	0.39	3.0 ± 0.3	Y	N	S	Iron (IIIB, IIID?)
Macha	Russia	N 60°6'	E 117°35'	0.3	< 0.007	Y	N	S	Iron
Boxhole	Northern Territory, Australia	S 22°37'	E 135°12'	0.17	.0540 ± 0.0015	Y	N	C	IIIAB
Odessa	Texas, U.S.A.	N 31°45'	W 102°29'	0.168	< 0.05	Y	Y	S	IAB
Henbury	Northern Territory, Australia	S 24°34'	E 133°8'	0.157	.0042 ± 0.0019	Y	N	S	IIIAB
Wabar	Saudi Arabia	N 21°30'	E 50°28'	0.116	0.00014	Y	N	S	IIIAB
Kaalijärv	Estonia	N 58°24'	E 22°40'	0.11	0.004 ± 0.001	Y	N	S	IAB
Morasko	Poland	N 52°29'	E 16°54'	0.1	< 0.01	Y	N	S	Octahedrite fragments
Illumetsä	Estonia	N 57°58'	E 27°25'	0.08	> 0.002	Y	Y	S	-
Veevers	Western Australia, Australia	S 22°58'	E 125°22'	0.08	< 1	Y	N	S	IIAB
Sobolev	Russia	N 46°18'	E 137°52'	0.053	< 0.001	Y	Y	M	Iron Meteoritic Material Found
Campo Del Cielo	Argentina	S 27°38'	W 61°42'	0.05	< 0.004	Y	Y	M	Coarse Octahedrite to granular Hexahedrite
Whitecourt	Alberta, Canada	N 54°00'	W 115°36'	0.036	<0.0011	Y	N	S	IIIAB iron
Sikhote Alin	Russia	N 46°7'	E 134°40'	0.027	0.000059	Y	N	C	Hexahedrite
Dalgaranga	Western Australia, Australia	S 27°38'	E 117°17'	0.024	~ 0.27	Y	N	C	Stony Iron
Haviland	Kansas, U.S.A.	N 37°35'	W 99°10'	0.015	< 0.001	Y	N	S	Pallasite

* pre-1977 K-Ar, Ar-Ar and Rb-Sr ages recalculated using the decay constants of Steiger and Jäger (1977) Ages in millions of years (Ma) before present.

** Abbreviations: C - Crystalline Target; C-Ms - Metasedimentary Target; M - Mixed Target (i.e. sedimentary strata overlying crystalline basement); S - sedimentary target (i.e. no crystalline rocks affected by the impact event). From Osinski, G. R., Spray J. G., and Grieve R. A. F. 2007. Impact melting in sedimentary target rocks: A synthesis. In *The Sedimentary Record of Meteorite Impacts, Geological Society of America Special Paper*. Editors: Evans K. Horton W., King D., Morrow J., and Warne J. Geological Society of America: Boulder, in press.

*** From Koeberl, C. *Identification of meteoritic components in impactites*. 1998, Koeberl, C. *The Geochemistry and Cosmochemistry of Impacts*. 2007 and PASSC Files. (IAB, IIIAB, IIIB, IIID - Iron Meteorite)

Impact sites sorted by age (increasing)

Structure Name	Age (Ma)*
Sikhote Alin	0.00059
Wabar	0.00014
Haviland	< 0.001
Sobolev	< 0.001
Whitecourt	<0.0011
Ilumetsä	> 0.002
Campo Del Cielo	< 0.004
Kaalijärvi	0.004 ± 0.001
Henbury	.0042 ± 0.0019
Macha	< 0.007
Morasko	< 0.01
Tenoumer	0.0214 ± 0.0097
Barringer	0.049 ± 0.003
Odessa	< 0.05
Lunar	0.052 ± 0.006
Boxhole	.0540 ± 0.0015
Amguid	< 0.1
Rio Cuarto	< 0.1
Tswaing (formerly Pretoria Saltpan)	0.220 ± 0.052
Kalkkop	0.250 ± 0.050
Dalgaranga	~ 0.27
Wolfe Creek	< 0.3
Zhamanshin	0.9 ± 0.1
Veevers	< 1
Monturaqui	< 1
Bosumtwi	1.07
New Quebec	1.4 ± 0.1
Talemzane	< 3
Aouelloul	3.0 ± 0.3
Elgygytgyn	3.5 ± 0.5
Roter Kamm	3.7 ± 0.3
Kara-Kul	< 5
Karla	5 ± 1
Bigach	5 ± 3
Steinheim	15 ± 1
Ries	15.1 ± 0.1
Chesapeake Bay	35.3 ± 0.1
Popigai	35.7 ± 0.2
Flaxman	> 35
Crawford	> 35
Mistastin	36.4 ± 4
Wanapitei	37.2 ± 1.2
Haughton	39
Logancha	40 ± 20
Beyenchime-Salaatin	40 ± 20
Logoisk	42.3 ± 1.1
Shunak	45 ± 10
Ragozinka	46 ± 3
Chiyli	46 ± 7
Kamensk	49.0 ± 0.2
Gusev	49.0 ± 0.2
Goat Paddock	< 50
Montagnais	50.50 ± 0.76
Jebel Waqf as Suwwan	56 - 37
Marquez	58 ± 2
Connolly Basin	< 60
Chicxulub	64.98 ± 0.05
Vista Alegre	< 65
Eagle Butte	< 65
Boltsh	65.17 ± 0.64
Vargeao Dome	< 70
Tin Bider	< 70
Ouarkiz	< 70
Chukcha	< 70
Kara	70.3 ± 2.2
Lappajärvi	73.3 ± 5.3
Manson	74.1 ± 0.1
Zeleny Gai	80 ± 20
Wetumpka	81.0 ± 1.5
Dellen	89.0 ± 2.7
Steen River	91 ± 7
Avak	3 - 95
Kentland	< 97
Deep Bay	99 ± 4
Sierra Madera	< 100
Mount Toondina	< 110
Carswell	115 ± 10
Oasis	< 120
B.P. Structure	< 120
Rotmistrovka	120 ± 10
Mien	121.0 ± 2.3
Tookoonoka	128 ± 5

Mjølner	142.0 ± 2.6
Gosses Bluff	142.5 ± 0.8
Morokweng	145.0 ± 0.8
Tabun-Khara-Obo	150 ± 20
Liverpool	150 ± 70
Vepriai	> 160 ± 10
Zapadnaya	165 ± 5
Puchezh-Katunki	167 ± 3
Obolon'	169 ± 7
Upheaval Dome	< 170
Kgagodi	< 180
Viewfield	190 ± 20
Cloud Creek	190 ± 30
Riachao Ring	< 200
Red Wing	200 ± 25
Wells Creek	200 ± 100
Manicouagan	214 ± 1
Rochechouart	214 ± 8
Saint Martin	220 ± 32
Karikkoselkä	~ 230
Araguinha	244.4 ± 3.25
Gow	< 250
Kursk	250 ± 80
Des Plaines	< 280
Ternovka	280 ± 10
Clearwater East	290 ± 20
Clearwater West	290 ± 20
Dobele	290 ± 35
Serra da Cangalha	< 300
Middlesboro	< 300
Ile Rouleau	< 300
Decaturville	< 300
Mishina Gora	300 ± 50
Serpent Mound	< 320
Crooked Creek	320 ± 80
Charlevoix	342 ± 15
Gweni-Fada	< 345
Aorunga	< 345
West Hawk	351 ± 20
Piccaninny	< 360
Flynn Creek	360 ± 20
Woodleigh	364 ± 8
Siljan	376.8 ± 1.7
Ilyinets	378 ± 5
Kaluga	380 ± 5
Elbow	395 ± 25
Brent	396 ± 20
Nicholson	< 400
La Moinerie	400 ± 50
Glasford	< 430
Pilot	445 ± 2
Slate Islands	~ 450
Calvin	450 ± 10
Tvären	~ 455
Kårdla	~ 455
Ames	470 ± 30
Neugrund	~ 470
Granby	~ 470
Presqu'île	< 500
Newporte	< 500
Glover Bluff	< 500
Gardnos	500 ± 10
Mizarai	500 ± 20
Rock Elm	< 505
Glikson	< 508
Lawn Hill	> 515
Foelsche	> 545
Holleford	550 ± 100
Kelly West	> 550
Sääksjärvi	~ 560
Spider	> 570
Acraman	~ 590
Söderfjärden	~ 600
Beaverhead	~ 600
Saarijärvi	> 600
Strangways	646 ± 42
Jänisjärvi	700 ± 5
Suvasvesi N	< 1000
Lumparn	~ 1000
Iso-Naakkima	> 1000
Santa Fe	< 1200
Goyder	< 1400
Shoemaker (formerly Teague)	1630 ± 5

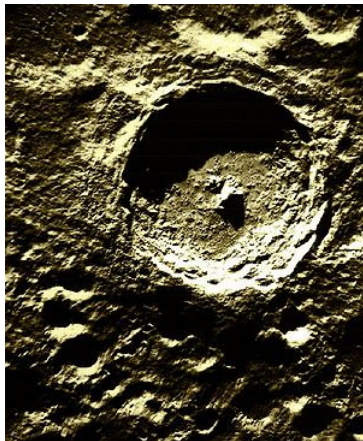
Amelia Creek	1640 - 600
Dhala	> 1700 < 2100
Keuruselkä	< 1800
Paasselkä	< 1800
Sudbury	1850 ± 3
Yarrabubba	~ 2000
Vredefort	2023 ± 4
Suavjärvi	~ 2400

Note B

Portions of Wikipedia Article on Impact Craters

Impact crater

From Wikipedia, the free encyclopedia



[caption] The prominent impact crater [Tycho](#) on the [Moon](#). *NASA photo*.

"Meteor crater" redirects here. For the crater in Arizona, see [Meteor Crater](#).

In the broadest sense, the term impact crater can be applied to any depression, natural or manmade, resulting from the high velocity impact of a projectile with larger body. In most common usage, the term is used for the approximately circular [depression](#) in the surface of a [planet](#), [moon](#) or other solid body in the [Solar System](#), formed by the [hyper-velocity impact](#) of a smaller body with the surface. This is in contrast to the [pit crater](#) which results from an internal collapse. Impact craters typically have raised rims, and they range from small, simple, bowl-shaped depressions to large, complex, multi-ringed impact basins. [Meteor Crater](#) is perhaps the best-known example of a small impact crater on the Earth.

The depth of an impact crater can usually be estimated using [Hunt's Impact Theorem](#), assuming that the radius of the impact body is negligible to the size of the crater.

Impact craters provide the dominant landforms on many solid Solar System objects including the [Moon](#), [Mercury](#), [Callisto](#), [Ganymede](#) and most small moons and [asteroids](#). On other planets and moons that experience more-active surface geological processes, such as [Earth](#), [Venus](#), [Mars](#), [Europa](#), [Io](#) and [Titan](#), visible impact craters are less common because they become [eroded](#), buried or transformed by [tectonics](#) over time. Where such processes have destroyed most of the original crater topography, the terms [impact structure](#) or [astrobleme](#) are more commonly used. In early literature, before the significance of impact cratering was widely recognised, the terms [cryptoexplosion](#) or [cryptovolcanic structure](#) were often used to describe what are now recognised as impact-related features on Earth.

In the early Solar System, rates of impact cratering were much higher than today. The large multi-ringed impact basins, with diameters of hundreds of kilometers or more, retained for example on Mercury and the Moon, record a period of [intense early bombardment](#) in the inner Solar System that ended about 3.8 billion years ago. Since that time, the rate of crater production on Earth has been considerably lower, but it is appreciable nonetheless; Earth experiences from one to three impacts large enough to produce a 20 km diameter crater about once every million years on average. This indicates that there should be far more relatively young craters on the planet than have been discovered so far.

Although the Earth's active surface processes quickly destroy the impact record, about 170 terrestrial impact craters have been identified. These range in diameter from a few tens of meters up to about 300 km, and they range in age from recent times (e.g. the [Sikhote-Alin craters](#) in [Russia](#) whose creation was witnessed in 1947) to more than two billion years, though most are less than 200 million years old because geological processes tend to obliterate older craters. They are also selectively found in the [stable interior regions of continents](#). Few under sea craters have been discovered because of the difficulty of surveying the sea floor, the rapid rate of change of the ocean bottom, and the [subduction of the ocean floor](#) into the Earth's interior by processes of [plate tectonics](#).

Impact craters are not to be confused with other landforms that in some cases appear similar, including [calderas](#) and [ring dikes](#).

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[\[edit\]](#) History



Eugene Shoemaker, pioneer impact crater researcher, here at a stereoscopic microscope used for asteroid discovery

[Daniel Barringer](#) (1860-1929) was one of the first to identify an impact crater, [Meteor Crater](#) in [Arizona](#); to crater specialists the site is referred to as [Barringer Crater](#) in his honor. Initially Barringer's ideas were not widely accepted, and even when the origin of Meteor Crater was finally acknowledged, the wider implications for impact cratering as a significant geological process on Earth were not.

In the 1920s, the American geologist [Walter H. Bucher](#) studied a number of sites now recognized as impact craters in the USA. He concluded they had been created by some great explosive event, but believed that this force was probably [volcanic](#) in origin. However, in 1936, the geologists [John D. Boon](#) and [Claude C. Albritton Jr.](#) revisited Bucher's studies and concluded that the craters that he studied were probably formed by impacts.

The concept of impact cratering remained more or less speculative until the 1960s. At this time a number of researchers, most notably [Eugene M. Shoemaker](#), (co-discoverer of the comet [Shoemaker-Levy 9](#)), conducted detailed studies of a number of craters and recognized clear evidence that they had been created by impacts, specifically identifying the shock-metamorphic effects uniquely associated with impact events, of which the most familiar is [shocked quartz](#).

Armed with the knowledge of shock-metamorphic features, [Carlyle S. Beals](#) and colleagues at the [Dominion Observatory](#) in [Victoria, British Columbia, Canada](#) and [Wolf von Engelhardt](#) of the [University of Tübingen](#) in [Germany](#) began a methodical search for impact craters. By 1970, they had tentatively identified more than 50. Although their work was controversial, the American [Apollo](#) Moon landings, which were in progress at the time, provided supportive evidence by recognizing the rate of impact cratering on the [Moon](#). Processes of erosion on the Moon are minimal and so craters persist almost indefinitely. Since the Earth could be expected to have roughly the same cratering rate as the Moon, it became clear that the Earth had suffered far more impacts than could be seen by counting evident craters.

[\[edit\]](#) Crater formation



A laboratory simulation of an impact event and crater formation

Impact cratering involves high velocity collisions between solid objects, typically much greater than the [velocity of sound](#) in those objects. Such hyper-velocity impacts produce physical effects such as [melting](#) and [vaporization](#), that do not occur in familiar sub-sonic collisions. On Earth, ignoring the slowing effects of travel through the atmosphere, the lowest impact velocity with an object from space is equal to the gravitational [escape velocity](#) of about 11 km/s. The fastest impacts occur at more than 70 km/s, calculated by summing the escape velocity from Earth, the escape velocity from the Sun at the Earth's [orbit](#), and the motion of the Earth around the Sun. The [median](#) impact velocity on Earth is about 20 to 25 km/s.

Impacts at these high speeds produce [shock waves](#) in solid materials, and both impactor and the material impacted are rapidly [compressed](#) to high density. Following initial compression, the high-density, over-compressed region rapidly depressurizes, exploding violently, to set in train the sequence of events that produces the impact crater. Impact-crater formation is therefore more closely analogous to cratering by [high explosives](#) than by mechanical displacement. Indeed, the [energy density](#) of some material involved in the formation of impact craters is many times higher than that generated by high explosives. Since craters are caused by [explosions](#), they are nearly always circular â€” only very low-angle impacts cause significantly elliptical craters.

It is convenient to divide the impact process conceptually into three distinct stages: (1) initial contact and compression, (2) excavation, (3) modification and collapse. In practice, there is overlap between the three processes with, for example, the excavation of the crater continuing in some regions while modification and collapse is already underway in others.

[\[edit\]](#) Contact and compression

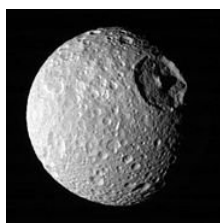
In the absence of [atmosphere](#), the impact process begins when the impactor first touches the target surface. This contact [accelerates](#) the target and decelerates the impactor. Because the impactor is moving so rapidly, the rear of the object moves a significant distance during the short-but-finite time taken for the deceleration to propagate across the impactor. As a result, the impactor is compressed, its density rises, and the [pressure](#) within it increases dramatically. Peak pressures in large impacts exceed 1 [TPa](#) to reach values more usually found deep in the interiors of planets, or generated artificially in [nuclear explosions](#).

In physical terms, a [supersonic](#) shock wave initiates from the point of contact. As this shock wave expands, it decelerates and compresses the impactor, and it accelerates and compresses the target. Stress levels within the shock wave far exceeds the strength of solid materials; consequently, both the impactor and the target close to the impact site are irreversibly damaged. Many crystalline minerals can be transformed into higher-density phases by shock waves; for example, the common mineral quartz can be transformed into the higher-pressure forms [coesite](#) and [stishovite](#). Many other shock-related changes take place within both impactor and target as the shock wave passes through, and some of these changes can be used as diagnostic tools to determine whether particular geological features were produced by impact cratering.

As the shock wave decays, the shocked region decompresses towards more usual pressures and densities. The damage produced by the shock wave raises the temperature of the material. In all but the smallest impacts this increase in temperature is sufficient to melt the impactor, and in larger impacts to vaporize most of it and to melt large volumes of the target. As well as being heated, the target near the impact is accelerated by the shock wave, and it continues moving away from the impact behind the decaying shock wave.

[\[edit\]](#) Excavation

Contact, compression, decompression, and the passage of the shock wave all occur within a few tenths of a second for a large impact. The subsequent excavation of the crater occurs more slowly, and during this stage the flow of material is largely sub-sonic. During excavation, the crater grows as the accelerated target material moves away from the impact point. The target's motion is initially downwards and outwards, but it becomes outwards and upwards. The flow initially produces an approximately hemispherical cavity. The cavity continues to grow, eventually producing a [paraboloid](#) (bowl-shaped) crater in which the centre has been pushed down, a significant volume of material has been ejected, and a topographically elevated crater rim has been pushed up. When this cavity has reached its maximum size, it is called the transient cavity.



[\[img\]](#)
[Herschel Crater](#) on Saturn's moon [Mimas](#)

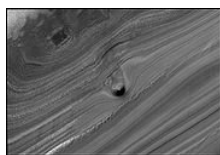
The depth of the transient cavity is typically a quarter to a third of its diameter. [Ejecta](#) thrown out of the crater does not include material excavated from the full depth of the transient cavity; typically the depth of maximum excavation is only about a third of the total depth. As a result, about one third of the volume of the transient crater is formed by the ejection of material, and the remaining two thirds is formed by the displacement of material downwards, outwards and upwards, to form the elevated rim. For impacts into highly porous materials, a significant crater volume may also be formed by the permanent compaction of the [pore space](#). Such compaction craters may be important on many asteroids, comets and small moons.

In large impacts, as well as material displaced and ejected to form the crater, significant volumes of target material may be melted and vaporized together with the original impactor. Some of this impact melt rock may be ejected, but most of it remains within the transient crater, initially forming a layer of impact melt coating the interior of the transient cavity. In contrast, the hot dense vaporized material expands rapidly out of the growing cavity, carrying some solid and molten material within it as it does so. As this hot vapor cloud expands, it rises and cools much like the archetypal mushroom cloud generated by large nuclear explosions. In large impacts, the expanding vapor cloud may rise to many times the scale height of the atmosphere, effectively expanding into free space.

Most material ejected from the crater is deposited within a few crater radii, but a small fraction may travel large distances at high velocity, and in large impacts it may exceed [escape velocity](#) and leave the impacted planet or moon entirely. The majority of the fastest material is ejected from close to the center of impact, and the slowest material is ejected close to the rim at low velocities to form an overturned coherent flap of ejecta immediately outside the rim. As ejecta escapes from the growing crater, it forms an expanding curtain in the shape of an inverted cone; the trajectory of individual particles within the curtain is thought to be largely ballistic.

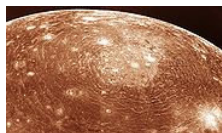
Small volumes of un-melted and relatively un-shocked material may be [spalled](#) at very high relative velocities from the surface of the target and from the rear of the impactor. Spalling provides a potential mechanism whereby material may be ejected into inter-planetary space largely undamaged, and whereby small volumes of the impactor may be preserved undamaged even in large impacts. Small volumes of high-speed material may also be generated early in the impact by jetting. This occurs when two surfaces converge rapidly and obliquely at a small angle, and high-temperature highly shocked material is expelled from the convergence zone with velocities that may be several times larger than the impact velocity.

[\[edit\]](#) Modification and collapse



[\[img\]](#)
Weathering may change the aspect of a crater drastically. This mound on [Mars'](#) north pole may be the result of an impact crater that was buried by [sediment](#) and subsequently re-exposed by [erosion](#).

In most circumstances, the transient cavity is not stable: it collapses under gravity. In small craters, less than about 4 km diameter on Earth, there is some limited collapse of the crater rim coupled with debris sliding down the crater walls and drainage of impact melts into the deeper cavity. The resultant structure is called a simple crater, and it remains bowl-shaped and superficially similar to the transient crater. In simple craters, the original excavation cavity is overlain by a lens of collapse [breccia](#), ejecta and melt rock, and a portion of the central crater floor may sometimes be flat.

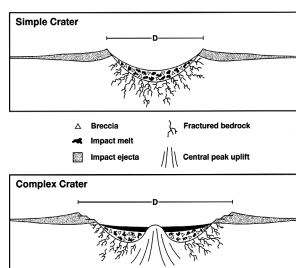


 Multi-ringed impact basin Valhalla on Jupiter's moon [Callisto](#)

Above a certain threshold size, which varies with planetary gravity, the collapse and modification of the transient cavity is much more extensive, and the resulting structure is called a *complex crater*. The collapse of the transient cavity is driven by gravity, and involves both the uplift of the central region and the inward collapse of the rim. The central uplift is not the result of *elastic rebound* which is a process in which a material with elastic strength attempts to return to its original geometry; rather the collapse is a process in which a material with little or no strength attempts to return to a state of gravitational equilibrium.


Complex craters have uplifted centers, and they have typically broad flat shallow crater floors, and terraced walls. At the largest sizes, one or more exterior or interior rings may appear, and the structure may be labeled an *impact basin* rather than an impact crater. Complex-crater morphology on rocky planets appears to follow a regular sequence with increasing size: small complex craters with a central topographic peak are called *central peak craters*, for example [Tycho](#); intermediate-sized craters, in which the central peak is replaced by a ring of peaks, are called *peak-ring craters*, for example [Schrodinger](#); and the largest craters contain multiple concentric topographic rings, and are called *multi-ringed basins*, for example [Orientale](#). On icy as opposed to rocky bodies, other morphological forms appear which may have central pits rather than central peaks, and at the largest sizes may contain very many concentric rings – [Valhalla](#) on Callisto is the type example of the latter.

Identifying impact craters



 Impact crater structure




 Shocked polymictic [breccia](#) from the [Azuara impact structure](#), Spain.

Some volcanic features can resemble impact craters, and [brecciated rocks](#) are associated with other geological formations besides impact craters. Non-explosive volcanic craters can usually be distinguished from impact craters by their irregular shape and the association of volcanic flows and other volcanic materials. An exception is that impact craters on Venus often have associated flows of melted material.

The distinctive mark of an impact crater is the presence of rock that has undergone shock-metamorphic effects, such as [shatter cones](#), melted rocks, and crystal deformations. The problem is that these materials tend to be deeply buried, at least for simple craters. They tend to be revealed in the uplifted center of a complex crater, however.

Impacts produce distinctive "shock-metamorphic" effects that allow impact sites to be distinctively identified. Such shock-metamorphic effects can include:



 Close-up of shatter cones developed in fine grained [dolomite](#) from the [Wells Creek crater](#), USA.

- A layer of shattered or "[brecciated](#)" rock under the floor of the crater. This layer is called a "breccia lens".
- [Shatter cones](#), which are chevron-shaped impressions in rocks. Such cones are formed most easily in fine-grained rocks.

- High-temperature rock types, including laminated and welded blocks of sand, [spherulites](#) and [tektites](#), or glassy spatters of molten rock. The impact origin of tektites has been questioned by some researchers; they have observed some volcanic features in tektites not found in impactites. Tektites are also drier (contain less water) than typical impactites. While rocks melted by the impact resemble volcanic rocks, they incorporate unmelted fragments of bedrock, form unusually large and unbroken fields, and have a much more mixed chemical composition than volcanic materials spewed up from within the Earth. They also may have relatively large amounts of trace elements that are associated with meteorites, such as nickel, platinum, iridium, and cobalt. Note: it is reported in the scientific literature that some "shock" features, such as small shatter cones, which are often reported as being associated only with impact events, have been found in terrestrial volcanic ejecta.
- Microscopic pressure deformations of minerals. These include fracture patterns in crystals of quartz and feldspar, and formation of high-pressure materials such as diamond, derived from graphite and other carbon compounds, or stishovite and [coesite](#), varieties of [shocked quartz](#).

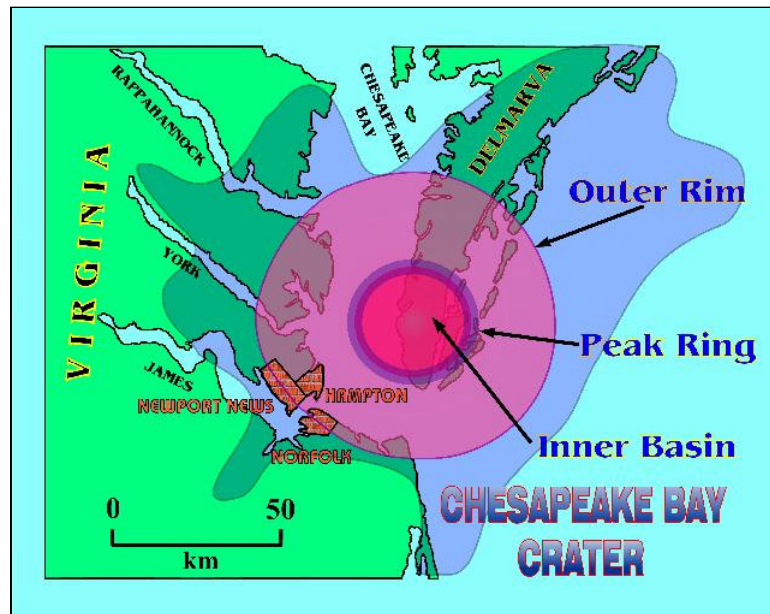
Craters can also be created from underground [nuclear explosions](#). One of the most crater-pocked sites on the planet is the [Nevada Test Site](#), where a number of craters were purposely made during its years as a center for [nuclear testing](#) (see, for example, [Operation Plowshare](#)).

Note C

Ancient Cataclysm

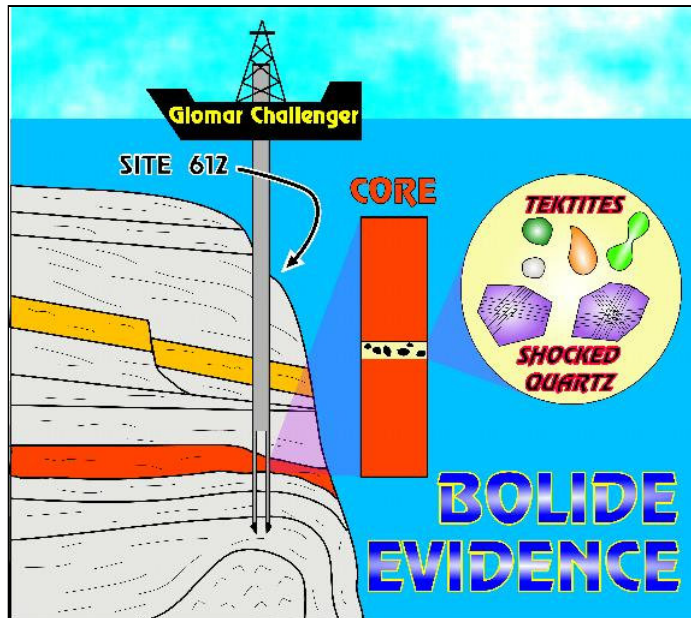
The Chesapeake Bay Impact by USGS

copied from http://woodshole.er.usgs.gov/epubs/bolide/ancient_cataclysm.html



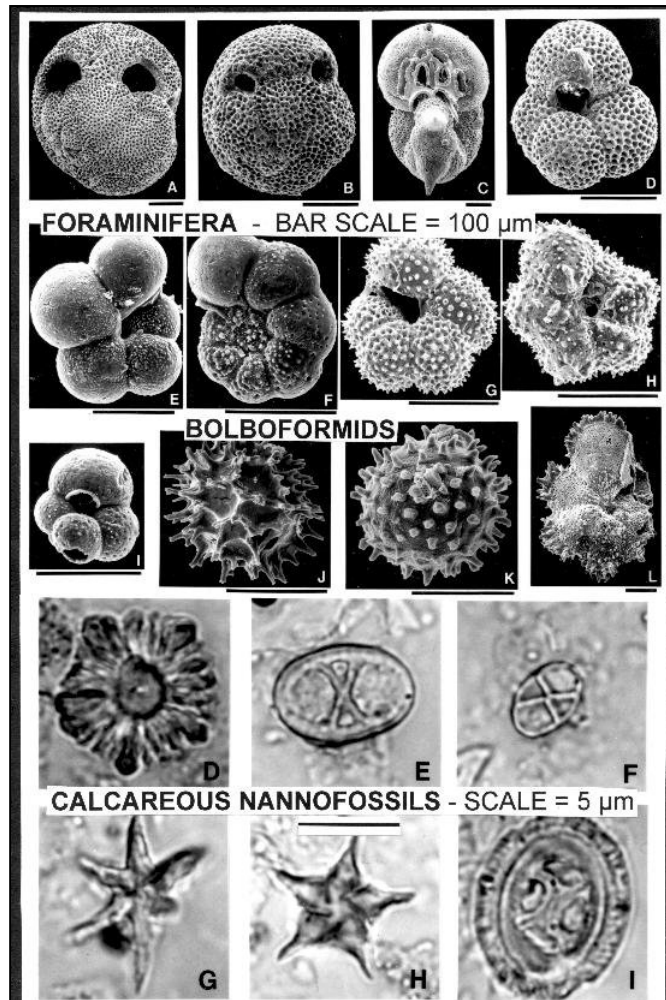
In order to fully appreciate the consequences of the Chesapeake Bay impact, we need to understand what the crater is like, and how we know it is there. It is the larger of two craters recently discovered on the US East Coast by Wylie Poag and his colleagues. Both were formed 35 million years ago in the late Eocene epoch of geological time. That's about half as old as the dinosaur extinction. The crater is located approximately 200 km southeast of Washington, D.C., and is buried 300-500 meters beneath the lower part of Chesapeake Bay, its surrounding peninsulas, and the inner continental shelf of the Atlantic Ocean. There is, however, much telltale geological evidence of the impact.

Tektites and Shocked Quartz



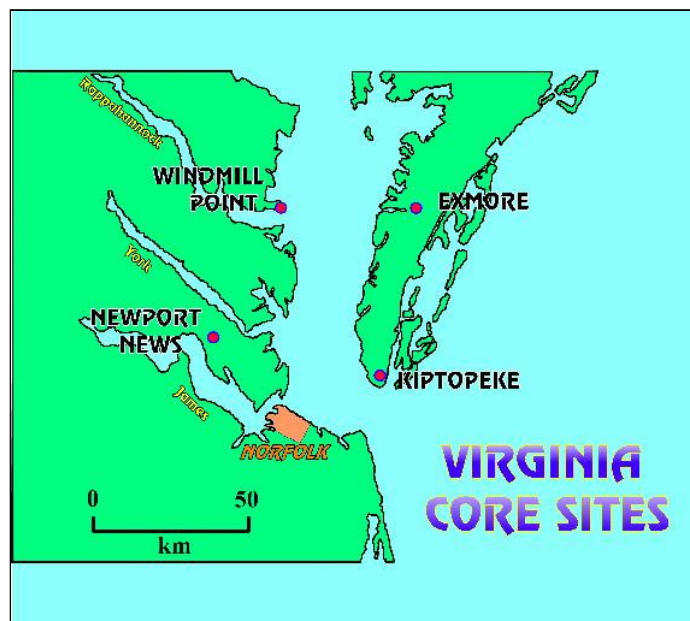
The first evidence of a bolide impact on the East Coast came to light in 1983. Wylie Poag was serving as Co-Chief Scientist on the drill ship *Glomar Challenger* during Leg 95 of the National Science Foundation's Deep Sea Drilling Project. At an offshore drill site 120 km east of Atlantic City, NJ, the scientific party of Leg 95 recovered a core containing sedimentary debris diagnostic of a bolide impact. This figure focuses on that discovery, and introduces some key terminology. Shown here in great exaggeration, is the *Glomar Challenger* drilling into the sedimentary beds that make up the seaward edge of the continental shelf. The continental shelf is represented as a stack of sedimentary beds, displayed on a seismic reflection profile. The seismic profile is a type of sea floor sonogram. The survey ship sends a series of sound waves into the sea floor. As each wave encounters the boundaries between individual beds, part of the wave is reflected back to a recording instrument. These reflections are digitized and processed by computer to produce the seismic profile. The profile shows the thickness, depth, and spatial orientation of each bed, and allows one to determine the best drill site for solving a particular geological problem. For example, we see here that the yellow bed is tilted seaward, and has been fractured. The eastern block has moved downward along the fracture plane relative to the western block. This fracture plane is called a fault. At the lower end of the drill pipe, the drill bit is located near the crest of a folded bed.

The drill bit has a hole in its center, about the diameter of a tennis ball. So as it grinds down through the sediments, a cylindrical core of sediment protrudes through that opening and up into the hollow drill pipe. From there, it can be recovered and sampled. **A core from the red bed** contains a 20-cm-thick layer, which includes diagnostic evidence of a bolide impact. The evidence consists of certain minerals, whose physical properties have been altered by the tremendous force of the impact shock, which can be tens of thousands of times greater than atmospheric pressure. Two of the most common alteration products are shown in the yellow circle. Tektites are millimeter-to-centimeter-size glass beads derived from sediment melted by the impact. Shocked minerals, especially quartz, show several sets of closely spaced, intersecting dark stripes when viewed microscopically. The lines represent tiny fracture planes oriented at specific angles to the main optical axis of the quartz crystal. No natural mechanism other than a bolide impact produces tektites and shocked quartz.

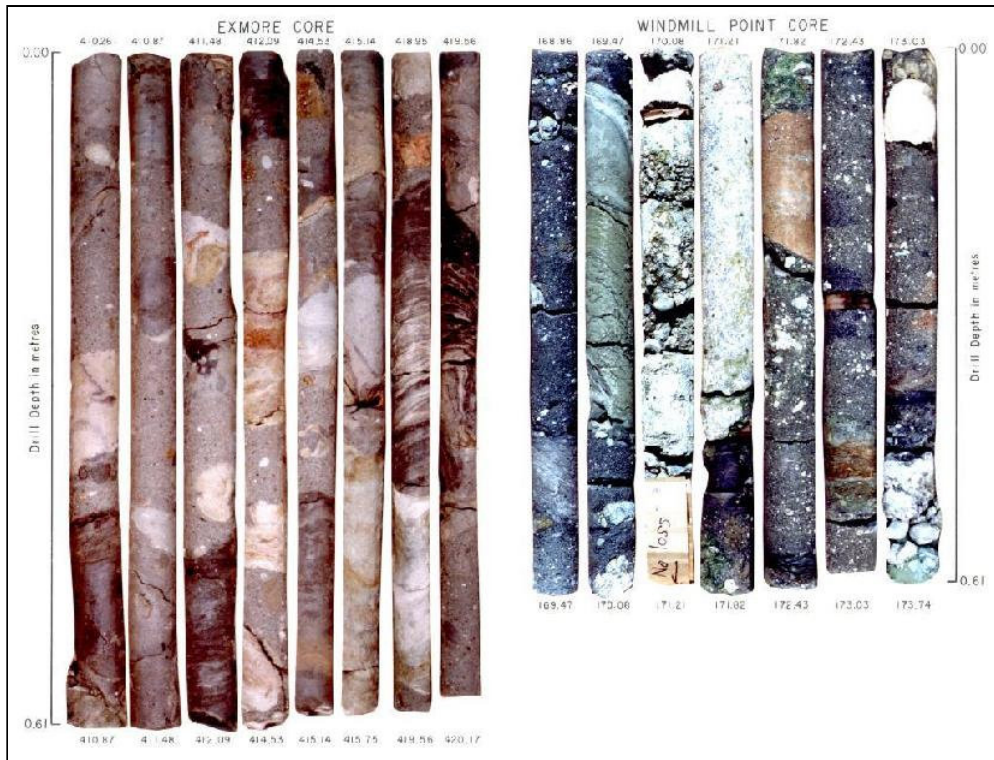


The sediments containing the tektite also contain fossilized remains of microorganisms (microfossils) that lived in the ocean when the tektites were deposited. These photomicrographs illustrate a variety of these microfossils (note the scale bars). The microfossils indicated that the tektite layer at Site 612 was deposited in the late Eocene epoch, 35 million years ago. This age was confirmed by determining the ratio of two isotopes of argon gas contained in the tektite glass.

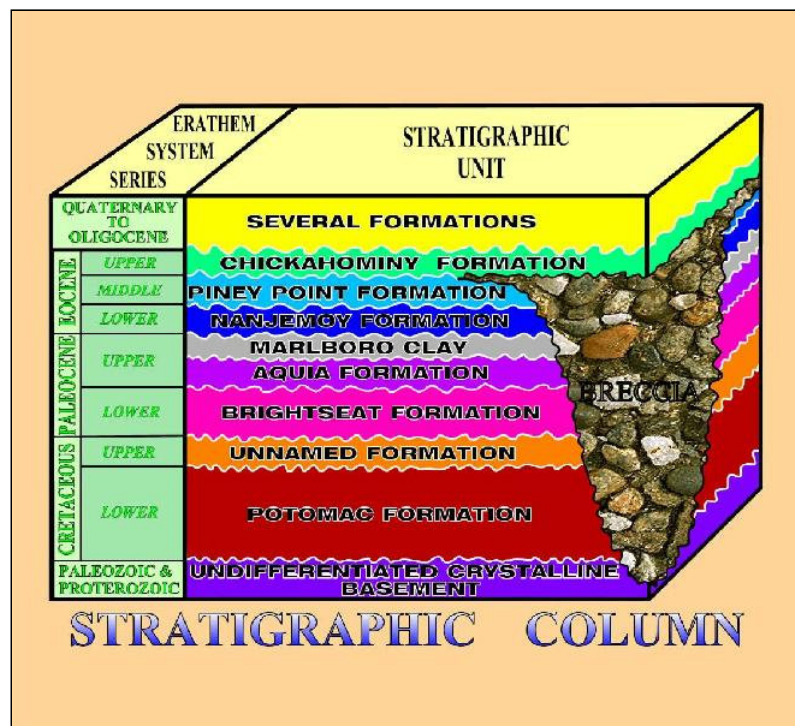
Rubble Bed



The second indication of an East Coast bolide impact came three years later (1986), from cores drilled onshore in southeastern Virginia. There, the U.S. Geological Survey and the Virginia State Water Control Board were investigating the composition, thickness, and geological age of subsurface sedimentary beds and evaluating their potential as sources of fresh groundwater. They drilled four cores, two on each side of the lower bay. Let's examine some of the core from the Windmill Point and Exmore sites.



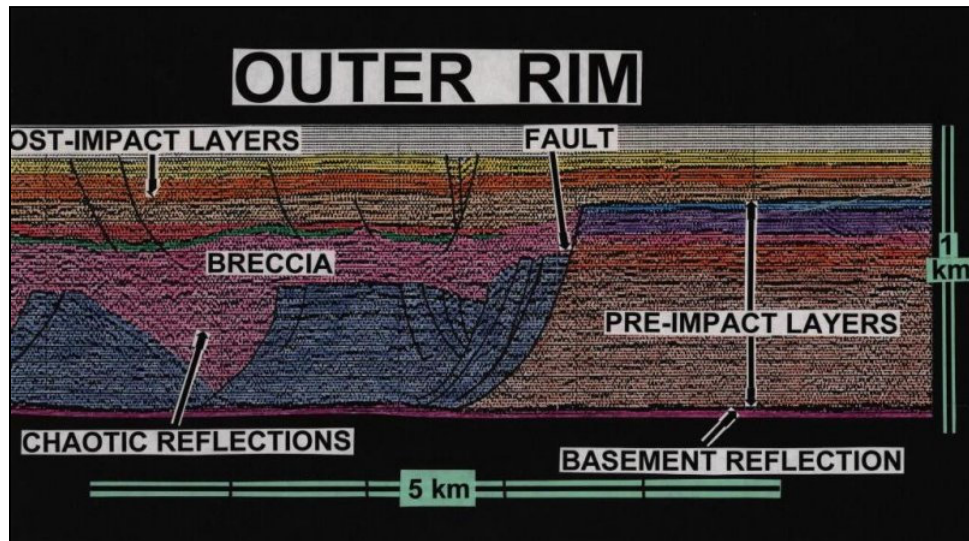
Here are parts of two different cores, cut up into two-foot sections for ease of storage. We can call this rock material a sandy rubble bed. Mixed within the sand are larger hand-size to person-size chunks (clasts) of clay, limestone, and sand. The clasts in the rubble bed change rapidly downcore in composition, size, color, and orientation. No one had ever seen such a rubble bed before in the subsurface of Virginia, but it is present in all four of our cores. **The strangest aspect of the bed is not visible to the naked eye, however. We didn't discover it until we analyzed the microfossils. The upper clay bed contained the normal stacked succession of microfossils... youngest on top, getting progressively older downcore. But that's not the case in the rubble bed. For example, the dark, fractured clay interval in the Windmill Point core differs by 20 million years in age from the white limestone below it. But the limestone is not older, as it should be; it's 20 million years younger. And we found a random mixture of ages among all the other clasts, too. The clasts turn out to be mainly fragments ripped from all the surrounding sedimentary beds that underlie southeast Virginia. Small pieces of the granitic basement are also scattered throughout the rubble. All these fragments were mixed together and redeposited in a layer that covers twice the area of Rhode Island. But most important of all, the youngest microfossils in the rubble bed are the same group of species we had seen in the tektite layer off New Jersey. Clearly, some terrific force had torn apart the normal horizontally stacked layers in Virginia, and scrambled them all together, at the same time a bolide impact had deposited the tektites off New Jersey.**



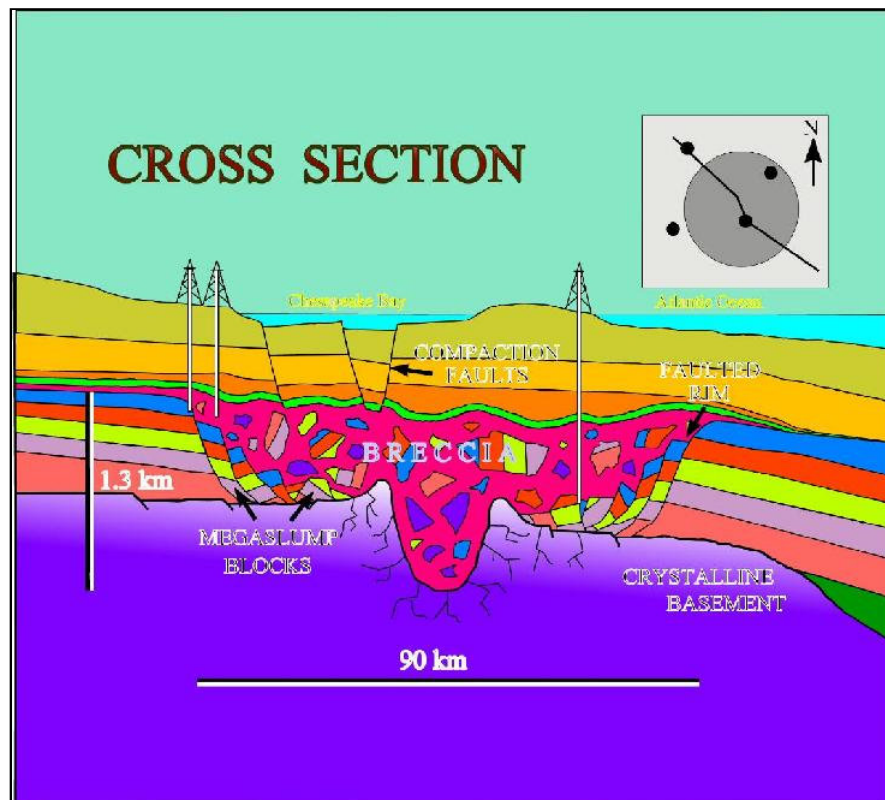
This suggested a common origin for the rubble bed and the New Jersey tektite layer. So we looked for shock-altered minerals in the rubble bed. Sure enough, we found trace amounts of shocked quartz and bits of melt-rock in the rubble bed at each core site. Now we had diagnostic evidence that the rubble bed resulted from a bolide impact. But we still could not pinpoint the location of the source crater.

Seismic Profiles

The final piece of the puzzle was provided in 1993 (ten years after the tektite discovery off New Jersey) by Texaco, Inc. and Exxon Exploration Co. These companies were exploring beneath Chesapeake Bay for structures that might contain oil and gas. And as part of that search, they collected a network of seismic reflection profiles in the bay. These profiles showed clearly that a huge peak-ring impact crater is buried beneath the bay and centered near the town of Cape Charles, on Virginia's eastern shore. The crater is 90 km in diameter and 1.3 km deep. It covers an area twice the size of Rhode Island, and is nearly as deep as the Grand Canyon. The rubble bed, which we now realize is an impact breccia, fills the crater and forms a thin halo around it, called an ejecta blanket. Inadvertently, we had drilled two of the core holes mentioned previously into the breccia inside the crater. The other two cores were drilled just outside the rim, into the ejecta blanket. The seismic profiles show that the breccia is much thicker than the cores indicated, however, reaching more than a kilometer.



Here is a seismic profile which shows, in cross section, the structure of the outer rim of the crater. Along the base of the profile is a prominent reflection separating the purple bed from the brown bed. The purple bed is composed of granite and granite-like rocks, which we call crystalline basement. The basement rocks are much denser than the sedimentary layers above it, and this produces the strong basement reflection. The stack of horizontal reflections to the right, between the purple and blue layers, represent the normal sedimentary beds that existed here when the bolide struck. The top of the blue bed represents the ancient sea-floor at the time of the impact. As we look to the left on this profile, however, these horizontal reflections are truncated by a series of faults, and the orderly stacking of beds is disrupted. The blue units are large blocks that have slumped off the crater's outer wall, and have slid to the left into the annular trough. We can still see some organized reflections in these blocks; some remain horizontal, but others are diagonal, indicating that the blocks have rotated. The pink breccia section is characterized by disorganized or chaotic reflections caused by the jumble of clasts it contains. On top of the breccia are horizontal reflections from the youngest beds, which accumulated during the past 35 million years since the bolide struck.



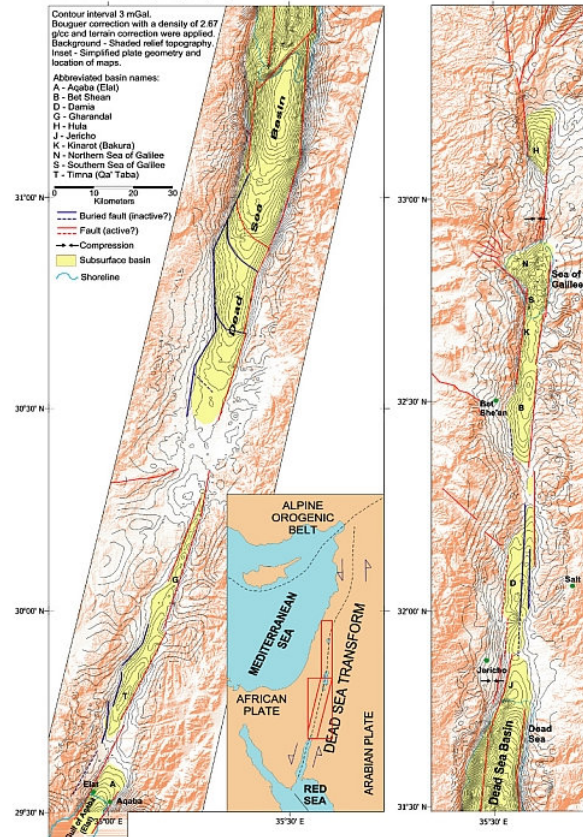
We can put all the core and seismic data together and produce a two-dimensional cross section across the entire crater. A map view at the upper right shows the location of the cross section relative to the crater outline and the core sites. Outside the crater we see a stack of gently dipping sedimentary beds lying on the granitic basement. The bolide punched a deep hole through the sediments and into the basement (the inner basin), fractured it to depths of 8 km, and raised the peak ring around it. The sedimentary walls of the crater progressively slumped in, widened the crater, and formed a layer of huge blocks on the floor of the annular trough. The slump blocks were then covered with the breccia. The entire bolide event, from initial impact to the

termination of breccia deposition lasted only a few hours or days. In geological perspective, the 1.2 km-thick breccia is an instantaneous deposit. **The crater was then buried by additional sedimentary beds**, which accumulated during the following 35 million years. The white perpendicular columns beneath the drill derricks indicate the beds that we cored.

Chapter 7; The Dead Sea/Lake Lisan



Subsurface basins (highlighted in yellow) along the Dead Sea Transform marked on Bouguer gravity anomaly map and shaded relief of the topography.



The Dead Sea water level is dropping at a rate of about 1 meter per year as water that would normally flow into it is being used by the surrounding communities. As you can see from the gravity anomaly map on the right above it is a very complex geological formation with many fault lines, both active and inactive. The Dead Sea Transform (DST) fault system, also sometimes referred to as the Dead Sea Rift, is a geologic fault which extends through the Jordan River Valley in the Middle East. It runs along the boundary of two tectonic plates, the African Plate on the west and the Arabian Plate on the east. It is a left lateral transform fault, signifying the relative motions of the two plates. **Both plates are moving in a general north-northeast direction, but the Arabian Plate is moving faster, resulting in the observed left lateral motions along the fault of approximately 107 km (72 miles). A component of extension is also present, which has contributed to the depression, or pull apart basin in which the Dead Sea is situated.** The Dead Sea Transform runs from the northern end of the Red Sea Rift just offshore of the southern tip of the Sinai Peninsula, to a junction with the East Anatolian Fault in southeastern Turkey.

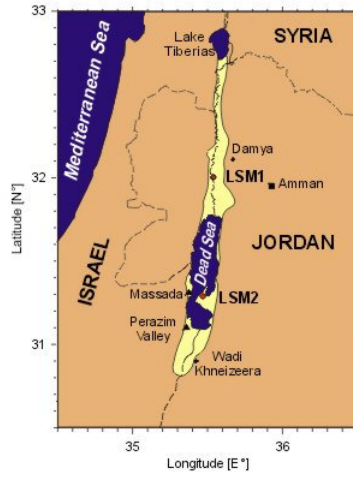
In ancient times what is now the valley of the Jordan River, Dead Sea, and Wadi Arabah/Nahal Arava **was repeatedly inundated by waters from the Mediterranean Sea.** The waters formed in a narrow, crooked bay which was connected to the sea through what is now the Jezreel Valley. The floods of the valley came and went depending on long scale climatic change. The lake that occupied the Dead Sea Rift, named "**Lake Sodom**", deposited beds of salt, eventually coming to be 3 km (2 miles) thick.

Then approximately two million years ago the land between the Rift Valley and the Mediterranean Sea rose to such an extent that the ocean could no longer flood the area. Thus, the long bay became a long lake.

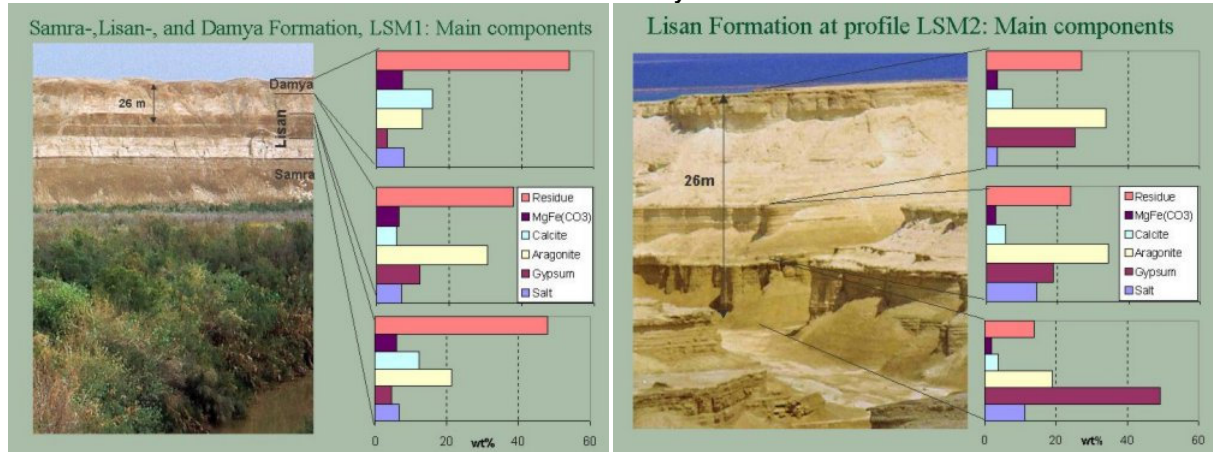
The first such prehistoric lake is named "**Lake Gomorrah**". Lake Gomorrah was a freshwater or brackish lake that extended at least 80 km (50 miles) south of the current southern end of the Dead Sea and 100 km (60 miles) north, well above the present Hula Depression. As the climate turned more arid, Lake Gomorrah shrank and became saltier. The large, saltwater predecessor of the Dead Sea is called "**Lake Lisan**".

Mount Sedom, on the southwest side of the lake, is a giant mountain of halite. In prehistoric times great amounts of sediment collected on the floor of Lake Gomorrah. The sediment was heavier than the salt deposits and squeezed the salt deposits upwards into what are now the Lisan Peninsula and Mount Sedom (on the southwest side of the lake). "Geologists explain the effect in terms of a bucket of mud into which a large flat stone is placed, forcing the mud to creep up the sides of the pail". When the floor of the Dead Sea dropped further due to tectonic forces the salt mounts of Lisan and Mount Sedom stayed in place as high cliffs. (see salt domes)

During 70,000 to 12,000 years ago the lake level was a **100-250 m (110 to 275 yards) higher** than its current level. This lake was termed "Lake Lisan", which fluctuated dramatically with rising to a highest level around 26,000 years ago, indicating very wet climate in the Near East.

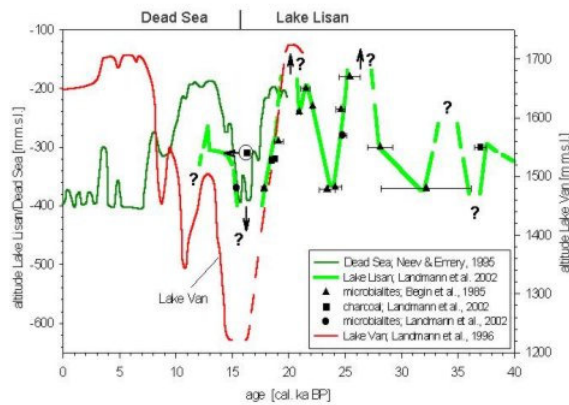


Lisan formations in yellow



The Lisan sediments consist of chalky white and clayey grey deposits that are so soft that they can be scratched with a fingernail. They contrast with the earlier hard brown limestone and dolomite sediments.

Then sometime around 10,000 years ago the lake level dropped dramatically, probably to levels even lower than today. During the last several thousand years the lake has fluctuated with some significant drops and rises.



Downfaulting possibly contributed to the drop in lake level. During the stages of low lake level deep canyons were eroded into the exposed side slopes. The eroded material and chemical precipitates accumulated on the floor of the North Basin to form its flat bottom. During most of the post-Lisan time the South Basin existed as an independent lake. Rock salt was deposited, occasionally interfingering with alluvial sediments brought mostly from the south. The absence of carnallite (an evaporite mineral, a hydrated potassium magnesium chloride) and the relatively high Cl/Br ration within these salt deposits indicate that bitterns (salts) probably were carried northward into the lower North Basin, possibly during periods of increased rainfall.

The water of the North Basin remained about 40 meters below its present level for a long time. Except possibly for a peak about 4,000 years ago during most of the Biblical period and until about 1200 years ago the Dead Sea was probably restricted to the North Basin. This restriction is supported by diverse evidence, including such Biblical narratives and descriptions as the definition of the borders of the tribes of Judah (Joshua 15:2), the battles waged by Kings David and Amatsyahu in the Valley of Salt (Samuel II 8:13-14), and the story for Ruth and Naomi, which refers to close ties and easy traffic between Moab and Bethlehem. Travel would have been rather long and tedious via either the northern route (through the lands of Benjamin and Ammon) or the southern route (via the lands of Edom) had there not been a short cut through the present-day Lisan Straight. Traces of a Roman road joining Transjordan and Judea across the Lisan Peninsula, the width-length ratios of the Dead Sea dimensions given by Josephus (Wars of the Jews, Book IV, Chap. VIII, par. 4) and the partial depiction of the Dead Sea on the mosaic map of Madaba, constructed about 560 A. D. (Avi-Yorah, 1954), all indicate that the South Basin was not flooded until comparatively recent times.

The period after the Moslim conquest in the 7th century A.D. approximately coincides with an increase in runoff that produced a rise of the Dead Sea and the consequent flooding of the South Basin. This rise may be connected with the destruction of an earlier

Judean-Byzantine culture based upon irrigation and restricted grazing. The rising lake eventually severed the road across the present Lisan Strait during the 19th century. It also drowned fringing thickets of tamarisks whose partly submerged remains still line the shores. About 60 years ago a climax level was reached, 10 to 11 meters above the present level (Klein, 1961)

Conclusion: The history of the Dead Sea area as documented in the geological formations give evidence of the ancient history of the Earth !

See Notes A through D below for additional details.
Other sources are included on this disc.

Note A: Wikipedia on the Dead Sea

[] Etymology

In Arabic the Dead Sea is called *al-Bahr al-Mayyit* "Dead Sea", or less commonly *bah.r^(u) lu-t.^(a)* (, "the Sea of Lot"). Another historic name in Arabic was the "Sea of Zoar", after a nearby town in biblical times. In Hebrew, the Dead Sea is **יָם הַמֶּלַח** *Ya-m ha-Melah*. (.), meaning "sea of salt" (Genesis 14,3). In prose sometime the term *Ya-m ha-Ma-vet* (, "sea of death") is used. The bible also refers to it as *Ya-m ha-Mizrah.î* (, "the Eastern sea") or *Ya-m ha-'A(ra-vâ* (, "Sea of the Arabah"). The Greeks called it *Lake Asphaltites* (Attic Greek , *he-Thálatta asphalti-te-s*, "the Asphaltite"^[6] sea.

[] Geography



Satellite photograph showing the location of the Dead Sea

The Dead Sea is an endorheic lake located in the Jordan Rift Valley, a geographic feature formed by the Dead Sea Transform (DST). This left lateral-moving transform fault lies along the tectonic plate boundary between the African Plate and the Arabian Plate. It runs between the East Anatolian Fault zone in Turkey and the northern end of the Red Sea Rift offshore of the southern tip of Sinai.

The Jordan River is the only major water source flowing into the Dead Sea, although there are small perennial springs under and around the Dead Sea, creating pools and quicksand pits along the edges.^[7] There are no outlet streams.

Rainfall is scarcely 100 mm (4 in) per year in the northern part of the Dead Sea and barely 50 mm (2 in) in the southern part. The Dead Sea zone's aridity is due to the rainshadow effect of the Judean Hills. The highlands east of the Dead Sea receive more rainfall than the Dead Sea itself.

To the west of the Dead Sea, the Judean Hills rise less steeply, and are much lower, than the mountains to the east. Along the southwestern side of the lake is a 210 m (700 ft) tall halite formation called "Mount Sodom".

[] Natural history

There are two contending hypotheses about the origin of the low elevation of the Dead Sea. The older hypothesis is that it lies in a true rift zone, an extension of the Red Sea Rift, or even of the Great Rift Valley of eastern Africa. A more recent hypothesis is that the Dead Sea basin is a consequence of a "step-over" discontinuity along the Dead Sea Transform, creating extension of the crust with consequent subsidence.

Around three million years ago what is now the valley of the Jordan River, Dead Sea, and Wadi Arabah was repeatedly inundated by waters from the M erranean Sea. The waters formed in a narrow, crooked bay which was connected to the sea through what is now the Jezreel Valley. The floods of the valley came and went depending on long scale climate change. The lake that occupied the Dead Sea Rift, named "Lake Sodom", deposited beds of salt, eventually coming to be 3 km (2 miles) thick.

According to geological theory, approximately two million years ago the land between the Rift Valley and the M erranean Sea rose to such an extent that the ocean could no longer flood the area. Thus, the long bay became a lake.

The first such prehistoric lake is named "Lake Gomorrah." Lake Gomorrah was a freshwater or brackish lake that extended at least 80 km (50 mi) south of the current southern end of the Dead Sea and 100 km (60 mi) north, well above the present Hula Depression. As the climate became more arid, Lake Gomorrah shrank and became saltier. The large, saltwater predecessor of the Dead Sea is called "Lake Lisan."



Near Ein Gedi, salt builds up along the shores of

the Dead Sea.



Cobble encrusted with halite evaporated from the Dead Sea near Ein Gedi.



Pebbles cemented with halite on the western shore of the Dead Sea near Ein Gedi.

In prehistoric times great amounts of sediment collected on the floor of Lake Gomorrah. The sediment was heavier than the salt deposits and squeezed the salt deposits upwards into what are now the Lisan Peninsula and Mount Sodom (on the southwest side of the lake). Geologists explain the effect in terms of a bucket of mud into which a large flat stone is placed, forcing the mud to creep up the sides of the pail. When the floor of the Dead Sea dropped further due to tectonic forces, the salt mounts of Lisan and Mount Sodom stayed in place as high cliffs. (see salt domes)

From 70 000 to 12 000 years ago the lake level was 100 m (328 ft) to 250 m (820 ft) higher than its current level. This lake, called "Lake Lisan", fluctuated dramatically, rising to its highest level around 26,000 years ago, indicating very wet climate in the Near East. Sometime around 10 000 years ago the lake level dropped dramatically, probably to levels even lower than today. During the last several thousand years the lake has fluctuated approximately 400 m (1,310 ft) with some significant drops and rises. Current theories as to the cause of this dramatic drop in levels rule out volcanic activity, therefore it may have been a seismic event.

[] Climate



Many people believe that the mud of the Dead Sea has special healing and cosmetic uses.

The Dead Sea's climate offers year-round sunny skies and dry air with low pollution. It has less than 100 millimetres (3.94 in) mean annual rainfall and a summer average temperature between 32 and 39 °C (90-102 °F). Winter average temperatures range between 20 and 23 °C (68-74 °F). The region has weakened ultraviolet radiation, particularly the UVB (erythrogenic rays), and an atmosphere characterized by a high oxygen content due to the high barometric pressure.^[8] The sea affects temperatures nearby because of the moderating effect a large body of water has on climate. During the winter, sea temperatures tend to be higher than land temperatures, and vice versa during the summer months. This is the outcome of slow penetration of the sun's rays into the sea, which is a huge mass that takes a long time to warm up.

[] Chemistry



A tourist (on the Jordanian side) demonstrates the unusual buoyancy caused by high salinity.

Until the winter of 1978-79, when a major mixing event took place,^[9] the Dead Sea was composed of two stratified layers of water that differed in temperature, density, age, and salinity. The topmost 35 metres (115 ft) or so of the Dead Sea had a salinity that ranged between 300 and 400 parts per thousand and a temperature that swung between 19 °C (66.2 °F) and 37 °C (98.6 °F). Underneath a zone of transition, the lowest level of the Dead Sea had waters of a consistent 22 °C (71.6 °F) temperature and complete saturation of sodium chloride (NaCl).^[citation needed] Since the water near the bottom is saturated, the salt precipitates out of solution onto the sea floor.

Beginning in the 1960s water inflow to the Dead Sea from the Jordan River was reduced as a result of large-scale irrigation and generally

low rainfall. By 1975 the upper water layer of the Dead Sea was saltier than the lower layer. Nevertheless, the upper layer remained suspended above the lower layer because its waters were warmer and thus less dense. When the upper layer finally cooled down so that its density was greater than the lower layer, the waters of the Dead Sea mixed (1978-79). For the first time in centuries the lake was a homogeneous body of water. Since then stratification has begun to redevelop.^[9]



A rough Dead Sea, with salt deposits on cliffs.

The mineral content of the Dead Sea is very different from that of ocean water. The exact composition of the Dead Sea water varies mainly with season, depth and temperature. In the early 1980s the concentration of ionic species (in g/kg) of Dead Sea surface water was Cl^- (181.4), Br^- (4.2), SO_4^{2-} (0.4), HCO_3^- (0.2), Ca^{2+} (14.1), Na^+ (32.5), K^+ (6.2) and Mg^{2+} (35.2). The total salinity was 276 g/kg.^[10] These results show that w/w% composition of the salt, as anhydrous chlorides, was calcium chloride (CaCl_2) 14.4%, potassium chloride (KCl) 4.4%, magnesium chloride (MgCl_2) 50.8% and sodium chloride (common salt, NaCl) 30.4%. In comparison, the salt in the water of most oceans and seas is approximately 97% sodium chloride. The concentration of sulfate ions (SO_4^{2-}) is very low, and the concentration of bromide ions (Br^-) is the highest of all waters on Earth. Stubborn cases of psoriasis that seem to resist most therapies seem to yield to the combination of sea, air and sun along the Dead Sea^[citation needed]. The sea itself is abundant in minerals acclaimed to have therapeutic value.

The salt concentration of the Dead Sea fluctuates around 31.5%. This is unusually high and results in a nominal density of 1.24 kg/L. Anyone can easily float in the Dead Sea because of natural buoyancy. In this respect the Dead Sea is similar to the Great Salt Lake in Utah in the United States.

One of the most unusual features of the Dead Sea is its discharge of asphalt. From deep seeps, the Dead Sea constantly spits up small pebbles of the black substance. After earthquakes, chunks as large as houses have been found.^[citation needed]

[] Health effects and therapies

The Dead Sea area has become a major center for health research and treatment for several reasons. The mineral content of the water, the very low content of pollens and other allergens in the atmosphere, the reduced ultraviolet component of solar radiation, and the higher atmospheric pressure at this great depth each have specific health effects. For example, persons suffering reduced respiratory function from diseases such as cystic fibrosis seem to benefit from the increased atmospheric pressure.^[11]

Sufferers of the skin disorder psoriasis also benefit from the ability to sunbathe for long periods in the area due to its position below sea level and subsequent result that many of the sun's harmful UV rays are reduced.^[12]

Thus, the region's climate and low elevation have made it a popular center for several types of therapies:

- Climatotherapy: Treatment which exploits local climatic features such as temperature, humidity, sunshine, barometric pressure and special atmospheric constituents.
- Heliotherapy: Treatment that exploits the biological effects of the sun's radiation.
- Thalassotherapy: Treatment that exploits bathing in Dead Sea water.

[] Fauna and flora



Dead Sea in the morning, seen from Masada

The sea is called "dead" because its high salinity prevents macroscopic aquatic organisms, such as fish and aquatic plants, from living in it, though minuscule quantities of bacteria and microbial fungi are present.

In times of flood, the salt content of the Dead Sea can drop from its usual 35% salinity to 30% or lower. The Dead Sea temporarily comes to life in the wake of rainy winters. In 1980, after one such rainy winter, the normally dark blue Dead Sea turned red. Researchers from Hebrew University found the Dead Sea to be teeming with a type of algae called *Dunaliella*. The *Dunaliella* in turn nourished carotenoid-containing (red-pigmented) halobacteria whose presence caused the color change. Since 1980, the Dead Sea basin has been dry and the algae and the bacteria have not returned in measurable numbers.

Many animal species live in the mountains surrounding the Dead Sea. Hikers can see camels, ibex, hares, hyraxes, jackals, foxes, and even leopards. Hundreds of bird species inhabit the zone as well. Both Jordan and Israel have established nature reserves around the Dead Sea.

The delta of the Jordan river was formerly a veritable jungle of papyrus and palm trees. Flavius Josephus described Jericho as "the most fertile spot in Judea". In Roman and Byzantine times sugarcane, henna, and sycamore fig all made the lower Jordan valley quite wealthy. One of the most valuable products produced by Jericho was the sap of the balsam tree, which could be made into perfume. But by the 19th century Jericho's fertility had disappeared.

[] Human settlement

There are several small communities near the Dead Sea. These include the West Bank Israeli settlements in the Megilot Regional Council: Vered Yeriho, Kalya, Almog, Beit Ha'arava, Mitzpe Shalem and Avnat. There is a beautiful nature preserve at Ein Gedi, and the Dead Sea hotels are located on the southwest end at Ein Bokek near Neve Zohar. Highway 90 runs north-south on the Israeli side.

Potash City is a small community on the Jordanian side of the Dead Sea. Highway 65 runs north-south on the Jordanian side.

[] Human history



World's lowest (dry) point, Jordan, 1971

The human history of the Dead Sea goes all the way back to remote antiquity. Bedouin tribes have continuously lived in the area.

[] In Judaism

Just north of the Dead Sea is Jericho. Somewhere, perhaps on the southeast shore, would be the cities mentioned in the Book of Genesis which were said to have been destroyed in the time of Abraham: Sodom and Gomorra (Genesis 18) and the three other "Cities of the Plain" - Admah, Zeboim and Zoar (Deuteronomy 29:23). But Zoar escaped destruction when Abraham's nephew Lot escaped there from Sodom (Genesis 19:21-22). Before the destruction, the dead sea was a valley full of natural tar pits, which was called the **vale of Siddim**. King David was said to have hidden from Saul at Ein Gedi nearby.

[] Hebrew Prophecies

In Ezekiel 47:8-9 there is a specific prophecy that the sea will "... be healed *and* made fresh", becoming a normal lake capable of supporting marine life. A similar prophecy is stated in Zechariah 14:8, which says that "Living waters will go out from Jerusalem, half of them to the eastern sea (likely the Dead Sea) and half to the western sea (the Mediterranean)..."

[] Second Temple era

Dwelling in caves near the Dead Sea is recorded in the Hebrew Bible as having taken place before the Israelites came to Canaan, and extensively at the time of King David. Various sects of Jews settled in caves overlooking the Dead Sea. The best known of these are the Essenes of Qumran, who left an extensive library known as the Dead Sea Scrolls.^[13] The town of Ein Gedi, mentioned many times in the Mishna, produced persimmon for the temple's fragrance and for export, using a secret recipe. "Sodomite salt" was an essential mineral for the temple's holy incense, but was said to be dangerous for home use, and to cause blindness.^[14]

The Roman camps surrounding Masada were built by Jewish slaves receiving water from the towns around the lake. These towns had drinking water from the Ein Feshcha springs and other sweetwater springs in the vicinity.^[15]

[] Ancient Greek period

The Greeks knew the Dead Sea as "Lake *Asphaltites*", due to the naturally surfacing asphalt. Aristotle wrote about the remarkable waters. Later, the Nabateans discovered the value of bitumen extracted from the Dead Sea needed by the Egyptians for embalming their mummies.

[] Herodian period

King Herod the Great built or rebuilt several fortresses and palaces on the Western Bank of the Dead Sea. The most famous was Masada, where, in 70-73 CE, a small group of Jewish Zealots held out against the might of the Roman legion, and Machaerus where, according to Josephus, John the Baptist was imprisoned by Herod Antipas and died.^[16]

Also in Roman times, some Essenes had settled on the Dead Sea's western shore; Pliny the Elder identifies their location with the words, "on the west side of the Dead Sea, away from the coast ... [above] the town of Engeda" (*Natural History*, Bk 5.73); and it is therefore a hugely popular but contested hypothesis today, that same Essenes are identical with the settlers at Qumran and that "the Dead Sea Scrolls" discovered during the 20th century in the nearby caves had been their own library.

[] In Christianity



Mount Sodom, Israel, showing the so-called "Lot's Wife" pillar made of halite like the rest of the mountain.

In the Bible the Dead Sea is called the Salt Sea, the Sea of the Arabah, and the Eastern Sea. The designation "Dead Sea" is a modern name which never appears in the Bible. The Dead Sea basin is another part of the Great Rift Valley. It is here that the Upper Jordan River/Sea of Galilee/Lower Jordan River water system comes to an end. Intimately connected with the Judean Wilderness to its northwest and west, the Dead Sea was a place of escape and refuge. The remoteness of the region attracted Greek Orthodox monks since the Byzantine era. Their monasteries such as Saint George in Wadi Kelt and Mar Saba in the Judean Desert are places of pilgrimage.

[] In Islam

In Islamic tradition, the Dead Sea was about the land in which the Prophet Lot lived. The people of the towns and cities in this vicinity were

wicked for their acts of homosexuality, robbery and murder, and therefore God had ordained punishment to the people of Lot for these deeds. The punishment arrived when two angels in the form of handsome men were sent down by God as guests for Lot to host. When Lot's people heard of the men, they rushed to Lot's house with their explicit intentions and asked Lot to turn over these men to them. This was the final test for the people of Lot in which they failed so the angel Gabriel raised the land where the prophet's people lived, tipped it upside down and threw it back on earth, causing the ground near the impact to cave in. Thus, the lowest land on Earth was formed because of this punishment. The non-believers (in the monotheism doctrine) were destroyed and the followers were saved. According to some interpretations, the sura of ar-Rum of the Quran refers to the Dead Sea as the lowest place on Earth.^{[17][18]}

[] Recent History



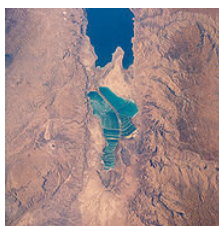
Turkish trenches at the shores of the Dead Sea, World War I, 1917.

More recently, explorers and scientists arrived in the area to analyze the minerals and research the unique climate. Tourism in the region has been developed since the 1960s.

The Dead Sea Scrolls were found in caves at Qumran at the Dead Sea. The world's lowest road, Highway 90, runs along the Israeli and West Bank shores of the Dead Sea at 393 m (1,289 ft) below sea level.

There are also health spas and hot springs along the shore, besides the unique water of the Dead Sea itself. A golf course named for Sodom and Gomorrah was built by the British at Kalia on the northern shore. The first major hotels were built in Israel, first at nearby Arad, and since the 1960s at the Neve Zohar resort complex. The Jordanian side has seen increasing development in recent years. For example, three international franchises have opened seaside resort hotels near the King Hussein Bin Talal Convention Center along the eastern coast of the Dead Sea.^[19]

[] Industry



View of salt evaporation pans on the Dead Sea, taken in 1989 from the Space Shuttle Columbia. The southern half is now separated from the northern half at what used to be the Lisan Peninsula because of the fall of the level of Dead Sea.

In the early part of the 20th century, the Dead Sea began to attract interest from chemists who deduced that the Sea was a natural deposit of potash and bromine. The *Palestine Potash Company* was chartered in 1929 after its founder, Siberian Jewish engineer and pioneer of Lake Baikal exploitation Moses Novomeysky, worked for the charter ex for over ten years. The first plant was on the north shore of the Dead Sea at Kalia and produced potash, or potassium chloride, by solar evaporation of the brine. Employing Arabs and Jews, it was an island of peace in turbulent times. The company quickly grew into the largest industrial site in the Middle East^[citation needed] and in 1934 built a second plant on the southwest shore, in the Mount Sodom area, south of the 'Lashon' region of the Dead Sea. Palestine Potash Company supplied half of Britain's potash during World War II, but ultimately became a casualty of the 1948 Arab-Israeli War. Its remnants were nationalised and Dead Sea Works Ltd. was established in 1952 in its stead as a state-owned company to extract potash and other minerals from the Dead Sea.

From the Dead Sea brine, Israel produces (2001) 1.77 million tons potash, 206,000 tons elemental bromine, 44,900 tons caustic soda, 25,000 tons magnesium metal, and sodium chloride. On the Jordanian side of the Dead Sea, Arab Potash (APC), formed in 1956, produces 2.0 million tons of potash annually, as well as sodium chloride and bromine. Both companies use extensive salt evaporation pans that have essentially diked the entire southern end of the Dead Sea for the purpose of producing carnallite, potassium magnesium chloride, which is then processed further to produce potassium chloride. The power plant on the Israeli side allows production of magnesium metal (by a subsidiary, Dead Sea Magnesium Ltd.). The salt evaporation pans are visible from space.

Due to the popularity of the sea's therapeutic and healing properties, several companies have also shown interest in the manufacturing and supplying of Dead Sea salts as raw materials for body and skin care products.

[] Recession and environmental concerns



Line painted in 1900 (at top of image) by Robert A.S. Macalister of the Palestine Exploration Fund showing the level of the Dead Sea.

In recent decades, the Dead Sea has been rapidly shrinking because of diversion of incoming water from the Jordan River to the north. The southern end is fed by a canal maintained by the Dead Sea Works, a company that converts the sea's raw materials. From a depression of 395 m (1,296 ft) below sea level in 1970 [20] it fell 22 m (72 ft) to 418 m (1,371 ft) below sea level in 2006, reaching a drop rate of 1 m (3 ft) per year. Although the Dead Sea may never entirely disappear, [citation needed] because evaporation slows down as surface area decreases and salinity increases, it is feared that the Sea's characteristics may substantially change. [citation needed]

The Dead Sea level drop has been followed by a groundwater level drop, causing brines that used to occupy underground layers near the shoreline to be flushed out by freshwater. This is believed to be the cause of the recent appearance of large sinkholes along the western shore — incoming freshwater dissolves salt layers, rapidly creating subsurface cavities that subsequently collapse to form these sinkholes. [21]

In May 2009 at the World Economic Forum, Jordan announced its plans to construct the "Jordan National Red Sea Development Project" (JRSP). This is a plan to convey seawater from the Red Sea near Aqaba to the Dead Sea. Water would be desalinated along the route to provide freshwater to Jordan, with the brine discharge sent to the Dead Sea for replenishment. As of 2009, the project is in its early phases of planning, with developer and financier selection to be completed by years end. The project is anticipated to begin detailed design in early 2010 with water delivery by 2017. Israel has expressed its support and will likely benefit from some of the water delivery to its Negev region. Some hydro-power will be collected near the Dead Sea from the dramatic change in elevation on the downhill side of the project. [citation needed]

At a regional conference in July 2009, officials expressed increased concerns that water levels are dropping. Some suggested that various industrial activities around the Dead Sea might need to be reduced. Others advised a range of possible environmental measures to restore conditions. This might include increasing the volume of flow from the Jordan River to replenish the Dead Sea. Currently, only sewage and effluent from fishponds run in the river's channel. Experts also asserted a need for strict conservation efforts. They also said that agriculture should not be expanded, sustainable support capabilities should be incorporated into the area and pollution sources should be reduced.

Note B: Technische Universität Darmstadt, Dr. Gunter Landmann

Summary:

Between 70-16 ka BP large areas of the Dead Sea Rift was occupied by a saline lake: Lake Lisan. Its water level stood up to 280 m above the present Dead Sea surface. Lake Lisan left terraces up to 40 m thick, consisting of laminated marls that are found from Lake Tiberias all the way to 35 km south of the Dead Sea (Fig. 1). In April 1998, in the framework of a binational research program, representatives of the Natural Resources Authority of Jordan and the TU-Darmstadt sampled profiles at two locations in western Jordan (Fig. 1).

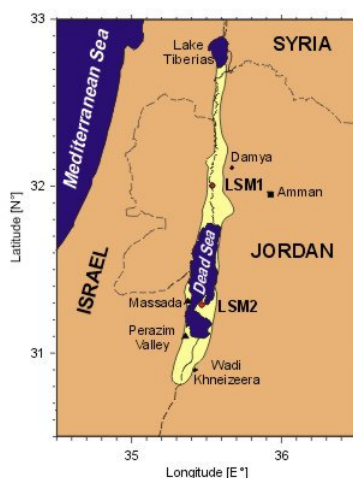


Fig. 1 Distribution of Lake Lisan deposits (yellow) and location of sampling sites LSM1 and LSM2. Also given are well studied sites in Israel. At present the level of the Dead Sea is at 414 m below sea level but it decreases with an average of 0.8 m per year. Dead Sea water is saturated with regard to aragonite, gypsum and halite.

Geochemical, mineralogical and sedimentological investigations was carried out on the Lisan- and the overlying Damya Formations.

Results reveal several transgressive depositional cycles, all terminating with massive gypsum precipitation (Fig. 2). The sediment composition is interpreted with regard to the water balance of the lake and its level fluctuations. From about 70-45 ka BP, representing the period of the lower member, the Lisan Formation is characterised by a high gypsum/aragonite ratio and a low lithogenic content, implying a regression of an initially high water level caused by reduced water input. This regression continues during the period 45-36 ka BP as indicated by the high salt content of the middle member. After recovery and a period of higher water level, the Lake Lisan era ends with a strong regression at around 16 ka BP.

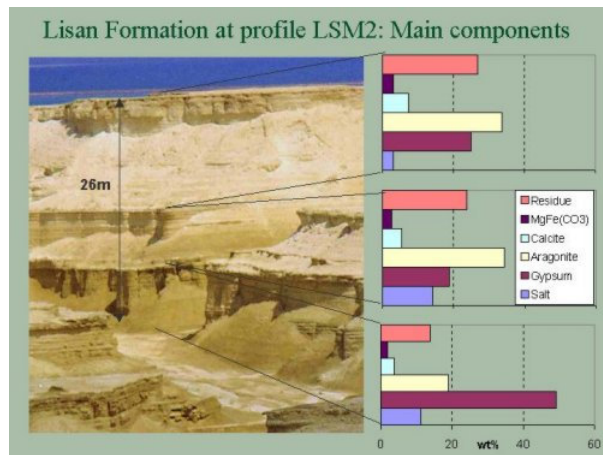


Fig. 2 Photo of profile LSM2 showing the upper-, middle and lower members of the Lisan Formation. Also given are the main components of the different members which are separated by erosion resistant gypsum horizons. Residues (i.e. the non-analysed soluble fraction) consist mainly of lithogenic detritus and represent, together with calcite, a marginal facies. Results average 20, 9 and 11 analyses for upper, middle and lower member, respectively. The top of the profile is at about 370 m below sea level. It consists of the most prominent gypsum horizon which is partly covered by microbialites.

At profile LSM1 the Lisan deposits are covered by the Damya Formation (Fig. 3). It consists of dark laminated clay and silt, intercalated by non-laminated sections with several sand layers. Most of the Damya Formation represent a shallow water facies but the topmost part of the profile reveals a short period characterised by a higher lake level.

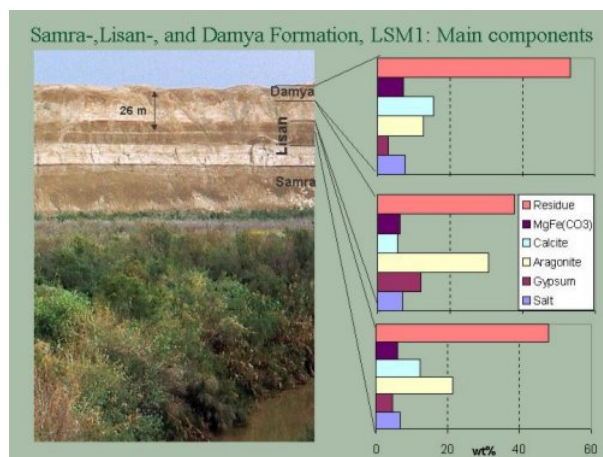


Fig. 3 Photo of profile LSM1 showing the Samra-Formation, the three members of the Lisan-Formation and the Damya Formation in a view from the river Jordan. The top of the profile is 305 m below sea level. Only the upper 26 m of the profile have been sampled so far. Compared to LSM2, the content of autigenic components is lower, that of lithogenic components higher at LSM1. Results average 12, 20 and 5 analyses for Damya F., upper and middle member of Lisan Formation, respectively.

The chronology of the profiles is based on several ¹⁴C-analyses and on the correlation with the well dated profile at Perazim Valley (Schramm, 1997). Additionally, ¹⁴C-dates of microbialites given by Begin et al. (1985) were used to reconstruct the lake level fluctuation. (Fig. 4). Microbialites depend on light due to their formation by photosynthesising micro-organisms, thus indicating a lake level within a few metres of accuracy. Gypsum horizons indicate lake level minima proving that both lake level reconstructions - based on sediment composition and on water stand indicators - are in good accordance. Comparison of fluctuations of Lake Lisan and [Lake Van](#) show similarities for the period 21-12 ka BP but a different evolution of both lakes in the Holocene.

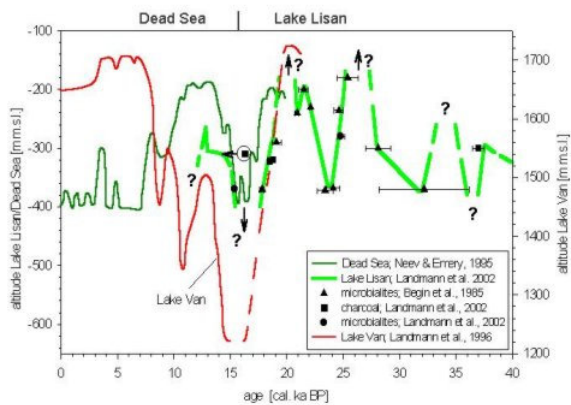


Fig.4 Reconstruction of the level of Lake Lisan/Dead Sea based ^{14}C -dated microbialites or other water level indicators and on interpretation of sediment composition. Additionally, the curve established by Neev & Emery (1995) for the Dead Sea/Lake Lisan as well as the reconstruction of the lake level history of [Lake Van](#), Turkey, are included.

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Note C

Geological Structure of the Dead Sea

- [Structured Layers, Rich in Organic Life](#)
- [Mount Sodom](#)
- [The Formation of Caves and Labyrinths](#)



Structured Layers, Rich in Organic Life

The entire Dead Sea region is located in the desert belt that runs between North Africa and the Sind Desert in western India. In early geological periods it was rich in water and in animal and plant life, signs of which are found both in the quantity of minerals and in the type and structure of the soil.

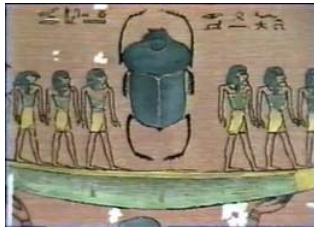
Animals whose bones and hard structures were compressed and refined between the limestone strata on the sea floor constitute the source of the layers of phosphoric chalk, important today for industry and agriculture. This organic life, which separated out into various carbonic materials, also constitutes a source for clay and bituminous chalk. Some of these layers are found only after drilling, while others are clearly visible on the surface, indicated by the brown-black color of the crevices and the combustibility of the rock.



Esterbon, the first century geographer, mentions [Massada](#) clay in his writings. This clay is found along the wadies and cliff walls and adheres to the soil and gravel, making lumps of conglomerate which are swept down in the winter floods. In Esterbon's view, the ancients regarded this marl as the remains of the destroyed biblical cities of [Sodom and Gomorrah](#), which are traditionally believed to have sunk under the southern basin of the Dead Sea.

Bedouin fellahs in the Judean Desert used to burn the bituminous chalk for lime and related the secret of the combustion to the influence of "Nebi Musa", the holy tomb of Moses located in the area.

In addition to the bituminous chalk and the clay found within the layers on both sides of the Dead Sea, there is floating clay which the Egyptians used to smear on their vessels and to embalm their dead and which rises spontaneously from the sea floor.



These and other geological signs create hopes that oil or petroleum may be found deep in the geological strata, and indeed trial drillings are undertaken here from time to time.

The pure sulfur, whose formation is associated with separation of oil into the strata of the Jordan Valley and into hydrogen gas which erupts from the hot springs and various fissures in the ground, was used most effectively by the local inhabitants, among other things, as a means of repelling snakes and at a later stage in the preparation of gunpowder for their weapons.

Sulfur is also found in the Dead Sea region between the layers of lissan marl and the gypsum formed as a result of the climate. Gypsum (used as a basis for plaster) sometimes attains a height of six meters and more; and has a property of rapid hardening that makes it useful in the construction and casting industries, as well as in sculpture and medicine.

The Dead Sea area is the richest region of mineral resources in Israel. Enormous deposits of phosphates, shale oil and natural gas, raw materials for the building and cement industries, and materials for ceramics and glass-making are located nearby in the mountains of the north-eastern Negev and in the Judean Hills.

Some of these resources are being mined at present, but for ecological reasons others are not, as the striking landscape of the area has to be preserved.



Mount Sodom

Mount Sodom, a uniquely scenic structure, rises 230 meters above the level of the Dead Sea. The mount is 2-3 kilometers wide and eleven kilometers long.

This mountain, which is nothing other than a block of salt that sank into the bottom of the ancient lake and was lifted out as a slab by tectonic tremors, consists of about a billion tons of pure salt which is almost ready for the table.



Inside, it is pierced by caverns and tunnels which originated as funnels and chimneys on the mountaintop. Rainwater dissolved first the upper layers of the gypsum marl, and then the layers of salt below as it penetrated the mountain in its movement towards the sea.

The chill that pervades the caverns on summer days as well as in winter is the result of the draughts of air that take up the damp that oozes through their hygroscopic walls and lower the temperature.



The number and sizes of the tunnels and caves, sometimes hundreds of feet long, are a striking proof that only great deluges of water in prehistoric times could have been capable of dissolving such thick layers of salt and forcing the solution out to the sea,

The Formation of Caves and Labyrinths

A process of cave and labyrinth formation is continuing even today. The cap rock and the pillars of salt that have fallen from the mountain top or formed within it have themselves become carved and shaped by changes in climate, erosion, and rainfall, and resemble sculptures of tropical hats, huge mushrooms altars, dolmens and of course Lot's wife.



The fault scarp consists mainly of hard limestone and dolomites from the Kinoman and Toron periods.

Canyons cut through it from the Judean Desert in the west and from the Moab Plateau, whose eminences change their hue from hour to hour with the changing color of the glass-smooth sea.

The wild landscape, together with the pastoral calm that imparts to the place the aura of Creation have, from time immemorial, formed the compelling scenic background to the Dead Sea.

The area is principally an "orographic desert". Its aridity results from the high barrier of the Judean and Hebron Hills, which obstruct the moisture-bearing low fronts coming in from the west and from the zone of the global desert belt.

The high air temperature, over 40 degrees Celsius in the summer and 20 degrees C in the winter, the slight cloudiness and

the rare occurrences of rainfall, together with the relatively low humidity and the wind regime in the region, give rise to massive evaporation, in spite of the low level of solar radiation. This evaporation has an annual daily average of 12.1 cubes, while in July it can reach 18 cubes a day.

The amount of water supplied by the River Jordan, the streams' springs, and the floodwaters on both sides of the Dead Sea, does not equal the very high evaporation rate on the lake, which amounts to approximately 2 billion cubes a year; for comparison, the figure for water consumption of Israel in 1980 was about 1.6 billion cubes. This has urged many people to start thinking about the [necessary steps for preserving this unique region](#).

Note D

History of the Dead Sea Region

- [Dead Sea Settlement - Dating Back to Chalcolithic Period](#)
- [Biblical Highways, Fortresses and Oases](#)
- [Massada](#)
- [Ein Gedi](#)
- [The Essenes and the Dead Sea Scrolls](#)
- [Hidden Caves and Tunnels](#)
- [The Beginning of Christianity](#)

Dead Sea Settlement - Dating Back to the Chalcolithic Period

Proof of human life in the area of the Dead Sea dates back to the Chalcolithic period – approximately the fourth century BC



Isolated, perched on a rock jutting out over the Ein Gedi springs, are the remains of a Chalcolithic temple, the only one known to us from this period, which apparently served the ritual needs of the entire area. Other Chalcolithic finds were collected at a number of caves on the western shore of the sea. The most important of these is the Matmon (treasure) cave, where a number of years ago a hoard of utensils and hundreds of ritual objects made of metal, stone and ivory were found, indicating a developed craft based on much knowledge, high level of technology and an advanced artistic sense.



Today no one knows for certain what led to the decline of this civilization of immigrants from the north, which remained uncharacterized by any link with the local civilizations that marked the end of the Neolithic period.

The latter period is in fact the oldest from which signs of settlement in the vicinity of the Dead Sea survive. They are found at Tel Yeriho, situated some tens of meters from the fertile oasis where the modern town of Jericho now lies.

The first settlers came here around 7000 BC and established themselves on the fertile alluvial plane about 10 kilometers north-west of the Dead Sea. They surrounded their settlement with a wall of smooth stone, cut a moat in the rock around it, and within the city built a tall stone tower. Among the surprising discoveries in this city are heads molded in clay, which are the earliest examples of the art of portraiture in the world. This, together with the size and sophistication of their buildings, indicates the high level of civilization and social organization of the inhabitants of the city at its various levels.



On the eastern shore of the lake, near the Lissan peninsula, a vast burial ground was found. The origins of this graveyard date back to the Chalcolithic period. It lies around three sides of an ancient settlement which, in the middle bronze age, was defended by a great system of fortifications. Within this fortification you can find the clearest and almost sole remains of the Canaanite period in the Dead Sea region.

How is it that a burial ground like this lies next to a settlement thirty times smaller than itself? Could it have served as a

central cemetery for the cities of the plain, including [Sodom](#), which is thought to have been situated in the then dry southern basin? Perhaps.

Biblical Highways, Fortresses and Oases

About four major routes and 27 descents traversed the Judean Desert eastward in biblical times and later. In spite of, and sometimes because of, the aridity and the sheerness of the eastern slope, it was important as the link between Jerusalem and the Judean plateau on the one hand and the Jordan valley on the other. The latter was a center of cattle breeding and, along it too, passed the biblical highway which was the main trade route for the spices and precious stones of Arabia and Yemen to Damascus.

These routes, which were mostly located on the larger dry riverbeds that drained to the east, were reinforced by forts, usually at strategic points on mountain peaks commanding river mouths. Wherever the fault scarp permitted, linking roads were paved.



The Judean Desert, poor in water resources, is rich in remains of settlement and fortresses in which complex systems for the collection and storage of floodwater are evident. Aqueducts have been found in different places within the region, for example an aqueduct which carried water to the Horkaniya fortress was about eleven kilometers long.

Massada

The most famous and outstanding of the fortresses in the Dead Sea area is Massada. This isolated mountain spot commanded the principal and best highway that ran lengthwise down the center of the Judean desert.



It was built on a steep escarpment about 450 meters above the level of the sea to its east. The post was strengthened by **King Herod**, who turned it into a palatial fortress with a system of huge reservoirs for rain and floodwater with palaces, bath-houses and battlements for his use both as a retreat and as a refuge at times of crisis.

Here, 73 years after the birth of Christ, three years after the fall of Jerusalem, the last fighters of the Jewish revolt against the Romans – 960 men, women and children – committed mass suicide leaving behind them much food and water to silently testify that they were not on the verge of starvation and want, but were true to their tragic end to the principle of freedom and liberty.

Yosef Ben-Matityahu, one of the leaders of the revolt in the north, who later became well known as the historian Josephus Flavius, has left with us a document about those times.

You can feel the force of the drama as you stand on that rocky prominence gazing down at the remains of the eight camps of the besieging Romans that encircled the fortress, connected by a high stone wall; or as you stand at the entrance of the room where ten clay tablets were found with names scratched on them of the ten fighters chosen by lot to execute the collective decision; the place where the lot was cast; and as you look down on the remains of the high earth ramp piled up by the Romans in the course of months. It was by this ramp that the Romans finally breached the wall, only to find the two women and three children who were left alive.

Ein Gedi

An ancient camp for thousands of Roman soldiers was Ein Gedi, 16 kilometers north of Massada, which has since time immemorial been a center of settlement and agriculture in the region by virtue of its fertile alluvial soil and its four springs.

Finds from the Chalcolithic, Israelite, Persian, Greek, Roman, and Byzantine periods have been discovered here. At every turn you will find well-known biblical names, such as David's Waterfall, Shulamit's Spring, Zeruya's Rise, Mount Jess, the Dudim Cave, and many others.

At Ein Gedi, famous for the blend of its fragrant perfumes, are found remains of developed agriculture, canals and pools for trapping rain and floodwater, and terraces down the mountainside, some of which even today have been restored and serve the needs of Kibbutz Ein Gedi.

The ruins of a biblical settlement at Tel Goren are only a bowshot away from the remains of a fine synagogue that flourished in the first centuries AD, a witness to the strength of the Jewish settlement even after the failure of the Second Revolt against the Romans led by Bar-Kochba 65 years after the fall of Jerusalem



At the edge of the cliff are the remains of the Ein Gedi fortress – a link in the Israelite security system and part of the defense array of the settlements in the Hasmonaen periods, and subsequently Roman periods, and which includes the fortresses Mazzad Zohar and Mazzad Boqeq near the southern basin of the lake. These served to warn of impending danger from the south and east.



Hidden Caves and Tunnels

About thirty large steep fissures have cut the hard limestone rock across the Judean Desert approaching the Dead Sea; their upper third replete with caves and tunnels. The distance of the area from the main centers of settlement and the deep canyons attracted and helped the extremists and rebels in their flight and defense against pursuers throughout biblical times.



David fled here from Saul, Jonathan the Maccabee concentrated his forces here, and went up to Jerusalem to expel the Syrian conqueror.

Here Bar-Kochba's soldiers found a place to hide after leaving behind letters in the caves of Hever and Wadi Murbaat which shed light on that fateful time.

The Essenes and the Dead Sea Scrolls



The most amazing discovery in recent times is the **Dead Sea scrolls**. This find was the first to reveal one of the most interesting aspects of Jewish thought in the period of the Second Temple. The writers of the scrolls belonged to a sect that formed part of a broad movement whose members believed that, at the end of days, there would be a great conflagration from which only the Lord's elect would be saved.

Most of the believers found succor in the scriptures on the Judgment Day. The men of Judean Desert sect, called **Essenes**, took practical steps and prepared themselves for that momentous time when the Sons of Light would vanquish the Sons of Darkness and thus usher in the victory of truth. This preparation found expression in seclusion, self-purification, abstinence from the pleasures of the flesh and material goods, a communal life, equality, prayer and extreme cleanliness, charity, loving-kindness and forgiveness.

The members of the community migrated to the Judean Desert where they and their descendents remained for about 200 years, the life-span of the sect. First they lived in caves, principally in the region of Wadi Qumran, and later in an organized settlement with constructed fortifications, communal buildings and a water supply system.

They engaged in agriculture, while awaiting the Last Day. Indeed, the conflagration came – not as they had expected, but in the form of the legions of Rome. As the sounds of battle approached in the final phase of the great revolt, the Essences hid their writings in caves and set out for the last struggle.



The scriptures, which were found by chance first in the possession of an antique dealer in Bethlehem and later in the Qumran caves, include the scrolls of the writings of the sect, commentaries on the books of the Bible, manuscripts of biblical texts, books by writers outside the sect, and works from the Bar-Kochba period.

The Beginning of Christianity



At the same time, and against the same background of alienation from the Jews of Jerusalem, Christianity sprang up. However, while the Essences were inspired by the concept of the community, the new movement took as its creed the inner purity of the individual.

The movement of Christian recluses in the Judean Desert apparently began as early as the second century AD, and their hermitages were situated at places traditionally held to be the site of important events in the lives of the prophets of Israel and forerunners of Christianity.

The first monks usually secluded themselves in caves and rocky shelters within canyons difficult of access whose entrances they blocked with stones for protection against the heat of summer, the cold of winter, and animals of prey. Only at a later stage did they form weekly congregations at a central meeting place called a *laura*. This was sometimes a recess in a large rock, occasionally containing an oven for baking bread, or a place where a monk of great repute dwelt.



The next stage in the development of the *laura* was the donation of funds for building a church, which thereby became a real center. Nearly thirty monasteries were established in the Judean Desert, some of them along the route believed to have been taken by John the Baptist in his flight from Jerusalem to the River Jordan.

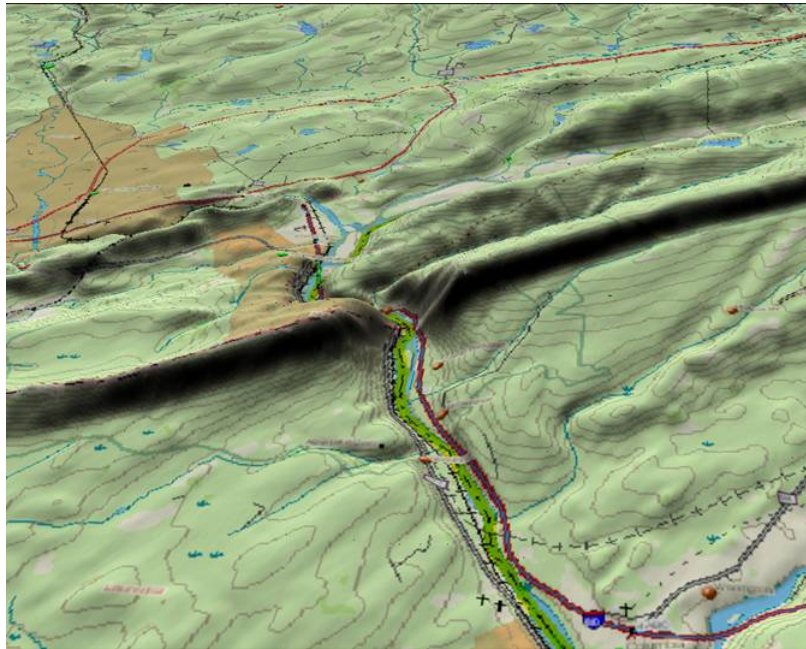
The monastic movement was struck a death blow by the Persian conquest in 614 AD. Some monks did subsequently return to several monasteries to restore them, but they never regained their former grandeur. Today four large monasteries remain, largely owing to their proximity to the two holy cities of Christendom; Bethlehem and Jerusalem. The oldest and most important monastery is [Mar Saba](#), which dates to the fifth century. A number of other monasteries have no regular monastic life, with only a sole monk left to maintain them; they usually attract pilgrims and tourists.

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Chapter 8; Bible Land Rivers that Show the Age of the Earth !

There are multiple areas throughout the world where river systems cut through mountain ranges instead of taking easier routes around them including such as the Nile, Tigris, and Euphrates rivers. These apparently “**illogical**”; river paths are actually records of earlier ages when these rivers established their paths along expected downhill routes. Subsequent geologic forces changed the shape of the landscape, but these rivers had enough erosion power to maintain their original paths. The processes that produce river systems that cut through mountain ranges require long periods of geologic history.

As such, they are evidence for the old age of the Earth.



The map above shows the Delaware Water Gap. There is more information about it in the “Ancestral Rivers of the Eastern United States” section, see Appendix A. All pictures on this page (and the linked pages) were generated by either Delorme’s Topo USA computer program or by Google Earth.

Antecedence

There are two geological principles governing the processes involved. The most common is “antecedence”. In antecedence, the river involved was in place first. Subsequently the mountain range rose, but the river played the part of a stationary band saw. The river stayed put, but it cut a groove into the rising mountain range. The more familiar name for a “groove” is a “canyon”.

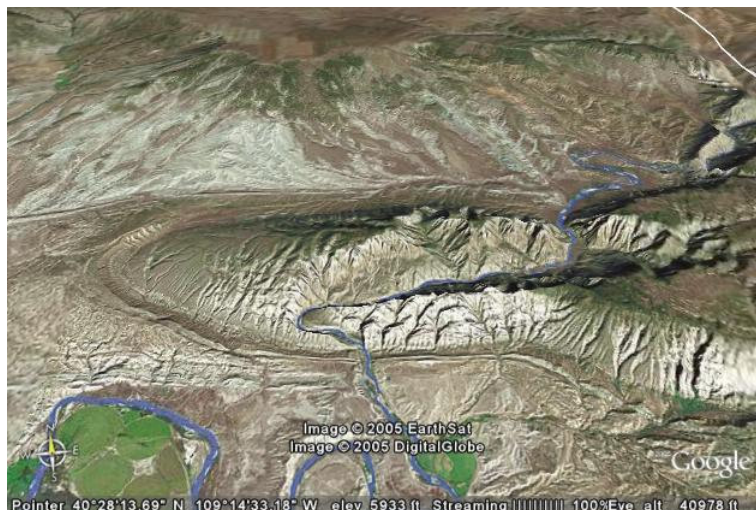
When a land area is uplifted above sea level, river drainage systems will develop to carry excess rainfall back to the ocean. These rivers will occupy the lowest areas available. Subsequent tectonic forces may start building a mountain range across the path of the river. If the river can not erode down fast enough, the rising mountain range will act as a dam, and the river will seek out the next easiest alternative for a new course. On the other hand, if the river can erode down as fast as the new mountain range rises, it will dig a canyon through the rising mountain range.

We look at this process and frequently (falsely) imagine that in the past the river was at the same elevation as the current high elevations of the mountain range. We then wonder how and why the surrounding lower terrain could have supported a river at this elevation. In fact an easier process is at work. Quite frequently the lower surrounding terrain is a reasonable approximation of the ancestral elevation of the river. After the river established its ancestral course, the mountain range rose. The river played the part of a stationary band saw. It cut a groove into the rising block of land.

Superimposition

The other process that can cause rivers to cut through mountain ranges is superimposition. Here, the mountain range was in place first. Over many millions of years erosion will erode a mountain range down to mere stubs. Also, nearby rivers may drop some of their sediment to fill in adjacent lowlands. Eventually, you end up with a flat surface. If mountain building (or just subtle changes in the tilt of the land surface) causes rivers to relocate to new positions on this flat surface, it is quite possible one of these new river channels may end up directly over the ancient beveled mountain range.

Subsequently, if there is a general uplift of all the surrounding terrain or if a lower exit elevation for the area should develop, erosion will set in. The newer, softer sediments that helped bury the stubs of the old mountain range will be easily eroded away. The remnants of the old mountains will have harder rock and will tend to resist erosion. Thus the old stubs will reemerge as surrounding areas erode away. However, the river may remain “stuck in its rut” and simply erode down into the old mountain range.



Split Mountain, Utah is an example of superimposition. You can read about its history at "Canyon of Lodore, Colorado and Split Mountain, Utah". <http://www.durangobill.com/Lodore.html>

Blue Nile River (Abay River), Ethiopia

Gen 41:1 Two years later the king of Egypt dreamed he was standing beside the Nile River. (CEV)

Joseph arrived in Egypt about 3900 years ago and then the Egyptian society was already very old. We have on a large stone stela called the Palermo Stone a record of Nile river flood levels back to about 5060 years ago during the reign of King Zer (Djer) of the First Egyptian Dynasty (ref. *The Oldest Records of the Nile Floods*, by Barbara Bell © 1970 The Royal Geographical Society (with the Institute of British Geographers) see Appendix C). Rudimentary ships (rowed, single-sailed) were depicted in Egyptian rock art as early as 8000 years ago. Archaeologists have discovered the remains of a developing society along the river before 10,000 years ago and very interestingly "11,600 years ago marked the beginning of the Rule of Mortal Humans on Earth according to Manetho (Egyptian historian ca. 343 BC)" prior to that was "Rule by Demigods and Spirits of the Dead (followers of Horus)". (from <http://www.innerx.net/personal/tsmith/iceciv.html>) A very close correspondence to the indicated termination of the Younger Dryas (11,550 ±70 B.P. per the GRIP ice core data) and the time which appears to be the most likely time of the flood, and soon afterward the tribes would start multiplying and migrating from the "Ararat" area into lower lands of the most northern part of the fertile crescent where the archaeologists have uncovered the first evidences of large scale farming and community building, around 10,000 to 11,000 B.P..



The picture above shows the origin of the Blue Nile (Abay) River in Ethiopia. The river originates in Lake Tana (Tana Hayk) which can be seen in the upper right corner of the picture. The elevation of the lake is about 5,865 above sea level. Several towns lie along its shore, chief of these towns are Bahir Dar in the south and Gorgora in the north. The Blue Nile flows about 1,400 kilometres (870 mi) to Khartoum, where the Blue Nile and White Nile join to form the "Nile proper". 90% of the water and 96% of the transported sediment carried by the Nile originates in Ethiopia, with 59% of the water from the Blue Nile alone.

After the river leaves the lake it flows southeastward to about the center of the picture and then turns more to the south where it cuts through the Choke Mountains. It leaves the field of view just below the center of the left edge.

The mountains on both sides of the gorge are more than 11,000 feet high. The river leaves the lake at about 5,865 feet, and is down to below 4,000 feet in-between these high peaks.

This part of Ethiopia is on the northwest side of the African rift zone. The rifts themselves are off the lower edge of the

picture, but uplift just to the northwest of the rift is producing the mountains in the foreground portion of the picture.

Uplift is much greater in the foreground and much less in the distant portion of the picture. The result is a "tipping" of the terrain.

The Blue Nile River was in place before this uplift/tipping began. The first effect of the uplift was to dam the river. The initial Lake Tana was closer to the foreground. As the mountains rose the Blue Nile immediately began to erode into them as a natural process to try to maintain its path. The erosion process started to cut the gorge. Also the "tipping" process is causing the lake to migrate toward the northwest. (Toward the distance in this view.)

While you can't see it in this view, a closer Google Earth view of the southeast side (near side) of the lake shows ancestral beach terraces extending up to 8 miles inland from the current lake shore. As the lake slowly tips down toward the northwest, these ancestral beaches are left behind.

Lake Tana is destined to disappear in a few million years. If erosion by the Blue Nile is strong enough to offset the tipping, the gorge will eventually cut back upstream into the lake and thus drain it. If this "headstream erosion" doesn't destroy the lake, the tipping will.

Tipping is forcing the lake to migrate northwestward. However, this motion is driving the northwest shore of the lake ever closer to the rim of the plateau, and there is a steep downhill gradient on the far side of this rim. The lake level is within 300 vertical feet of this rim on the lake's west side, and if/when the rim is breached, the river can easily rip out a new path to the west. When that happens, the current Blue Nile River will be history, and there will only be local drainage left in the canyon that we see in the picture.

Tigris River, Iraq

Gen 2:14 The Tigris River that flows east of Assyria is the third,
Dan 10:4 Then, on the twenty-fourth day of the first month,
I was standing on the banks of the great Tigris River, (CEV)
Gen 10-9-12 Nimrod first ruled in Babylon, Erech, and Accad, all of which were
in Babylonia. From there Nimrod went to Assyria and built the great city of Nineveh.
He also built Rehoboth-Ir and Calah, as well as Resen, which is between Nineveh and Calah. (CEV)

The cities of Nineveh and Calah were along the Tigris river. "Most of Nineveh's period of existence is mainly prehistoric: a 30 metre long shaft dug in 1931-32 from the top to virgin soil proved that only 20% of the debris belonged to the period of recorded history." (Nineveh, The LookLex Encyclopedia) Thus putting the origin of settlements at Neveveh at about "8,000" years ago.



The picture above shows the Tigris River where it diagonally cuts through the Jabal Hamrin mountain ridge in northern Iraq. Very little is known about the uplift history other than what can be seen in the picture. The ridge rises about 1,000 feet above the river about midway between Mosul and Baghdad.

The small amount of detail that can be seen via Google Earth shows that the ridge is composed of tilted layers of sedimentary rock. It is also about 55 miles west-southwest of Kirkuk and its associated oilfields. There are similar NW-SE trending ridges that extend through the oilfields area. Thus, it is assumed that the Jabal Hamrin ridge is part of the same system, and probably dates back over 50 million years.

Euphrates River, Syria

Gen 2:14 ... and the fourth is the Euphrates.
Gen 15:18 At that time the LORD made an agreement with Abram and told him:
I will give your descendants the land east of the Shihor River
on the border of Egypt as far as the Euphrates River. (CEV)

The Euphrates River originates in the mountains of Turkey, flows southward into Syria, and then turns east-southeast

through eastern Syria and Iraq. Eastern Syria is a dry desert. Areas near the Euphrates have water available for irrigation, and the resulting vegetation shows up as dark areas. If water is not available, the land is dry sand and rock, and has a lighter color.

At Uruk (possibly Biblical Erech Genesis 10:10) which now is on a dry channel of the ancient Euphrates "archeologists have discovered multiple cities of Uruk built atop each other in chronological order.

* Uruk XVIII Eridu period (c 5000 BC); the founding of Uruk

* Uruk XVIII-XVI Late Ubaid period (4800–4200 BC)

* Uruk XVI-X Early Uruk period (4000–3800 BC)

* Uruk IX-VI Middle Uruk period (3800–3400 BC)

* Uruk V-IV Late Uruk period (3400–3100 BC); The earliest monumental temples of Eanna District are built.

* Uruk III Jedet Nasr period (3100–2900 BC); The 9 km city wall is built

* Uruk II

* Uruk I

(reference: Uruk - Wikipedia)



In the picture above, the Euphrates River is flowing from left to right through a mesa in eastern Syria, about 100 miles south east of Sanliurfa, in the center of one of the longest inhabited areas in the world. A testament to the rich past of the region of Sanliurfa is the large number of tumuli and old settlements. Harran, located 25 miles south of Sanliurfa, is one of the most notable of these settlements and was continuously inhabited from 3000 BC to the 13th century. The low farmland both upstream and downstream from the mesa is about 700 feet above sea level while the mesa ranges from 1,000 feet to 1,150 feet. Information on the origin of the mesa is lacking, and the Google Earth image has relatively low resolution. Thus, its geologic history is not known and the following "eyeball analysis" by the author who has not visited this area.

It appears the mesa is the result of a series of recent fluidic lava flows. (The area apparently is not included in the USGS database of volcanoes, but there are some obvious cinder cones 30 miles to the WNW that are not included either.) If this conclusion is correct, then the mesa and the short canyon that the Euphrates has cut would be the result of the following sequence of events.

- 1) Five to ten million years ago the Euphrates River flowed through the valley. The mesa did not exist yet.
- 2) Sometime during the last few million years, volcanic eruptions of fluid lava covered the area that is now the mesa. These volcanic eruptions would form temporary dams across the river. The river would quickly overflow interim layers that were built up, and try to start cutting a canyon down through the mesa. However, subsequent eruptions and lava flows would fill in these initial attempts to cut a canyon, and leave a new flat surface.
- 3) The volcanic eruptions ended perhaps one to two million years ago (+/-). Since then the Euphrates has cut down through the mesa to generate its canyon. Ordinary erosion has also removed some of the surrounding terrain that was not protected by the hard lava layer. The steep sides of the canyon plus the fact that they have not eroded very far back from the river indicate that this has all been done very recently.

Arun River, Himalayan Mountains, China (Tibet), Nepal, India

Outside of the traditional Bible land, however, Saint Thomas is credited with introduction of Christianity in India in 52 AD. According to the 3rd century text Acts of Thomas, (written in Syriac), when the apostles were in Jerusalem and divided the world among them, it was decided that Saint Thomas would go to India. Saint Thomas then arrived in North West India, and baptized King Gondophares and his brother, thereby heralding the beginning of Christianity in India. (Note: The Acts of Thomas may be apocrypha, and may not be a historical account.) It is always interesting to look at the extremes such as the highest mountain range in the world just north of India, 4 out of the 5 highest peaks in the world (all over 27,000 feet), and a river runs through it. (Actually there are several rivers that run through it, but we will only give a picture of one of them.) The picture below is a vertical view of the Himalayan Mountains. The bright yellow line marks the border between China (Tibet) to the north and Nepal to the south. A small piece of India can be seen in the lower right corner.

Mt. Everest at 29,035 feet is the highest mountain in the world. The summit is under the second "e" in the "Everest" label. Lhotse (label not shown) tops out at 27,940 feet and is just 2 miles to the southeast. Makalu at 27,766 feet is 12 miles east-southeast of Everest and is the 5th highest mountain in the world. Kanchenjunga at 28,169 is the third highest and can be found on the Nepal/India border in the lower right hand corner.



Water drainage from the slopes of Mount Everest is an interesting study in antecedence. Starting from the top of Mt. Everest, the Rongbuk Glacier flows 11 miles to the north-northwest into China. The Rongbuk Monastery is 16 miles NNW of Everest and can be reached by road from China. Melt water from the glacier becomes part of the headwaters for the Rong River.

22 miles north-northwest of Everest, the Rong River turns eastward. You can locate this point in the above picture by going NNW from Everest until you intersect a faint yellow road. The Rong River flows ENE and then ESE until it joins the Arun River some 33 miles northeast of Mt. Everest. (This is near the intersection of two local "roads" - faint yellow lines in the picture)

The Arun River flows nearly due south from this point. If you look closely, you can follow its path from the road intersection (above), across the China/Nepal border (the crest of the Himalayas), and through the "a" in "Europa".

60 million years ago the Himalayan Mountains did not exist. The rock that would become Mt. Everest was 450 to 500 million year old sedimentary layers that were at or below sea level and somewhere well south of the current location of Mt. Everest. **These sedimentary rocks contained fossils of trilobites (a well-known fossil group of extinct marine arthropods), crinoids (also known as sea lilies or feather-stars, are marine animals that make up the class Crinoidea of the echinoderms (phylum Echinodermata), the state fossil of Missouri), and other animals that once lived in a much earlier ocean.** What was then the southern coast of China was located somewhere near the northern border of present day India. The ancestor of the Arun River flowed southward over these lowlands.

Meanwhile, the subcontinent of India had rifted away from the east coast of Africa and was being rafted north-northeastward by convection currents in the upper part of the Earth's mantle. **Movement was a relatively rapid several inches per year.**

The collision between India and China began about 50 million years ago. By 40 million years ago the intervening ocean was gone. The Indian subcontinent was plowing into China. The leading edge of the subcontinent had to go somewhere, and the most convenient direction was to dive under China. This extra buoyant material began to lift what had been the Chinese lowlands. The uplift of the Tibetan Plateau began.

The 450 to 500 million year old sedimentary rock that had been in-between India and China, including the Mt. Everest limestones and sandstones, also had to go somewhere. As these rocks were crumpled together, they broke into slabs, and then the slabs were pushed one on top of the other. In short, the only direction the sedimentary layers could go was up - bigtime up.

As the old sedimentary layers rose out of the ocean, the ancestral Arun River initially just extended its course further south out over the new land area. However, it wouldn't be long before the Arun had to start eroding into the rising land mass if it was going to keep its southward course.

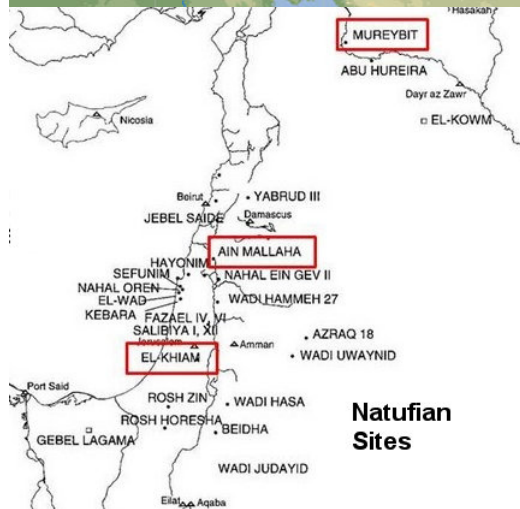
The Himalayan Mountain Range has been uplifted rapidly over the last 30 million years. What had been lowlands in southern China have been buoyed upward to over 15,000 feet to form the Tibetan Plateau. **The Mt. Everest limestones/sandstones have been both buoyed upward and stacked (faulted slabs), and the old fossils of trilobites are now found at 29,000 feet above sea level.**

The Arun River has cut downward into this rising mass (mess?) but not as fast as the land has been uplifted. It's been: "uplift 2 feet", "cut down 1 foot", "uplift 2 feet", "cut down 1 foot", etc. However, the Arun's erosion has been good enough for the river to maintain its course.

The Himalayan Mountains are still rising today as the Indo-Australian plate is still moving at a rate of about 2.6 inches/year (67mm/year). This movement causes the orogen to rise vertically at a rate of approximately one inch in 5 years (5mm/year) as a testament to the slow and ancient nature of this movement. (see Appendix B) And the Arun is still eroding down into this rising mountain mass. Today the Arun is cutting a steep gorge across the Himalayas. In all probability the Arun will win this contest! ...

Reference: <http://www.durangobill.com/> "Ancestral River Systems of the World", (as included on this disc), by Bill Butler

Chapter 9; Natufians; Before the Israelites; Before the Canaanites; there were the Natufians !



----- Location of Important Natufian settlements ----- A Natufian wall remains -----



Burial with puppy at head __ necklace __ sculpture

The Natufian culture is the name given to the sedentary hunter-gatherers living in the Levant region of the near east between about 15,000 and 10,000 years ago. They were hunter-gatherers, foraging for food such as emmer wheat, barley and almonds, and hunting gazelle, deer, cattle, horse, and wild boar.

For at least part of the year, Natufian people lived in communities, some quite large, of semi-subterranean houses. These semi-circular one room structures were excavated partly into the soil and built of stone, wood and perhaps brush roofs. The largest Natufian communities (called 'base camps') found to date include Jericho, Ayn Mallaha, and Wadi Hammeh 27. Smaller, short-range dry season foraging camps may have been part of the settlement pattern, although evidence for them is scarce.

The Natufians were hunter-gatherers, and they located their settlements at the boundaries between coastal plains and hill country, to maximize their access to a wide variety of food. They buried their dead in cemeteries, with grave goods including stone bowls and dentalium shell. Natufian Artifacts include grinding stones, used to process seeds, dried meats and fish for planned meals, and ochre for likely ritual practices. Flint and bone tools, and dentalium shell ornaments are also part of the Natufian assemblage. Specific tools created for harvesting various crops are a hallmark of Natufian assemblages, such as stone sickles. Large middens are known at Natufian sites, located where they were created (rather than secondary refuse pits). Dealing with refuse is one defining characteristics of the descendants of

the Natufians, the Pre-Pottery Neolithic.

Burials are located in the settlements, commonly in pits in abandoned houses but also in caves in Mount Carmel and the Judean Hills. The pits were backfilled with settlement refuse, which sometimes makes the identification of grave-goods difficult. Sometimes the graves were covered with limestone slabs. The bodies are stretched on their backs or flexed, there is no predominant orientation. There are both single and multiple burials, especially in the early Natufian, and scattered human remains in the settlements that point to disturbed earlier graves. More than 400 individuals have been recovered from organized Natufian cemeteries. The rate of child mortality was rather high—about one-third of the dead were between ages five and seven. Skull removal was practiced in Hayonim cave, Nahal Oren and Ain Mallaha. Sometimes the skulls were decorated with shell beads (El-Wad). Grave goods consist mainly of personal ornaments, like beads made of shell, teeth (of red deer), bones and stone. There are pendants, bracelets, necklaces, earrings and belt-ornaments as well.

It is at Natufian sites that the earliest archaeological evidence for the domestication of the dog is found. At the Natufian site of Ein Mallaha in Israel, dated to 12 000 BP, the remains of an elderly human and a four-to-five-month-old puppy were found buried together. At another Natufian site at the cave of Hayonim, humans were found buried with two canids.

14,000-year-old tool kit unearthed in Jordan

ABOUT 14,000 years ago the owner of an ancient tool kit possibly plonked it down near the wall inside a small hut in what is now Jordan.

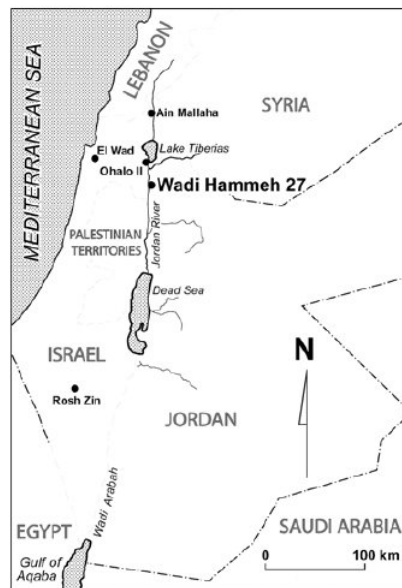


Figure 1. The location of Wadi Hammeh 27 and other sites mentioned in the text.

It contained everything that could come in handy on a trip to gather food: a sickle to cut wild wheat, spearheads to hunt gazelle, and even bead-making materials to while away a few hours waiting for more prey to appear.

But it lay there, forgotten, for thousands of years, until now. The collection of 36 objects has been unearthed and studied by Australian archaeologist Phillip Edwards, providing a rare insight into life for prehistoric hunter-gatherers.

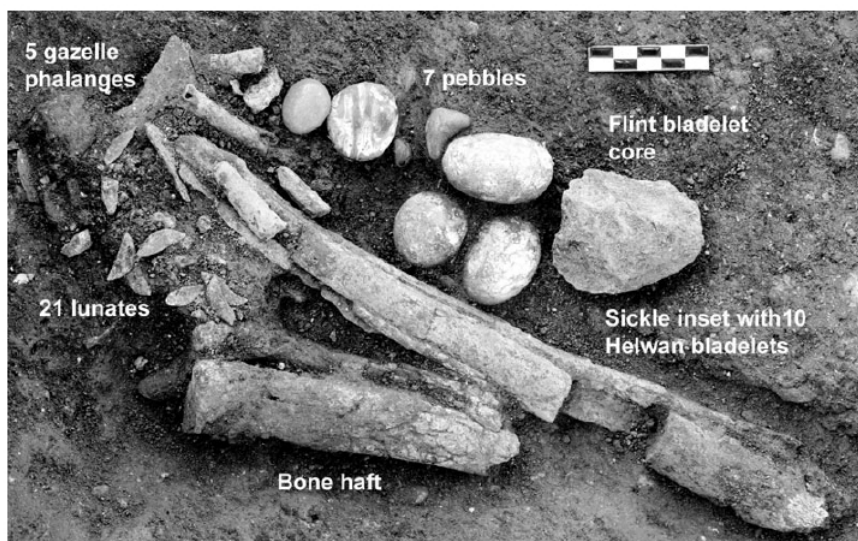


Figure 2. Artifact Cluster 9, Wadi Hammeh 27 (scale = 5cm).

Dr Edwards, of La Trobe University, said the implements had probably been carried in a shoulder bag made of animal hide or twined fibres.

"The most plausible explanation is that it served as a tool kit for use on foraging excursions," he said. But it was not known whether the owner was male or female.

The ancient people of this region were known as Natufians and built their earthen-floored huts near sources of water, gathering wild barley to eat as well as wheat.

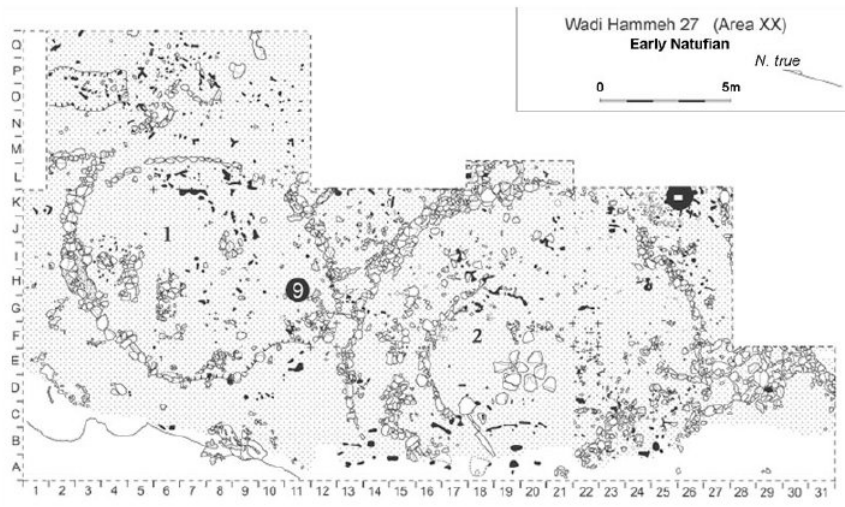


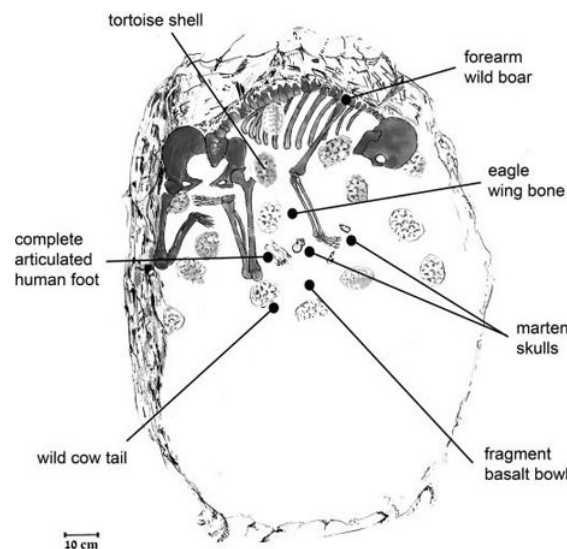
Figure 3. The uppermost phase of Wadi HammeH 27 (Phase 1, indicated by dot-shading) showing the position of Artifact Cluster 9 (the black-circled numeral '9').

The sickle in the tool kit was made of two pieces of animal horn and 10 small stone blades, which had been placed in two rows according to their colour. This showed the hunter-gatherers were interested in appearance, not just utility, said Dr Edwards, whose research is published in the latest issue of the journal *Antiquity*.

The more than 20 sharp pieces of flint in the tool kit could have been used to make spears or arrows to kill the many animals in this lush area of the Jordan Valley. The large number of spares in the tool kit might have allowed a lone hunter to re-arm while pursuing an animal.

Other possible weapons in the tool kit included a clutch of smooth pebbles. "The smaller stones may have been used as slingshot projectiles," Dr Edwards said.

But there may also have been some time for handicrafts. The kit also contained five toe bones from gazelles, which the Natufians used to turn into beads by drilling holes in them and cutting them to the same shape.



National Geographic News: NATIONALGEOGRAPHIC.COM/NEWS

Oldest Shaman Grave Found ? Includes Foot, Animal Parts, 50 Turtle Shells

Mati Milstein in Galilee, Israel for National Geographic News November 4, 2008

Archaeologists in northern Israel say they have discovered the world's oldest known grave of possibly a shaman. The 12,000-year-old grave holds an elderly female of the mysterious Natufian culture, animal parts, and a human foot.

The immediate area contains several burials, at least 28 individuals, but the proposed shaman's grave is unique in its construction, contents, and arrangement.

"From the standpoint of the status of the grave and its contents, no Natufian burial like this one has ever been found," lead archaeologist Leore Grosman said.

"This indicates the woman had a distinct societal position."

The Hilazon Tachtit site—9 miles (14 kilometers) inland from Israel's Mediterranean coastline—is associated with the Natufian culture, which flourished in the eastern Mediterranean between 11,500 and 15,000 years ago.

Hundreds of Natufian graves have been excavated in Israel, Jordan, Syria, and Lebanon. But only the one uncovered by Grosman contains a woman believed to have been a shaman.

The term "shaman" originated in Siberia, but these magic-invoking priest-doctors are common in cultures around the globe.

The 1.5-meter-tall (nearly 5-foot-tall), 45-year-old woman was relatively old for her time. After her death, she was placed in a mud-plastered and rock-lined pit in a cave and was buried beneath a large stone slab.

She was not buried with everyday items and tools, as hunters, warriors, or political leaders were. Instead, her grave contained 50 arranged turtle shells and parts of wild pigs, eagles, cows, leopards, martens, and a human foot, among other artifacts.

Shedding Light on Strange Rites

During this period Natufian culture changed from a nomadic, hunting-and-gathering culture to a sedentary, agriculture-based lifestyle, according to Grosman, a professor at the Hebrew University of Jerusalem. Grosman received partial funding from the National Geographic Society's Committee for Research and Exploration for her work on the Natufian site. (The National Geographic Society owns National Geographic News.)

This transition was likely accompanied by an evolution of the culture's social structure as well as new rules, rituals, and belief systems.

The artifacts found in the woman's grave shed light on some of the specifics of Natufian rituals from this period, said Grosman, whose study was published today in the journal *Proceedings of the National Academy of Sciences*.

For example, the turtles appear to have been eaten as part of the burial ceremony. Their shells were then placed around the deceased woman. Pig bones were cracked open and their marrow was removed before the bones were placed beneath the woman's hand. The grave was closed with the slab perhaps to prevent damage caused by animals.

"Like Finding Napoleon's Grave"

Harvard University anthropologist Ofer Bar-Yosef said the shaman grave is a rare find. For every 50 Natufian hunter-gatherers, only one would have been a shaman, he said.

"Finding a shaman's burial is like finding Napoleon's grave," said Bar-Yosef, who was not involved in the study but who served with a group of fellow scientists who reviewed the report for inclusion in the journal.

"I've spent many years digging other Natufian sites, and I've found a bunch of graves, but I've never found anything like this."

The shaman's grave and its contents "finally give another view into a society that didn't leave behind a written record. ... It's almost equivalent to a textual record."

Grosman's findings can assist researchers investigating shamanistic societies in other parts of the world, Bar-Yosef said. Though burial rituals differ from culture to culture, the graves of shamanic leaders generally stand out from those of the general public, he added.

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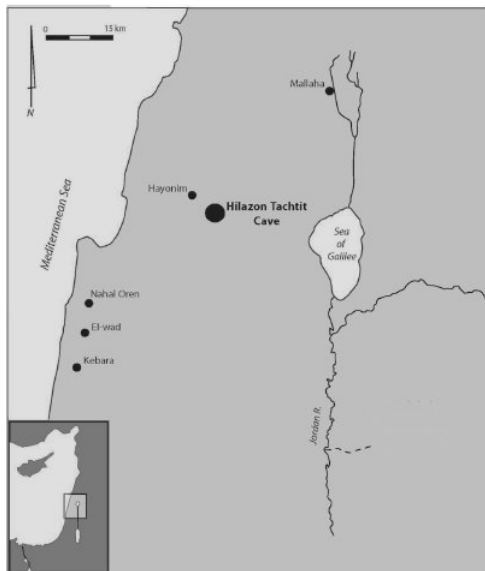


Fig. 1. The location of the site of Hilazon Tachtit Cave and other sites with cemeteries in the Natufian core area.

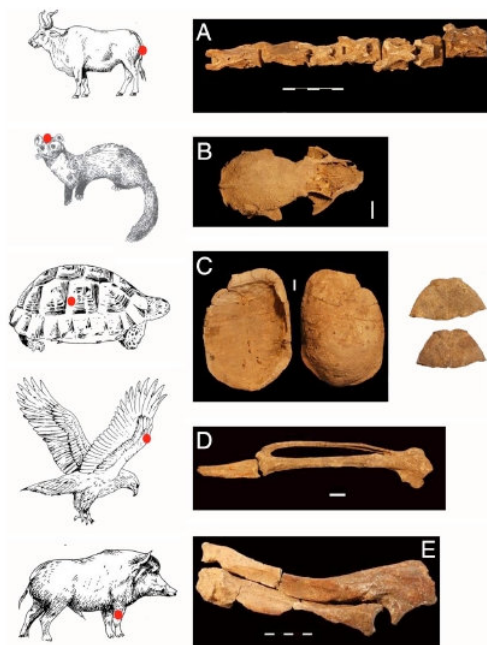


Fig. 5. The animal body-parts present in the Shaman grave. The location of the body-part represented is indicated on the animal illustration with a red dot. (A) Caudal vertebrae from an auroch's tail (*Bos primigenius*); (B) complete marten (*Martes foina*) skull; (C) carapace of a spur-thighed Mediterranean tortoise (*Testudo graeca*) and examples of the anterior plastron which was repeatedly broken in the same location; (D) carpometacarpus and first phalanx of digit II from the wing tip of a golden eagle (*Aquila chrysaetos*); and (E) articulated forearm (radius and ulna) of a wild boar (*Sus scrofa*). (Photographs by G. Hartman, Department of Anthropology, Harvard University, Cambridge, MA; Illustrations by P. Groszman.)





The End
